



<sup>b</sup>  
UNIVERSITÄT  
BERN

Medical Faculty  
[www.medizin.unibe.ch](http://www.medizin.unibe.ch)

# Annual Report 2022



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## Foreword

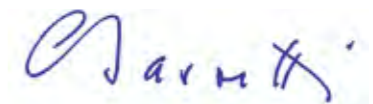
The University of Bern was founded in 1834 and the medical faculty was a part of it from the beginning. Many personalities of our faculty had a significant impact on modern medicine, among them the surgeon Theodor Kocher (Nobel Prize awardee in 1909), the internist Heinrich Quincke, the pathologist Theodor Langhans, the dermatologist Josef Jadassohn, the ophthalmologist Hans Goldmann, the physiologist Alexander von Muralt (founder of the Swiss National Science Foundation in 1952), the orthopedist Maurice Müller (known as the orthopedic surgeon of the 20<sup>th</sup> century), the neurologist Marco Mumenthaler, and the anatomist Ewald Weibel.

Today, the Medical Faculty of the University of Bern offers a full program of study in Human and Dental Medicine, as well as Master studies in Biomedical Sciences, Biomedical Engineering, Pharmacy and Artificial Intelligence in Medicine. With a budget of over 200 million Swiss francs, we support the academic activities of 40 clinics and 15 institutes, 300 full, associate and assistant professors and more than 2'200 students, which is the highest number among all medical faculties in Switzerland. Our faculty is ranked top 3 in Switzerland, top 35 in Europe and top 76-100 worldwide (Shanghai, THE and QS 2022).

I am pleased to present another very successful year of the Medical Faculty of the University of Bern. In numbers, this means: We have published 3'137 original articles, done 157'868 hours of teaching, and acquired more than 90 million Swiss francs of extramural funding (37 million Swiss francs from the Swiss National Science Foundation). I am proud of these numbers, but they only tell part of the story. The year 2022 was also marked by successes that can hardly be expressed in figures. I highlight a few of them below – and you find many more in this year's annual report. But before that, I would like to turn to a topic that had a strong impact on us in 2022 and still does: the war in Ukraine. As a faculty, we quickly took a position and developed measures to help – on the one hand directly in Ukraine and on the other hand by enabling students and scientists to live and work here with us in safety. In this annual report, we introduce you to four Ukrainian scholars currently working with us – and we present you the set of measures that we implemented and are continuously refining.

In the summer of 2021, the faculty approved its Strategy 2030 and began implementing it that year. We described our Strategy 2030 in detail in last year's annual report. Now we look back at the first year of implementation. Already in this short time, important developments have been initiated, and milestones achieved. In this annual report you will find an overview. I would like to point out just one of them: the new agreement with the Faculty of Biomedical Sciences of the Università della Svizzera Italiana (USI), which allows USI students to complete their Bachelor's degree in Human Medicine in Bern before starting their Master's degree program in Ticino. This cooperation is strategically relevant not only for the medical campus Bern but for medical education in Switzerland in general - and for me, as a Ticino native, a matter of the heart.

I hope you enjoy reading this report. I would like to thank all scientists, employees, students, and partners of the Medical Faculty of Bern for their outstanding commitment and continued support. And I would like to express my empathy with the people affected by the war in Ukraine. Our thoughts and hearts are with you.



Prof. Dr. med. Dr. h.c. Claudio Lino Alberto Bassetti  
Dean, Medical Faculty, University of Bern

## Highlights and Numbers

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[Other Outstanding Publications](#)

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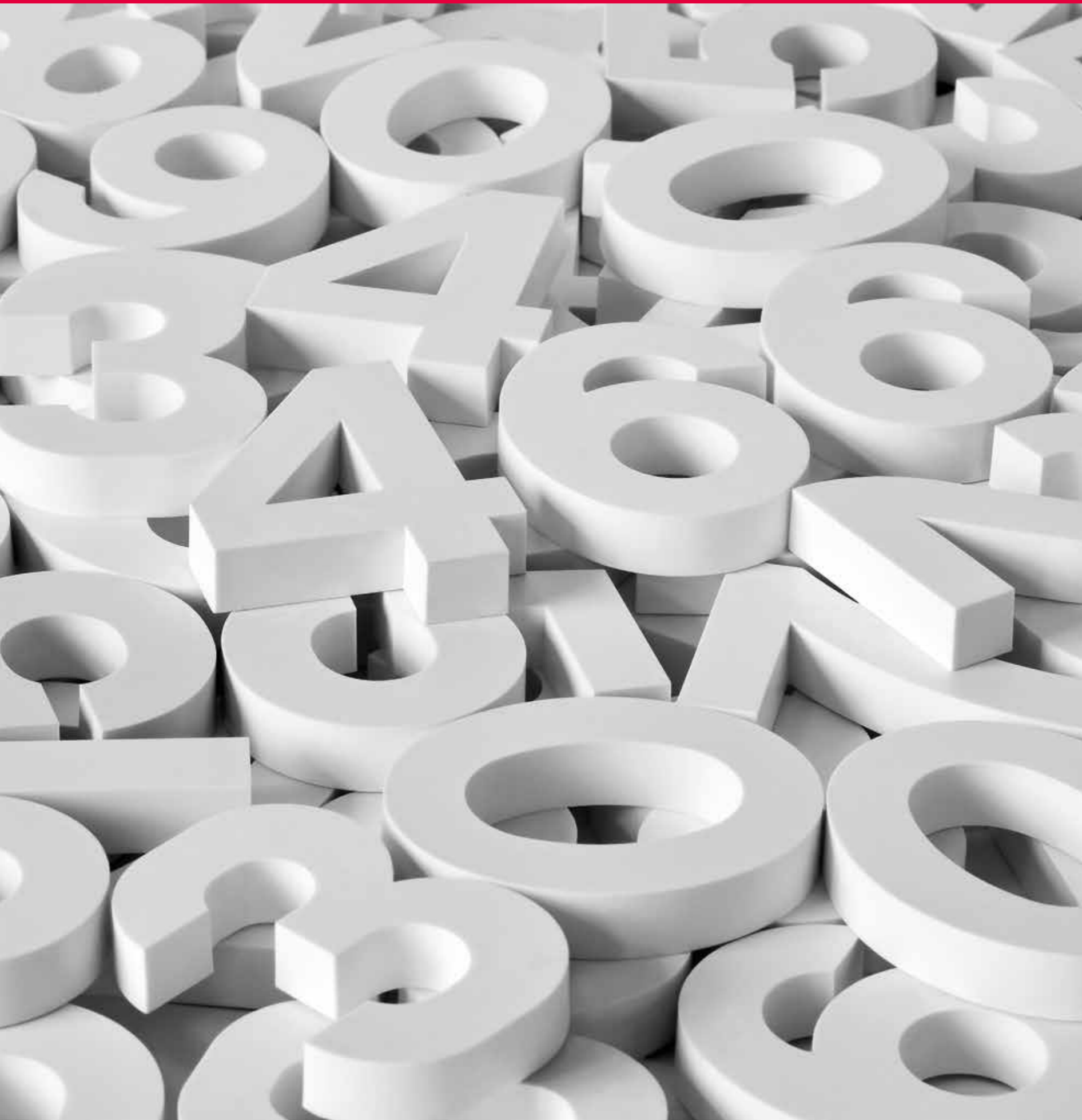
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# Highlights 2022

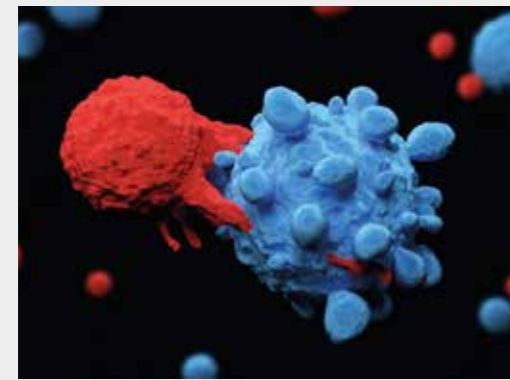
## January 2022

### 6.1.2022 - New European Master's Degree Program on Stroke

Stroke is the second most common cause of death in Europe, affecting around 16,000 people in Switzerland every year. For this reason, the Medical Faculty of the University of Bern and the Stroke Center of the Department of Neurology, in collaboration with the European Stroke Organisation, are launching the MAS Stroke Medicine continuing education program: It will train the next generation of specialists in stroke medicine throughout Europe starting in spring 2022.



Stroke simulation course at the Department of Emergency Medicine of the Inselspital Bern.



T cells (red) can effectively eliminate degenerated or infected cells (blue: cancer cell) only in a magnesium-rich environment.

### 20.1.2022 - Magnesium is Essential for the Immune System, Including in the Fight Against Cancer

The level of magnesium in the blood is an important factor in the immune system's ability to tackle pathogens and cancer cells. Writing in the journal *Cell*, a research group from the University of Basel and University Hospital Basel with participation of the Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM) of the Inselspital, the Department for BioMedical Research (DBMR) and the Diabetes Center Berne (DCB) have reported that T cells need a sufficient quantity of magnesium in order to operate efficiently. Their findings may have important implications for cancer patients.

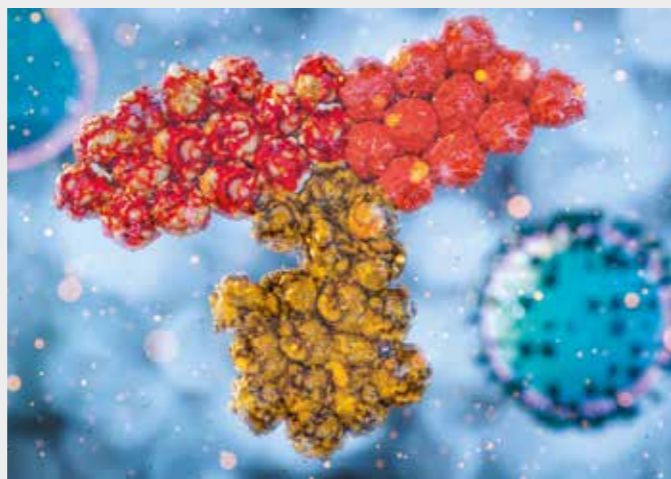
[Löttscher J et al., Magnesium sensing via LFA-1 regulates CD8 + T cell effector function, Cell. 2022 Feb 17;185\(4\):585-602.e29](#)

## February 2022

### 8.2.2022 - Insufficient Vaccination Protection in Majority of Immunocompromised Patients

A research team from the Department of Nephrology and Hypertension of the Inselspital shows: Immunosuppressed patients who have been on therapy for less than six months or who have had a kidney transplant are often unable to build up sufficient Corona vaccine protection. Individual care is therefore needed in particularly vulnerable cases to specifically build up vaccination protection.

[Schietzel S et al., Humoral and cellular immune responses on SARS-CoV-2 vaccines in patients with anti-CD20 therapies: a systematic review and meta-analysis of 1342 patients, RMD Open. 2022 Feb;8\(1\):e002036.](#)



Antibodies indicate a successful build-up of immune protection after vaccination.

### 15.2.2022 - Pathojet - Shorter Waiting Times and Increased Patient Safety

The Institute of Pathology at the University of Bern designs radically new workstations for pathologists: Ergonomically designed for the visual assessment of cell sections, with a wide field of view for the simultaneous assessment of numerous image units and with a direct connection to the network - this is how the Pathojet workstation can be characterized. Advantage for patients: Faster and more broadly based findings enable shorter waiting times and increased patient safety.

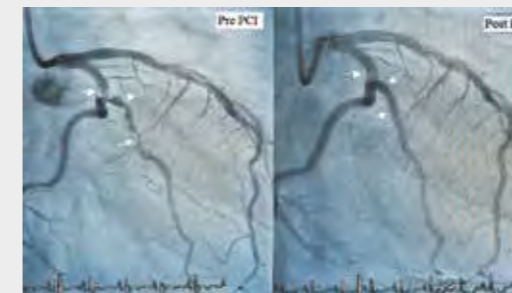


Innovator Miryam Blassnigg and Alessandro Lugli with the Pathojet

### 16.2.2022 - Definitions of „Treatment-Related Myocardial Infarction“ Reviewed

Researchers at the Department of Cardiology of the Inselspital are clarifying the definition of „treatment-related myocardial infarction“ in a comprehensive study. Existing models are being tested for their suitability for clinical use. The Bern study is an important contribution to clarify the controversy among experts.

[Ueki et al., Frequency and Outcomes of Periprocedural MI in Patients With Chronic Coronary Syndromes Undergoing PCI, J Am Coll Cardiol. 2022 Feb 15;79\(6\):513-526.doi: 10.1016/j.jacc.2021.11.047.](#)



The use of stents improves the quality of life and can save lives. In rare cases, it can also be the cause of myocardial infarctions. The classification and definition of such „periprocedural myocardial infarctions“ is the subject of this publication.

### 17.2.2022 - Long-term Consequences of Childhood Strokes

A research team from the Department of Pediatrics of the Inselspital, University Hospital Bern and the University of Bern succeeded in describing the long-term cognitive consequences of childhood strokes depending on the timing of the event. If the stroke occurs in children between one month and five years of age, recovery is poorer than for events before or after that age.

[Abgottspon S et al., Effect of Age at Pediatric Stroke on Long-term Cognitive Outcome, Neurology. 2022 Feb 15;98\(7\):e721-e729.](#)



Cognitive examination in neuropsychiatry at the Inselspital

### Graduation Ceremony of the Medical Faculty



Due to the Covid-19 pandemic, no graduation ceremony could be held in 2022. The awardees for the year 2022 will receive their prizes at the ceremony 2023. Congratulations to all the winners!

#### Faculty Awards for the three best dissertations of the year 2022

1<sup>st</sup> price - Mr. Dr. Jonas Oliver MITTNER for the dissertation „Intraperitoneal microbial contamination drives post-surgical peritoneal adhesions by mesothelial EGFR-signaling“ under the direction of Mrs. Prof. Dr. D. M. Keogh-Stroka, Department for BioMedical Research (DBMR) and Mr. Dr. J. Zindel, Department for Visceral Surgery and Medicine

2<sup>nd</sup> price - Mr. Dr. Severin FANKHAUSER for the dissertation „The Relationship between Enhancing Left Atrial Adipose Tissue at CT and Recurrent Atrial Fibrillation“ under the direction of Mr. Prof. Dr. T. Reichlin, Department of Cardiology and Mr. Prof. Dr. A. T. Huber, Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)

3<sup>rd</sup> price - Mrs. Dr. Debora Melina HOFER for the dissertation „Rethinking the definition of chronic postsurgical pain: composites of patient-reported pain-related outcomes vs pain intensities alone“ under the direction of Mrs. Prof. Dr. U. Stamer, Department of Anaesthesiology and Pain Medicine

#### Recognition Prize of the Dental Society SSO

For outstanding achievements in the study of dentistry  
Mr. Dr. med. dent. Dino AGOVIC

#### Prize of the Medical Society of the Canton of Bern

For the best Federal examinations in human medicine 2022  
Best Candidate for CS Exam: Mrs. Anna Magdalena ZENTNER  
Best candidate for the CK Exam: Mrs. Eva-Maria Magdalena ANGEHRN

#### CSL Behring Award

For excellence in the Master program Biomedical Sciences  
Mrs. Janine Andrea FUHRER & Mrs. Ladina HÖRTENSTEINER & Mrs. Nadia FASEL

#### Alumni Biomedical Sciences Award

For the best Master's thesis in the Master program Biomedical Sciences  
Mrs. Nadia FASEL

#### The RMS Foundation Award

For the best graduate in the Biomedical Engineering Master program  
Mr. Florian KESSLER

#### Teacher of the Year 2022

Mr. PD Dr. Stefano de Marchi, Department of Cardiology (see also on pageSeite 98)

### 1.3.2020 - CSF Leakage in the Brain: the Search for the Leak

An international research team from Canada, the United States, Germany and Switzerland (Department of Diagnostic, Interventional and Pediatric Radiology [DIPR], Department of Neurosurgery and Department of Neurology), led by physicians from the Inselspital, presents a comprehensive review article on spontaneous intracranial hypotension in The Lancet Neurology. The sudden loss of cerebrospinal fluid (CSF) has long been under-recognized as a cause of positional headache. The publication provides a basis for future guidelines on diagnosis and therapy.

[Dobrocky T et al., Spontaneous intracranial hypotension: searching for the CSF leak, Lancet Neurol. 2022 Apr;21\(4\):369-380.](#)



### 3.3.2022 - Migration Status without Disadvantage after Stent Intervention

A research team from the Department of Cardiology and the Interdisciplinary Centre for Sports & Exercise Medicine of the Inselspital and the Institute for Social and Preventive Medicine has shown that underrepresented groups are not disadvantaged in the treatment and rehabilitation of coronary artery disease. However, older individuals and women are underrepresented in outpatient rehabilitation programs. There is a need for action to motivate these groups.

[Gonzalez-Jaramillo N et al., Clinical outcomes and cardiac rehabilitation in underrepresented groups after percutaneous coronary intervention: an observational study, Eur J Prev Cardiol. 2021 Dec 11;zwab204.](#)



©Insel Gruppe, Photo: Sam Rogers

### 10.3.2022 - Faster, more Reliable Thyroid Punctures

A research team from the Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UEM), the Department of ENT, Head and Neck Surgery (HNO) and the Department of Nuclear Medicine of the Inselspital and the Institute of Pathology of the University of Bern succeeded in demonstrating that cytologically assisted immediate assessment of thyroid punctures can reduce the number of inconclusive samples by a factor of ten. Thanks to this procedure, the learning effect for junior physicians is also significantly accelerated.

[Muri R et al., The impact of rapid on-site evaluation \(ROSE\) on the quality and diagnostic value of thyroid nodule fine-needle aspirations, Thyroid. 2022 Mar 2.](#)



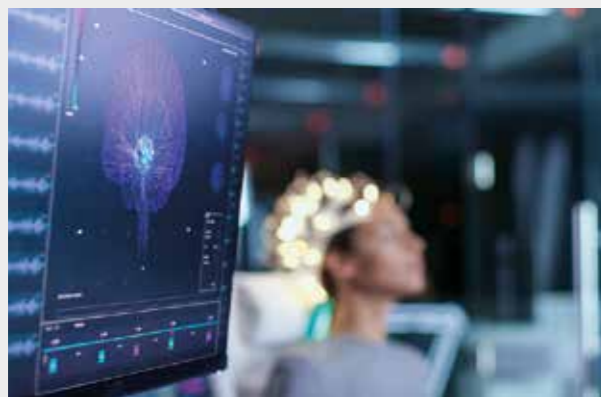
©Insel Gruppe, Photo: Pascal Gugler

### 21.3.2022 - A Novel Painless and Reliable Allergy Test

Although allergies are widespread, their diagnosis is complex and therapy has unclear prospects of success, depending on the allergy. Previous skin tests are unpleasant, time-consuming and associated with a certain risk of triggering an allergic overreaction. Now, researchers at the Department for Pulmonary Medicine and Allergology of the Inselspital and the Institute of Pharmacology of the University of Bern, have developed a novel test that massively simplifies the diagnosis of allergies and reliably predicts the success of a therapy.

[Zbären N et al., A novel functional mast cell assay for the detection of allergies, J Allergy Clin Immunol. 2022 Mar;149\(3\):1018-1030.e11.](#)

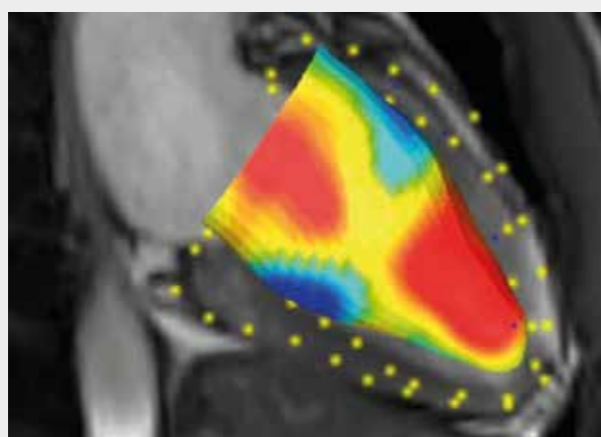




### 22.3.2022 - Our Sleep Shows how Risk-Seeking We Are

Each person has their own individual sleep profile which can be identified by the electrical brain activity during sleep. Researchers at the University of Bern now demonstrated that the brain waves during periods of deep sleep in a specific area of the brain can be used to determine the extent of an individual's propensity for risk during their everyday life.

[Studler M et al., Local slow-wave activity over the right prefrontal cortex reveals individual risk preferences. Neuroimage. 2022 Jun;253:119086.](#)

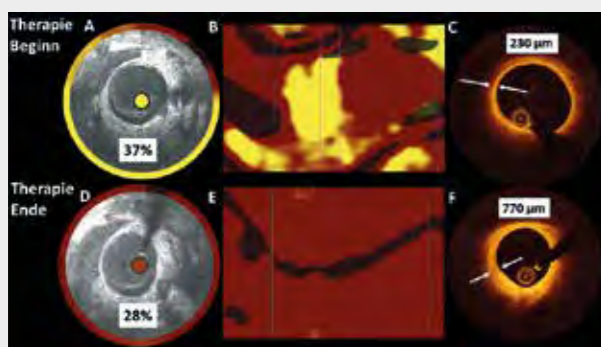


Heart muscle inflammation

### 24.3.2022 - AI Enables Personalized Treatment of Heart Muscle Inflammation

A research team from the University of Bern and the Department of Cardiology of the Inselspital, investigates and develops innovative approaches that will enable personalized diagnosis and treatment of myocarditis. Artificial intelligence will allow individual risk assessment and progression prognosis in the future. The project received funding from the Center for Artificial Intelligence in Medicine (CAIM) of the University of Bern and the Insel Gruppe.

[Eichhorn C et al., Multiparametric Cardiovascular Magnetic Resonance Approach in Diagnosing, Monitoring, and Prognostication of Myocarditis. JACC Cardiovasc Imaging. 2022 Jul;15\(7\):1325-1338.](#)



Imaging of a plaque immediately after myocardial infarction and at the end of therapy with the injectable cholesterol stencer alirocumab. ©zvq

### 5.4.2022 - New Combination Therapy Reduces Plaque in Heart Attacks

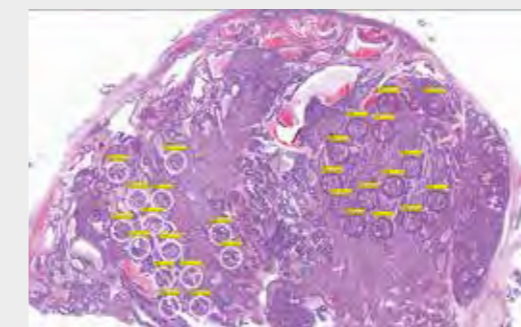
An international research team led by Inselspital, Bern University Hospital and the University of Bern succeeded in illustrating with high precision the positive effect of combined administration of statins and the new cholesterol-lowering drug alirocumab in heart attack patients. In a combination of three imaging methods used for the first time worldwide, a significant reduction in plaque and cholesterol content as well as a thickening of the protective plaque cap in the coronary vessels were demonstrated.

[Räber L et al., Effect of Alirocumab Added to High-Intensity Statin Therapy on Coronary Atherosclerosis in Patients With Acute Myocardial Infarction: The PACMAN-AMI Randomized Clinical Trial. JAMA. 2022 May 10;327\(18\):1771-1781.](#)

### 11.5.2022 - Precision Oncology Helps Prostate Cancer Patients

Researchers at the University of Bern and University Hospital Bern achieved a breakthrough in a particularly aggressive form of prostate cancer. In tissue samples from advanced brain metastases, they were able to establish the genetic profile of the cancer cells. These findings show for the first time that affected patients could benefit from target treatment, from which they have so far not been eligible.

[Rodriguez-Calero A et al., Alterations in homologous recombination repair genes in prostate cancer brain metastases. Nat Commun. 2022 May 3;13\(1\):2400.](#)



Brain metastasis of prostate cancer ©Antonio Rodriguez, Dept. of Pathology and DBMR

### 13.5.2022 - How Sleep Helps to Process Emotions

Researchers at the Department of Neurology of the University of Bern and University Hospital Bern identified how the brain triages emotions during dream sleep to consolidate the storage of positive emotions while dampening the consolidation of negative ones. The work expands the importance of sleep in mental health and opens new ways of therapeutic strategies.

[Aime M et al., Paradoxical somatodendritic decoupling supports cortical plasticity during REM sleep. Science. 2022 May 13;376\(6594\):724-730.](#)



A technique called optogenetics can be used to study brain activity during REM sleep. ©Insel Gruppe, Photo: Pascal Gugler

### 13.5.2022 - Bacteria with a Recording Function Record Intestinal Health

Researchers from ETH Zurich, Department for Visceral Surgery and Medicine of the Inselspital, Bern and the University of Bern equip intestinal bacteria with a data logger function to monitor which genes are active in the bacteria. The microorganisms will one day be able to diagnose diseases in a non-invasive way and record the health effects of a diet.

[Schmidt F et al., Noninvasive assessment of gut function using transcriptional recording sentinel cells. Science. 2022 May 13;376\(6594\):eabm6038.](#)



Enterobacterias Gram negativas Proteobacteria, bacteria such as salmonella, escherichia coli, yersinia pestis, klebsiella, 3D illustration

### 16.5.2022 - The Exceptional Athlete Sprints onto the Podium

The successful hurdle sprinter Noemi Zbären and her team took first place with ATANIS Biotech in this year's Bern Business Creation Competition STAGE UP. The spin-off from the University of Bern has developed a novel diagnostic procedure for various allergies.



The first-placed team ATANIS Biotech in the golden shower: Alexander Eggel, Noemi Zbären and Thomas Kaufmann. ©Fabian Gfeller



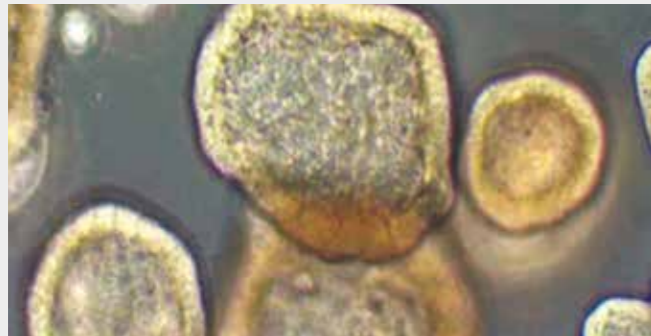


**1.6.2022 - New lectureship and research focus on patient safety**

Thanks to the support of the Swiss Medical Association FMH, the University of Bern is able to establish a lectureship and a research focus on patient safety at the Institute of Social and Preventive Medicine (ISPM). As of June 1, 2022, Prof. Dr. David Schwappach will take over the leadership of the new research focus.

<http://www.ispm.unibe.ch/>

Prof. Dr. David Schwappach, Foundation Lecturer in Patient Safety at the Institute of Social and Preventive Medicine (ISPM), University of Bern. © zvg



Bright field image of 3D organoid cultures of patient-derived ovarian carcinoma cells. Scale bar = 60mm. ©University of Bern

**8.6.2022 - Major US Award for Bern and Geneva Researchers**

A prestigious grant from the USA goes to the biomedical scientist Sven Rottenberg, group leader at the BCPM, and the clinical scientist Intidhar Labidi-Galy, University of Geneva and University Hospital of Geneva. They received a joint grant from the „Congressional Directed Medical Research Programs“ for their project on ovarian cancer. This underlines the high quality of the collaborative research on ovarian cancer in Bern and Geneva.

**10.6.2022 - The University of Bern on the Front Lines of HIV Research**

The Institute of Social and Preventive Medicine (ISPM) has been making important contributions to research on the prevention and treatment of HIV infection since 2007. The University of Bern and the University of Cape Town are assigned to the severely affected Southern Africa as part of the international research consortium, „International Epidemiology Databases to Evaluate AIDS“ (IeDEA). The research has been recently awarded a highly competitive grant and approved for another five years.



Pharmacy at Newlands Clinic in Zimbabwe, where public and private health workers are trained to use ART. Photo: Andrew Philip

**10.6.2022 - AI for Diabetes Project MELISSA Launched**

The EU Research Project “MELISSA: Mobile Artificial Intelligence Solution for Diabetes Adapted Care” has been launched by a consortium of 12 partners, comprising the ARTORG Center Artificial Intelligence in Health and Nutrition (AIHN) lab. AIHN is the artificial intelligence expert in the project and initiated it in collaboration with DEBIOTECH, but cannot act as official leading house due to Switzerland’s non-association to the EU Project.

[www.melissa-diabetes.eu](http://www.melissa-diabetes.eu)



Research at the AI in Health and Nutrition Lab ©ARTORG Center



**23.6.2022 - With a Hydrogel Against Black Skin Cancer**

Researchers at the Department of Pathology of the University of Bern have developed a treatment option that activates the body’s own defense system against black skin cancer. Components of a bacterium are embedded in gel and applied directly to the area of the tumor. In the model, it was shown that the gel reduces tumor growth, inhibits its spread to other organs and thus prolongs survival. In a next step, the gel is to be tested for its effectiveness in patients in clinical trials.

[Kremenovic M et al., BCG hydrogel promotes CTSS-mediated antigen processing and presentation, thereby suppressing metastasis and prolonging survival in melanoma, J Immunother Cancer. 2022 Jun;10\(6\):e004133.](#)

**8.7.2022 - Stroke Study Shows Excellent Results with Combination Therapy**

An international study led by the Department of Neurology and the Department of Diagnostic and Interventional Neuroradiology of the Inselspital shows that in stroke patients with occlusion of a large cerebral vessel, a combined approach - first thrombolysis, then thrombectomy - should not be replaced by thrombectomy alone. With the combination therapy, the occluded cerebral vessel could be reopened in 96 percent of those affected. Thus, the researchers make an important contribution to clarifying an ongoing controversy among experts.

[Fischer U et al., Thrombectomy alone versus intravenous alteplase plus thrombectomy in patients with stroke: an open-label, blinded-outcome, randomised non-inferiority trial, Lancet 2022 Jul 9;400\(10346\):104-115.](#)



Combination therapy of thrombolysis and thrombectomy shows superior results in the international SWIFT DIRECT study led by Inselspital

**8.7.2022 - Artificial Pancreas Proves its Worth During Surgery**

Blood glucose regulation in individuals with diabetes mellitus is particularly challenging during surgery. A new study led by the Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM) of the Inselspital, shows that insulin delivery via a fully automated closed-loop system, also called an „artificial pancreas,“ achieves more precise blood glucose control than conventional injection therapy.

[Herzig D et al., Perioperative Fully Closed-Loop Insulin Delivery in Patients Undergoing Elective Surgery: An Open-Label, Randomized Controlled Trial, Diabetes Care. 2022 Jul 26;dc220438.](#)



Schematic drawing of the components of the closed loop system

**26.7.2022 - Novel Medical Device Provides Early Recognition of Brain Diseases**

Dominic Senn appreciates the challenge of starting and creating something new. Together with Mathias Abegg and three colleagues, he founded machineMD, a spin-off from the University of Bern, with the goal of radically improving the early detection of brain diseases through a combination of virtual reality and artificial intelligence, and making reliable diagnostic data accessible anywhere in the world.



Dominic Senn



### 5.8.2022 - Opening of the Educational Trail „Vitaport - What our Body Transports“

How are nutrients and molecules transported through the body? Why is this transport so important, and what diseases arise when it does not work? Questions like these can be experienced in the public educational and art trail „Vitaport - what our body transports“ in the Elfenau park Bern. The multidisciplinary discovery tour is a collaboration of the National Center of Competence in Research (SNF) TransCure and the School of Design Bern and Biel.

### 8.8.2022 - Virtual Reality in the Service of Emergency Medicine

Pain is one of the most common, yet challenging, complaints in individuals. Virtual reality technologies have been successfully used to treat pain for some time. A pilot study led by the Department of Emergency Medicine of the Inselspital has shown that these technologies prove their worth even in the hectic circumstances of an emergency department.

[Birrenbach T et al., Virtual Reality for Pain Relief in the Emergency Room \(VIPER\) - a prospective, interventional feasibility study, BMC Emerg Med. 2022 Jun 21;22\(1\):113.](https://doi.org/10.1186/s13054-022-03949-9)

<https://visl.ch/>



The VR goggles have proven their worth in the University Emergency Center at Inselspital Bern for the treatment of pain.

### 17.8.2022 - Challenges in the Fight against Tuberculosis in Europe

An international study that exorbitantly expensive drugs, lack of effective medicines and limited diagnostics are having an unfavorable impact on the treatment of multidrug-resistant tuberculosis in a number of European countries. The study was conducted in significant collaboration with the Department for Pulmonary Medicine and Allergology of the Inselspital and the research organization TBnet.

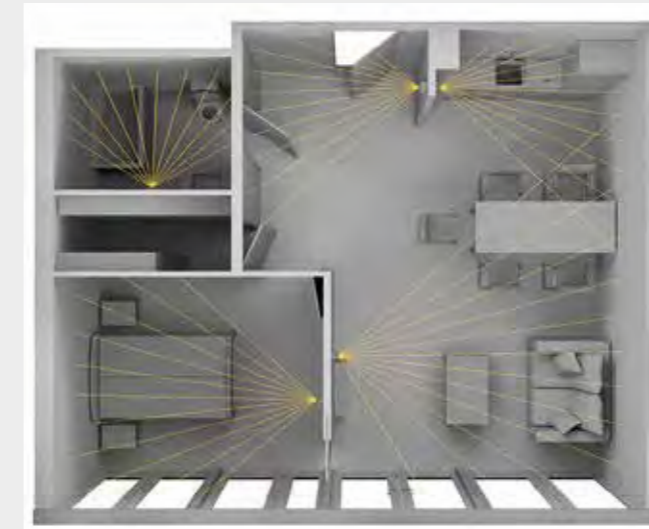
[Günther G et al., Availability and costs of medicines for the treatment of tuberculosis in Europe, Clin Microbiol Infect. 2022 Aug 10;S1198-743X\(22\)00394-9.](https://doi.org/10.1186/s12875-022-00394-9)



Patient with daily concurrent drug ration for multidrug-resistant tuberculosis.

### 23.8.2022 - University Department of Urology Recognized as „European Prostate Cancer Centre of Excellence“

The Department of Urology of the Inselspital was awarded as „European Prostate Cancer Centre of Excellence“. It is one among ten other urological clinics in Europe to receive this award. The European Society of Urology awards this Honor to clinics that provide the highest quality in clinical treatment, research and education.



Exemplary apartment, highlighting the sensor system used in the study. Individual rooms are equipped with motion sensors, entrance and fridge doors are equipped with magnetic door sensors, and a bed sensor is placed beneath the mattress. ©NeuroTec/Nature Scientific Reports, Creative Commons Licence

### 30.8.2022 - Sensor-Based Early Detection of Age-Related Diseases from Home

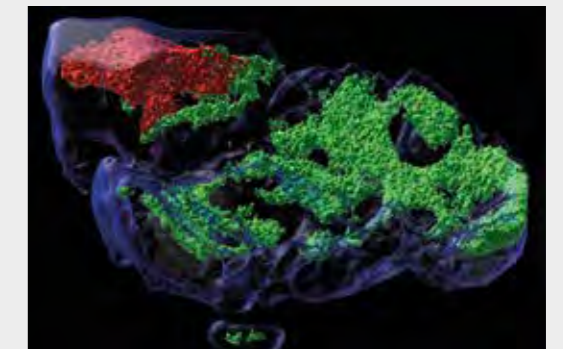
Researchers at the research center Gerontechnology and Rehabilitation of the ARTORG Center and the Department of Cardiology of the Inselspital have demonstrated how sensors that record movement patterns could help detect health problems in the elderly, including old-age depression, risk of falls or cognitive impairment, at an early stage. In the future, this could not only help seniors to longer live a self-determined life at home, but also to relieve increasing pressure on the health-care system.

[Schütz N. et al., A systems approach towards remote health-monitoring in older adults: Introducing a zero-interaction digital exhaust, NPJ Digit Med. 2022 Aug 16;5\(1\):116.](https://doi.org/10.1038/s41746-022-0116-6)

### 1.9.2022 - Technological Advances in Cancer Therapy

Researchers from the Bern Center for Precision Medicine (BCPM), the Department for BioMedical Research (DBMR) and the Department of Medical Oncology of the Inselspital provide an overview of the latest technologies in precision oncology. Translating these into clinical application is still a major challenge. With research projects, the Bern Center for Precision Medicine (BCPM) contributes to bringing technological progress to the patient.

[Akhoundova D et al., Clinical application of advanced multi-omics tumor profiling: Shaping precision oncology of the future, Cancer Cell. 2022 Aug 26;S1535-6108\(22\)00375-0.](https://doi.org/10.1016/j.ccr.2022.08.003)



Tumor cells (red) grown within a microstructure (host tissue; green), a so-called organoid. The Rubin Lab has been developing organoids that will serve as a tool for investigating patient-derived tumors at a cell-cell level. ©Alison Ferguson / BCPM

### 5.9.2022 - Continuing Education Course on Refugee and Migrant Health

The Department of Emergency Medicine (UNZ) of the Inselspital conducted a two-week continuing education course on refugee and migrant health. The hands-on course included an interactive exhibition on life in a refugee camp and a symposium.



Exhibition on life in a refugee camp



Dentistry Treatment Hall in 1955 ©zmk Bern

### 8.9.2022 - From Niche to World Leader: 100 Years Dentistry in Bern

Founded amidst resistance in 1921, the School of Dental Medicine of the University of Bern (ZMK) is today among the most renowned dentistry centers in the world. This year, for the 5<sup>th</sup> year in a row, zmk Bern was ranked among the top ten dental institutes in the world in the „QS World University Ranking“ and thus, remains the highest-rated dental clinic in the entire German-speaking region. After ranking 9 last year, zmk Bern improved to 7<sup>th</sup> place. zmk Bern ranked 4<sup>th</sup> and 2<sup>nd</sup> respectively in quantifiable factors such as the number of citations of publications listed in Scopus over the last five years and the so-called H-index. The board of directors would like to thank all those involved in research for their contribution to this very gratifying result.

### 13.9.2022 - Hans Sigrüst Symposium: Maternal-Fetal Communication during Pregnancy

The Hans Sigrüst Symposium focused on the topic of maternal-fetal communication during pregnancy. At this symposium, international experts from the field were brought together and the 2020 Hans Sigrüst Prize Winner, Prof. Amanda Sferruzzi-Perri, University of Cambridge, was honored.



### 16.9.2022 - Bern and Ticino Join Forces in Human Medicine

The Medical Faculty of the University of Bern and the Biomedical Faculty of the Università della Svizzera Italiana USI will cooperate in the future in the training of students in human medicine. As of 2023, students from Ticino will be able to complete a bachelor's degree in human medicine in Bern.



## October 2022



Endometriosis can occur anywhere in the abdomen and affect various organs. ©Prof Mueller

### 5.10.2022 - Progress in the Diagnosis of Endometriosis

An abdominal endoscopy is currently the only method to detect endometriosis with certainty. Now, researchers from the Department of Obstetrics of the Inselspital, in collaboration with Australian researchers, have identified cells that are predominantly found in the endometrium of women with endometriosis. The findings serve as the basis for the development of a rapid and non-invasive endometriosis test using menstrual samples.

[McKinnon B D et al., Altered differentiation of endometrial mesenchymal stromal fibroblasts is associated with endometriosis susceptibility, Commun Biol. 2022 Jun 20;5\(1\):600.](#)



Microscopy pictures of three-dimensional lung cancer spheroids transfected with green fluorescent-labelled ASOs. ©UniBE / NCCR RNA & Disease

### 6.10.2022 - Discovering New Cancer Treatments in the "Dark Matter" of the Human Genome

Researchers of the Department of Medical Oncology of the Inselspital and the Department for BioMedical Research (DBMR) have developed a screening method to discover new drug targets for cancer treatment in the so-called "Dark Matter" of the genome. The researchers applied their method to non-small cell lung cancer (NSCLC), a severe cancer for which effective therapies are urgently sought. They could show that inhibiting identified targets could greatly slow down cancer growth. Their method is adaptable to other cancers.

[Esposito R et al., Multi-hallmark long noncoding RNA maps reveal non-small cell lung cancer vulnerabilities, Cell Genomics, 22 August 2022.](#)

## November 2022

### 1.11.2022 - Better Understanding of the Development of Intestinal Diseases

Bacteria in the small intestine adapt dynamically to our nutritional state, with individual species disappearing and reappearing. Researchers of the Department of Visceral Surgery and Medicine of the Inselspital and the Department for BioMedical Research (DBMR) have been the first to comprehensively study the bacteria of the small intestine and their unique adaptability. Their findings contribute to a better understanding of intestinal diseases such as Crohn's disease or celiac disease and to the development of new therapeutic approaches.

[Yilmaz B et al., Plasticity of the adult human small intestinal stoma microbiota, Cell Host Microbe. 2022 Dec 14;30\(12\):1773-1787.e6. doi: 10.1016/j.chom.2022.10.002. Epub 2022 Oct 31.](#)



Bacteria of the small intestine play a role in many intestinal diseases.



Prof. Axel Rominger, Director of the Department of Nuclear Medicine

### 1.11.2022 - Top Position of Nuclear Medicine in Bern thanks to Cooperation between Inselspital and the University of Bern

The latest generation of medical equipment is in use at the Department of Nuclear Medicine of the Inselspital. In 2020, the world's first whole-body PET/CT device was installed. During its first year of clinical use, experts from Inselspital in collaboration with the Center for Artificial Intelligence in Medicine (CAIM) at the University of Bern have developed new methods and algorithms. These allow finer and more dynamically correct imaging, which leads to a significantly lower radiation exposure for patients and a shorter duration of stay in the PET/CT device.

[Sari H et al., Quantitative evaluation of a deep learning-based framework to generate whole-body attenuation maps using LSO background radiation in long axial FOV PET scanners, Eur J Nucl Med Mol Imaging. 2022 Nov;49\(13\):4490-4502.](#)

[Guo R et al., Using domain knowledge for robust and generalizable deep learning-based CT-free PET attenuation and scatter correction, Nat Commun. 2022 Oct 6;13\(1\):5882.](#)

### 29.11.2022 - The Swiss Sleep House Bern is open

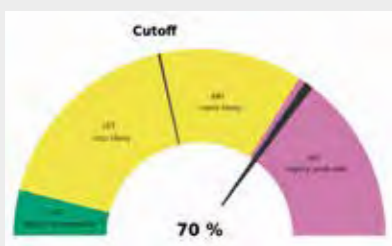
With a festive event, the Swiss Sleep House Bern officially opened its doors on Tuesday, 29 November 2022 in the presence of the Bernese Health Director Pierre Alain Schnegg. It is now open to anyone who is directly affected by sleep problems or who wants to find out more about sleep health.

About one-third of the population suffers from a sleep onset or sleep maintenance disorder, a sleep-related illness such as restless legs syndrome or sleep apnea. Often, those affected remain without a diagnosis and thus without treatment. The multidisciplinary team of experts at the Swiss Sleep House Bern will help improve this situation.



Modern premises in the Swiss Sleep House Bern

## December 2022

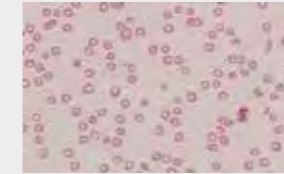


Reliable and fast diagnosis thanks to AI

### 1.12.2022 - Avoiding Severe Embolisms thanks to Artificial Intelligence

After major surgery or severe inflammation, hospitalized patients are treated with the anticoagulant heparin to prevent thrombosis. Heparin-induced thrombocytopenia (HIT), leading to severe emboli, is a rare but potentially life-threatening complication of this preventive therapy. Immediate replacement of heparin by other aggressive anticoagulants is necessary in case of HIT. A machine-learning model has shown to reduce the risk of misdiagnosing HIT.

[Nilius H et al., A machine-learning model for reducing misdiagnosis in heparin-induced thrombocytopenia: A prospective, multicenter, observational study, EClinicalMedicine. 2022 Nov 24;55:101745. doi: 10.1016/j.eclinm.2022.101745. eCollection 2023 Jan.](#)



Peripheral blood smear of a patient admitted with a first acute episode of TTP, demonstrating absence of platelets and many fragmented red cells (schistocytes).

### 23.12.2022 - Breakthrough in the Treatment of the Hereditary Form of Thrombotic Thrombocytopenic Purpura (TTP)

A multi-site research team from the Hirslanden Clinic in Zurich and the Department of Hematology and Central Hematology Laboratory of the Inselspital in Bern reported the first successful treatment of a patient suffering from the rare congenital form of thrombotic thrombocytopenic purpura (TTP) with recombinant-derived ADAMTS13. This marks the next milestone in TTP research and diagnostics, in which researchers at the Inselspital have been world leaders for over 25 years.

[Asmis L et al., Recombinant ADAMTS13 for Hereditary Thrombotic Thrombocytopenic Purpura, N Engl J Med. 2022 Dec 22;387\(25\):2356-2361. doi: 10.1056/NEJMoa2211113.](#)

## Other Outstanding Publications

### Department of BioMedical Research (DBMR)

[Ng C K Y et al., Integrative proteogenomic characterization of hepatocellular carcinoma across etiologies and stages, Nat Commun. 2022 May 4;13\(1\):2436.](#)

### Department of Cardiology, Institute of Physiology

[Odening KE et al., Electromechanical reciprocity and arrhythmogenesis in long-QT syndrome and beyond, Eur Heart J. 2022 Aug 21;43\(32\):3018-3028.](#)

[Räber L et al., Effect of Alirocumab Added to High-Intensity Statin Therapy on Coronary Atherosclerosis in Patients With Acute Myocardial Infarction: The PACMAN-AMI Randomized Clinical Trial, JAMA. 2022 May 10;327\(18\):1771-1781.](#)

### Department of General Internal Medicine, Institute of Primary Health Care (BIHAM)

[Khan SU et al., PCSK9 inhibitors and ezetimibe with or without statin therapy for cardiovascular risk reduction: a systematic review and network meta-analysis, BMJ. 2022 May 4;377:e069116.](#)

### Department of Infectious Diseases

[Surial B et al., Better Operating Room Ventilation as Determined by a Novel Ventilation Index is Associated With Lower Rates of Surgical Site Infections, Ann Surg. 2022 Nov 1;276\(5\):e353-e360.](#)

### Department of Intensive Care Medicine, Clinical Trials Unit

[Takala J et al., Variation in severity-adjusted resource use and outcome in intensive care units, Intensive Care Med. 2022 Jan;48\(1\):67-77.](#)

### Department of Neurology

[Baillieux S et al., Sleep apnoea and ischaemic stroke: current knowledge and future directions, Lancet Neurol. 2022 Jan;21\(1\):78-88.](#)

[Fischer U et al., Magnetic Resonance Imaging or Computed Tomography for Suspected Acute Stroke: Association of Admission Image Modality with Acute Recanalization Therapies, Workflow Metrics, and Outcomes, Ann Neurol. 2022 Aug;92\(2\):184-194.](#)

[Scutelnic A et al., Management of Cerebral Venous Thrombosis Due to Adenoviral COVID-19 Vaccination, Ann Neurol. 2022 Oct;92\(4\):562-573.](#)

### Department of Neurology, Department of BioMedical Research (DBMR)

[Aime M. et al., Paradoxical somatodendritic decoupling supports cortical plasticity during REM sleep, Science. 2022 May 13;376\(6594\):724-730.](#)

### Department of Neurosurgery

[Nowacki A et al., Probabilistic Mapping Reveals Optimal Stimulation Site in Essential Tremor, Ann Neurol. 2022 May;91\(5\):602-612.](#)

### Department of Obstetrics and Gynecology

[Siegenthaler F et al., Prospective Multicenter Trial Assessing the Impact of Positive Peritoneal Cytology Conversion on Oncological Outcome in Patients with Endometrial Cancer Undergoing Minimally Invasive Surgery with the use of an Intrauterine Manipulator: Positive Peritoneal Cytology Conversion and Its Association with Oncological Outcome in Endometrial Cancer, Ann Surg Oncol. 2022 Dec;29\(13\):8320-8333.](#)

### Department of Pediatrics, Institute of Pharmacology

[Peng S et al., Nascent RHOH acts as a molecular brake on actomyosin-mediated effector functions of inflammatory neutrophils, PLoS Biol. 2022 Sep 15;20\(9\):e3001794.](#)

### Department of Radiation Oncology, Department of Urology

[Dal Pra A et al., Validation of the Decipher Genomic Classifier in Patients receiving Salvage Radiotherapy without Hormone Therapy after Radical Prostatectomy - An Ancillary Study of the SAKK 09/10 Randomized Clinical Trial, Ann Oncol. 2022 Sep;33\(9\):950-958.](#)

Department of Rheumatology and Immunology, Proteomics and Mass Spectrometry Core Facility, Dept for BioMedical Research (DBMR), University Institute of Clinical Chemistry  
[Schniering J et al., Computed tomography-based radiomics decodes prognostic and molecular differences in interstitial lung disease related to systemic sclerosis, Eur Respir J. 2022 May 19;59\(5\):2004503.](#)

Department for Visceral Surgery and Medicine, Department of BioMedical Research (DBMR)  
[De Gottardi A et al., Porto-sinusoidal vascular disorder, J Hepatol. 2022 Oct;77\(4\):1124-1135.](#)

Institute of Anatomy, Institute of Pathology  
[Hupp S et al., Pneumolysin boosts the neuroinflammatory response to Streptococcus pneumoniae through enhanced endocytosis, Nat Commun. 2022 Aug 26;13\(1\):5032.](#)

Institute of Social and Preventive Medicine  
[Gasparrini A et al., Small-area assessment of temperature-related mortality risks in England and Wales: a case time series analysis, Lancet Planet Health. 2022 Jul;6\(7\):e557-e564.](#)

[Mesa-Vieira C et al., Mental health of migrants with pre-migration exposure to armed conflict: a systematic review and meta-analysis, Lancet Public Health. 2022 May;7\(5\):e469-e481.](#)

[Wilder-Smith A et al., Impact of BMI on COVID-19 vaccine effectiveness, Lancet Diabetes Endocrinol. 2022 Aug;10\(8\):551-552.](#)

Institute of Social and Preventive Medicine, Graduate School of Health Sciences  
[Buitrago-Garcia D et al., Occurrence and transmission potential of asymptomatic and presymptomatic SARS-CoV-2 infections: Update of a living systematic review and meta-analysis, PLoS Med. 2022 May 26;19\(5\):e1003987.](#)

Institute of Pathology, Department of BioMedical Research (DBMR), Bern Center for Precision Medicine  
[Rodriguez-Calero A et al., Alterations in homologous recombination repair genes in prostate cancer brain metastases, Nat Commun. 2022 May 3;13\(1\):2400.](#)

Theodor Kocher Institute  
[Decker Y et al., Magnetic resonance imaging of cerebrospinal fluid outflow after low-rate lateral ventricle infusion in mice, JCI Insight. 2022 Feb 8;7\(3\):e150881.](#)



## The Medical Faculty in Numbers

**2'241**  
 students in  
 2 Bachelor programs  
 6 Master programs

**351**  
 students in  
 42 CAS/DAS/MAS programs

**375**  
 Final Master Degrees  
 246 Medicine  
 26 Dental Medicine  
 20 MSc in Biomedical Sciences  
 22 MSc in Pharmacy  
 50 MSc in Biomedical Engineering  
 9 Masters of Medical Education

**1** Faculty  
 3 Organisations  
 15 Clinics  
 40 Institutes

**108** Full Professors  
 20 Assistant Professors  
 179 Associate Professors  
 494 Lecturers

**455**  
 Doctorate Degrees  
 324 Dr. med.  
 43 Dr. med. dent.  
 71 from the Graduate School for Cellular and Biomedical Sciences  
 17 from the Graduate School of Health Sciences

**207'026'177**  
 Budget  
 37'101'471 from the Swiss National Science Foundation  
 53'478'416 third party funds for research

**3'137**  
 Original Articles published  
 157'868 hours of teaching

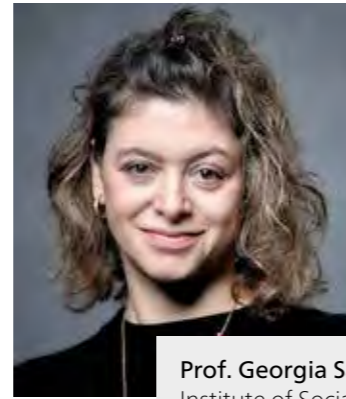
## Highly Cited Researchers

The Medical Faculty congratulates its researchers. In the field of medicine, our researchers are once again among the most cited in the world.

Of the world's scientists and social scientists, Highly Cited Researchers truly are one in 1,000. These pioneers in their fields represent the most influential researchers who have produced multiple highly-cited papers that rank in the top 1% by citations for field and year in the Web of Science.



**Prof. Matthias Egger**  
Institute of Social and Preventive Medicine, University of Bern



**Prof. Georgia Salanti**  
Institute of Social and Preventive Medicine, University of Bern



**Prof. Stephan Windecker**  
Department for BioMedical Research, University of Bern and Department of Cardiology, Inselspital



**Prof. Marc A. Rubin**  
Department for BioMedical Research, and Bern Center for Precision Medicine, University of Bern



**Prof. Andrew Macpherson**  
Department for BioMedical Research, University of Bern and Department for Visceral Surgery and Medicine, Inselspital

## Awards and Honors

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### 3Rs Young Investigator Award

The 2021 3Rs Young Investigator Award went to Pauline Zamprogn from the ARTORG Center for Biomedical Engineering Research at the University of Bern for her contribution to a lung-on-chip model, which is designed to replace animal testing.

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### Pfizer Research Prize

Prof. Stephanie Ganal-Vonarburg, Dr. Hai Li and Dr. Julien Limenitakis from the Department of BioMedical Research (DBMR) and the University Department of Visceral Surgery and Medicine, Gastroenterology, are awarded the Pfizer Research Prize for their joint work. In collaboration with Prof. Andrew Macpherson, they discovered that gut bacteria can „program“ our antibodies.

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### NIH Grant

Prof. Matthias Egger from the Institute of Social and Preventive Medicine and project partners received an NIH Grant from the National Institutes of Health (USA) to conduct a global study to investigate drug resistance in HIV.

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### NeurIPS Presentation

The work of researchers led by Dr. Mihai Petrocivi from the Institute of Physiology on learning mechanisms of the brain was selected from approx. 10'000 submissions for presentation at the world's most important forum on artificial intelligence (NeurIPS).

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### Swiss Tinnitus League Research Award

Dr. Suyi Hu from the ARTORG Center for Biomedical Engineering Research and the Hearing Research Lab of the Insel Gruppe developed a computer model that uses artificial intelligence to make individualized tinnitus diagnoses and predict the treatment success of individual therapies. For this achievement, he received the 2022 Research Award of the Swiss Tinnitus League.

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### Swiss Aerosol Award

PD Dr. Loretta Müller from the Department of Pediatrics, together with a colleague from Zurich, was awarded the Swiss Aerosol Award 2021 by the Swiss Aerosol Group. The award, sponsored by the Swiss Lung Foundation, recognizes outstanding work in the field of aerosol research.

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### SNSF Eccellenza Professorial Fellowships

Dr. Maxime Baud from the Department for BioMedical Research (DBMR) and the Department of Neurology received an Eccellenza Professorial Fellowship from the Swiss National Science Foundation (SNSF). SNSF Eccellenza Professorial Fellowships are aimed at highly qualified researchers who aspire to a permanent professorship.

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### Research Award of the Swiss Heart Foundation

Dr. Baris Gencer, Vice Director of the Institute of Primary Health Care (BIHAM), has shown in a metastudy that fish oil capsules increase the risk of cardiac arrhythmias. For this study, as well as earlier work on blood lipids, the Swiss Heart Foundation awarded him its 2022 research prize.

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### US Award for Ovarian Cancer Project

Prof. Sven Rottenberg from the Bern Center for Precision Medicine (BCPM) and Institute of Animal Pathology, together with a colleague from Geneva, has received a prestigious American grant from the „Congressional Directed Medical Research Programs“ for their project on treatment resistance in ovarian cancer.

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#### **Distinguished Scientist Award**

At its annual meeting in June 2022, the International Association for Dental Research (IADR) presented its Distinguished Scientist Geriatric Oral Research Award to Prof. Dr. Martin Schimmel from the Department for Reconstructive Dentistry and Gerodontology of the Institute of Dental Medicine (ZMK).

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#### **STAGE UP Awards**

The Bernese start-up ATANIS Biotech by Noëmi Zbären, Prof. Alexander Eggel, Prof. Thomas Kaufmann, Jean-Pierre Kinet and Rosa Robin van Brummelen, a spin-off of the University of Bern, has won the first prize in STAGE UP 2022, the Business Creation Competition by the University of Bern. Third place also goes to a spin-off from the University of Bern: Sensawear by Prof. Ursula Wolf, Dr. Oliver Kress and Tarcisi Cantieni from the Institute of Complementary and Integrative Medicine (IKIM).

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#### **Research Award of the Swiss Brain League**

Prof. Antoine Adamantidis, Prof. Claudio L.A. Bassetti and Laura Facchin were awarded this year's research prize of the Swiss Brain League. The award recognizes their work to show how sleep helps treat stroke.

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#### **Stern-Gattiker Prize of the SAMS**

PD Dr. Vanessa Banz is one of the two laureates of the Stern-Gattiker Prize 2022: „PD Dr. Vanessa Banz is a senior physician for Visceral and Transplant Surgery at the Inselspital Bern, a field in which women are particularly underrepresented. In addition to the challenging and scientific work in transplantation surgery, she shows an impressive commitment to the advancement of younger employees. The numerous voices on her nomination paint a convincing picture as a female role model, professionally „Role Model“, professionally as well as humanly.“ (Media Release SAMW)

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#### **Johanna Dürmüller-Bol DBMR Research Award**

Dr. Emma Hodcroft of the Institute of Social and Preventive Medicine (ISPM) and the Multidisciplinary Center for Infectious Diseases (MCID) received the Johanna Dürmüller-Bol DBMR Research Award 2022 for her study of the impact of pandemic restrictions on the spread of the respiratory virus Enterovirus D68.

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#### **Day of BioMedical Research**

At the DBMR Day of BioMedical Research 2022, the following persons were recognized: Dr. Tim Rollenske received an award for the best DBMR publication 2021, and Charlotte Kern was awarded the Research Prize Alumni MedBern 2022. The following young researchers received a DBMR poster award: Liana Hayrapetyan (best preclinical project), Maria Natalia Rojas Velazquez (best clinical project), Cosima Meret Schmid (best medical project of a medical student). Chantal Bachmann received the SCRM Poster Prize for Best Stem Cell Project 2022.

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#### **Venture Kick Award**

The start-up Sensawear of the University of Bern co-founded by Prof. Ursula Wolf, Dr. Oliver Kress and Tarcisi Cantieni from the Institute of Complementary and Integrative Medicine IKIM received an award from Venture Kick for the development of a wearable monitoring device for tissue health.

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#### **Award of the Scientific Association of Swiss Radiation Oncology (SASRO)**

Carmen Muñoz-Maldonado from the Department for BioMedical Research (DBMR) and the Department of Radiation Oncology received the SASRO Best Poster Biology Award 2022.

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#### **Awards for Projects to Reduce Animal Testing**

Dr. Marco Osterwalder from the Department for BioMedical Research (DBMR), Dr. Christian Zuppinger from the Department of Cardiology, Prof. Hanno Würbel from the VPH Institute, Dr. Charlotte Blattner from the Institute for Public Law, Prof. Andrea Endimiani and Prof. Siegfried Hapfelmeier from the Institute for Infectious Diseases, Prof. Andrew Macpherson from the Department for Visceral Surgery and Medicine and PD Dr. Fabian Blank from the Department of BioMedical Research (DBMR) receive funding from the Swiss National Science Foundation SNSF for their projects on the reduction of animal testing.

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#### **SGAIM Awards 2022**

Dr. Adrian Rohrbasser from the Institute of Primary Health Care (BIHAM), received the SGAIM Prize 2022 from the Swiss Society of General Internal Medicine (SGAIM) for his research on increasing antibiotic resistance in patients. Dr. Manuel Blum from BIHAM and Department of General Internal Medicine received a SGAIM award for the best original paper, and Dr. Carole Aubert and Dr. Katharina Tabea Jungo, both from BIHAM and Department of General Internal Medicine received each one of this year's four grants from the SGAIM Foundation. They are investigating the use of digital technologies to support medication reviews and medication plan management in primary care in Switzerland.

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#### **Ewald Weibel Award for Pulmonary Research in Switzerland**

Prof. Manuela Funke-Chambour from the Department for BioMedical Research (DBMR) and Department for Pulmonary Medicine and Allergology was honored with the Ewald Weibel Award 2022 for her pioneering work on lung diseases.

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#### **Fritz-and-Ursula-Melchers Postdoctoral Prize**

Dr. Tim Rollenske from the Department for BioMedical Research (DBMR) and Department for Visceral Surgery and Medicine received the Fritz-and-Ursula-Melchers Postdoctoral Prize for his research on the role of intestinal mucosal antibodies in the reciprocal relationship between host and microorganisms.

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#### **SNSF Starting Grants**

Four researchers from the Medical Faculty of the University of Bern received a SNSF Starting Grant 2022 from the Swiss National Science Foundation (SNSF): Dr. Bahtiyar Yilmaz from the Department for BioMedical Research (DBMR) and the Department for Visceral Surgery and Medicine, Dr. Ana Maria Vicedo Cabrera from the Institute of Social and Preventive Medicine, Dr. Tim Rollenske from the DBMR and Department for Visceral Surgery and Medicine, and Annekatrin Steinhoff from the University Hospital of Child and Adolescent Psychiatry and Psychotherapy.

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#### **BRIDGE Discovery Project**

Prof. Benjamin Gantenbein from the Department for BioMedical Research (DBMR) and partners from the Lucerne University of Applied Sciences and Arts received CHF 1.3 million from the BRIDGE funding program of the SNSF and Innosuisse for their joint project to identify innovative cell therapeutics for degenerated intervertebral discs.

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#### **Presidency of the Swiss Society of Hematology**

Prof. Anne Angelillo-Scherrer from the Department for BioMedical Research (DBMR) and Department of Hematology and Central Hematology Laboratory has been elected President of the Swiss Society of Hematology (SGH-SSH).

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#### AAAS Fellow

Prof. Mark Rubin, Director of the Department for BioMedical Research (DBMR) and the Bern Center for Precision Medicine (BCPM) has been appointed Fellow by the US scientific organization AAAS. Of the more than 500 Fellows, Prof. Rubin is the only member from Switzerland and one of only a few from Europe.

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#### PCF Challenge Award

Prof. Mark Rubin, Director of the Department for BioMedical Research (DBMR) and the Bern Center for Precision Medicine (BCPM), and Dr. Anke Augspach from the DBMR, together with colleagues from ETH Zürich and the University of Connecticut (USA), received a Challenge Award from the Prostate Cancer Foundation (PCF).

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#### Presidency of CED IADR

Prof. Anton Sculean, Director of the Department of Periodontology of the Institute of Dental Medicine (ZMK), has been elected President of the Continental European Division of the International Association for Dental Research (CED IADR). He will assume the position in September 2023.

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Medicine Library at the Bühlplatz

## Faculty Supported Research Projects 2022

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#### Strategic Funding - SF Board Projects

An annual call for proposals is launched to support collaborative research projects that correspond to the strategic priorities of the Medical Faculty. More information about the Project Call 2023 of the SF Board can be found on [www.medizin.unibe.ch/research/funding\\_financing](http://www.medizin.unibe.ch/research/funding_financing).

In 2022, the following projects have been supported by the Medical Faculty:

#### Inflammation & Infection

##### Novel Targeted Approach for the Visualisation of Inflammation using a novel 18F-AzaFol radiotracer for PET Imaging in Large Vessel Vasculitis

Director: Prof. Britta Maurer, Department of Rheumatology and Immunology  
Co-Directors: Prof. Axel Rominger and PD Dr. Federico Caobelli, Department of Nuclear Medicine;  
Prof. Iris Baumgartner and Prof. Yvonne Döring, Department of Angiology  
Grant: CHF 626'815

##### Immune responses and inflammation following vaccination in immuno-suppressed persons: A prospective translational multi-cohort study

Director: PD Dr. Christine Thurnheer, Department of Infectiology  
Co-Directors: Prof. Britta Maurer, Department of Rheumatology and Immunology; Prof. Urban Novak, Department of Medical Oncology; PD Dr. Anke Salmen and PD Dr. Robert Hoepner, Department of Neurology;  
Dr. Cornelia Staehelin, Dr. Cédric Hirzel and Prof. Andri Rauch, Department of Infectiology  
Grant CHF 750'650

##### Towards reducing infections after healthcare-associated interventions

Director: Prof. Guido Beldi, Department for Visceral Surgery and Medicine  
Co-Directors: Prof. Daniel Candinas, Prof. Andrew Macpherson and Dr. Bahtyar Yilmaz, Department for Visceral Surgery and Medicine; Prof. Siegfried Hapfelmeier, Institute for Infectious Diseases; Prof. Christoph Stettler and Prof. Lia Bally, Department for Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM); Prof. Matthias Siepe and Prof. Florian Schönhoff, Department for Cardiac Surgery; Prof. Klaus Siebenrock, Department for Orthopedic Surgery and Traumatology; Dr. Philipp Jent, Department for Infectious Diseases  
Grant: CHF 1'000'113

#### Medical Technology

##### Ex-vivo Heart Perfusion – Technology that innovates cardiac transplantation and precision therapies

Director: Prof. Matthias Siepe, Department of Cardiac Surgery  
Grant: CHF 742'500

##### Open Topic

##### Early Life Intervention in Pediatrics Supported by E-health (ELIPSE)

Director: Prof. Matthias Kopp, Department of Pediatrics  
Co-Director: Michael Kaess, University Hospital of Child and Adolescent Psychiatry and Psychotherapy (UPD KJP)  
Grant: CHF 1'078'89

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### Young Academics Grant for Translational Research „Protected Research Time“

The grants for „Protected Research Time“ are meant to support the possibility of creating clinical research time for young academics in the medical service sector.

In 2022, Dr. Sebastian Wangler of the Department of Orthopedic Surgery and Traumatology, Dr. Amanda Brosius Lutz of the Department of Obstetrics and Gynecology, Division of Obstetrics and Feto-Maternal Medicine, Dr. Simone Zwicky of the Department for Visceral Surgery and Medicine, Dr. Chantal Dysli of the Department of Ophthalmology, Dr. Wiebke Solass of the Institute of Tissue Medicine and Pathology and Dr. Yuly Paulin Mendoza Jaimes of the Department for Visceral Surgery and Medicine were awarded with this grant for research.

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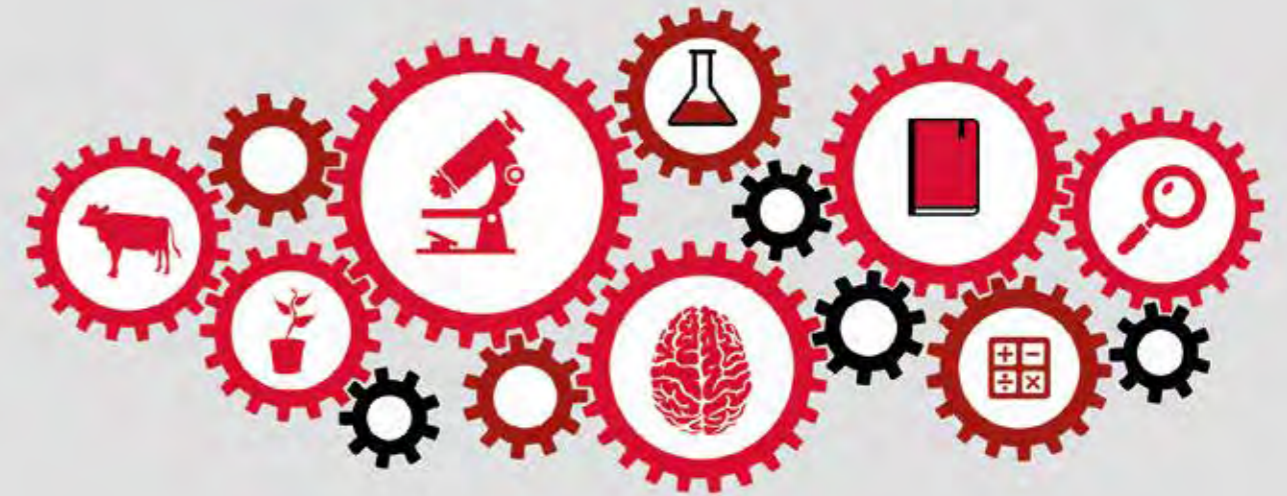
### FILMED (Promotion of Innovative Teaching in Medicine)

Starting in 2022, the Faculty of Medicine Bern awards funding for the development of innovative teaching projects to participating institutes and clinics within the framework of the FILMED project. This will give lecturers or project leaders the time to design, implement and evaluate an innovative teaching project.

The FILMED project is based on the FIL project at the University of Bern (<https://tinyurl.com/5djakkpr>). The funding is provided by matching funds of the University of Bern and the Innovation fund from the Dean's office of the Medical Faculty.

The winners in 2022 were Dr. Sebastian Bigdon of the Department of Orthopedic Surgery and Traumatology, PD Dr. med. Franca Wagner of the Department of Diagnostic, Interventional and Pediatric Radiology (DIPR), Dr. Fabienne Schwitz of the Department of Cardiology, Prof. Dr. Carla Meyer-Masseti of the Department of General Internal Medicine, Clinical Pharmacology&Toxicology and Dr. Lia Jeker of the Institute of Primary Health Care (BIHAM), Teaching Team

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## University Supported Interfaculty Research Projects 2022

### One Health: Cascading and Microbiome-Dependent Effects on Multitrophic Health

The IRC One Health investigates how environmental chemicals affect the health of soils, plants, animals and humans. In an integrated effort, 9 research groups from the Faculties of Science, Veterinary Medicine and Medicine quantify the impact of pesticides, heavy metals and plant toxins on microbial communities at the interfaces between soils, plants, animals and humans. Through an interdisciplinary approach, the collaboration aims at a better understanding of the impact of environmental change on the health of food chains.

### Decoding Sleep: From Neurons to Health & Mind

Sleep has remained almost unchanged in the course of evolution, which indicates its fundamental importance for survival. The research cooperation wishes to achieve a better understanding of the mechanisms of sleep, consciousness and cognition with the three areas of "Brain – Mind – Body". Finally, sleep-wake disorders could be the first signs of illnesses such as Parkinson's and dementia or depression. For this purpose, molecular and neurophysiological processes of sleep and sleep disorders and their link to brain damage, pain and infections is examined. In addition to this, with the aid of sleep, new insights should be gained into cognitive and neuroplastic processes. In this way, the importance of sleep for mental health, brain functions and physical performance in healthy and sick conditions are examined in animals and humans. New model calculations of sleep phases should be developed from the "big data" of individual project groups - with the aim of identifying new biomarkers for sleep and sleep disorders.

More information about the Interfaculty Research Cooperations (IRC) can be found on the corresponding website of the University: <https://tinyurl.com/3bvza2ww>

## Rankings of World Universities

The academic world is international - shaped by both collaboration and competition. This also applies to medicine. There are different indicators to measure and reflect the academic performance of a medical faculty. International rankings are one of them. We are pleased that the Medical Faculty of the University of Bern has once again been able to improve its ranking in several subjects in 2022.

The following table shows the ranking of the University of Bern from 2020 to 2022, either in clustered form (not specified more precisely by the authors of the ranking) or as an exact rank (for top rankings).

Shanghai Ranking: Global Ranking of Academic Subjects			
	2020	2021	2022
Clinical Medicine	76-100	76-100	76-100
Public Health	201-300	201-300	151-200
Dentistry & Oral Science	17	16	13
Nursing	101-150	76-100	101-150
Medical Technology	51-75	51-75	51-75
Pharmacy & Pharmaceutical Sciences	151-200	201-300	151-200
Times Higher Education (THE): World University Rankings by Subject			
	2020	2021	2022
Medicine & Dentistry	113	109	101
QS World University Rankings by Subject			
	2020	2021	2022
Medicine	101-150	114	94
Dentistry	9	9	7
Pharmacy & Pharmacology	201-250	201-250	151-200



## Top 5 Departments of the Inselspital and Institutes of the Medical Faculty

Measuring research output according to objective criteria allows a significant ranking of the top departments and top institutes of the Medical Faculty and the Inselspital. The yearly research evaluation is based on the key figures RCR, number of publications in relation to resources and third party funding.

The indicators are applicable to all institutes and clinics and provide incentives in line with the research strategy. The research evaluation aims to assure quality, creates a base for the performance-oriented allocation of funds and serves as a means of control to the respective clinics and institutes.

### Departments of the Inselspital

Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM)  
 Department of Clinical Chemistry  
 Department of Ophthalmology  
 Department of Diagnostic and Interventional Neuroradiology  
 Department of Medical Oncology

### Institutes of the Medical Faculty

Institute of Social and Preventive Medicine (ISPM)  
 Institute of Primary Health Care (BIHAM)  
 Department for BioMedical Research (DBMR)  
 Institute for Infectious Diseases (IFIK)  
 ARTORG Center for Biomedical Engineering Research



## Solidarity with Ukraine

Supporting Researchers and Students from Ukraine  
Visiting Scholars at the Medical Faculty





## Supporting Researchers and Students from Ukraine

**Together with the University of Bern, the Medical Faculty stands in solidarity with Ukraine, its universities, scholars, and researchers. Shortly after the outbreak of the war, the Medical Faculty launched a set of supporting measures. We present the measures here. One of them was to give researchers the opportunity to continue their work here in safety. We have met the four researchers who fled the war and have been working at the Medical Faculty here in Bern ever since. In the interview, you will get to know the four women and their stories.**

The Medical Faculty of the University of Bern witnesses the military invasion of Ukraine initiated by the Russian government with the greatest concern and strongly condemns all violations of international and humanitarian law. Our thoughts are wholeheartedly with the Ukrainian people, but also with the courageous Russian scientists and citizens who publicly voice their disagreement with these actions ordered by the Russian government.

As an academic institution, we believe that international scientific exchange is a fundamental criterion for peace in Europe and may not be interrupted, especially not in such difficult times of conflict. The Medical Faculty supports the statements of the All European Academies ALLEA and the European network of universities The Guild. We call for solidarity of all democratic states and all universities within Europe and urge the Russian government to stop the attack on the sovereign and democratic state of Ukraine and its population.

Since the outbreak of the war, various measures have been taken by the University of Bern, and these continuously expanded. Simultaneously, the Medical Faculty has independently defined its own additional

measures and recommendations regarding teaching and research, with the aim to support Ukrainian students and academics quickly and efficiently. The measures taken by the Medical Faculty in 2022 are the following:

### Teaching

- With special status S, Ukrainian students could apply for the programs of Human and Dental Medicine.
- Free enrollment as a visiting student was granted for fall semester 2022 and participation in all courses and exams was possible (depending on language skills).
- Ukrainian students could apply for a regular study status in the two English-taught master's programs of the Medical Faculty: the Master in Biomedical Sciences and the Master in Biomedical Engineering.

### Research

- To all its clinics and institutes, the Medical Faculty recommended a sustainable integration of Ukrainian researchers into existing research groups whenever possible.
- The Medical Faculty established grants for visiting Ukrainian scholars at the level of professors and post-doctoral researchers to give them the opportunity to teach and/or conduct research here in Bern. Ophthalmologist Olha Kuzyo, who is working at the Department of Emergency Medicine of the Inselspital, was awarded with this grant. She shares her story in the interview on the following pages.
- Three additional scholars from Ukraine joined clinics and institutes of the Medical Faculty thanks to the Switzerland Section of Scholars at Risk and grants from the Swiss National Science Foundation. More details on their personal stories in the interview below.

The Medical Faculty was determined to not only help students and researchers here in Bern, but also to provide immediate support in the Ukraine. At the beginning of March 2022, the Medical Faculty initiated a fundraising campaign through the Swiss Red Cross. We set ourselves the goal to collect the amount of CHF 50,000 by 1st of May 2022. The campaign successfully closed with a total of CHF 52'385! This donation contributed to the humanitarian aid by the Swiss Red Cross for those affected by the war in Ukraine.

Furthermore, clinics and institutes of the Medical Faculty organized and conducted several transports of medical equipment and medical products directly to Ukraine to provide urgently needed material. It is with gratitude, that we noticed an enormous personal commitment and willingness, inside and outside of the Medical Faculty, to help those affected by the war. THANK YOU to all the supporters, donors and committed people who significantly contributed to support the Ukraine in the year 2022.

### About Scholars at Risk

Scholars at Risk (SAR) is a network of 500 universities advocating the principles of academic freedom. The scholars can apply for temporary placements in countries where they and their families are safe. The stays will allow them to pursue their own academic work, or become involved in research at the host institution. Since October 2020, the Swiss National Science Foundation SNSF finances SAR's activities in Switzerland. For more information see: Scholars at Risk Switzerland Section: <https://www.scholarsatrisk.org/sections/sar-switzerland/> Information from the SNSF: <https://www.snf.ch/en/WpOf-VoVBYdBid6By/news/support-measures-for-scientists-from-ukraine>

### About the Faculty Supported Grants for Visiting Scholars from Ukraine

The Medical Faculty offers grants to visiting scholars (professors and post-doctoral researchers) from Ukraine, to teach and/or conduct research at the Medical Faculty of the University of Bern. The grants provide a maximum of CHF 2,000 per full month spent at the Medical Faculty, for periods of up to five months. Matching grants (e. g. from the host institutions) are accepted. Visiting scholars are expected to hold an academic degree (post-doctoral researchers or professors; no PhD candidates) and to be affiliated with a Ukrainian academic research institution. Appointments as visiting scholars do not include a regular salary from the University of Bern and thus, do not entail to a university employment. For more information: [https://www.medizin.unibe.ch/about-us/current/ukraine/index\\_eng.html](https://www.medizin.unibe.ch/about-us/current/ukraine/index_eng.html)

## Visiting Scholars at the Medical Faculty



**Dr. Inna Potiekhina**

Inna Potiekhina is biologist and physical anthropologist. She is head of the Department of Bioarchaeology at the Institute of Archaeology, National Academy of Sciences of Ukraine, and Associate Professor at the Department of History, National University of Kyiv-Mohyla Academy. Her research focus is on the Prehistory of Ukraine. By means of a grant from Scholars at Risk (SAR) she works as a research associate at the Department of Physical Anthropology of the Institute of Forensic Medicine at the University of Bern. Among her research activities in Bern are osteological analyses on the Late Medieval plague cemeteries Bern Klösterlistutz and Stans in collaboration with Dr. Marcel Keller.



**Dr. Olha Kuzyo**

Olha Kuzyo graduated from Bukovinian State Medical University in Chernivtsi, western Ukraine, in ophthalmology, followed by research on diabetic retinopathy (Master's degree) at the Chernivtsi Regional Hospital. Before her escape to Switzerland, she worked as a clinician in ophthalmology and optometry in Ivano-Frankivsk, western Ukraine. Since January 2023, she works at the Department of Emergency Medicine of the Inselspital (Prof. Aristomenis Exadaktylos) where she is part of the trauma registry team, analyzing the circumstances and severity of injuries. Dr. Kuzyo received a "Grant for Visiting Scholars from Ukraine" awarded by the Medical Faculty of the University of Bern.



**Dr. Antonina Antonenko**

Antonina Antonenko is a consultant gastroenterologist and internal medicine physician at the Department of Internal Medicine, Bogomolets National Medical University in Kyiv. Her research focus is on the assessment of risk factors for the development of porto-sinusoidal vascular disease, clinical manifestations and the risk of infectious complications after liver transplantations. She obtained a grant from Scholars at Risk (SAR) to come to the University Clinic for Visceral Surgery and Medicine of the Inselspital in April 2022. Here she is part of the research team of Prof. Annalisa Berzigotti and works on the project „Surveillance of primary liver cancer in non-alcoholic fatty liver disease“.



**Dr. Kateryna Antonenko**

Kateryna Antonenko is Assistant Professor at Bogomolets National Medical University, Department of Neurology in Kyiv. She has more than ten years of experience in clinical and scientific work in neurology. Her research focus is on stroke, intracranial atherosclerosis, acute treatment, and secondary prevention. She obtained a grant from Scholars at Risk (SAR) to come to the Stroke Center of the Inselspital in April 2022. Here she is part of the research team of Prof. Mirjam Heldner and works on the project „Intracranial atherosclerotic stenoses in stroke patients with symptomatic disease in different vascular beds“.



**During 2022, four female researchers from Ukraine came to the Medical Faculty to find safety and to be able to continue their work. Professor Uyen Huynh-Do has met them for a roundtable discussion.**

**You've been living and working in Switzerland for a few months now. How are you doing here in Bern?**

**Kateryna Antonenko:** My heart and my thoughts are with the people of Ukraine, every day. I miss my family and my friends. Nevertheless, I can say that I feel at home here in Bern. I find that people here in Switzerland have a similar mentality as at home. They are friendly, sociable and helpful. One reason why I feel so comfortable here is perhaps the fact that I speak German fluently. Most patients are interested in where I come from when they hear my accent. Then we often talk about the situation in Ukraine, and I am impressed by how well-informed the Swiss people are about Ukraine.

**Inna Potiekhina:** I also feel very safe and welcome here. People are incredibly kind, open-minded, and helpful. This impressed me so much that I asked my young colleagues at the Department of Anthropology: „Is it in your genes or are you raised this way?“ They answered that, from an early age, they were brought up that way in the family and at school.

**Kateryna Antonenko:** Because the standard of living in Switzerland is so high, I had thought that the Swiss might be a bit arrogant. But I have found that this is not the case at all.

**That's nice to hear, of course. Have you ever been to Switzerland before the outbreak of the war?**

**Antonina Antonenko:** Yes, in 2018, when I spent one month at the University Clinic for Visceral Surgery and Medicine of the Inselspital as part of a clinical fellowship from the United European Gastroenterology. I was free to choose the country for my stay and chose Switzerland because I speak German. The stay here in Bern - at that time still under Prof. Jean-François Dufour as head of the clinic - was critical for my further career because it awakened my enthusiasm for hepatology, and I wanted to continue doing research in this field. Back in Kyiv, contacts with my former colleagues from Bern have always remained intact, especially with Prof. Annalisa Berzigotti. At the outbreak of the war, I was desperate. Because of the rocket attacks, my long commute to the hospital was no longer possible. I could no longer work and did not know how to go on. On the second day of the war, I received a message from Prof. Berzigotti. She wrote: „Antonina, how are you?“ That made me feel much better. Together we then submitted an application to Scholars at Risk Switzerland and the Swiss National Science Foundation, which was fortunately approved. Now, since the beginning of April, I'm back at the University Clinic for Visceral Surgery and Medicine and do research on liver carcinoma.

**What was the situation like for you? Why did you choose Switzerland?**

**Kateryna Antonenko:** Fortunately, I already had a good contact in Switzerland from an earlier time. As a young neurologist, I participated in the Summer School of the European Stroke Organization in 2013 and met Prof. Mirjam Heldner there. She was not yet a professor at that time, but like me, a participant in the

Summer School. We became friends and kept in touch over the years.

When the war started, Prof. Heldner immediately inquired how I was doing and whether it was not too dangerous to stay in Kyiv. At first, I thought that the fighting might not last long. But the way to my hospital in the city center became too dangerous and when the situation got worse, I decided to try my luck through the Scholars at Risk program. Together with Prof. Heldner and Prof. Marcel Arnold we designed a project and submitted the application, which was indeed approved. I never dreamed that one day I would be able to work in Switzerland. For me, Switzerland has always stood for the highest standards in medicine.

**Olha Kuzyo:** When the Russian invasion started, I worked as a clinician in the field of ophthalmology and optometry in the city of Ivano-Frankivsk in western Ukraine. I have a little daughter, who was three years old at that time. The situation was very distressing, and I fled with my daughter to a safe place. That's how we came to Switzerland. I had no personal contacts in Switzerland at that time. I initially thought it would only be for a short time. But when the situation in Ukraine got increasingly worse, I wanted to take the opportunity to get more involved, gain work experience and pursue my medical career here in Switzerland. Living near my fellow countrymen, I often supported them as a doctor and accompanied them to medical institutions. That's how I got to know the Swiss healthcare system. These experiences motivated me to look for a job. I got the job at the Emergency Department of the Inselspital, which is perfect. Not only because my colleagues welcomed me very well, but also because it allows me to combine my scientific with my clinical background. It is a great door opener to the Swiss medical system.

**Inna, you are not a medical doctor but an anthropologist. You currently work at the Department of Physical Anthropology of the Institute of Forensic Medicine. How did you get in touch with Bern?**

**Inna Potiekhina:** When the war started, I was contacted by PD Dr. Sandra Lösch, Head of the Department of Physical Anthropology, and by Dr. Marcel Keller. This came as a surprise to me because I had had no contact with this department until then. As it turned out, I was recommended to my Swiss colleagues by the Lithuanian anthropologist Prof. Rimantas Jankauskas. Dr. Sandra Lösch and Dr. Marcel Keller invited me to come to Bern and join their team. Since missile attacks on Kyiv had become permanent, I decided to accept this proposal. I was very well received in the institute.

I have fantastic working conditions and constant support from each member of the department, not only in research work, but also in everyday matters. I also have the opportunity to continue my existing international projects and collaborations as well as to continue teaching my Ukrainian students online. I am very grateful for this.

My department and its collections at home in Kyiv are fortunately still intact. However, I could not work there at the moment without electricity but frequent air raids. Many museums and collections were not as lucky. Prehistoric material of inestimable value has been destroyed by the war.



**You mentioned that you are contributing to a research project in Bern. What is it about?**

**Inna Potiekhina:** I am happy to be able to collaborate on an ongoing project of the department. It involves the analysis of skeletons from the Late Medieval plague cemeteries of Stans and Bern Klösterlistutz, including paleopathology, sex-age estimations, and paleodemography. Because of my experience in the analysis of human remains, I can make a real contribution. In addition, I can pass on some of my knowledge in classic craniology, especially to young researchers. At the same time, I have gained invaluable scientific experience by communicating with my colleagues, participating in several conferences, and working with Swiss osteological collections. I feel very comfortable in this friendly professional team and enjoy our good cooperation.

**In addition to your research, the three of you are also clinically active at Inselspital. Where do you see differences in clinical work between Ukraine and Switzerland?**

**Olha Kuzyo:** My work here is similar to what I did in Ukraine. I help organize and analyze medical information. However, a big difference is that thanks to a modern information system, patient information can be accessed much more easily and quickly by the medical staff here. In Ukraine, a lot of information exists only on paper and these documents are with the patients. Sometimes the documents get lost or the patients forget to bring them to the consultation. In addition, it was very impressive for me to see how openly and friendly team members interact with each other here.

**Antonina Antonenko:** Right. The teamwork is quite different. That also applies in particular to interprofessional and interdisciplinary exchange, which is much more developed here. I think it is great that complex clinical cases are discussed here by boards of experts from different specialists. In Ukraine, there is no such exchange between different specialists.

**Kateryna Antonenko:** The technological standard is very high here. For my clinical work, I extremely appreciate how quickly I have access to the results of examinations that other specialists have performed. For example, of MRI scans or ultrasound examinations. I have the impression that patients get the best possible treatment here. They are treated according to official guidelines or recommendations. This is very important, I think. In Ukraine, treatments are not always based on modern recommendations. Sometimes doctors simply treat according to their personal opinion.

**We very much hope that the situation in Ukraine will change for the better. What do you wish for yourself and for your colleagues at home in Ukraine?**

**Olha Kuzyo:** I am still at the beginning of my medical career. I would like to continue my work here in Bern and gain more experience. In the past year, I have learned that it is important to be prepared for anything. Good training helps in any case. So, it would be a great opportunity for me to stay and continue my medical work.

**Inna Potiekhina:** Due to my age, it will be difficult to extend my current employment contract when it expires in May. But while the war in Ukraine continues, I would be very happy if I could continue to work for the Department of Physical Anthropology because my research project in Bern is not finished yet. I have

not given up hope that a solution can be found. Because for me - and probably for most scientists - the following is true: Our research is our life! That is why I hope that my colleagues in Ukraine will have the same opportunities as I had. Here in Switzerland, we can continue our research and learn many useful things.



**Antonina Antonenko:** For me personally, it would be a great opportunity to stay longer and continue the research that I have started here. My message to young colleagues in Ukraine would be: Have a clear goal in your career or your education. Believe in yourself and have the confidence to gain experience abroad. Don't think that people in other countries are cleverer than you are.

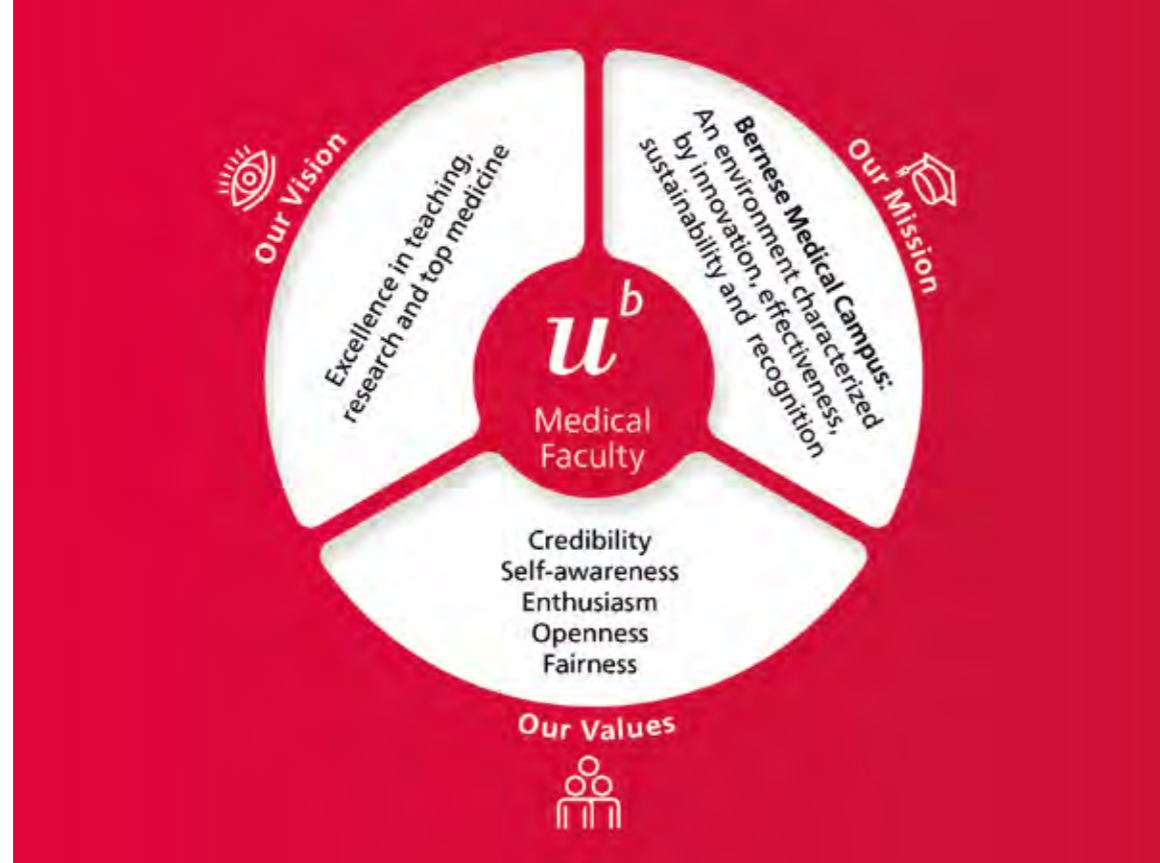
**Kateryna Antonenko:** Life is interesting but unpredictable! We don't know what the future holds. At the moment, I'm really enjoying being here in Bern. I have always appreciated working abroad. Thanks to grants from the European Stroke Organization and the World Stroke Organization, I have been able to do several international visits in my career so far. I find these experiences and contacts very enriching and valuable. I would wish that all doctors from Ukraine would have such opportunities.

**Olha Kuzyo:** At the same time, we are aware that the medical personnel in Ukraine is enormously challenged by the war. They have a lot more to do than normal. I have the utmost respect for their work and wish them a lot of strength. They are my heroes!

## Strategy 2030

Strategy 2030: Excellence in Teaching, Research and Top Medicine  
Implementation of the Strategy 2030: Results of Year 1  
Implementation of the Strategy 2030: Interim Statement of the Dean





## Strategy 2030: Excellence in Teaching, Research and Top Medicine

As an institution rich in tradition, the Medical Faculty of the University of Bern sets its future paths in the course of the Strategy 2030:

**“Bern is an internationally leading medical site that stands for excellence in teaching, research and top medicine.”**

Along with this vision, a mission, strategic goals and functional strategies, the Medical Faculty orientates itself towards the future striving for excellence. This is happening hand in hand with the university hospitals (Insel Gruppe, UPD) and other institutions on the Bernese Medical Campus in an environment characterized by innovation, effectiveness, sustainability and recognition.

### Six Long-Term Strategic Goals

1. Excellence in Teaching
2. Excellence in Research
3. Existing and New Thematic Focus Areas (Thematic Cluster)
4. Organizational Development
5. National and International Networking and Positioning
6. Digital Medicine



### Six Functional Strategies

The functional strategies of the Medical Faculty support the functional strategies of the University of Bern and define additional faculty-specific goals.

1. Promotion of Early-Career-Researchers
2. Scientific Integrity
3. Communication
4. Sustainability
5. Equality & Diversity
6. Quality Assurance



The figure shows the interplay between research clusters (red) and cross-discipline priorities (white) of the Medical Faculty (long-term strategic goal 3).

## Implementation of the Strategy 2030: Results of Year 1

The Faculty Executive Board and the Faculty Council approved the Strategy 2030 in the summer of 2021. Subsequently, sixteen task forces have been commissioned to launch the implementation of the Strategy 2030. In the following, we present the current status of implementation.

Based on the long-term strategic goals and the functional strategies defined in the Strategy 2030, 16 task forces were created to develop and implement various measures and activities.

In 2022, great efforts were made in various important fields such as excellence in teaching, excellence in research, thematic clusters, organizational development, networking and positioning, digital medicine, promotion of young researchers, core facilities and equality as well as in various more fields.

The following milestones, only a few out of a large set of activities, were successfully implemented during the year of 2022:

- The Dean's Office was restructured.
- Five new and important positions were established: A "Dean of Education" and a "Vice-Dean Digitalization" on faculty level as well as a "Communications Officer" and a "Coordinator for national and international Relations" in the Dean's Office as well as a Digitalization Officer.
- The agreement with the Biomedical Faculty of the Università Svizzera Italiana USI to cooperate in the training of students in human medicine was signed. From 2023 on, students from Ticino will be able to complete a bachelor's degree in human medicine in Bern.

- The calls for applications for the funding of "Global Health Initiatives" and "International Networking Activities in Research" were published in order to build sustainable academic cooperations between entities of the Medical Faculty and their international partners.
- "Talent4Bern", a faculty grant to support young academics, was established and the first call has been successfully launched.
- A new concept of the award "Teacher of the Year" was developed and the program "Innovative Lehre in der Medizin" FILMED started.
- The new comprehensive faculty process for successions was established and revised.
- A new task force for the complex topic of "Professorship Planning" was initiated.
- Strategy papers were elaborated on the topics of "Digital Medicine" and "Professorship Planning".
- An in-depth analysis of the structure and the interaction between the Medical Faculty, the University Hospital Inselspital and the University of Bern has been initiated. This process takes place under occupation of the Bernese government, which has anchored the structure analysis in the government guidelines 2023-2026 of the canton of Bern.
- An analysis of the core facilities was conducted.
- The network "Female Empowerment in Life Sciences FELS" was established. FELS is an interdisciplinary association of female scientists with medical or life science background. Its mission is to create a network that supports gender-neutral scientific career development, the implementation of gender equality for women, and female leadership.





## Implementation of the Strategy 2030: Interim Statement of the Dean

After a development phase of less than one year, the implementation of the Strategy 2030 has been initiated in autumn of 2021. We are now looking back on the first year of implementation. What has been achieved so far in this short period of time? In the following interview, Prof. Uyen Huynh-Do, member of the working group “Communication” of the Faculty Executive Board, asks Prof. Claudio L.A. Bassetti, Dean of the Medical Faculty, about his first personal interim assessment.

**Before we talk about the Medical Faculty’s Strategy 2030 and thus about the future, let’s look at the past: How has the faculty developed over the past five years?**

If we look at the past five years, growth is an important keyword. Both the number of students and professors have increased. Since 2018, we offer 100 additional study places. That was a huge growth spurt for the Medical Faculty. The additional study places also brought us additional resources. The number of professors and full professors has increased from 99 in 2017 to 108 in 2022. The percentage of women has grown from 10.8 to 14.3 percent in this time period. That’s still not as we would like it to be, but at least it’s a start.

Research has also developed and grown encouragingly. I am thinking of newly opened research institutions such as the Department for BioMedical Research DBMR, the Department of Clinical Research DCR, the Microscopy Imaging Center, the Biobank Bern, or the site Center for Translational Medicine and Biomedical Entrepreneurship. There has been a lot of investment. The possibilities to do research at a very high level have clearly been expanded. In Bern, we really have a lot that is necessary for top-level research.

**We may call it a “tour de force” that so much has been accomplished with yet rather limited resources.**

Yes, there have been many positive developments. What worries me are the research funds. They have lost value over the last 20 years. One Swiss franc of research money has less than 50 percent value today. That is one of the challenges. If we create more professorships, but the financial resources do not grow proportionally, then each professorship will have less available. Is that what we want? This is one of the key challenges in professorship planning.

**Professorship planning is a challenge. You have been Dean of the Medical Faculty for more than two years, since August 1, 2020 to be precise. Where did you perceive the greatest need for action when you took office, and how have these problem areas developed since then?**

I believe that we have come to a new modus operandi. I would like to make special emphasis on the Faculty Executive Board and the Dean’s Office. We have moved from a rather administrative to a more strategic and decisive functioning. I would like to give two examples of this.

First, the professorship planning, which I mentioned before. It had been stuck for years. We brought the important issues on the table and unblocked the professorship planning. That’s how we created the preconditions for a change. My second example is the successions process. We have accelerated and professionalized the procedure.

A key issue was and remains the structures in which we operate. How do we shape the interactions between the university, the faculty and the university hospital? At the level of individual interactors, the situation is good. However, processes are too slow and complicated. Resources are being lost and we cannot afford that.

**„The specific identity of the Medical Faculty has been incorporated into our strategy.“**

I have the feeling that we have tackled a lot in the past two years. In fall 2022, the various task forces presented the status of the implementation of our strategy 2030. The list of implemented measures was already long.

**You have mentioned the first important measures as part of the Medical Faculty’s Strategy 2030. The University of Bern also presented its Strategy 2030 this year. What are the overlaps and differences between these two strategies?**

The university gave us an early insight into its Strategy 2030. That allowed us to choose congruent language, terminology and structure in our own strategy development. I’m very happy about that. Not because we wanted to copy the university’s strategy, but because it simplifies the dialogue and mutual understanding in the strategy discussions that now lie ahead. This is a formal aspect, but it is important.

Sustainability, young talent, equality and diversity are core points of the university strategy. At the same time, they are so central that they have also found their way into our strategy. Such overlaps are obvious, because we are the largest faculty of the university, and “Health and Medicine” is a key area of the university. The Medical Faculty is therefore well embedded in the university. In addition, our strategy considers the particularities of the Medical Faculty. Unlike most other faculties of the university, we have a strong link to services and care – this via the Inselspital. This specific identity of the Medical Faculty has been incorporated into our strategy.

**The Medical Faculty’s Strategy 2030 is a lean document. Nevertheless, it is comprehensive, and it contains innovative approaches – both short- and long-term. Would you describe it more as a „natural evolution“ or as a „revolution“?**

I am someone who stands for innovation and change. That is also my profile as a physician and as an academic. Innovation and change are not only important to me personally, but also to our stakeholders.

On the other hand, from my 25 years of leadership experience, I have learned that trees do not grow to the sky overnight. It takes a continuous process, not a revolution. After a change – where it makes sense – you should find your way back to continuity. For me, that’s what innovation is all about. One must understand that change, especially cultural change, takes time and cannot be forced by decision. In this sense, I also see our Strategy 2030 as a “letter of intent”. It sets the new direction.

**The functional strategies include relatively new topics such as sustainability, equality, and scientific integrity. Have these topics been neglected so far? Or are they simply zeitgeisty?**

It is absolutely necessary to pay more attention to. We must honestly say that we have somewhat neglected these topics so far. Also, I personally have gone through a development in this regard. I started my medical career in a professional world where such things were rarely addressed. Even later, as a young researcher and physician, the management hardly ever modeled such values to me. Today, we live in a different world. There are more stakeholders involved. We must adapt to such changes. The strategy on teaching, for example, is emblematic of this. It says: “We must become adaptable.” That is central to me. But even a strategy is not set in stone. As I said, it provides a direction. It sets a development in motion. The topics you mentioned are important, and we need to do more in these areas.

**In addition to the functional strategies, the Strategy 2030 includes six long-term strategic goals. In a nutshell: What is to be achieved by 2030?**

Of course, we aim to achieve many goals. It is difficult to bring them down to a simple denominator. But I think the strategy can be described in simplified terms with three key words. The first is a “feeling of togetherness”. We want to strengthen this feeling. We need to work together even more. That way we can benefit more from each other and get the most out of our resources.

**„We should make sure that the Medical Faculty of the University of Bern is attractive to talented and motivated academics with varied backgrounds.“**

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The second key word is “excellence”. Excellence is the only thing that counts in the end. That is why it is always our yardstick. The third key word is the “next generation”. In other words, the fostering of talents. We leaders, who are established, should make sure that the Medical Faculty of the University of Bern is attractive to talented and motivated academics with varied backgrounds.”

**You mention the responsibility of the leaders in the faculty, in other words, the Faculty Executive Board. What other expectations do you have of this board in implementing Strategy 2030?**

First of all, I would like to emphasize that I am very happy with the Faculty Executive Board. I appreciate the diversity of this group. It is made up of different and strong personalities which represent the different realities of our faculty. I know that I can rely on these people and that we are moving forward together. I would like to see that continue.

In general, I expect members of the Faculty Executive Board to think not only for their own area, but for the whole organization. When we come together, it’s not about specific disciplines, but about challenges that we are all facing.

**The implementation of our Strategy 2030 is still in its early stages. But if we now draw up an initial interim balance sheet. What has already been achieved?**

We have reached several milestones in the first year. Along with our goal of professionalizing the Dean’s Office, we made a strategically very important decision: We established the position of a Dean of Education, which will substitute the previously existing Vice-Deans of Master and Bachelor Studies. This measure aims to facilitate and professionalize the complex activities around the curriculum and in the entire field of medical education. Further, we have decided that we want to communicate more intensively and professionally and therefore, created the new position of a Communications Officer in the Dean’s Office. This is an important start as far as communication is concerned. Another strategic course set that we have achieved is the fact that we can now use resources for strategic research funding based on the Strategy 2030. For example, we have created intrafaculty grants. This means that we can award interdisciplinary grants every year in the area of patient-oriented and transla-

tional research or support young researchers as part of the “Talent4Bern” program. I am very proud of this. Furthermore, we are in the process of analyzing the structure of the University of Bern, the Medical Faculty and the University Hospitals, as well as the cooperation of these three organizations. The canton of Bern has given us this mandate for structural analysis and the project is listed as a strategic goal in the canton’s government guidelines 2023-2026. This is highly significant, and I have the utmost confidence that this workup is taken seriously by the stakeholders. This will bring us forward.

We have also started to position ourselves more strongly on the national and international level: We now have an agreement in teaching with the Università Svizzera Italiana USI, Ticino, we launched two major calls to strengthen our international network and we worked on our international strategic partnerships. We also achieved steps in terms of the very current topic of digitalization, as we now have a strategy paper on „Digital Medicine” and established the position of a Digitalization Officer.“And last but not least, we have structured the complex process of successions. We now achieve to successfully go through such a process in a time-efficient manner: For example, we completed the entire structure and election process for the two new full professors for Cardiac and Vascular surgery, respectively within only one year.

So, in certain areas, the implementation of our Strategy 2030 has started well. Now we should start making progress across the board.

**You have mentioned various milestones. Many of them consider the need for increased professionalization. What about fundraising? Should it also be professionalized and what could that look like?**

Professional fundraising is very demanding. But it is very relevant in the context of endowed chairs, for example. We are currently in the process of promoting the creation of endowed chairs, which is very important. We already have a specialized group that deals with endowed chairs. But we need to professionalize further in this area. This will help us improve sustainability. Because endowed chairs should have a long-term perspective. For this, we must understand and orient ourselves to the major challenges facing society, and not primarily to our own needs as a medical faculty or a university hospital.

**„In certain areas, the implementation of our Strategy 2030 has started well. Now we should start making progress across the board.“**

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**What would you like to share with the early career researchers of the Medical Faculty?**

Three things! I think it is extremely important to put your heart into your work. I am convinced that basic career decisions should be based on curiosity and passion. Young researchers should have the freedom to do what they are really interested in, what they are enthusiastic about. Young researchers have a wealth of opportunities open to them. They should take advantage of them.

My second piece of advice can be difficult to implement. I think it is important to have a mentor as a young

researcher. That is, a person with whom you can have an open exchange and who believes in you. To get to this point, you must invest not only in yourself, but also in the exchange with experienced colleagues. In return, however, old-stagers must also be willing to do so.

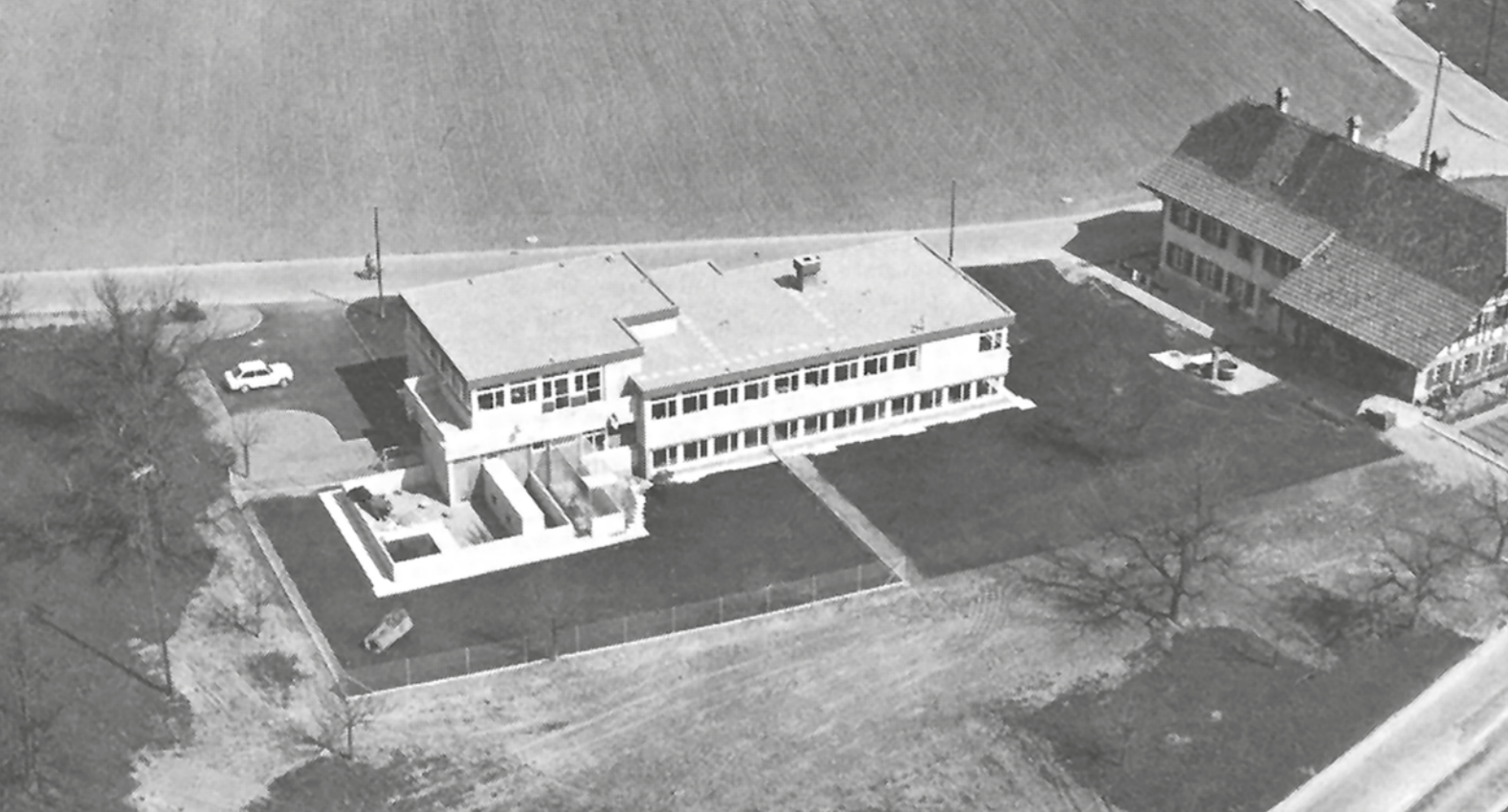
Thirdly, I think it’s important to develop a certain self-confidence and resilience. One must work on that on an ongoing basis.



## Historical

Glimpses of the History of the Medical Faculty  
A Brief History of the Medical Faculty  
Deans of the Medical Faculty  
In Memoriam: Prof. em. Dr. med. Harald Reuter





The new Institute of Brain Anatomy with outdoor spaces for ethological observation, 1968

## Glimpses of the History of the Medical Faculty Brains, Drugs, and Dolphins: early Biological Research at the Psychiatric Clinic

In 1936, Friedrich Glauser, one of the first and most important crime writers in the German language, was interned in the Waldau, the University Psychiatric Clinic in Bern.

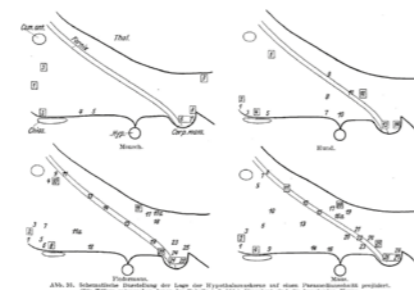
Together with a fellow inmate, he produced a satirical Clinical Annual Gazette, in which he listed the latest publications of PD Dr. E. Blauberg (english: ‚Bluemountain‘): ‘100 examinations of brain arteriosclerotic psychiatrist husbands’ (‘Hirnarteriosklerotikerpsychiaterhegatten’), ‘Clinico-anatomical studies of the therapeutic value of shoe polish’ and ‘Senile dementia and post-encephalitic parkinsonism in incestuous pike twins and their effect on their descendants’. It was clear to everyone that Glauser was making fun of the research of the psychiatrist and neurologist Ernst Grünthal (1894-1972; english: ‚Greenvalley‘), who had been dismissed in Germany in 1934 because of his Jewish origins and was now working in the Waldau.

### Organic brain research

Glauser’s remarks were not just satire, however; they also show an astute perception of the three central research directions pursued at the Waldau in Grünthal’s time and beyond: brain anatomy and pathology, psycho- and neuropharmacology, and comparative studies of animal anatomy and behaviour. Simplified accounts of the history of psychiatry tend to describe the first half of the 20th century as the age of psychoanalysis and psychopathology. Grünthal is a good example of how biological approaches were

widely pursued even after the 19th century and did not only regain importance in the 1950s. There was a great breadth of psychiatric research. However, the intensity of organic brain studies in Bern was exceptional; in Zürich, for example, there was hardly any psychiatrically oriented laboratory research before the 1960s.

Grünthal built up a brain anatomy research institute in Bern thanks to support from the Rockefeller Foundation. He focused on the diencephalon and conducted comparative neuroanatomical studies to capture the ‘typically human’ aspects of the brain. For example, he compared the hypothalamic nuclei of mice, bats, dogs and humans and found that the more developed the cortex, the less complex the thalamus. He concluded that there are different ways of processing sensory perceptions. The anatomical-morphological questions were linked to fundamental functional-physiological ones. Grünthal thus had a stimulating effect on the later foundation of palaeoneurology.



Comparison of the hypothalamic nuclei of mice, bats, dogs and humans, 1946

### Clinical and pharmacological perspectives

Working as a senior physician on the psychiatric ward, Grünthal linked these studies to clinical perspectives. He examined the brains of deceased psychiatric patients. In a patient with excessive emotionality and gradual dementia, for example, he found highly localised sub-cortical damage and atrophy of thalamic areas. He diagnosed ‘thalamic dementia’ and emphasised the interdependence of thalamic and cortical functioning. He endeavoured to explore organic principles without falling prey to a simplistic dogma of brain localisation and thus contributed to the increasing understanding of the brain as a complex, multi-layered organ shaping but not determining mental life. This differentiated pathological and clinical view also led him to develop a clinical-neuropathological staging scheme for Alzheimer’s disease as early as 1926 and to the realisation that Alzheimer’s and senile dementia could not be distinguished on the basis of their histological findings. With the support of the Basel-based company Geigy (later Ciba-Geigy, today part of Novartis), which had just entered pharmaceutical research in 1939, Grünthal set up a psychopharmacological laboratory in 1943. In the 1940s, he conducted roughly 1000 experiments with 30-50 of Geigy’s drugs, mainly first-in-human clinical trials. He was a central figure in the early development of neuro- and psychotropic drugs. Among other things, he discovered the extrapyramidal effect of Parpanit, one of the first Parkinson’s drugs, and conducted systematic observations on the use of imipramine. The behavioural changes caused by these and other preparations were documented by films.



Grünthal in his laboratory, 1957

### Comparative anatomy, physiology, and ethology

The small research team in Bern was dependent on external funding. When the support from the newly founded Swiss National Science Foundation expired in 1955, Grünthal knocked on the door of the US Air Force on the advice of colleagues. Initially, he wanted to continue his earlier research on the dolphin brain, as it was similar to the primate brain. However, he was advised to research the beaver brain because of its extraordinary ability to shape their environments. The funding came about, but was stopped by the Swiss authorities in 1959 as it was not deemed compatible with Swiss Neutrality.

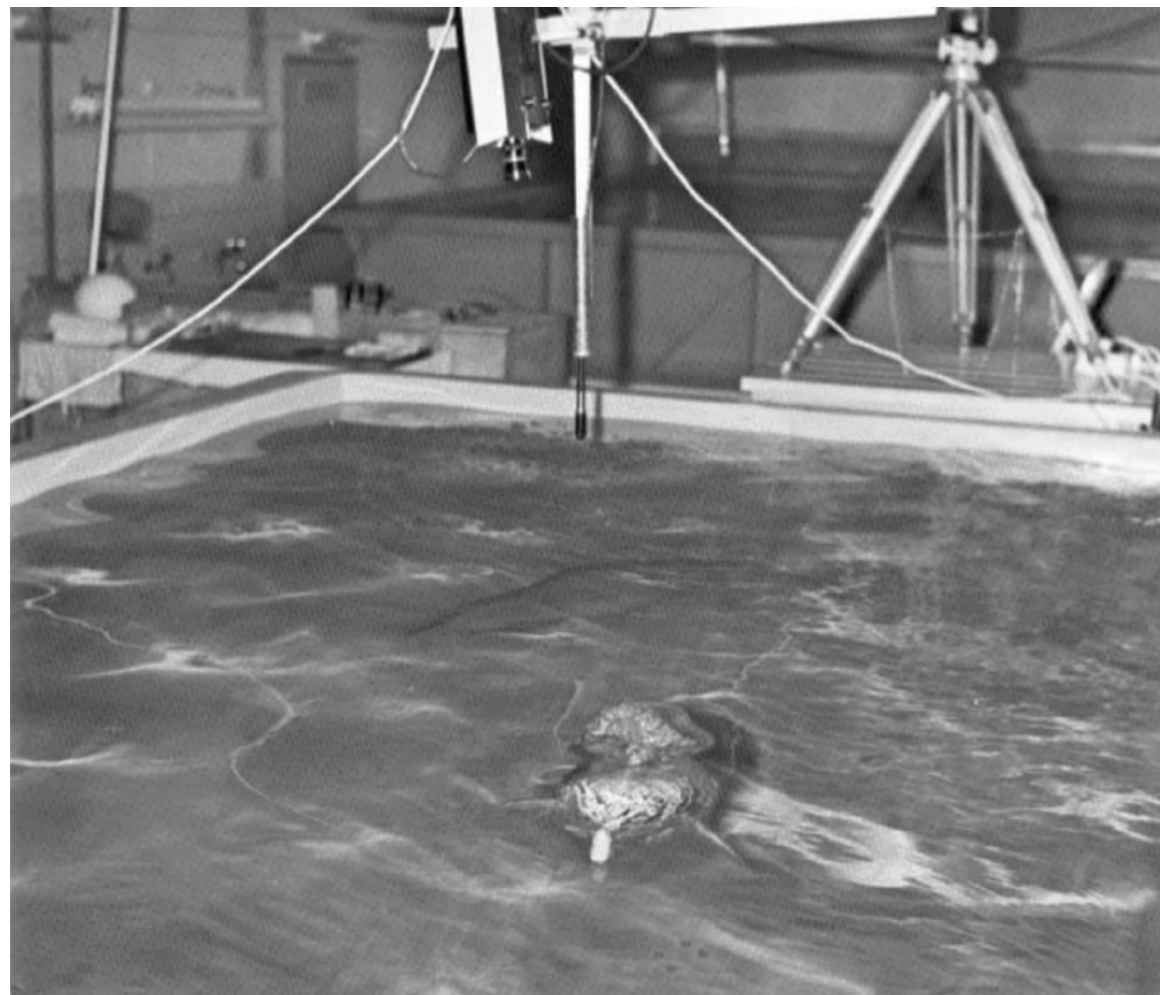


Filmstill from the 1940s documenting the extrapyramidal effect of Parpanit

The research on the beaver's brain and behaviour was mainly carried out by Giorgio Pillieri (1925-2018), Grünthal's collaborator and successor. Besides beavers, other rodents such as opossums and pacas were also kept. The aim was to develop animal models for human behaviour, thus positioning psychiatry in the life sciences without reducing it to neuroanatomy and neurochemistry. Pillieri's most prominent study objects were, however, South Asian river dolphins. For seven years, until 1975, he kept several of these small dolphins in two pools of 4 to 5 metres in the basement of the Institute. He considered dolphins and whales as particularly interesting species as they represented an alternative evolutionary path in brain development. One of his most important findings was

that the cetaceans, although phylogenetically and ecologically completely separate from the primates, have in some respects reached a level of development comparable to, and in some cases even superior to, Homo sapiens. Despite his important discoveries on the physiology and behaviour of these animals, he was later critical of their captivity and campaigned for the closure of all dolphinariums.

Lit.: P. Kalus, J. Bondzio, W.K. Strik, Ernst Grünthal (1894-1972), *Nervenarzt* 2003, 74: 298-300. – K. Schoefert: The view from the psychiatric laboratory. The research of Ernst Grünthal and his mid-twentieth-century peers (PhD Univ. Cambridge 2015)



Studying dolphin behaviour in the Waldau, early 1970s



Seal of the Medical Faculty from 1834

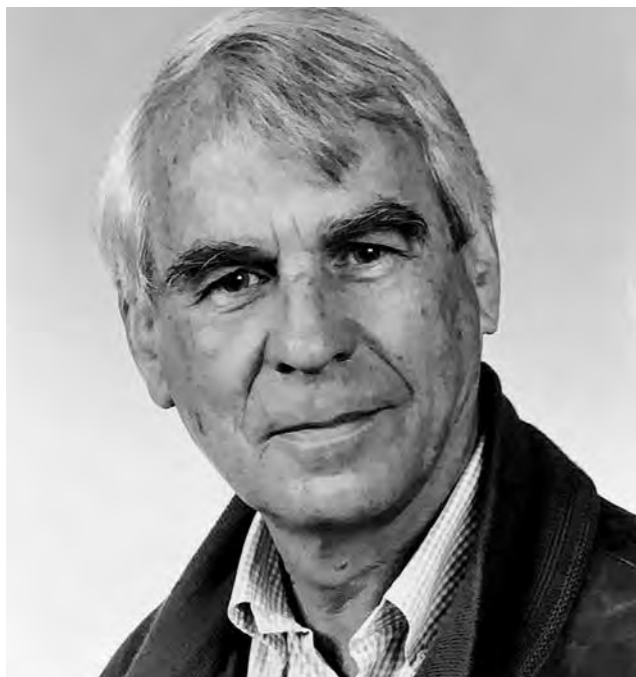
## A Brief History of the Medical Faculty

**A medical faculty, called "facultas medica" or "collegium medicum", existed already in the 16<sup>th</sup> century. This was, however, not a research or teaching institution but an appointed body of physicians and surgeons providing medical care and expertise for the city and State of Bern. Since 1805 there is a proper Medical Faculty as part of the newly established Academy, precursor of the University, founded in 1834.**

In this period, Switzerland was academically still a developing country. Thanks to the reigning liberal attitude the State and the University of Bern were willing to attract the best scholars from Germany, the leading nation in research at that time. Outstanding German researchers therefore left their mark on the university in the 19<sup>th</sup> century. Worthy of mention are for example Gabriel Gustav Valentin (1810-1883), a leading authority in cytology, Hugo Kronecker (1839-1914), a master of physiological methods with pupils all over the world, Alexander Tschirch (1856-1939), the indisputed authority on pharmacognosy, or Josef Jadassohn (1863-1936) who transformed Bern into an international center of dermatology. The most prominent figure of the early period was, however, Theodor Kocher (1841-1917) from Bern. As professor and head of the surgical clinic he shaped the Medical Faculty and was the figurehead of the University for 45 years. With his new approach of a „system of safe surgery“ based on slow operating techniques and painstaking haemostasis he had a particular impact on the emerging American medicine. For his contributions to the physiology, pathology, and surgery of the thyroid he was awarded the 1909 Nobel Prize in Medicine.

Kocher was not only the key figure to establish the Medical Faculty as an internationally renowned institution, he started also Bern's tradition of excellence in medical technology and collaboration with the industry. An exemplary figure in this tradition was Hans Goldmann (1899-1991) who together with Haag-Streit Inc. developed split lamps, perimeters and tonometers which set new international standards. Of even greater consequence was the work of Maurice E. Müller (1918-2009) who invented new materials and techniques for internal plate fixation of fractures (osteosynthesis) and hip prosthesis. Müller generously founded an Institute for Biomechanics, today's ARTORG Center for Biomedical Engineering Research which continues our tradition of developing internationally acclaimed new medical technologies.

The history of the Medical Faculty is, of course, deeply inter-twined with the history of the local hospital, the Inselspital, a charitable foundation dating back to 1354. Since the founding of the University, the hospital has been the university care centre for the Canton of Bern and beyond. Together with the Faculty, it provides the basis for the University of Bern to continue and expand its goal as a place of excellent medical education and research.



Prof. em. Dr. med. Harald Reuter (25.03.1934 – 23.02.2022)

## In Memoriam: Prof. em. Dr. med. Harald Reuter

The Medical Faculty, University of Bern bids farewell to Prof. em. Dr. med. Harald Reuter (25 March 1934 – 23 February 2022), appreciated emeritus professor and pharmacologist.

Harald Reuter had a large impact on the academic landscape in Bern and leaves impressive traces: He was Director of the Institute of Pharmacology for many years and Dean of the Medical Faculty.

Harald Reuter studied human medicine in Freiburg (D) and Innsbruck, obtained his doctorate and habilitation at the Pharmacological Institute of the University of Mainz, and followed an academic call to Bern in 1969. During his time as Professor of Pharmacology and from 1972 on Director of the Institute of Pharmacology, he completed research stays in the USA and was a visiting professor in Basel, Great Britain, Japan and China.

His research activities were concentrated to fundamental questions of cardiac function. In the course of his research, he discovered, among other things, the sodium/calcium exchange in cardiac cells and the calcium current in cardiac membranes, as well as the respective functional significance in cardiac contraction. He has received various prizes and awards for his achievements in research and was awarded an honorary doctorate from the University of Basel in 2010. His numerous memberships in national and international scientific academies and his position as Chairman of

the Committee for Human Rights of the Swiss Academies of Sciences and of the International Network on Human Rights of Academies and Scholarly Societies illustrate his great and diverse commitment to research and science – and beyond.

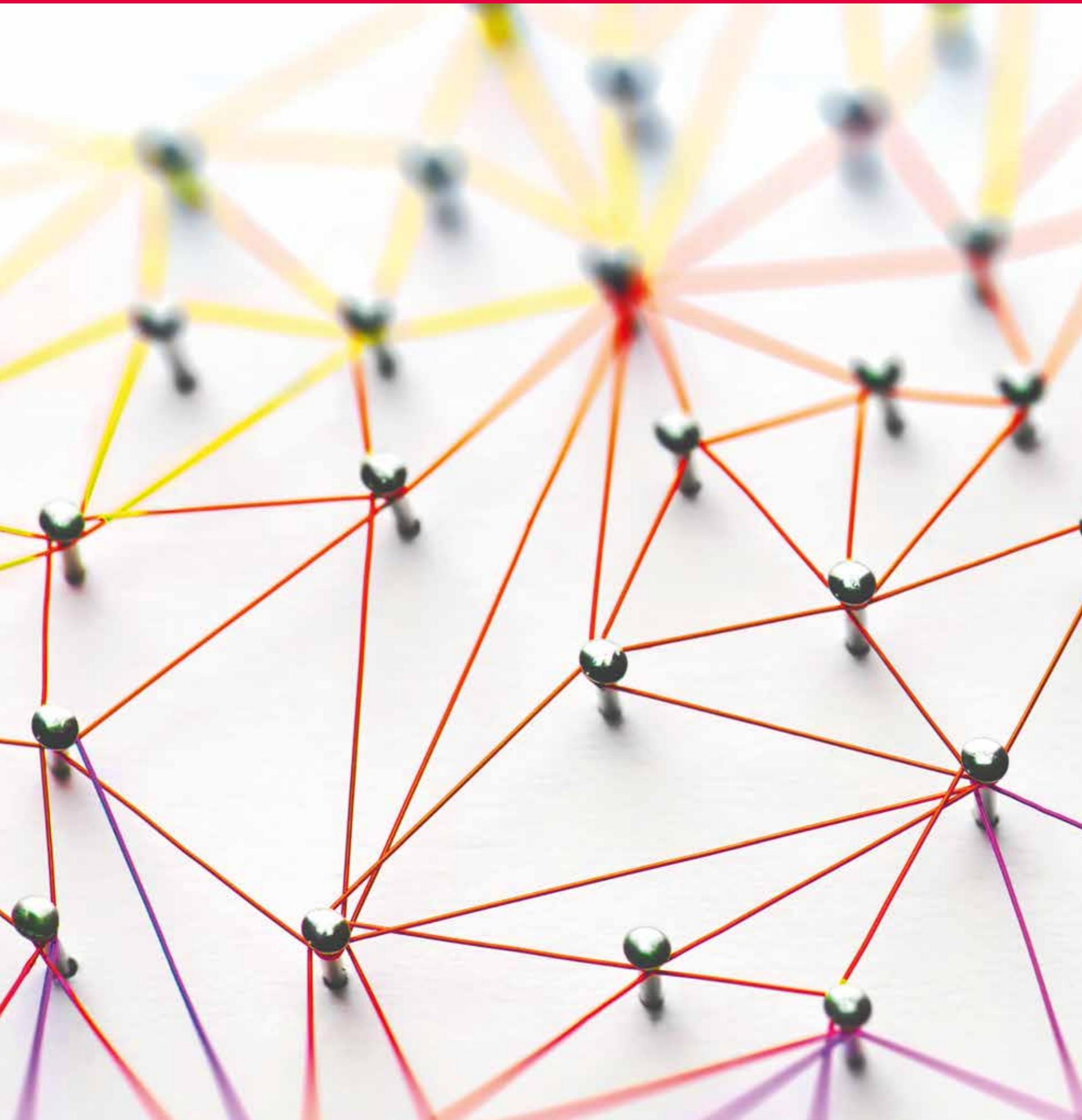
The Medical Faculty looks back on an outstanding personality and an impressive career and remains in gratitude and appreciation for the experienced collaboration with Harald Reuter.

## Deans of the Medical Faculty

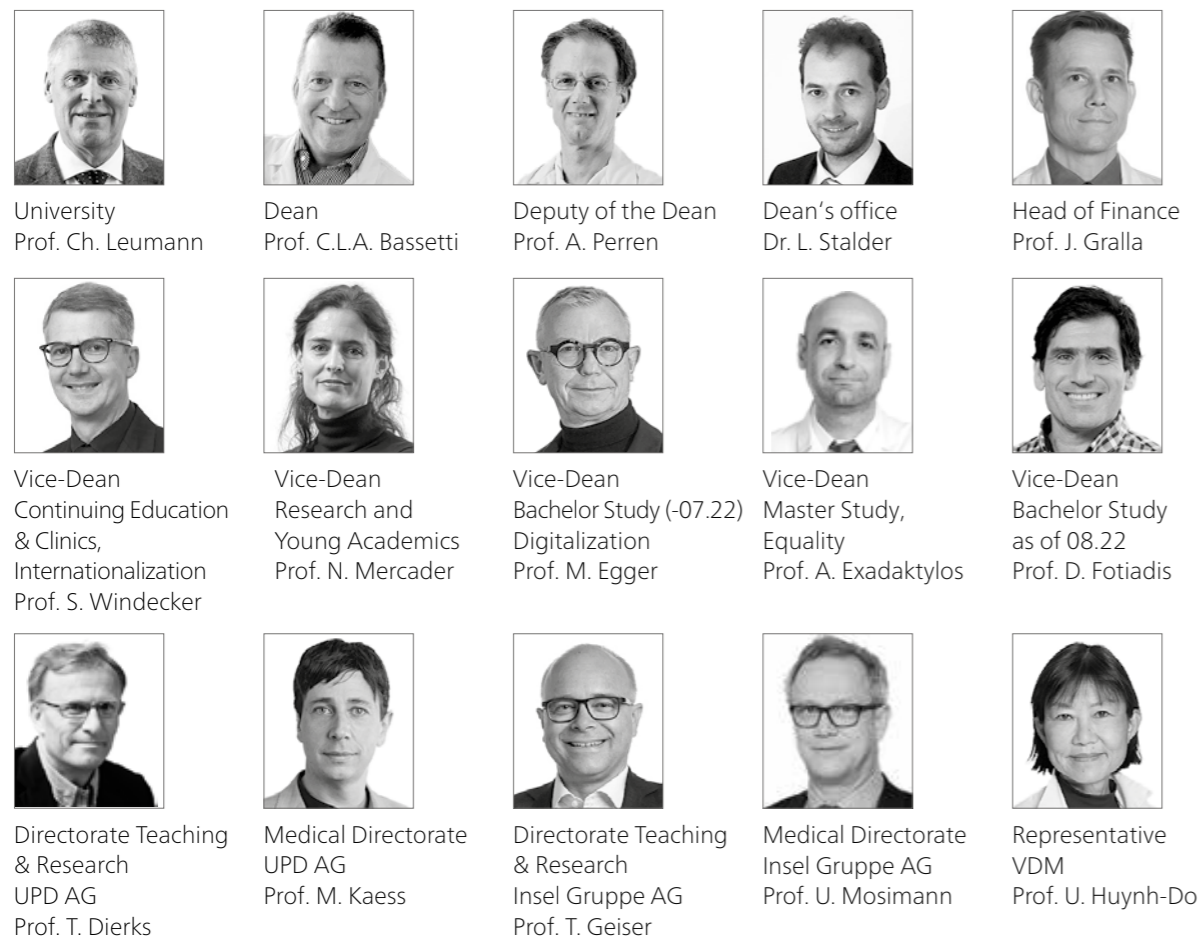
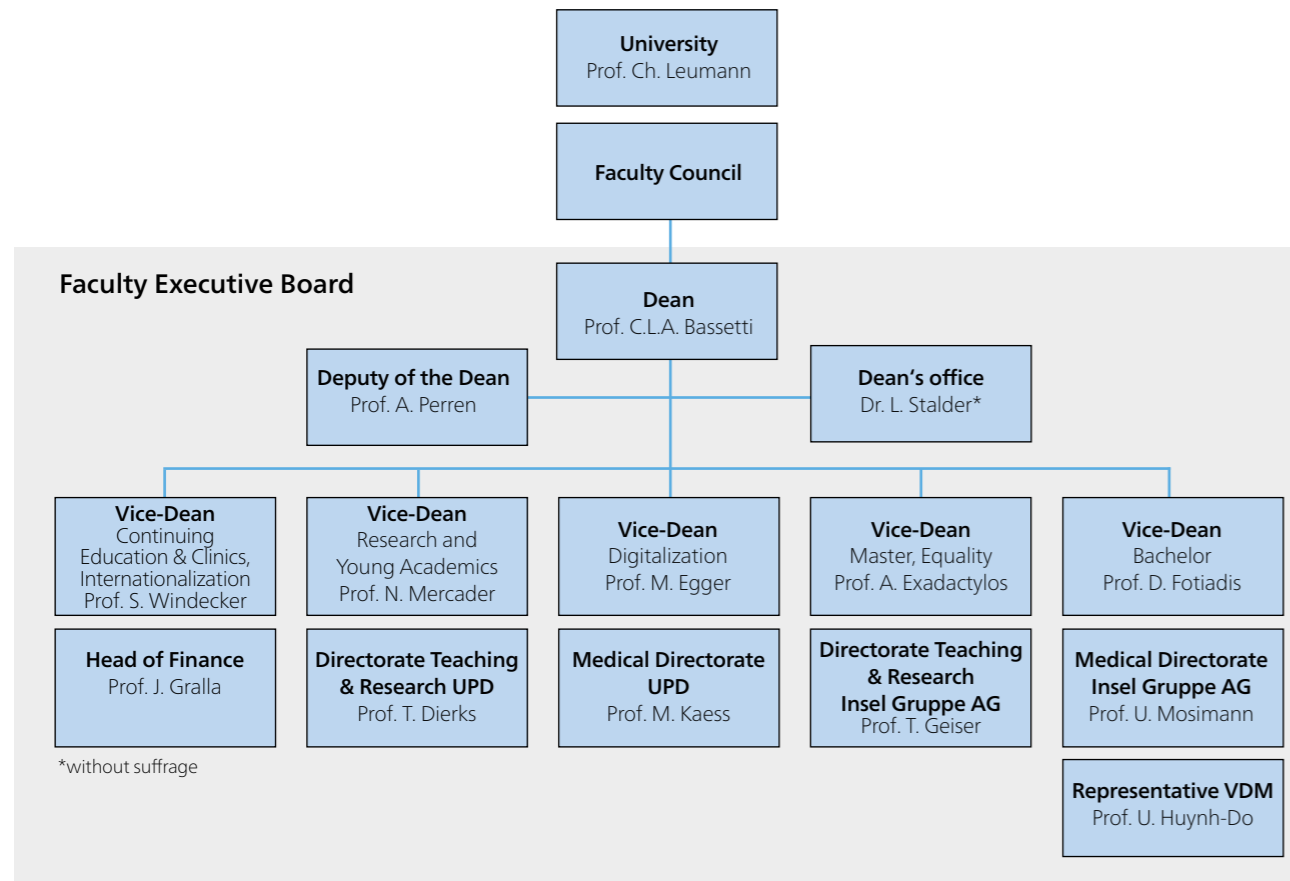
1834–1835	Hugo Mohl	1932–1934	Walther Frey
1835–1838	Hermann Askan Demme	1934–1936	Emil Bürgi
1838–1843	Wilhelm Philipp Friedrich Vogt	1936–1938	Paul Casparis
1843–1847	Gabriel Gustav Valentin	1938–1940	Jakob Klaesi
1847–1849	Friedrich Miescher	1940–1941	Hans Bluntschli
1849–1852	Friedrich Wilhelm Theile	1941–1943	Alexander von Muralt
1852–1857	Wilhelm Rau	1943–1945	Eduard Glanzmann
1857–1860	Wilhelm Philipp Friedrich Vogt	1945–1947	Hans Goldmann
1860–1861	Wilhelm Rau	1947–1949	Joseph Dettling
1861–1865	Gabriel Gustav Valentin	1949–1951	Curt Hallauer
1865–1867	Daniel Jonquière	1951–1953	Karl Lenggenhager
1867–1869	Christoph Theodor Aeby	1953–1955	Bernhard Walthard
1869–1871	Karl Emmert	1955–1957	Walther Wilbrandt
1871–1874	Georg Albert Lücke / Henri Dor	1957–1959	Erich Hintzsche
1874–1876	August Breisky / Th. Kocher	1959–1961	Walter Neuweiler
1876–1878	Heinrich Irenäus. Quincke	1961–1963	Hugo Aebi
1878–1880	Theodor Langhans	1963–1965	Adolf Zuppinger
1880–1882	Ernst Pflüger	1965–1967	Franz Escher
1882–1884	Ludwig Lichtheim	1967–1969	Johann Kuske
1884–1886	Marcellus Wilhelm von Nencki	1969–1971	Eugen Läubli
1886–1888	Hugo Kronecker	1971–1973	André Schroeder
1888–1890	Rudolf Demme	1973–1978	Jürg Hodler
1890–1892	Ernst Pflüger	1978–1981	Beat Roos
1892–1894	Hans Strasser	1981–1983	Herbert A. Fleisch
1894–1896	Hermann Sahli	1983–1985	Harald Reuter
1896–1898	Alexander Tschirch	1985–1987	Rudolf Berchtold
1898–1900	Theodor Kocher	1987–1989	Max Hess
1900–1902	Arthur Carl Wilhelm Heffter	1989–1991	Georg Eisner
1902–1904	Theodor Langhans	1991–1993	Alfred H. Geering
1904–1906	Josef Jadassohn	1993–1995	Hans-Rudolf Lüscher
1906–1908	August Siegrist	1995–1997	Bernhard H. Lauterburg
1908–1910	Wilhelm Kolle	1997–1999	Kurt Schopfer / H.-R. Lüscher
1910–1911	Emil Bürgi	1999–2004	Emilio Bossi
1911–1912	Leon Asher	2004–2008	Martin Täuber
1912–1914	Hans Strasser	2008–2016	Peter Eggli
1914–1916	Hans Guggisberg	2016–2020	Hans-Uwe Simon
1916–1918	Leon Asher	2020–	Claudio L. A. Bassetti
1918–1920	Carl Wegelin		
1920–1921	Fritz de Quervain		
1921–1923	Georg Sobernheim		
1923–1924	Fritz de Quervain		
1924–1926	Friedrich Lüscher		
1926–1928	Emil Bürgi		
1928–1930	Hans Guggisberg		
1930–1932	Carl Wegelin		

## Key People and Institutions

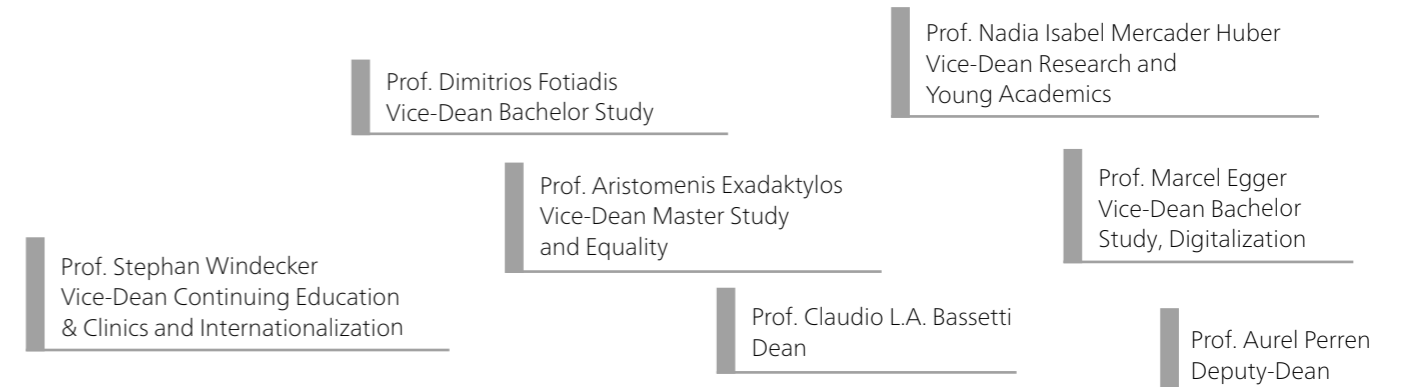
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Honorary Doctorate of the Medical Faculty for Professor Masashi Yanagisawa  
New Professors at the Medical Faculty  
SNF Eccellenza Professors at the Medical Faculty  
Faculty Membership due to Academic Excellence  
Association of the Lecturers of the Medical Faculty Bern



# Organigram



# Dean and Vice-Deans







PD Dr. Roman Hari

## Dean of Education

**PD Dr. med. Roman Hari is going to take up the position as “Lehrdekan” (“Dean of Education”), a newly created position at the Medical Faculty, as of February 2023.**

As part of the Medical Faculty’s Strategy 2030, a concept was developed in the area of professionalization of the Dean’s office to replace the Vice-Deans of Bachelor’s and Master’s Education and Continuing Education with a Dean of Education. It should be noted that this fusion of the two previous Vice-Dean positions represents a historical change at the Medical Faculty of the University of Bern. The move away from the militia system and the concentration of these tasks within one position brings numerous advantages, such as the significant reduction of interfaces in the education department (e.g., with education commissions, the Institute for Medical Education, etc.) and a general increase in efficiency in the execution of processes. As a member of the Faculty Board, he is also the interface to the Dean, the other Vice-Deans and the Directors of Teaching and Research of the University Hospitals Inselspital and UPD.

PD Dr. med. Hari will assume the newly created position of Dean of Education at the Medical Faculty in February 2023. He was elected by the Faculty Board on November 16, 2022.

Roman Hari has been with the Institute of Primary Health Care (BIHAM) since 2014. Since 2016, he has been head of education at the BIHAM and obtained in the same year the Master of Medical Education (MME). In 2021, he habilitated in primary health care with a focus on medical education. In addition to his academic activities, he is a primary health care and senior physician at the Emmental Regional Hospital in Burgdorf. With such a background, PD Dr. med. Hari also represents an excellent person to support and further develop the connection and continuation of pre-graduate education into post-graduate practice.

The Medical Faculty wishes PD Dr. med. Hari already now much success in his new position and looks forward to working with him.

## Departments of the Vice-Deans

### Bachelor and Master Studies Profs Egger, Exadaktylos, Fotiadis

In the past year, we successfully managed a transition from the Covid-19 years to a normal functioning. Importantly, we have continued the work of the Task Force “Exzellenz in der Lehre” that began in 2021, with the goal of incorporating new ideas, aspects and impulses for the Bernese medicine curriculum and considering strategies for their implementation. In doing so, it was particularly important to us to take up and consider suggestions and ideas from the students, which was very fruitful for the work of this commission. The evaluation of teaching was reorganized for the Bachelor’s program. The evaluation of the lectures, courses and tutorials for the academic year 1 - 3 follows now the same standards and criteria as in the Master’s program. This process is now coordinated and carried out in the Dean’s Office Administration (Dr. M. Wullschleger, Head of the Dean’s Office Administration and Course Evaluation). In an evaluation context, the medical education at the Medical Faculty of the University of Bern received excellent feedback in the national comparative survey in 2022 by the SWISMA (the Swiss Medical Students’ Association). In recent years, due to the increase in the number of students and the related time burden of operational and strategic tasks, it has become clear that the “Milizsystem” (Vice-Deans Bachelor & Master) for these functions can no longer be maintained. In the faculty Strategy 2030, the professionalization of the functions of the Vice-Deans Bachelor and Master was already a strategic goal and of high priority. In 2022, this strategic goal was implemented with the advertisement and filling of the new function of a “Lehrdekan”. This new function combines and merges the tasks of both Vice-Deans. PD Dr. Roman Hari (BIHAM) was evaluated and confirmed for this position by the Faculty Executive Board in September 2022 and the Faculty Council in November 2022, and he will take over this central function for medical teaching in the Faculty as of February 2023. We are convinced that this central change in a long-practiced paradigm will have a positive long-term impact on the significance and the standing of medical teaching in the clinic as well as in pre-clinical education and training at the Medical Faculty.

### Digitalization Prof. Egger

The implementation of the Medical Faculty’s Strategy 2030 „Digital Medicine” is of central importance for the position of the Medical Faculty in the nationwide biomedical university research landscape. The digitalization strategy of the Medical Faculty 2030 is aligned with the digitalization strategy of the University of Bern (UniBE). Top priority is given to various fields of action to solve the problems of data exchange, data interoperability and the coordination of activities of different stakeholders. Furthermore, national initiatives (federal government, SNSF) in connection with „digital medicine” (e.g. SPHN / Biomed IT Node, Swiss Digital Pathology Initiative, Open EM Data Network, etc.) - these are generally concerned with Switzerland-wide networking - are important drivers of development and must be included in the activities of the Medical Faculty. Currently, the focus is on the development of a governance structure in order to be able to carry out activities in the field of digital medicine between Insel Gruppe AG and UniBE / Medical Faculty in a legally secure manner. In the meantime, a project manager and a business analyst have started their work to implement the Bio-IT-Node project and the exchange of clinical data via the IDSC with UniBE / Medical Faculty. In its Digitalization Strategy 2030, the UniBE formulates the strategic goal of (a) creating basic and applied knowledge on the guiding theme of „People in Digital Transformation” (MidT) and (b) promoting the exchange of knowledge between internal and external researchers, the critical reflection of research results, and the sustainable transfer of knowledge to society. In order to implement the this strategic goal, the UniBE has granted funding in the amount of CHF 20 million for the years 2023- 2027 and a first project call was launched at the end of 2022.



Prof. Marcel Egger



Prof. Aristomenis Exadaktylos



Prof. Dimitrios Fotiadis

## Equality Prof. Exadaktylos

In the past year, the topics of gender equality and new aspects of diversity have also gained in importance. These span all areas of teaching, research and clinical practice and are supported by a common will of all those involved. In the past year, various initiatives from among colleagues were actively supported to organize themselves and to take the initiative. These included mentoring programs and, for example, the FELS initiative to support young female academics. In the case of new appointments and promotions, active attention is paid to diversity. Postdoctoral female colleagues are to be further strengthened in their career planning.

## Research and Young Academics

Last year we presented the Strategy 2030 within the annual report. This year we already started with the implementation of our goal to promote excellence in research and promote young academics.

A first call for the Talent4Bern Program was launched to support researchers in preparing for an SNSF Starting Grant and provide additional financial support as well as mentoring upon successful grant acquisition. We hope to ease the way to establish an independent research group with this program and attract excellent and motivated young academics to Bern. At the same time, we congratulate the four awardees from our faculty from the SNSF Starting Grant call 2022: Dr. Ana Maria Vicedo Cabrera (ISPM), Dr. Annekatrin Steinhoff (UPD), Dr. Bahtiyar Yilmaz (DBMR) and Dr. Tim Rollenske (DBMR).

Furthermore, with support from the Béatrice-Weber-Ederer foundation we could open a call for Young Investigator call for Scientific Projects in Cancer. The winner was Dr. Roberta Esposito (DBMR).

Measures to counteract COVID-19 related pandemic delays in PhD thesis were still active during 2022. The financial support to prolong PhD contracts for a maximum of 6 months was awarded to overall 12 PhD candidates from 10 different clinics and institutes.

At the Medical Faculty, we want to contribute to promote interest in research to medical students and encourage them to pursue an academic career that combines clinical activity with research. An early exposure to research, even as an undergraduate, is key. Therefore, we have intensified reach-out activities to inform Human Medicine and Dentistry students about their options to perform research with the aim to attract their interest for a MD-PhD or Clin-PhD track. Furthermore, the successful ongoing program Protected Research Time (PRT) to financially support Clin-PhD students, was again able to support two candidates. The grant allows them to free time for research while performing their medical training.

The University of Bern is among the 150 best Universities world-wide according to several international rankings. Notably, within the Medical Faculty, the Clinics for Dentistry are among the top 10. Furthermore, among the six top highly cited researchers from the University of Bern according to the Clarivate™ ranking five are from the Medical Faculty. We congratulate Proffs Matthias Egger, Andrew J. Macpherson, Georgia Salanti, Mark Rubin, Marco Valgimigli and Stephan Windecker for this achievement.

A further highlight is the inauguration of the Department of Clinical Research headed by Prof. Eva Segelov, that will bring new research possibilities for the year to come.

## Continuing Education & Clinics and Internationalization

During 2022, continuous medical education was characterized by a normalization of teaching activities at the Medical Faculty of the University of Bern following the restrictions related to the COVID-19 pandemic, with the resumption of face-to-face courses while continuing the online offerings. The MAS course in Stroke Medicine at the Department of Neurology at Inselspital started for the first time in April 2022. Also, the CAS in Medication Safety under the auspices of the Department of Internal Medicine at the Inselspital, the BIHAM and the ISPM has been launched in 2022.

Within the Medical Faculty, a commission was established with the purpose to develop a national and international networking strategy. In addition to the consolidation of existing national collaborations in French-speaking Switzerland (Fribourg and Neuchâtel), an official agreement with the Faculty of Biomedical Sciences of the Università Svizzera Italiana (USI) was completed in fall 2022. First students from USI will start in Bern in the fall semester of 2023.

Several evaluations regarding international strategic partnerships have been carried out together with Insel Gruppe AG and are in the final review phase. The framework for the intensification of strategic international partnerships as well as the promotion of researcher exchanges has been elaborated within the commission for internationalization. In this context, an internal call for internationalization and global health initiative was prepared, which will be carried out in 2023.



Prof. Stephan Windecker



Prof. Nadia Isabel  
Mercader Huber

## Institutional Overview

### Uni Mittelstrasse

Institute for Medical Education (IML), Mittelstrasse 43  
 Institute of Primary Health Care (BIHAM), Mittelstrasse 43  
 Institute of Social and Preventive Medicine (ISPM), Mittelstrasse 43  
 Department of Clinical Research (DCR), Mittelstrasse 43 and sitem-insel  
 Multidisciplinary Center for Infectious Diseases (MCID), Hallerstrasse 6

### Uni Muesmatt

Institute of Anatomy, Baltzerstrasse 2  
 Institute of Biochemistry and Molecular Medicine, Bühlstrasse 28  
 Institute for the History of Medicine, Bühlstrasse 26  
 Institute of Physiology, Bühlplatz 5  
 Library Medicine, Baltzerstrasse 4  
 Microscopy Imaging Center (MIC), Freiestrasse 1  
 Theodor Kocher Institute (TKI), Freiestrasse 1

### von Roll Area

Institute of Complementary and Integrative Medicine (IKIM), Freiburgstrasse 46 & Fabrikstrasse 8

### Insel Area

Clinics and Institutes at the University Hospital, Inselspital  
 ARTORG Center for Biomedical Engineering Research, Murtenstrasse 50  
 Bern Center for Precision Medicine, Murtenstrasse 40  
 Center for Artificial Intelligence in Medicine CAIM, Murtenstrasse 50  
 Dean's Office, Office of student's affairs, Murtenstrasse 11  
 Department for BioMedical Research (DBMR), Murtenstrasse 35  
 Department of Clinical Research (DCR), sitem-insel and Mittelstrasse 43  
 Diabeter Center Berne (DCB), sitem-insel  
 Experimental Animal Center (EAC), Murtenstrasse 31  
 Institute of Complementary and Integrative Medicine (IKIM), Freiburgstrasse 46 & Fabrikstrasse 8  
 Institute for Infectious Diseases (IFIK), Friedbühlstrasse 51  
 Institute of Forensic Medicine, Murtenstrasse 26  
 Institute of Pathology, Murtenstrasse 31  
 Institute of Pharmacology, Inselspital, INO-F  
 Learning Center, Murtenstrasse 17  
 Neurotec, sitem-insel  
 School of Dental Medicine zmk, Freiburgstrasse 7  
 Swiss Institute for Translational and Entrepreneurial Medicine (sitem), sitem-insel  
 Translational Imaging Center, sitem-insel  
 University Cancer Center, Freiburgstrasse 10  
 University Neurocenter, sitem-insel  
 PBL-Tutorial Rooms, Effingerhaus 55

### Teaching Facilities

Effingerhaus 55  
 UniAlhambra  
 UniZiegler

### UPD

Universitäre Psychiatrische Dienste, Bolligenstrasse 111





The future centerpiece of the Insel-Campus becomes visible in 2022: The "Insel"-letterings were installed on the new main building Anna-Seiler-Haus at the end of November 2022.

## Structural Development of the Inselepital Area

Within the year of 2022, several steps were taken in the continuous expansion and modernization of the spatial infrastructure on the Insel-Campus: The new main building Anna-Seiler-Haus became visible by the logo of the Insel Gruppe, a winning project was selected in the course of the architectural competition for the Clara-Winnicki-Haus, and the renovation of the Clinic for Obstetrics and Gynecology, the future Marie-Colinet-Haus, has successfully started.

### The New Anna-Seiler-Haus (ASH): The New Insel-Campus Becomes Finally Visible (Construction Area 12)

Three years after the beginning of the construction works of the new main building, the final phase has been reached with more and more floors being completed each month in 2022. In August 2022, the second floors of the new Anna-Seiler-Haus were cleaned of construction dust, and in October 2022, the building's lighting was programmed and tested – some may have already noticed the buildings lightning. However, the new main building is not only visible by its illumination, but also by its letterings: With the installation of the logo of the Insel Gruppe, another step was taken towards the new Insel-Campus. In a spectacular helicopter action, the four "Insel"-letterings were placed on the roof of the new Anna-Seiler-Haus at the end of 2022. Around 60 helicopter flights were required to conduct the transportation of the 250-ton lettering including its substructure and ballast. The

new centerpiece of the Insel-Campus is now visible. It is scheduled to be ready for occupation and replacement of the old tower in September 2023. The Anna-Seiler-Haus will be the new heart of the Insel-Campus linking various clinics. It represents a major step in the reorganization of the Insel-Campus and brings departments closer together, shortens distances and makes processes more efficient.



Construction area 12: The new main building Anna-Seiler-Haus is now visible by its illumination and the "Insel"-letterings on its roof.

### Medical Research and Training Center (Construction Area 7)

The 2020 winning project "JANUS" is in the construction project planning phase now, which is foreseen to be finished in 2023. The construction period is estimated to start after 2024 and the completion and commissioning of the new center is said to take place in 2030.

The new building will allow research, teaching and clinical practice to be brought together under one roof, while it will be able to create contemporary research conditions. This project represents a huge step forward for Bern as a university medical location.



Construction area 7: The front of project "JANUS", the future building of the medical research and training center  
Photo: ©ARGE BB07

### „Panta Rhei“ Wins Architectural Competition for the Clara-Winnicki-Haus (Construction Area 4)

The future Clara-Winnicki-Haus is the third major building project on the Insel-Campus. Located at Friedbühlstrasse, it will be the logistical hub for the Inselepital and, thus, takes up a key function on the Insel-Campus. The design „Panta Rhei“ by the Bernese



Construction area 4: Visualization of the future Clara-Winnicki-Haus, the winning project „Panta Rhei“ by Aebi & Vincent Architekten. Photo: ©Aebi & Vincent Architekten

architecture company Aebi & Vincent Architekten prevailed against six other competition entries. The design convinced the jury with its efficient organization and differentiated facade. The core idea of the architectural concept is the delivery for the entire hospital logistics, which is organized in a traffic circle and relocated to the interior of the building. (Disclaimer: All texts, visualizations, plans and schemes are part of the original project and represent the opinion of the author team.)



### Renovation of the Clinic for Obstetrics and Gynecology: A New Hospital in its Old Shell

The building of the Clinic for Obstetrics and Gynecology at Effingerstrasse is now being completely modernized, and will eventually be called Marie-Colinet-Haus. Inside the building, new and modern clinic areas with a high level of comfort will be created: Completely new rooms, a regulated room climate, high-quality materializations, as well as an equally functional and inviting room concept with all the advantages of a modern hospital building. The new areas will be occupied by the Clinic for Obstetrics and Gynecology, the Neonatology of the Department of Pediatrics, and the Department of Ophthalmology by the end of 2024.

### The New Base Camp for Bernese Medical Students (Construction Area 3)

The teaching and learning infrastructure for basic medical training of the 1st-6th year (Bachelor and Master) will be accommodated in the new building on construction area 3, which will serve as the base camp for Bernese medical students. The feasibility study for construction area 3 was completed at the end of 2019 and the architectural competition is expected to be announced until 2023, after which the project planning will be initiated. The commissioning of the new medical training building is planned to be around 2032-2033.

## Dean's Office



**Prof. Claudio L. A. Bassetti**  
Dean



**Dr. Lukas Stalder**  
Head of the Dean's Office

## Dean's Office Administration



**Dr. Marcel Wullschleger**  
Head of the Dean's Office  
Administration, Research



**Nadia Möri**  
Administration Dean's Office



**Pia Jäggi**  
Finances



**Pham Lan**  
Finances / Human  
Resources Coordinator  
until 30.11.2022



**Marc Oboussier**  
IT Service Manager



**Kapilraj Sivalingam**  
IT-Support & Webmaster



**Nicole Peter**  
Quality Manager



**José Schranz**  
Annual Report,  
Teaching Capacities



**Doris Häfelin**  
Assistant to the Head of the  
Dean's Office until 30.9.2022

## General Secretariat



**Gabriela Schaller**  
Head of General Secretariat,  
Assistant to the Dean,  
Communication



**Romano Hoenger**  
Assistant to the Dean



**Isabelle Salzmännli**  
Dissertations, Confirmations



**Franziska Studer**  
Diploms, Exam fees,  
Graduation Ceremony



**Rita Meyer**  
Appointments, Habilitations



**Svea Lehmann**  
Gender Equality Coordinator



**Sanche Schwab**  
Successions, IT-support



**Debora Scherrer**  
Successions, Promotion of  
Young Academics



**Tina Schubert**  
Successions,  
Internationalization

## Dean's Office of Student's Affairs



**Dr. Peter Frey**  
Head of Dean's Office of  
Student's Affairs  
Study Coordinator 3<sup>rd</sup> Year



**Sarah Habegger**  
Student's Office



**Beatrice Ducret**  
Courses 1<sup>st</sup> Year, Dispensation



**Dr. Helena Röss**  
Study Coordinator 1<sup>st</sup> Year



**Franziska  
Schmidhauser**  
Recruitment PBL-Tutors



**Dr. Sandra Trachsel**  
Study Coordinator 2<sup>nd</sup> Year



**Daniela Wuillemin**  
Clerkships 5<sup>th</sup> Year  
Courses SK2 6<sup>th</sup> Year  
Project FILMED



**Barbara Rechsteiner**  
Master in Pharmacy  
Lectures and Elective Year  
in Medicine



**Regula Walther**  
Clinical Skills Training  
Courses 3<sup>rd</sup> Year



**Isabel Fahrni**  
Lectures and Seminars  
3<sup>rd</sup> Year



**Karin Erb**  
Masterthesis  
Courses EKP 4<sup>th</sup> Year



**Franziska Kolb**  
Courses 2<sup>nd</sup> Year  
Courses BK1/2, SK1 5<sup>th</sup> Year



Dierk Matthäus, Mittagflue 2020

## In Memoriam: Dierk Matthäus

**„Only those who climb mountains  
can measure the height of the sky.“**

**The Medical Faculty, University of Bern bids farewell to Dierk Matthäus (24 August 1964 – 27 March 2022), appreciated colleague and friend.**

Since November 2003, Dierk Matthäus worked as an IT project manager at the Dean's Office of the Medical Faculty. He developed and introduced the administration software FACTScience, which was, back then, not only new to the Medical Faculty but also to the entire University of Bern. As a system architect, Dierk developed, in collaboration with the company team KSL, the software KSL ("Kernsystem Lehre"). Together with the local project team, he then introduced KSL to the entire university. KSL still serves for the planning and organization of the study programs at the University of Bern. Dierk was a much sought-after specialist at the Medical Faculty and the University of Bern and he closely collaborated with the teams of the university's IT services to develop customized solutions to existing

problems. To the staff at the Dean's Office, he was a highly valued and much appreciated colleague - he always knew how to provide competent help out of his longtime expertise. Through Dierk, the staff's coffee breaks were enriched with reflective topics and his finest sense of humor. He was an enthusiastic mountain sportsman. Together with his wife Elisabeth and his daughter Eva (\*2004) he went on numerous mountain tours in Switzerland and abroad, which he always shared with his work colleagues through adventurous stories and pictures. Dierk also enjoyed cooking – in pre-Christmas season, he generously shared his very popular and delicious roasted almonds among his work colleagues. On 27 March 2022, he went on a ski tour with his brother Jochen. During the descent from the Ladholzhorn in Horboden (Diemtingtal), he suffered a fatal accident. His sudden death leaves a painful gap. He is greatly missed by all.



Prof. Dr. med. Masashi Yanagisawa, Director and Professor at the International Institute for Integrative Sleep Medicine, University of Tsukuba, Japan

## Honorary Doctorate of the Medical Faculty for Professor Masashi Yanagisawa

Sleep is a familiar phenomenon. From a neuroscientific perspective, however, it is a big mystery. With his discovery of orexin, a neuropeptide that regulates wakefulness, Prof. Masashi Yanagisawa launched a new era in sleep research. For this, as well as other outstanding scientific achievements, the Medical Faculty awarded Prof. Yanagisawa an honorary doctorate. In this interview, the laureate explains how the groundbreaking discovery came about and how far we are today in unraveling the mystery of sleep.

**Professor Yanagisawa, you are a leading expert in sleep research, especially in sleep homeostasis, which is one of the greatest mysteries in today's neuroscience. What does sleep homeostasis mean?**

The longer you are awake, the more your brain builds up "sleep need" or "sleep pressure", which will be dissipated during sleep. Sleep homeostasis is the mechanism in which your sleep is regulated through sleep need.

The concept of sleep homeostasis is generally well accepted in the scientific community. But nobody really knows the physical or neuroscientific entity for sleep pressure or sleep need. The fundamental question of how your brain "counts" the hours of wakefulness and regulates your night sleep remains unresolved. This question, however, is crucial in the basic neuroscience of sleep.

**You tackle this fundamental question in your sleep research. What kind of approach have you chosen for this endeavor?**

One of our main experimental approaches is called "forward genetic analysis". It means that random genetic mutations are induced in a population of model organisms, and the population is then screened for specific phenotypic features. This way, the genes that are responsible for the respective phenotype can be identified.

The concept of forward genetics has frequently been used in flies. In mice however, the method has hardly been used, because it is so labor and resource intensive. We use forward genetics in mice, nevertheless. We prepare a large number of mice with random genetic mutations and screen for abnormalities in sleep behavior in these individuals.

When we find a mouse with sleep abnormality, we try to build a pedigree of inherited sleep abnormality. Once we have established a pedigree from these abnormal individuals, we can try to identify the causal genetic mutation. It may appear convoluted, but the approach is very unbiased and potentially very powerful. I like this exploratory type of research, which is not strictly hypothesis based. One could call it a fishing expedition!

„My feeling as a sleep researcher is that we are still scratching on the surface of this whole puzzle of sleep homeostasis.“

**In the past, you have been very successful with a different type of exploratory research. It led to one of your greatest discoveries.**

Yes. Back in 1995/96, we were hunting for ligands of so-called orphan receptors. Orphan receptors are proteins whose partner, the signaling molecule or ligand binding to the receptor, is not known. Identifying ligands of orphan receptors is kind of a reverse endocrinology approach. Traditionally, you would start from the ligand and identify its receptor. We started the other way round.

The very first molecule we discovered through this approach was a neuropeptide called orexin. We were able to identify it as ligand to the orphan receptor we examined. However, we had no idea of the physiological function of this new brain substance. Our hypothesis was - for various reasons - that orexin may be involved in appetite regulation, which is a very important field in medicine. So, we were excited about our finding.

**But the hypothesis turned out to be false.**

Exactly! To investigate the function of orexin, we created an orexin knock-out model. This is a mouse breeding line, which cannot make orexin. It turned out that these mice ate normally and had normal body weight. They looked completely healthy and behaved normally. So, it seemed very unlikely that orexin is involved in appetite regulation. This left us scratching our heads. But we still believed that orexin must be responsible for something important. Mice are nocturnal animals. But we observed them only during the day. At some point, I had the idea to observe the orexin knock-out mice during nighttime. We took video recordings with an infrared camera and quickly noticed a very bizarre "behavior arrest phenomenon": A very active individual suddenly stops, falls on its side, and is completely immobile for maybe a minute. Then it recovers quickly and continues its normal behavior.

These observations finally led us to the conclusion that the orexin knock-out mice suffer from narcoleptic attacks. Narcolepsy is a sleep disorder involving a decreased ability to regulate sleep and wakefulness. Brief involuntary sleep episodes, as observed in the orexin knock-out mice, are a common symptom of narcolepsy. It seems that orexin is an essential molecule in our brain which probably helps maintain wakefulness.



**The discovery of orexin and its relevance for sleep regulation brought you to the field of sleep research.**

Initially, we did not aim at sleep research at all. It is solely out of biomolecular interest that we have identified ligands of orphan receptors. I am a molecular biologist who graduated from medical school. My father, who was a surgeon, motivated me to medical science. At the time when I discovered that orexin deficiency causes narcolepsy, I had no training in neuroscience. When we found out about orexin being extremely important for sleep behavior, we went through the sleep science literature and found very little information on the molecular or genetic level. That's why I decided to switch my entire research laboratory to basic sleep research right away. The field turned out to be so exciting so that I stayed there and have been doing this type of research for more than 20 years now.

**You've already achieved a lot in your career. What is your ambition for the next few years?**

There is still a lot of work to do. My feeling as a sleep researcher is that we are still scratching on the surface of this whole puzzle of sleep homeostasis. Let me describe it with a metaphor I heard on TV the other day: Sota Fujii is an extremely talented professional player of shogi, the Japanese chess. At his very young age of 20 he has broken a number of professional shogi records. After winning another big title, an interviewer asked Sota Fujii: If you compare your shogi career to climbing Mount Fuji, where are you right now on the path to the mountain top? Fujii answered: Still below the forest line. I am in the woods and do not even see the summit. I feel exactly the same: In terms of resolving the mystery of sleep homeostasis, I still walk below the forest line.

**That's a beautiful metaphor. Still, of course, you deserve this honorary doctorate very much. What does it mean to you?**

I feel very lucky and highly honored. To be honest, this is my very first honorary degree. I will highly cherish this for the rest of my life.

The interview was conducted by Prof. Claudio L. A. Bassetti.

**Laudatio**

From the numerous achievements of Prof. Masashi Yanagisawa, we would like to highlight the following:

- A pioneer in the cloning of peptide genes involved in body and brain physiology;
- In 1988, the identification of the endothelin as a potent vasoconstrictor factor produced by endothelial cells; then the endothelin isopeptide family, endothelin receptors, and endothelin converting enzymes - a hormonal system that raise blood pressure.
- Elucidating the role of endothelin in embryonic development of neural crest-derived tissues, and mechanism for Hirschsprung's disease and related neurocristopathies in humans.
- In 1998, the discovery of orexins/hypocretins as endogenous ligands for orphan G protein-coupled receptors that regulate wakefulness feeding behavior. The lack of a functional orexin system lead to the disease narcolepsy.
- The discovery of orexins (1998) which opens a new era of sleep studies. The lack of a functional orexin system leads to the disease narcolepsy in human.



Prof. Yanagisawa with his team

- The foundation of the International Institute for Integrative Sleep Medicine (IIIS) in 2012 (funded by the World Premier International Research Center Initiative (WPI) program by MEXT)
- His continued efforts to elucidate the mechanisms underlying sleep/wake regulation
- His many contributions to spreading knowledge about sleep diseases to the general public.
- 1991 – 1991 Assistant Professor of Pharmacology, Kyoto University School of Medicine, Japan
- 1991 – 1996 Associate Professor of Molecular Genetics; Associate Investigator, Howard Hughes Medical Institute University of Texas Southwestern Medical Center at Dallas (UTSW), USA
- 1996 – 2014 Professor of Molecular Genetics, UTSW, USA; Investigator, HHMI , USA

**Curriculum Vitae**

- 1960 Born in Tokyo, Japan
- 1985 M.D. (summa cum laude), University of Tsukuba, Japan
- 1988 Ph.D. in Medical Sciences, University of Tsukuba, Japan
- 1988–1989 Postdoctoral fellow, Department of Pharmacology, University of Tsukuba, Japan
- 1989 – 1991 Assistant Professor of Pharmacology, University of Tsukuba, Japan
- 1991 – 1991 Assistant Professor of Pharmacology, Kyoto University School of Medicine, Japan
- 1991 – 1996 Associate Professor of Molecular Genetics; Associate Investigator, Howard Hughes Medical Institute University of Texas Southwestern Medical Center at Dallas (UTSW), USA
- 1996 – 2014 Professor of Molecular Genetics, UTSW, USA; Investigator, HHMI , USA
- 1998 – 2014 The Patrick E. Haggerty Distinguished Chair in Basic Biomedical Science, UTSW, USA
- 2003 Elected Member, National Academy of Sciences
- 2001 – 2007 Director, Yanagisawa Orphan Receptor Project (JST/ERATO), Japan
- 2010 – 2014 Professor and Director, FIRST program, University of Tsukuba , Japan
- as of 2012 Director, International Institute for Integrative Sleep Medicine (WPI-IIIS)
- as of 2014 Adjunct Professor of Molecular Genetics, UTSW, USA



Presentation of the honorary doctorate by the Dean of the Medical Faculty, Prof. Claudio L.A. Bassetti



## New Professors at the Medical Faculty



### Matthias Siepe

Since 15 March 2022 Full Professor and Director and Chief Physician of the University Department of Cardiac Surgery at the Inselspital

Matthias Siepe completed his specialist training in cardiac surgery and vascular surgery at the University of Freiburg (Germany). He was then employed at today's University Heart Center Freiburg-Bad Krozingen, between 2004 and 2012, firstly as Senior Consultant, then Department Head Physician, and most recently, as Deputy Medical Director. His expertise encompasses the entire spectrum of cardiovascular surgery and bridges gaps with neighboring disciplines; ranging from the correction of congenital heart defects in infancy through adulthood, to cardiac bypass, (minimally invasive) valve and aortic surgery, heart and combined heart-lung transplantation, to cardiac assist devices („artificial heart“). His research initially focused on investigations into the use of stem cells, and then expanded to include clinical (multicenter) studies, generating fundamental and award-worthy findings with studies supported by the German Research Foundation and the German Heart Foundation. Matthias Siepe has served as a board member for the German Society for Thoracic and Cardiovascular Surgery (DGTHG) and is currently the Editor-in-Chief of the Journal of the European Association for Cardio-Thoracic Surgery (EACTS). He is strongly committed to student teaching, continuing education and diversity characterizes him, and he involves young scientists in clinical and research activities as early as possible, already during their studies.



### Inti Zlobec

Since 1 April 2022 Professor of Digital Pathology Institute of Pathology, University of Bern

Inti Zlobec (43) grew up in Montreal, Canada, where she studied physiology, pathology and epidemiology and received her PhD in experimental pathology from McGill University. In 2007, she started as a postdoctoral fellow at the Institute of Pathology, University Hospital Basel, where she conducted tissue-based research in colorectal cancer using biostatistical models. After her habilitation in 2010, she moved to the Institute of Pathology at the University of Bern, where she established the Translational Research Unit (TRU) and later modernized the Tissue Bank Bern (TBB). Inti Zlobec was appointed Associate Professor in 2014. Today, she leads an interdisciplinary research group using artificial intelligence and machine learning as tools to study histopathology image data and other data types to discover and validate novel prognostic and predictive biomarkers for colorectal cancer patients. In her new position, she will be responsible for the research and development of digital pathology and artificial intelligence at the Institute of Pathology. Inti Zlobec is a member of the Center for AI in Medicine (CAIM) at the University of Bern, co-founder and president of the Swiss Consortium for Digital Pathology (SDiPath) and chair of the Digital & Computation Working Group of the European Society of Pathology (ESP).



### Drosos Kotelis

Since 1 June 2022 Full Professor for Vascular Surgery and Director and Chief Physician of the University Department of Vascular Surgery at the Inselspital

Drosos Kotelis (40), originally from Thessaloniki, Greece, completed his medical studies at the University Heidelberg, Germany in 2005. From 2006 to 2015, he worked in the Department of Vascular Surgery at Heidelberg University Hospital, obtaining his specialist title in Vascular Surgery in 2012, and advancing to Senior Physician in 2013. In 2015, he joined the Department of Vascular Surgery at the University Hospital RWTH Aachen. In 2016, he was appointed Deputy Head of Endovascular Aortic Surgery, and in 2019, he was promoted to Deputy Clinic Director, Chief Resident and Head of Endovascular Aortic Surgery. Drosos Kotelis' clinical focus is on both open and minimally invasive treatments of aortic diseases. The University Hospital RWTH Aachen is an international center of reference for complex aortic diseases. For many years, there has been close scientific and clinical cooperation in the field of aortic surgery between the Aortic Center Aachen-Maastricht and Inselspital Bern with almost identical areas of expertise. His research focuses on individualized implants for the treatment of aneurysms and on autologous hybrid vascular prostheses. Drosos Kotelis supports the establishment of multidisciplinary, translational and academic research in aortic pathologies.



### Andrea Katharina Klein

Since 1 July 2022 Professor for Neuropediatrics and Head of Neuropediatrics at the University Department of Pediatrics at the Inselspital

Andrea Klein studied medicine in Basel. After years of training in Rorschach, Basel, St. Gallen and Zurich, she qualified as a pediatrician in 1998 and as neuropediatrician in 2002. From 2002 to 2015, she worked as a senior physician in the Department of Neuropediatrics at the Children's Hospital in Zurich. During this time, she had the opportunity to deepen her clinical and scientific interest in the special field of neuromuscular diseases at the Dubowitz Neuromuscular Center in London and completed her habilitation at the University of Zurich in 2015. Since 2016, she has headed the Pediatric Neuromuscular Centers at the University Hospitals of Basel and Bern. Andrea Klein's main research interests are in the field of diagnostics and therapy of neuromuscular diseases in childhood. She co-founded and since 2016 is head of the Swiss Neuromuscular Disease Registry and leads clinical trials in children with Spinal Muscular Atrophy and Duchenne Muscular Dystrophy. Another area of interest is opsoclonus-myoclonus syndrome, a rare neuroinflammatory disease.

## SNF Eccellenza Professors at the Medical Faculty



### Athina Tzovara

Since 1 September 2022 Assistant Professor with Tenure Track for Machine Learning for Medicine at the Faculty of Science (Institute of Computer Science) and Medical Faculty (Experimental Neurology Center, ZEN and NeuroTec SITEM, Department of Neurology at the Inselspital)

Athina Tzovara is an assistant professor at the Institute of Computer Science at the Faculty of Science and the Department of Neurology. She received a diploma in electrical and computer engineering from the National Technical University of Athens, Greece in 2009, and a PhD in neuroscience from the University Hospital Centre of Lausanne in 2012. She then moved to the University of Zurich as a postdoctoral researcher and the University College London, UK as an honorary research associate. Before joining the University of Bern, she was a visiting scholar at the Helen Wills Neuroscience Institute, at the University of California Berkeley, USA.

Her research program combines machine learning techniques with invasive and non invasive electrophysiological recordings to study functions of the human brain in health and disease. In particular, her research group is studying neural functions in coma, epilepsy, and during sleep, with the goal of investigating how the human brain processes sensory information as a function of consciousness, and of developing novel biomarkers to assist and augment clinical decision-making.



### Eva Segelov (Hoffman)

Since 1 December 2022 Full Professor for Clinical Research and Director of the Department of Clinical Research at the Medical Faculty of the University of Bern and University Cancer Center, Inselspital

Eva Segelov graduated in medicine at the University of Sydney. She is a specialist in Medical Oncology, in particular Gastrointestinal Cancers and Neuroendocrine Tumours. She has held joint academic and clinical positions throughout her career, including at University of NSW and as Professor of Medicine at Monash University, Melbourne. After attaining her PhD in 1998, her research career has focused on clinical trials, in particular investigator-initiated trials, with translational research on trial biospecimens.

Professor Segelov has an interest in Global Oncology, values-based health care and patient-centered care. She is excited to take the role as Chair of the Department of Clinical Research with the mission to enhance all clinical research across University of Bern, Inselspital and affiliated health services, by harnessing innovations and opportunities with large and small industry and biotech partners, biobanks and integrated clinical data. She has expertise in working with patients and communities to enhance their role as active partners in research, as well as in promoting research performed by and on women and underrepresented populations. As Head of DCR, she will oversee the current Clinical Trials Unit based at University of Bern, the Clinical Investigation Unit at sitem-insel and a new Medical Data Science professorship.



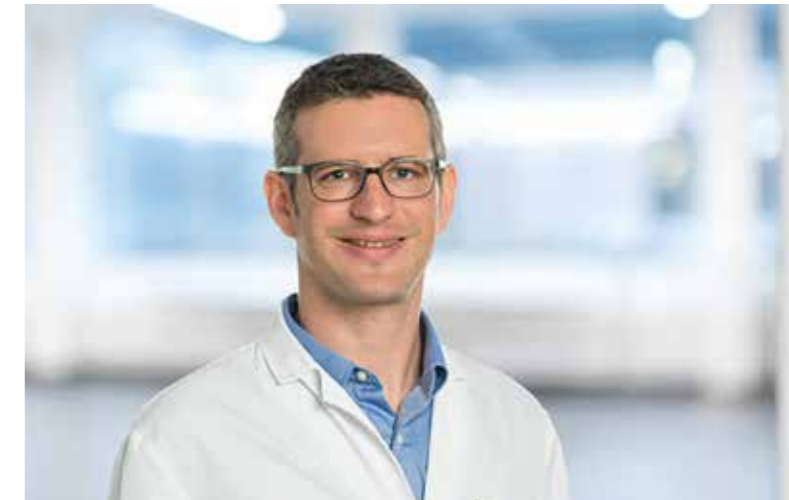
### Thomas Lemmin

Institute of Biochemistry and Molecular Medicine (IBMM), University of Bern  
1 September 2021 - 31 August 2026

#### Project: LMol: Biomolecular language models for protein design

What is the relationship between the structure, dynamics and function of protein? Can we computationally predict and tailor new function into proteins? These are some of the fundamental questions that I plan to address in my academic research program at Institute of Biochemistry and Molecular Medicine (IBMM), University of Bern. Proteins are remarkable biomolecular nano-machines that perform most essential processes needed for the survival of living organisms. The objective of protein design is to harness this powerful framework in order to engineer new function into proteins for biomedical and biotechnological applications.

In my lab, we will tackle the design process of functional proteins as a language-modeling process. This will create a new methodology for the design of protein with distinct catalytic, pharmaceutical and sensing properties, and ultimately help narrow the gaps in our theoretical understanding of the functional relationships between sequence, structure and dynamics.



### Maxime Baud

Department of Neurology of the Inselspital  
1 November 2022 - 31 October 2027

#### Project: Dynamical control of seizures

Epilepsy is a prevalent brain disorder in which seizures recur with apparent randomness. As a result, the million affected people live in a state of constant uncertainty about the timing of upcoming seizures. The ability to anticipate periods of higher seizure risk would mitigate uncertainty in epilepsy. In the last five years, my research group discovered that seizures are in fact organized over time in cycles of vulnerability followed by a relatively calm period, with a periodicity specific to each patient, lasting from hours to weeks. For example, some people have seizures about every month, while others have them weekly. At a shorter timescale, some people suffer mainly from seizures in the afternoon, while others have them only out of sleep. In this Eccellenza project, we posit that constant monitoring of brain activity will help anticipate the occurrence of seizures in order to better prevent them. We will test this directly in people with the disorder, using a new implantable device as well as in rodent models of epilepsy, using modern neuroscience tools. By opening up basic and clinical studies in parallel at Inselspital and Uni Bern, we increase the speed of acquisition of new deep mechanistic knowledge and its real application to the everyday clinical situation. This translational project, from bench to bedside, inscribes itself in the Swiss effort to develop highly performant medicine based on a deep scientific understanding.

## Faculty Membership due to Academic Excellence

### **Professor Wolf Hautz, Department of Emergency Medicine, member of the faculty due to academic excellence**

Professor Wolf Hautz, MD, MME, is senior attending specialist and head of research and education at the Department of Emergency Medicine at Inselspital Bern. He has been granted a faculty membership based on academic excellence in research in the field of emergency medicine. His research focus is on diagnostic error and the quality of medical diagnoses in acute care, a field in which he leads several SNF and EU funded research projects. He has further established extensive capacity for prospective clinical research in emergency medicine at Inselspital. In his own words, "the faculty membership is first and foremost recognition of a team performance".



### **Professor Gilles Wandeler, Department of Infectious Diseases, member of the faculty due to academic excellence**

Professor Gilles Wandeler is Head of Research and Attending Physician at the Department of Infectious Diseases, Bern University Hospital. He was granted a Professorship from the Swiss National Science Foundation (SNF) for his project on functional cure of hepatitis B in Switzerland and sub-Saharan Africa, and is the principal investigator of an SNF Investigator-initiated Clinical Trial within the Swiss HIV Cohort Study. He leads numerous cohort studies on viral hepatitis and HIV in Europe and sub-Saharan Africa and teaches on viral hepatitis in several European Universities. Since 2020, he co-leads the BEready cohort, a population-based cohort to study emerging infectious diseases in the framework of the Multidisciplinary Center for Infectious Diseases (MCID) in Bern. Furthermore, he chairs the Scientific Steering Committee of EuroSIDA, a large European HIV cohort collaboration, and is the Secretary General of AFRAVIH, the largest francophone HIV and hepatitis care alliance.





## Association of the Lecturers of the Medical Faculty Bern

The VDM represents the interests of the academic mid-level staff in the area of teaching, research and service and promotes contact and the exchange of information among its members. It is committed to the promotion of young academics and the equal opportunities of women and men.

The VDM is under the name of „Verein der Dozierenden der Medizinischen Fakultät Bern“ an association according to Article 60 ff of the Swiss Civil Code with a registered office in Bern.

All lecturers and professors of the Medical Faculty of Bern who are not permanent members of the faculty may become members of the VDM. Membership expires automatically when a member no longer belongs to the „Mittelbau“ due to promotion, change of position or other reasons. The association is financed by the optional contributions of its members.

The VDM Board consists of the President, the Vice-President, the Actuary and 5 other members, one of whom is an Assistant Professor. The members of the Board are elected for a term of 3 years. Re-election is possible.

Members of the board in 2022:

- Prof. Uyen Huynh-Do, President
- Prof. Jean-Marc Nuoffer, Vice-President
- Prof. Marcel Arnold, former President
- Prof. Jan Kucera, Actuary
- Prof. Mario Tschan
- Prof. Manuela Funke-Chambour
- Prof. Gabriela Bärlocher
- Prof. Florian Schönhoff

Members in committees and commissions:

- Teaching committee: Prof. Thomas Müller
- Dissertation commission: PD Sophie Yammine
- Habilitation commission: Prof. Zeno Stanga
- Interfaculty Equal Opportunity commission: Prof. Gabriela Baerlocher
- Internationalization commission: PD Myriam Heldner
- Strategy & Promotion commission: Prof. Marcel Arnold

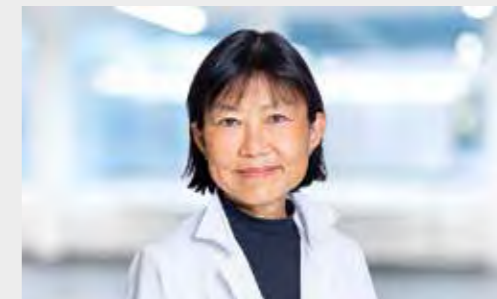
### Representation in other committees

In 2022, VDM representatives were delegated to 9 structural and succession commissions.



### VDM President

The current VDM president, Prof. U. Huynh-Do, in office since February 2021, is member of the scientific committee and serves in the following faculty working groups: Communication, Promotion of Young Professionals, Professionalization of the Dean's Office.



### VDM Vice-President

The newly elected VDM Vice-President, Prof. J.M. Nuoffer is member of the resource committee and since summer 2022, also of the „Sounding Board New Executive Compensation“.



**Verein der Dozierenden der Medizinischen Fakultät Bern (VDM)**  
 Institut für Physiologie  
 Bühlplatz 5, 3012 Bern



## Teaching

School of Human Medicine  
School of Dental Medicine  
Quality of Teaching  
Local Student Association of Bernese Medical Students  
Teacher of the Year  
Master of Science in Artificial Intelligence in Medicine  
Master of Science in Biomedical Sciences  
Master of Science in Biomedical Engineering  
Bachelor and Master of Science Program in Pharmacy



## School of Human Medicine

Physicians and medical doctors have been trained at the Medical Faculty in Bern for more than 200 years. Currently, the Bernese Medical Faculty is the second largest institution for the education of medical professionals in Switzerland.

### Profile

- Undergraduate and postgraduate training of physicians for more than 200 years
- 2<sup>nd</sup> largest institution in Switzerland for the education of medical professionals
- High practical relevance and patient-orientated training
- Increasing the number of study places by 100 in the master program of human medicine
- Bachelor program based on the educational approach of problem-based learning
- Master program offers subject-specific and practice-oriented study model with a high emphasis on bedside teaching in hospitals and in general practices
- Comprehensive training at the Inselspital in more than 50 disciplines
- Learning objectives according to PROFILES, which forms the basis of the Federal examinations

### Figures

#### Bachelors of Medicine

Study places HUM and DENT 2022	360
Starters HUM bachelor program 2019	353
Ending HUM with bachelor degree 2022	301
Drop out in the bachelor program 2019-2022	15%

#### Master of Medicine

Study places 2022	340
Starters master program 2019	249
Ending with master degree 2022	246
Drop out in the master program 2019-2022	1%

#### Federal Exam Human Medicine 2022

Multiple choice exam:	Clinical Skill exam:
247 candidates	247 candidates
246 passed	246 passed
1 missing	1 missing
0.4% missing	0.4% missing

### New Introduction Day for Study Beginners

New Bachelor students were welcomed to the Medical Faculty one week before the official start of their studies and introduced to the websites, the Library of Medicine (e-Day) and the campus. On e-Day, they were asked to indicate their place of residence, which was recorded on a descriptive map; see the picture of BibMed. 60% of the students do not come from Bern but another canton in Switzerland.



### Cohort of +100 Students Reached the Block Internships

In 2022, for the first time, the cohort had one hundred extra students who reached the Block Internships in the Master's program. Therefore, the block practicals were carried out in two cohorts. The course SK1 was shortened, and two new block courses, BK1/BK2, were introduced in the 4<sup>th</sup> year and 5<sup>th</sup> year. This made it possible to spread the many practical courses at the Inselspital over a total of 24 weeks with over 300 students.

### Student Assessment of Lectures via QR Code

In the 3<sup>rd</sup> year of study, student assessment of lectures via QR code was introduced as a pilot test. The lecturers welcomed the large variety of student feedback.



### School of Human Medicine

Murtenstrasse 11, 3007 Bern  
[https://www.medizin.unibe.ch/studium/index\\_ger.html](https://www.medizin.unibe.ch/studium/index_ger.html)



## School of Dental Medicine

The school of dental medicine zmk bern is one of the few schools of dental medicine in the world to offer an integrated interdisciplinary synoptic program based on problem-based learning and clinical case studies. Evidence-based treatment concepts ensure the high quality of teaching. The course of studies is based on the detailed Swiss national curriculum for dental medicine. The bachelor's and the master's degree programs in Dental Medicine at the University of Bern were accredited in December 2018 by the Rectors' Conference of the Swiss Universities based on the recommendation of the Swiss Center of Accreditation and Quality Assurance in Higher Education and is compliant with the Bologna process.

The bachelor studies in dental medicine (B Dent Med) comprise the first two years together with the studies in Human Medicine and one year at the zmk bern with dedicated dental propaedeutic courses with a final examination. The B Dent Med degree does not qualify for the acquisition of the Swiss dental license.

As part of the master program (M Dent Med), candidates are trained and tested on their ability to correctly and independently perform interdisciplinary treatment on patients as well as on their theoretical and analytical competence.

The master thesis may comprise

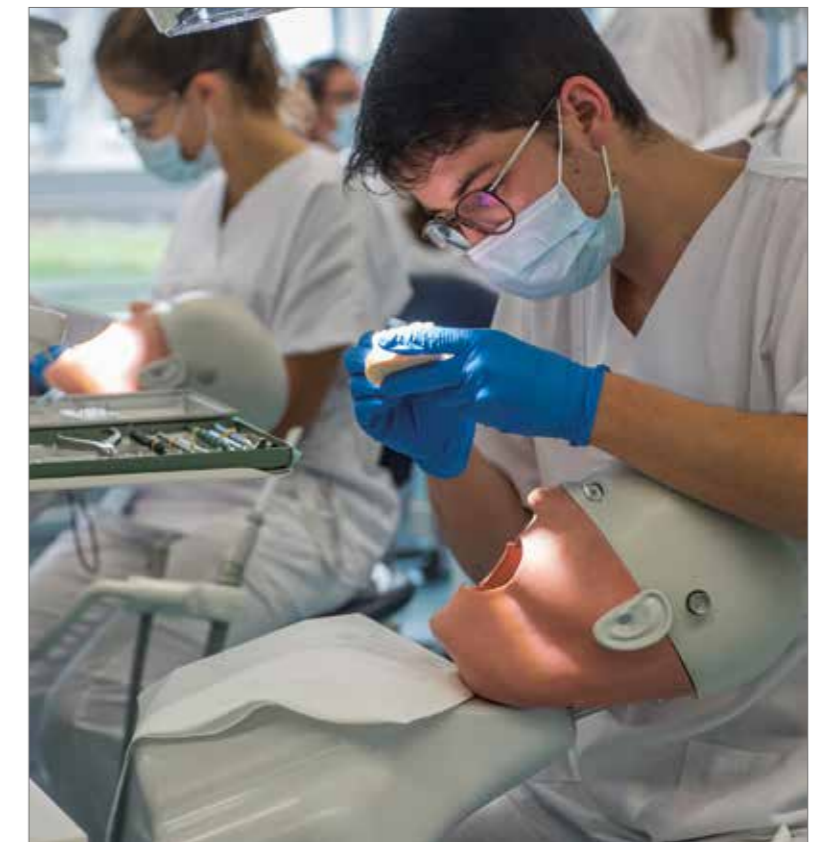
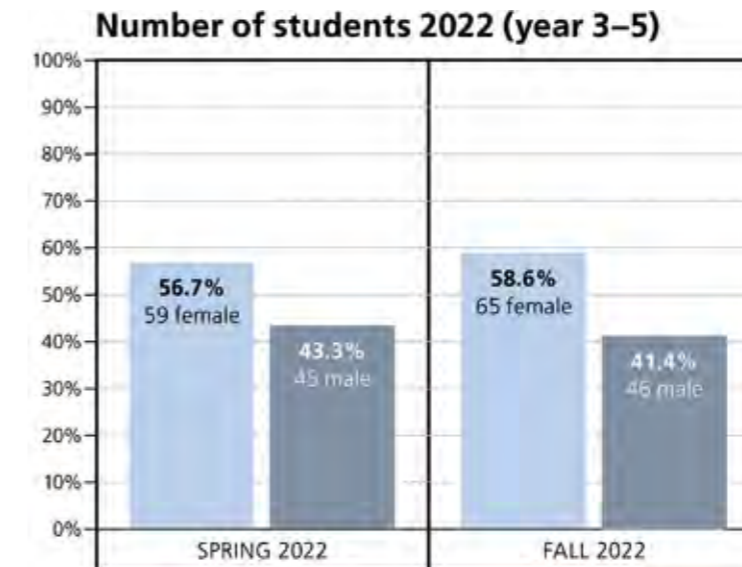
- an academic discussion of a topic relevant to dentistry
- an extended case study involving a discussion based on a systematic literature review
- a report of academic research (e.g. clinical trial protocol), or
- a fully elaborated e-learning case.

### Swiss national examination in dental medicine

Upon completion of the M Dent Med degree, candidates must take the Swiss National Examination in dental medicine in order to qualify for the Swiss dental license. Since 2011, the examination is based on a uniform standardized multiple-choice test that is conducted simultaneously nationwide in the two main languages German and French. After successful completion of the M Dent Med degree and the Swiss National Examination in dental medicine, the graduates may apply for a dental license in one of the Swiss cantons in order to work independently as dentist. The Swiss dental degree is recognized to be equivalent in the European Union. Furthermore, it is a prerequisite to apply for formal post-graduate training in one of the recognized federal dental specialties.

In 2022, 26 candidates (10 women, 16 men) successfully passed the Master exam and the Swiss National Examination in dental medicine.

The numbers of undergraduate students at the zmk bern (both bachelor and master) as well as the gender ratios are listed in the figure below.



**School of Dental Medicine**  
 Freiburgstrasse 7, 3010 Bern  
[www.zmk.unibe.ch](http://www.zmk.unibe.ch), [www.facebook.com/zmkbern](https://www.facebook.com/zmkbern)



## Quality of Teaching

The quality of teaching can be considered at three levels: at the level of the study programme, at the level of the individual teaching format (lecture, practical, seminar, patient-centred training, etc.) and at the level of the individual lecturer.

### Quality of the study programme (systemic level)

The teaching committees control the learning objectives. They are responsible for ensuring that the competences to be acquired, such as knowledge, skills and attitudes, are implemented using suitable forms of learning. They pay attention to appropriate learning quantities (cognitive load) and to a beneficial quality assurance of teaching. The Medical Faculty and the Inselspital ensure sufficient resources. Good quality teaching requires sufficient lecturers, classrooms, but also digital platforms and media. Coordination between lecturers is also important in a highly-structured, fully-scheduled course of study. Because the individual clinical lecturer has long since lost the overview of teaching. Medical teaching is too atomised as an expression of highly specialised medicine. It needs a good conductor, i.e. a Dean of Education.

### Quality of teaching formats

Knowledge, skills and attitudes must be taught or trained in a suitable format. Orientation knowledge can still be conveyed well in lectures. Students get detailed knowledge from the internet and only 20% of medical students buy books (estimate). Clinical skills need to be trained in appropriate settings, first with each other or on a model, later with real patients. Every student should be able to undergo the same training in the best possible quality. This requires an

appropriate and efficient training plan and sufficient and well-instructed lecturers. In PBL (Problem Based Learning), this includes challenging case vignettes, balanced learning objectives and sufficient time for self-study (learning load). In the clinical clerkships, the training plan consists of integrating students as learning team members, explicit feedback tools, lecture exercises and documentation of admissions. Especially in the clinical placements, the students' attitudes should also be addressed. This requires frequent feedback from the training doctors. Virtual patient cases are also increasingly important, which can be worked on in a self-determined manner when the motivation to learn is greatest.

### Quality of the lecturers

This aspect is commonly understood as teaching quality. Jan Breckwoldt has written an article\* in the SAEZ that is worth reading. According to this article, the success factors of good teaching are clearly communicated learning objectives, clear structures and content, adaptation of the content to the level of the students, commitment and role models. In practical courses, challenging tasks and the use of feedback are also important.

Often, apparent trivialities lead to complaints in lectures: The lecture slides are not uploaded and digital annotation in the lecture is thus not possible. Too many presentation slides usually also lead to exceeding the lecture time. Our recommendation is one slide per minute of presentation, so a maximum of 45 slides per lesson. Medicine is a visual subject. Therefore, illustrations should be labelled, which unfortunately is often missing.

### Can students assess the quality of teaching or do we need lecturer peers for this?

A pilot test in the 3<sup>rd</sup> year of study with the direct assessment of lectures by means of QR codes delivered astonishing results. The students gave school marks from 3 to 6 and thus very differentiated. These are average values of 50-70 students, so these are not individual opinions. It was pleasing to see that the majority of students gave very good marks around 5.5. Many encouraging words were also written, such as „top lecture - keep up the good work!“ Many concrete suggestions for improvement were written for poorly rated lectures, which could directly help the lecturers to improve their quality of teaching.. Of course, an experienced peer lecturer could also assess his colleague from a different perspective, such as whether the subject content is presented in a level-appropriate and interactive manner. However, the decisive factor is how the lecturer's message is received by the students. The student council (Fachschaft Medizin) has taken a different approach to electing the Teachers of the Year (TOY). At the end of the winter semester, all students first nominate good lecturers, and then a TOY is selected from the most nominated lecturers by vote.

Experience shows that more bachelor students take part in this process, as master students participate much less in the nomination and election process due to absence (hospital internships).

### Conclusion

The quality of teaching depends not only on the performance of the individual teacher, but also on the overarching study programme and its actors. Quality can be measured quite well in summary with suitable instruments.

Dr. Peter Frey, Head of Dean's Office of Student's Affairs

### Literature

doi: <https://doi.org/10.4414/saez.2022.21085>

Publication: 28.09.2022

Schweiz. Ärztztg. 2022;103(39):28-31







fsmb Executive Board at the end of 2022

## Local Student Association of Bernese Medical Students

### The fsmb (Fachschaft Medizin der Universität Bern)

- is created by students for students
- provides a link between the students and the faculty
- contributes to the optimization of studies
- has spokespersons in all study years, who are contact persons for the students and represent the academic year in the board of the student committee
- acts as a bundled voice for the interests of medical students in Bern: The Executive Board (EB) takes up concerns and inputs from the students, reflects on possible solutions and approaches the responsible holders of office, open for dialogue and cooperation.
- represents the interests of medical students in Bern in various commissions of the medical faculty (representation and right of codetermination)
- offers several assistance services and events: Clinical language courses for French and Italian, ski and sports weekends, stethoscope sales, the "Medifest", a monthly beer "BLS", a welcome aperitif for master students from Fribourg, fondue dinner, etc. (see homepage)
- 's board is elected at the annual general meeting, interested students are welcome!

### Questions to former president Florin Kalberer on the fsmb:

#### What kind of imprint have these past two years of presidency left on you?

The practical skills that can be acquired through a commitment as president are obvious: taking responsibility for a team, moderating discussions, guiding joint solution-finding processes. At the same time, one develops a valuable understanding of university structures and processes behind the scenes. Beyond that, however, – and this is all the nicer because I could not have foreseen it – I believe that I have made friendships that may last a lifetime.

#### What do you think are fsmb's strengths?

The fsmb offers young students like me an opportunity to get involved in something bigger: Everybody can realize his or her project for fellow students, without obligation. Due to the proximity to the target group, one gets direct feedback on one's own successes. And despite the local limitations, the fsmb, as the largest medical student association in Switzerland, has influence far beyond Bern – the ideal breeding ground for the seeds of tomorrow's change makers.

### Paul-Ehrlich Contest

The Paul-Ehrlich Contest is a yearly event organized by the Charité Berlin, where students from Germany and Austria compete in several different medical tasks against each other. Last year, the University of Bern participated with the first Swiss team at this international contest, trying to show the strength of medical education in Switzerland. Although the team did not reach the finals at the event, the participation was a great experience and with rank 9 out of 16 a reasonable success. Since the event was more than just a competition in practical skills and medical knowledge, the University of Bern competes again this summer at the Charité in Berlin, trying to win some more points than last year but also especially meeting with other Universities and students to learn, practice and connect with each other.



### New members

In September, the first-year students were welcomed with several projects, which were all reworked for this year. Everyone received a goodie bag, this year with an improved assortment of goodies – the favorite being the mini Aarebag from swisstransplant. An improved campus tour and the new first-years aperitif in the inselpark were key to helping the students connect with each other early on. Further, a fsmb project presentation was held for the students, so they could learn about the association and its work – hoping it would spark the idea of exerting their talents and getting involved themselves.

### General assembly

This year's general assembly had several important items on its agenda:

- A major part was taken up by the vote on the long overdue bylaw rework. Changes were made to rights and responsibilities of EB members and fsmb's organs. Furthermore, the concept of an advisory board was introduced.
- A recapitulation of the projects supported by the fsmb funds showed, that this newly introduced form of support has a lot of potential.
- A wide variety of events were financed, "Medi championships" or "SonoDays", only to mention a few.
- With the resignation of Florin Kalberer and Nicolas Graf, the general assembly has elected Laurin Largiadèr and Janik Müller for the offices President and Treasurer. Handover will take place in early 2023. Further, Lukas Schwendimann was confirmed as Secretary and Janis Stoffel was the first person to be elected into the newly created advisory board.



### Social calendar

The fsmb spinoff "BLS" has continued organizing its events "Alhambra-Cinemas" and the very successful "Monthly beer" in the Gertrud Woker Mensa. They have become important dates in most medical students' agenda and play a crucial role in connecting people as well as maintaining mental well-being. An especially big hit was the event in September, having attracted over 400 medical students. The BLS OC has also made developmental progress in various areas, like beginning a strategic partnership with a big player in healthcare. Further, a lot of brainpower was drawn into the creation of a clothing line, which was launched in November.





PD Dr. med. Stefano de Marchi

**„In addition, he is sympathetic and has a good sense of humor.“**

Comment from a 3<sup>rd</sup> year student

## PD Dr. Stefano de Marchi elected as «Teacher of the Year»

Stefano de Marchi, cardiologist and co-head of echocardiography at the Inselspital Bern, studied Medicine in Bern as well. During his training, he studied in San Francisco and after the state exam he conducted a research stay in the cardiological clinic of Oslo University Hospital in Norway. Ever since, he works in the Inselspital Bern, where he practically belongs to the inventory now.

In the fall semester 2022 he took over the cardiopathophysiology block, which is being attended by 3<sup>rd</sup> year medical students. He reorganized the block and even digitalized the heart tones from the auscultation course, therefore made them available to listen to after the course. With his sound studio experience he replaced the old generator in the Maurice E. Müller auditory with a modern mixing desk. These courses, despite taking place during lunch break after lectures, were highly appreciated. They proved to be practical for the cardiovascular clinical skills training, which he enjoyed to lead for years.

In our conversation, he gave me insights into the didactic goal of his lectures: no incoherent information overflow and lengthy slides, rather linking prior physiology knowledge and providing context for us in order to get a sustainable, logical knowledge basis on which we can build upon.

With lots of notes and sketches only made from scratch on his tablet, he approached the optimal conveyance of the heart's pathophysiology. His final result, concise and informative slides with a wide variety of selfmade, clear diagrams were described by several 3<sup>rd</sup> year students to be the ideal conceptualization of the topics he covered.

These logical, easily comprehensible slides, his explanatory style during lectures as well as his eye level to the students were reasons for his election as «Teacher of the Year 2022». In the comment box of the election poll he was especially praised for his dedication, motivation, organization, low-hierarchical interactions, slides manageable in number and content as well how he dealt with criticism, which was directly implemented in the next lecture.

His election was quite unusual, as he mainly gave lectures to 3<sup>rd</sup> year students, therefore having only few possible voters from other years of study. When he was informed about his nomination and later his election he seemed to be surprised and touched. He mentioned that this election by the students almost meant more to him than his habilitation.

However, the most important thing to him was that this title is dedicated to Prof. Christian Seiler. De Marchi worked many years alongside him and has taken over parts of his position, now being co-head of echocardiography. De Marchi sees his success in teaching as largely dependent on the support and confidence from Prof. Seiler, who led the cardiophysiology block for years and has always encouraged and trusted him to give these lectures.

Rightfully so, he does a great job in passing on this motivation to understand interrelations. We are very glad to have professors like him who refresh our everyday learning, sometimes overshadowed by a lot of memorization work, with thoughtfully created and logically explained lectures.

The interview was conducted by Florence Donzé, local student committee of Bernese medical students.



## Master of Science in Artificial Intelligence in Medicine

### Profile

- Interdisciplinary two-year full-time program in English
- Admission with BSc in a variety of STEM subjects
- Compatible with up to 40 % part-time work
- Rotations in university hospital departments to be instructed in medical specialities
- Fundamental and applied courses in AI
- Master's thesis project (one semester)
- Strong ties to industry and hospitals

### Program and New Courses

Within the frame of the program, students gain solid knowledge in Artificial Intelligence (AI) and Machine Learning and get acquainted with basic concepts of biology and medicine. They regularly dive deeply into clinical procedures and routines.

The MSc thesis project is conducted in collaboration with distinguished physicians from Insel Gruppe, internationally acknowledged AI researchers from the University of Bern and leading Swiss and international companies.

This year, we introduced four new AI-related courses and the course "Clinical Implementations of AI" which offers the unique opportunity for our students to visit eight clinical departments and get interesting insights.

Semesters 1-4	<b>AI</b> 20 ETCS	<b>Medicine</b> 18 ETCS
	<b>Foundation</b> 20 ETCS	<b>Applications</b> 20 ETCS
	<b>Electives</b> 12 ETCS	
	<b>MSc Thesis</b> 30 ETCS	

MSc AIM Study Structure

### Master's Open Days: Guided Lab Tours

In March, we opened our 12 ARTORG labs for interested engineering students and organized guided tours at both locations, Murtenstrasse 50 and SITEM. Each year in spring, all the UniBe master's programs welcome Swiss and international students for virtual and / or on-site visits. We are very pleased to have met some of our new students this way!



### Preparation Week

For the first time, the MSc Artificial Intelligence in Medicine organized a preparation week right before the start of the fall semester. By combining theoretical lectures on linear algebra, probability and optimization with a rich array of practical exercises in Python, this session provides an opportunity for high-achieving and ambitious students to work on their skills and successfully prepare for the new and exciting challenges.

On Friday, all 3<sup>rd</sup> semester students were invited for lunch for a lively exchange between "new" and "old" students.



### Mastermesse Oerlikon

In November, the MSc Artificial Intelligence in Medicine attended the annual Mastermesse in Oerlikon. Students from all over Switzerland had the chance to visit our booth and get involved in personal discussions about studying an engineering program at the University of Bern. We are looking forward to welcoming the new batch of motivated young scientists in Bern next year.



### CAIM Research Symposium

Some of our students followed the invitation to this year's research symposium at the end of November, which featured updates on the CAIM funded projects and provided an overview of the most important developments during the academic year. In addition, invited keynotes were given by AI experts from The Hebrew University of Jerusalem and the ETH Zurich. What a networking opportunity for the master students!



**Master of Science in Artificial Intelligence in Medicine**  
Murtenstrasse 50, 3008 Bern  
[www.caim.unibe.ch/msc\\_aim](http://www.caim.unibe.ch/msc_aim)



## Master of Science in Biomedical Sciences

Swiss Academic Institutions and Biomedical Research Companies recruiting young biomedical scientists are faced with a considerable shortage of local candidates. Having the goal to ease this situation, educational opportunities in life sciences and biomedicine have multiplied in recent years.

Among these efforts, the Biomedical Science program of the Universities of Fribourg (Bachelor) and Bern (Consecutive Master) has played a pioneering role. Established in 2006, the harmonized curriculum of the two universities remains unique in Switzerland with regards to being focused on exposing the students to a translational teaching environment involving both natural, medical and pharmaceutical sciences as well as offering insights into clinical research. To achieve a comprehensive translational knowledge in biomedical sciences, the first year of the bachelor's degree program is committed to convey a firm basis in natural sciences while, in the second year, students share lectures with medical students thereby acquiring a comprehensive knowledge in human anatomy, physiology and biochemistry. During the last year of the bachelor's studies and the 1<sup>st</sup> year of the master's degree program, students acquire a systematic knowledge of the pathophysiology of all organ systems with lectures given by basic research institutions, the university hospital, and pharmaceutical companies. Theoretical knowledge is complemented by introductions into state-of-the-art techniques used in biomedical research. The master thesis is conducted in a laboratory of choice and also includes collaborative projects with the industry. Based on the specific design of the curriculum, graduates in biomedical sciences have an exquisite and broad portfolio of both

knowledge and skills at the interface between basic sciences and clinical research that endorses them to engage successfully in basic, translational and clinical research including emerging new research fields in human medicine like artificial intelligence and precision medicine.

### Profile

- Direct admission with a BSc in Biomedical Sciences of the University of Fribourg or a Bachelor in Human and Dental Medicine
- 1 1/2 year full time study program
- Human pathophysiology is lectured by basic researchers and clinicians
- Courses include practical work in research laboratories and training in modern experimental techniques
- Two laboratory internships (3 weeks each) in research fields chosen by the students allow for deeper insights into research areas of interest
- Elective studies offered include introductions to clinical studies, attendance of the Labortierkudkurs 1 (LTK1, completed with a diploma), and a course in career planning
- Opportunities for conducting the master thesis in the industry
- Broad portfolio of systematic knowledge and skills at the interface between basic sciences and clinical research
- Graduates are in high demand for doctoral positions in academia and for research positions in the industry

### Figures

- Diplomas since 2011: 230
- Presently enrolled students: 17
- Gender (f/m): 1/16
- 20 biomedical sciences graduated in 2022

### CSL Behring Prize 2021

The CSL Behring Prize 2021 for the best Master degrees were awarded to:

1. Rank: Caroline Piccand \*5.78\*
2. Rank: Kaitlyn Stephanie Berchier \*5.76\*
3. Rank: Laurent Jean Elie Gueissaz \*5.43\*

The CSL Behring Report can be found here: <https://www.cslbehring.ch/news/2022/biomedical-science-award-2022>



Left to right: Laurent Gueissaz (23), Caroline Piccand (24), Kaitlyn Berchier (24) and Nathan Roth (CSL Behring)

### Alumni Biomedical Science Prize 2022

The prize for the best master thesis 2022 sponsored by the Alumni Organization went to Giulia Sartoris for her study on „The influence of weaning reaction on lifelong immunity“.

The work was supervised by Prof. Dr. Ziad Al Nabhani, Department for Visceral Surgery and Medicine and Dr. Hai Li, Department for BioMedical Research, Research Group Gastroenterology / Mucosal immunology



### Master Program in Biomedical Sciences

Bühlplatz 5, 3012 Bern  
[www.medicin.unibe.ch/studium/studienprogramme/master\\_in\\_biomedical\\_sciences/index\\_ger.html](http://www.medicin.unibe.ch/studium/studienprogramme/master_in_biomedical_sciences/index_ger.html)



The Biomedical Engineering class of 2022

## Master of Science in Biomedical Engineering

The master's degree program in biomedical engineering is a full-time study program offered in cooperation with the Bern University of Applied Sciences. It aims at training multidisciplinary engineers to deliver scientifically-founded, sustainable and cost-effective solutions for biomedical problems in academia, medical care and industry.

### Curriculum

The full-time study program takes four semesters, which corresponds to 120 ECTS. It can be extended to a maximum of six semesters. When a student decides to complete the studies in parallel to a part-time professional occupation, further extension is possible on request. To support regular part-time work, mandatory courses take place (with rare exceptions) on only three days per week. After the first semester with mostly mandatory courses, which lay the foundation for the specialized courses in the upcoming semesters, students select one of the focus areas («Major Modules»)

Biomechanics, Electronic Implants, or Image-Guided Therapy. In the last semester, the program is completed by a master thesis of 30 ECTS.

### Profile

- Admission with BSc (FH/HES/SUP/Uni/ETH)
- International program in English
- Affiliated to a leading medical faculty hospital (Inselspital)
- Two-year full-time program but compatible with 40% working time
- Oriented towards clinical applications
- Excellent career perspectives

### Figures

- 157 students were enrolled in the fall semester
- 51 regular and 5 exchange or guest students joined in 2022
- 18% of new students are female
- 50 biomedical engineers graduated over the year 2022

### Graduation

Because the traditional graduation ceremony of the Medical Faculty had been cancelled, the BME program decided to organize a brief graduation ceremony for its graduates of 2021; the event took place after the official end of the BME Day. The graduates had already received their diplomas by post, and for this reason, they were solemnly awarded an „Aare bag“ – a dry bag typically used for swimming in Bern's river Aare.



2021 BME graduates

### Biomedical Engineering Day

What a relief! After a cancellation in 2020 and a virtual BME day in 2021 due to the Corona pandemic, the 13<sup>th</sup> BME day opened its doors to more than 350 interested visitors in May 2022. This annual networking event is a platform where Swiss MedTech companies as well as the BME research groups from the ARTORG Center and the Bern University of Applied Sciences (BFH) present themselves to interested students, researchers, and medical doctors. A highlight was the live surgery, performed by PD Dr. Häberlin from the Department of Cardiology at Inselspital.



BME Day 2022: Live surgery

### Biomedical Engineering Club

The BME club has a new president: Isaac Tripp replaces Samuel Knobel who has resigned. Isaac is a U.S. citizen who spent a year in Switzerland as a high school student. In 2020 he came back to enroll in the master's program Biomedical Engineering, which he graduated from in September 2022. We wish him and the BME Club a lot of success!



Isaac Tripp, the new BME Club president

### Award Winners in 2022

Several prizes were awarded to our students at the BME Day 2022: The RMS Award went to Lukas Geisshüsler for his outstanding grade point average (GPA) of 5.71/6.0. Each year, the Robert Mathys Stiftung (RMS) offers the grant to the BME graduate with the highest GPA. Moreover, Swiss Engineering awarded two prizes for the best master theses in the fields of innovation and basic science, respectively. The awards went to Aurélien Dorn and Remo Muri, respectively.



Our award winners Lukas Geisshüsler, Remo Muri and Aurélien Dorn (from left to right)

### Start of the BME Laboratory in Spring 2022

The BME Laboratory was held in the spring semester of 2022 for the first time. It has been introduced as a compulsory subject for all students in order to further promote applied education and practical skills within the BME master's degree program. Twenty-six projects were offered within the affiliated BME research groups. While working on immersive projects, students strengthen their ability to work in a team and improve their skills in data analysis, statistics, and especially scientific writing.



Jenny Estermann (left) and Silvan Rüttimann (right) in the Biomechanics Lab at ARTORG Center, supervised by PhD student Benjamin Voumard

**Master of Science in Biomedical Engineering**  
 Freiburgstrasse 3, 3010 Bern  
[www.bme.master.unibe.ch](http://www.bme.master.unibe.ch)



## Bachelor and Master of Science Program in Pharmacy

### Profile

- Bifacultary study programme with the Bachelor course in Pharmaceutical Sciences at the Natural Sciences Faculty and the Master course in Pharmacy at the Medical Faculty
- Bachelor years 1 and 2: Natural sciences (e.g. chemistry, physics, cell biology) and biomedical sciences (e.g. biochemistry, anatomy, physiology, microbiology, plant biology)
- Bachelor year 3 (first started in September 2019): Pharmaceutical sciences (pharmaceutical technology, pharmaceutical chemistry, pharmaceutical biology, pharmacology, epidemiology, clinical chemistry, nutrition, biotechnology, quality management)
- Master year 1 / year 4 (first started in September 2020): Diseases and pharmacotherapy, health promotion and disease prevention, the Swiss health system, scientific methodology; master thesis (6 months)
- Master year 2 / year 5 (first started in September 2021): Clinical pharmacy and pharmaceutical care, clinical skills, triage and red flags, vaccination, prescription validation, communication training, business management, law, manufacturing of medicines in the public pharmacy, and other courses; practical training in a public pharmacy (30 weeks)
- Upon completion of the Master of Science in Pharmacy, the Federal Exam in Pharmacy has to be passed to obtain the qualification to work as a pharmacist.
- In close collaboration between institutes of the Medical Faculty (most prominently the BIHAM), clinics of the Inselspital, and practising pharmacists we aim at offering a high-quality, patient-oriented education of our future generations of pharmacists.

### Successful Accreditation

The new full study program comprising the Bachelor course in Pharmaceutical Sciences and the Master course in Pharmacy received the accreditation by the Swiss Accreditation Council.



### Successful Master Theses in Pharmacy

The year 4 pharmacy students performed their master theses during six months between January and August 2022. The Swiss Society of Industrial Pharmacists (GSIA) sponsored again a prize for an outstanding thesis. The prize was presented by Dr. h.c. Uwe E. Jocham, President of the GSIA Foundation, to Jana Schelshorn for her thesis „Evaluation of a drug therapy safety algorithm for the detection of Triple Whammy prescriptions in inpatients at risk of acute kidney injury “ carried out at Kantonsspital Aarau, and co-supervised by Prof. Carla Meyer-Massetti (Clinical Pharmacy, Inselspital) and Hendrike Dahmke and Claudia Zaugg (Kantonsspital Aarau).



Left to right: Prof. Carla Meyer-Massetti, Dr. h.c. Uwe E. Jocham, Jana Schelshorn, Prof. Verena Schröder

### Clinical Skills and Communication Training

In parallel to the 30-week practical training in a public pharmacy, students in year 5 acquire clinical skills at the Bernese interdisciplinary skills and simulation person centre (BiSS). They also attend a communication training to prepare them for their work in a pharmacy. Interprofessional teams of pharmacists and physicians have developed the new concepts and deliver the lessons. In small groups, students can practice their clinical and communication skills hands-on and they receive constructive feedback from their peers, tutors and the simulation persons who act as patients. This practical training in a protected and supportive environment is very much appreciated by the students.



Clinical skills training in dermatology

### New Simulation Pharmacies at the BiSS, Uni Ziegler

In order to create a more realistic setting for the training of clinical skills and communication, as well as OSCE workshops, eight rooms at the BiSS can be furnished as simulation pharmacies. They include a sales-counter, a selection of drug packets, and a separate corner with table, chairs and couch representing the consultation room in a pharmacy.



A simulation pharmacy

### Successful First Completion of the Master's Degree and Federal Exams in Pharmacy

In summer 2022, all students successfully completed the first Master course in pharmacy and received the degree Master of Science in Pharmacy. In September, the first federal exams in pharmacy took place in Bern, and 22 young pharmacists have achieved the federal diploma. Congratulations!



Administration Office Bachelor, Freiestrasse 3, 3012 Bern  
[https://www.philnat.unibe.ch/studium/studienprogramme/bachelor\\_pharmazeutische\\_wissenschaften/index\\_ger.html](https://www.philnat.unibe.ch/studium/studienprogramme/bachelor_pharmazeutische_wissenschaften/index_ger.html)  
 Administration Office Master, Murtenstrasse 11, 3008 Bern  
[https://www.medizin.unibe.ch/studium/studienprogramme/master\\_pharmazie/index\\_ger.html](https://www.medizin.unibe.ch/studium/studienprogramme/master_pharmazie/index_ger.html)

## Promotion of Young Academics

sitem-insel School for Translational Medicine and Biomedical Entrepreneurship  
CAS, DAS and MAS Degree Programs  
Grants  
Talent4Bern  
PhD Education  
Commission for Equality





## sitem-insel School for Translational Medicine and Biomedical Entrepreneurship

### Bringing innovation to the patient – by connecting people

The sitem-insel School offers continuing education programs (MAS/DAS/CAS) and standalone courses to specialists in industry, hospitals, and academia in the fields of translational medicine, biomedical entrepreneurship, and medical device regulatory affairs. The sitem-insel School operates under the umbrella of the Medical Faculty of the University of Bern.

Together with the sitem-insel community, the sitem-insel School aims to connect the best minds in Science, Clinical Care, Regulation, and Management to advance medical technologies and improve patient care. We support individuals in their entrepreneurial and scientific endeavors by offering studies in advanced education (MAS/DAS/CAS), thereby training specialists in the highly relevant topics of translational medicine and entrepreneurship.

The sitem-insel School is located at the Insel Campus Bern and benefits from its proximity to the University Hospital (Inselspital) and the University of Bern. A wide variety of representatives from clinics, industry, research, and education interconnect at sitem-insel to innovate for the benefit of the patient.

As a business, medical, and research campus, sitem-insel promotes innovation and collaboration among all partners and stakeholders. sitem-insel opens its doors to all disciplines of translational medicine as a non-profit public-private partnership (PPP).

Together, we bridge the gap between clinical practice, research, and business.

### Members

- Dr. Christian Rosser, Director
- Prof. Dr. Rudolf Blankart, Professor of Regulatory Affairs
- Dina Marti, Study Program Manager and Business Lead
- Ivan Santos, Head of MDRQ Program, Marketing and Communications Development Manager
- Mark Illi, Head of TMBE Program
- Mei Wang, Study Administration

### Contact

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### Science Meets Entrepreneurship

sitem-insel addresses unmet professional needs in healthcare and elevates the expertise with the transfer of knowledge in scientific and medical fields, as well as entrepreneurial skills. In collaboration with experts in the fields of entrepreneurship, translational medicine, and life science, the sitem-insel School provides access to an excellent network.

Our study programs:

### MAS / DAS / CAS in Translational Medicine and Biomedical Entrepreneurship

Translational medicine is a new, process-oriented discipline that aims to translate new findings and products resulting from industrial development and basic research into clinical applications. In line with the tenants of translational medicine, this program seeks to professionalize the essential interaction between basic science researchers, clinicians, regulatory bodies, and investors.

### MAS / DAS in Medical Device Regulatory Affairs and Quality Assurance

Regulatory specialists are integral to bringing novel medical devices to market. They require a breadth of managerial and interpersonal skills in addition to technical, clinical, and legal knowledge. This state-of-the-art program provides you with according skills and knowledge.

### CAS in Artificial Intelligence in Medical Imaging

In an increasingly technological world, understanding the principles and extensive potential of Artificial Intelligence is key to explore its possibilities in the daily clinical practice of Medical Imaging. The study program aims to highlight the possibilities AI opens up for medical doctors and to show the places this technology might take us.



### MAS / DAS / CAS in Translational Medicine and Biomedical Entrepreneurship 2022-2024 has started

In collaboration with industry partners and the Inselspital, the sitem-insel School is able to grant 12 scholarships to promising research and development projects in Translational Medicine and Biomedical Entrepreneurship. After a challenging grant competition, the new cohort has presented their thrilling projects at the semester kickoff in September 2022 at sitem-insel. The cohort shows high diversity in terms of entrepreneurial projects, educational background, gender, and academic home institution. The sitem-insel School wishes the participants all the best for their upcoming educational journey.

**sitem-insel School**  
 Freiburgstrasse 3, 3010 Bern  
[www.sitem-insel.ch](http://www.sitem-insel.ch)  
[www.sitem.unibe.ch](http://www.sitem.unibe.ch)





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## CAS, DAS and MAS Degree Programs

The Medical Faculty offers over 30 programs of advanced studies. All programs are held by teachers of the faculty who transmit practice-oriented and state-of-the-art knowledge. The programs are addressed to professionals with a tertiary education.

### Advanced study programs of the Medical Faculty

- CAS/DAS/MAS in Artificial Intelligence Diagnostic Medical Systems
- CAS in Artificial Intelligence in Medical Imaging
- CAS in Biomedical Entrepreneurship
- MAS in Cariology, Endodontology and Pediatric Dentistry
- CAS in Clinical Nutrition
- CAS in Clinical Research in Health Care Organisations
- CAS in Exercise and Sports Therapy for Mental Illness
- CAS in Exercise and Sports Therapy in Orthopedics, Rheumatology and Traumatology
- CAS/DAS in Experimental and Translational Nephrology
- CAS/DAS in Hepatology
- MAS in Implant Dentistry
- CAS in Interprofessional Specialist Palliative Care
- CAS in Leadership in Health Care Organisations
- DAS, MAS in Leading Learning Health Care Organisations
- CAS in Managing Medicine in Health Care Organisations
- DAS, MAS in Medical Device Regulatory Affairs and Quality Assurance
- MAS of Medical Education (MME Unibe)
- MAS in Oral and Implant Surgery
- MAS in Orthodontics and Dentofacial Orthopedics
- MAS in Periodontology and Implant Dentistry
- CAS/DAS/MAS in Public Health
- MAS in Reconstructive and Implant Dentistry
- CAS in Sex and Gender Specific Medicine
- CAS/DAS/MAS in Sleep, Consciousness and Related Disorders
- CAS in Spiritual Care
- MAS in Stroke Medicine
- CAS in Swiss Cardiovascular and Diabetes Therapy
- CAS/DAS in Swiss Exercise Therapy in Sports and Medicine
- CAS in Translational Medicine
- DAS/MAS in Translational Medicine and Biomedical Entrepreneurship

„The Medical Faculty aims to increase its attractiveness for outstanding national and international young researchers at all levels and to promote talented individuals.“

(Strategy 2030)

### New advanced study program

A CAS in Medication Safety has been developed in the Clinical Pharmacy of the Division of Clinical Pharmacology and Toxicology of the Department of General Internal Medicine of the Inselspital. The Institute of Primary Health Care (BIHAM) and the Institute of Social and Preventive Medicine (ISPM) are represented in the program management. The aim of the program is to train specialists in the field of medication safety.



CAS in Medication Safety  
(starting in 2023)

## Grants

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### **Young academics grant for translational research (Dean's Office) and Young academics promotion for patient-oriented research of Insel Gruppe AG**

With the announcement of grants for „Protected Research Time“, the Medical Faculty supports the possibility of creating clinical research time for young academics in the medical service sector. The Dean's Office of the Medical Faculty and the Department of Teaching and Research of the Insel Gruppe AG jointly offer Young Investigator Grants. These are aimed at young assistant and senior physicians who pursue ambitions in research in addition to their clinical activities, as well as PhD students of the Graduate School for Health Science (GHS) in the Clinical Sciences Program. „Protected research time“ provides the opportunity to create clinical research time for junior academic staff in the medical services area.

The two grants have different orientations. The Dean's Office call is for individuals with translational research projects. The call from the Department of Teaching and Research is for physicians from Insel Gruppe AG with a patient-oriented research project.

### **Young academics grant for translational research „Protected Research Time“**

Career stage: doctoral students at the Graduate School for Health Sciences, Senior Physicians

Duration: 2 years

Number of calls/year: 2x per year (April and November)

Funding source: Dean's Office of the Medical Faculty, University of Bern

Additional information: open for doctoral students at the GHS or Senior Physicians with an academic degree, working at least 6 months at the Insel hospital, UPD or Service Institute of the University, over 40 years old and not habilitated

Women are explicitly encouraged to apply.

### **Young academics promotion for patient-oriented research of Insel Gruppe AG**

Career stage: MD's before habilitation

Duration: max. 2 years

Number of calls/year: 2x per year

Funding source: Departement of Teaching and Research of the Insel Gruppe AG

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### **Uni Bern Initiator Grant**

Career stage: postdocs and young PI

Number of calls/year: 2x per year

Funding source: University of Bern

Additional information: open to all disciplines; support for proposals for third-party funded career schemes (SNSF mobility fellowships, Ambizione, SNSF-professorship; EU Marie-Curie-S. fellowships, ERC grants, etc)

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### **Numerous Foundations**

Career stage: during BSc or MSc

Duration: 1 – 5 years

Number of calls/year: 1x per year

Funding source: Foundations

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### **Travel Grants**

Career stage: during BSc or MSc

Duration: 1 – 6 years

Number of calls/year: continuously

Funding source: Dean's Office of the Medical Faculty, University of Bern

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### **SF-Board Project Calls**

Career stage: Promotion of strategic research priorities at the university units of Inselspital

Duration: 2 – 4 years

Number of calls/year: 1x per year (March)

Funding source: Medical Faculty, University of Bern and the Departement of Teaching and Research of the Insel Gruppe AG

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### **FILMED (Promotion of Innovative Teaching in Medicine)**

Career stage: lecturers or project managers of innovative teaching projects at institutes and clinics of the Medical Faculty

Duration: 1-2 years

Number of calls/year: 1-2x per year

Funding source: Matching funds of the University of Bern and the Medical Faculty

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### **Röthlisberger Stipendium**

Career stage: medical students from the 2<sup>nd</sup> year of study upwards

Duration: 1x per year

Number of calls/year: 1x per year (September)

Funding source: Röthlisberger Foundation

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**New Grant!**

### Talent4Bern Program

One of the strategic missions of the Medical Faculty of the University of Bern is to promote the next generation of Medical and Biomedical Researchers. This funding scheme will support researchers that aim to apply for an SNSF Professorial Fellowship or the equivalent scheme in the upcoming calls to start their own independent research group at the Medical Faculty. Grantees will benefit from help in the preparation of the SNSF grant proposal as well as mentoring and additional financial support during the duration of their SNSF Starting Grant. A candidate who was not initially selected for the Talent4Bern program, but who nonetheless submitted her/his application to the SNSF and was invited to the second evaluation can still obtain support in the preparation of the oral evaluation. If successful at SNSF, the candidate will also benefit from the rest of the Talent4Bern program. A candidate who was successful at SNSF but did not participate in the Talent4Bern selection process can enter the Program if joining the Medical Faculty of Bern.

Career stage: researchers that aim to apply for an SNSF Starting Grant (former Eccellenza,PRIMA and Professorial Fellowships)  
Duration: maximum 5 years  
Number of calls/year: 1x per year  
Funding source: Strategic Fund Medical Faculty, Strategic funds Departement of Teaching and Research of the Insel Gruppe AG and Host Institute





## PhD Education

The GCB and GHS offer research-oriented curricula with a wide range of courses, including special workshops and practical courses tailored to the individual needs of PhD candidates. The emphasis is on high-quality training and support in research methods and study design to direct the candidates towards independent scientific work and enable them to assume scientific responsibility.

### Profile of the Graduate School of Health Sciences GHS

The GHS offers a research-oriented-curricula on psychological and physiological factors that determine the health of individuals and groups in their social contexts and physical environments.

The requirement for the program is a master's degree in Psychology, Medicine, Biomedicine, Epidemiology, Geography, Sport Science, or other fields depending on the respective research project.

Depending on the field of research and on the amount of time invested in research, the candidates are assigned to one of the following expert committees:

- FK I: Preventive and Social Medicine, Public Health, Medical Education, Psychology, Biostatistics, Rehabilitation and Patient-Related Studies, Dentistry and Pharmacy
- FK II: Neurosciences
- FK III: Clinical Sciences (50:50 model: patient-oriented research and clinical career)

Each candidate is supported by a thesis committee consisting of a thesis advisor (in some cases also a co-thesis advisor), co-referee, and a member of an expert committee as mentor (only in FKIII).

### Profile of the Graduate School of Cellular and Biomedical sciences GCB

The GCB offers training in experimental research with state-of-the-art methods in molecular life sciences, biomedical sciences and biomedical engineering. Research areas include Cell Biology, Biochemistry, Molecular Biology, Immunology, Genetics, Biomedical Sciences, Epidemiology as well as Tissue Engineering and Computer-Assisted Surgery.

There are currently four areas of specialization:

- Cutting-Edge Microscopy
- Stem Cell Research in Regenerative Medicine
- Cell Migration
- Tumor Biology

Two new areas approved in 2022 to begin in 2023

- Cardiovascular
- Neuroscience

The program requires a master's degree in Molecular Life Sciences, Biomedicine, Medicine, Biomedical Engineering or a related field depending on the project.

There are five expert committees

- Biological Systems
- Biomedical Sciences
- Cell Biology
- Molecular Biology & Biochemistry
- Biomedical Engineering

Each candidate is supported by a thesis committee consisting of a supervisor, a co-advisor, and a member of an expert committee as a mentor.

The curricula of the MD-PhD program for medical doctors focuses on basic sciences, but the PhD candidates can spend 20% of their time in the clinic.

Graduates receive one of the following titles from the University of Bern:

- MD,PhD (Doctor of Medicine and Philosophy)
- DDS,PhD (Doctor of Dentistry and Philosophy)

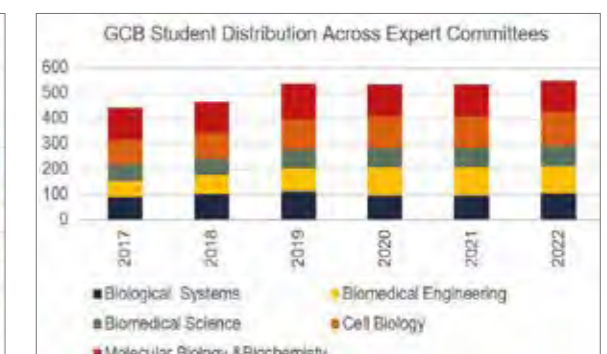
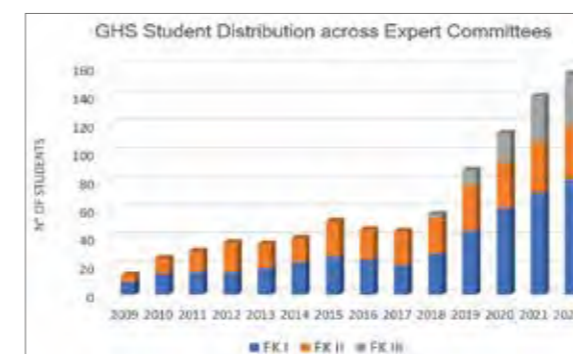
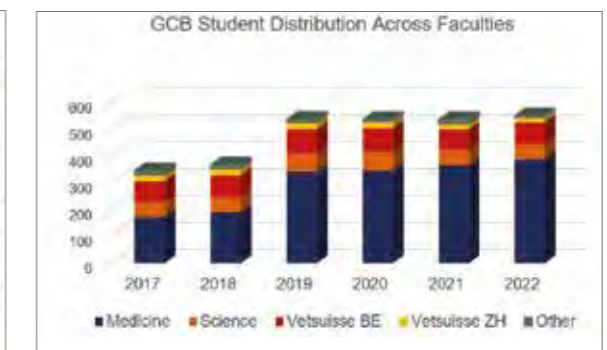
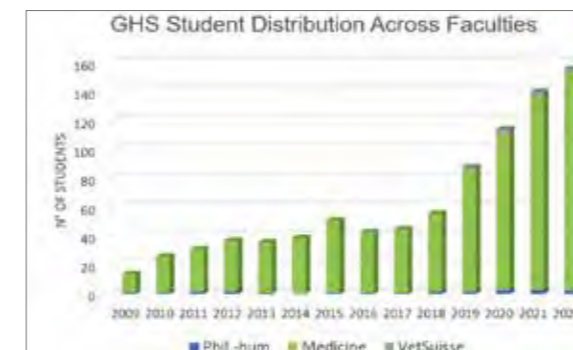
As in 2021, the graduate schools were fully functional throughout 2022 with no interruption despite the Covid-19 pandemic. GCB and GHS thank the Medical Faculty and the other associated faculties, together with the GHS/GCB offices and students, committee members/mentors, and supervisors for helping attain this achievement.

### Highlights, important events at GHS

- Increased number of students from 140 to 156.
- From the end of 2018 – 2022 there was a growth of 174% in the number of students
- Two-days GHS Symposium at Studienzentrum Gerzensee was very successful with a record number of student's participation (84 presentations of posters and talks)
- Changes in the Steering Board Committee: Prof. Thomas Abel retired. As his successor was nominated Prof. Marcel Zwahlen
- Welcomed seven new medical faculty expert committee members and thanked three outgoing
- The GHS regulations renewal process was finalized. With the new regulations the students with a master's degree from the Universities of Applied Sciences will be able to join the GHS.
- Despite the third year of pandemic, we had the highest number of graduations (17) since the beginning of the GHS
- Publication of the third GHS Annual Report

### Highlights, important events at GCB

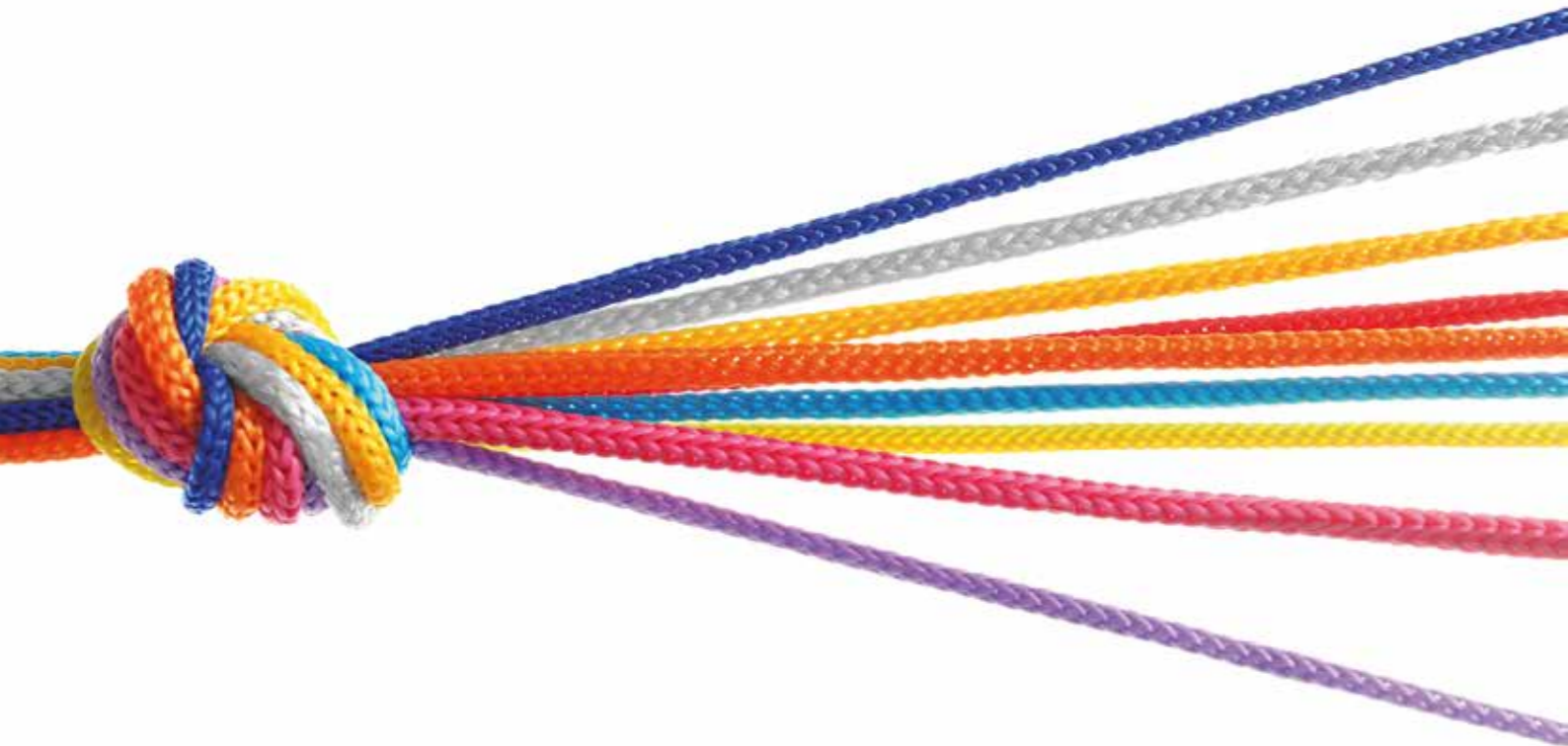
- Admission Applications – there were 157 in 2022 compared to 127 in 2021
- Welcomed 7 incoming medical faculty mentors and only one stepped down
- Successful second fully virtual GCB Symposium 2022 supported by ATORG's Prof. Dr. Tobias Nef and Dr. Stephen Gerber – 39 talks, 189 poster flashes, 257 posters
- Currently there are 56 MD, PhD & 2 DDS,PhD and 43 DVM,PhD students enrolled



GHS total number of students in 2022: 156 students (which includes 17 theses defended, 5 resignations and 35 new applications in 2022). 98 % of the GHS students are pursuing PhD degrees within the Faculty of Medicine.

GCB total number of students in 2022: 549 registered, (which includes 107 theses defended, and includes the 157 new applications in 2022).

**Graduate Schools GCB & GHS**  
Mittelstrasse 43, 3012 Bern  
[www.gcb.unibe.ch](http://www.gcb.unibe.ch) & [www.ghs.unibe.ch](http://www.ghs.unibe.ch)



## Commission for Equality

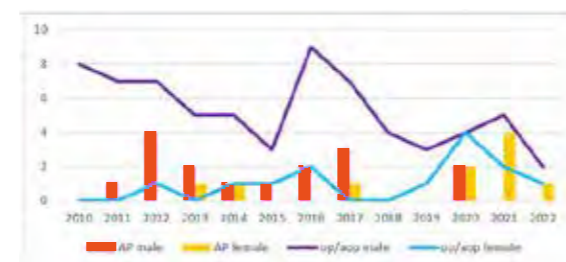
The Medical Faculty Commission for Equality (Innerfakultäre Kommission für die Gleichstellung, IFKG) supports the Medical Faculty in implementing measures ensuring effective equality and diversity throughout the whole faculty. Together with the decision-makers of the institutes and clinics, the IFKG for example aims to improve conditions that facilitate the decision for women to pursue an academic career.

The immediate aim of the Commission for Equality is to increase the number of women in leadership positions at the Medical Faculty and to increase diversity. Among other measures, the IFKG aims to illustrate career options that improve working conditions such that they allow both women and men to combine their family with their academic career pathway.

### Profile

- Mentoring4Women program: empowering women in clinical and academic careers
- Ensuring implementation of equal opportunities in search committees and in the work environment of the Medical Faculty
- Female Empowerment in Life Sciences (FELS): a new interdisciplinary association of clinical and pre-clinical female researchers in the Medical Faculty
- Contact point for all equal opportunity and diversity topics
- Contact point in case of discrimination
- External partners: Coordinator of the Office for Equality of the University Zürich, Coordinator of the Office for Equality of the University Hospital Bern
- Tight interaction with HR Insel and the Office for Equality of the University of Bern
- All gender equality activities are funded by the Dean's office.

### Figures



oP = Full Professors, aoP = Professors, AP = Assistant Professors  
 The graph highlights that the number of appointments of female professors is slowly increasing. Currently there are 63 female professors. In contrast at the level of Ordinaria and Extraordinaria we presently count only 20 female professors. You can find them on our website: [Medizinische Fakultät - Über uns - Professorinnen](https://www.medizin.unibe.ch/ueber_uns/gleichstellung/fels_netzwerk/index_ger.html)

Ordinaria and Extraordinaria are however the leadership positions, where women finally head institutions and direct their research and teaching independently, become faculty members and thus can have an impact on strategic decisions in their environment. Especially at the leadership level the Medical Faculty thus cannot stop its efforts to reach a better balance in the employment of female and male professors.

### Female Empowerment in Life Sciences (FELS)

The first retreat of the FELS network after last year's foundation took place in Appenberg in November 2022. The first day was marked by an interactive workshop by and with Sibyl Schädeli. The aim here was to prepare the female academics for a career in science. With this foundation, the FELS academics worked on various leadership skills during the second day together with Ms. Laetitia Philippe from the Swiss National Science Foundation and Ms Monica Brodmann SIWF President (Swiss Institute for Continuing Medical Education). On top the FELS team worked on the further orientation of their own network at the end of these two eventful days. The retreat allowed for two fantastic and productive days with many opportunities to network and grow on further topics. The first scientific collaborations between FELS members have already resulted from the network.

Find more information under [https://www.medizin.unibe.ch/ueber\\_uns/gleichstellung/fels\\_netzwerk/index\\_ger.html](https://www.medizin.unibe.ch/ueber_uns/gleichstellung/fels_netzwerk/index_ger.html)



### Excellence needs EQUAL OPPORTUNITY!

The IFKG is continuously working on the implementation of the equality plan according to the Strategy 2030 of the Medical Faculty. After the first half of the implementation of the gender equality plan, the IFKG summed up. A total of around 20 measures is currently implemented! We had the opportunity to present specifically the Mentoring4Women Program as well as the FELS network to the Faculty Council in April 2022. After the consistently positive feedback, we were also approached by clinics that would like to proactively address the issue of equal opportunities. These requests have resulted in workshops/mini symposia at which the current offers were shown and steps for continuous improvement were presented. This is a real highlight for us! Anyone who truly strives for excellence in research must leave room for more diversity, and even encourage it. Excellence needs EQUAL OPPORTUNITY! It is not in the hands of IFKG to make this change. Each individual clinic and institute can make a valuable contribution in this direction. The IFKG will gladly support them in their initiatives!



### Mentoring4Women Program

Furthermore, IFKG offers the Mentoring4Women Program to empower women in clinical and academic careers. As in every year, we have placed competent mentors. This would not be possible without the multitude of highly motivated mentors who make an exceptionally important contribution with their networks, experience, ideas, and critical reflections. It is great to feel this spirit and we would like to thank them for this volunteer effort! It is highly appreciated.

**Medical Faculty Commission for Equality**  
 Murtenstrasse 11, 3008 Bern  
[https://www.medizin.unibe.ch/ueber\\_uns/gleichstellung/index\\_ger.html](https://www.medizin.unibe.ch/ueber_uns/gleichstellung/index_ger.html)



## Centers and Platforms

ARTORG Center for Biomedical Engineering Research  
Bern Center for Precision Medicine (BCPM)  
Center for Artificial Intelligence in Medicine (CAIM)  
Department for BioMedical Research (DBMR)  
Department of Clinical Research (DCR)  
Diabetes Center Berne (DCB)  
Experimental Animal Center (EAC)  
Microscopy Imaging Center (MIC)  
Multidisciplinary Center for Infectious Diseases (MCID)  
NeuroTec  
Swiss Institute for Translational and Entrepreneurial Medicine (sitem-insel)  
Translational Imaging Center (TIC)  
University Cancer Center (UCI)  
University Neurocenter  
University Sleep-Wake-Epilepsy-Center (SWEC)

## ARTORG Center for Biomedical Engineering Research

Murtenstrasse 50, 3008 Bern  
www.artorg.unibe.ch

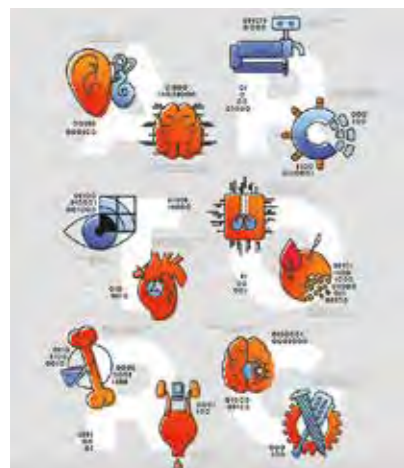


Prof. Raphael Sznitman AIMI | Prof. Stefan Weber IGT | Prof. Philippe Zysset MSB | Prof. Tobias Nef GER | Prof. Olivier Guenat OOC | Prof. Dominik Obrist CVE | Prof. Stavroula Mouggiakakou AIHN



Prof. Laura Marchal-Crespo MLN | Prof. Mauricio Reyes MIA | Prof. Philippe Büchler CBE | Dr. Francesco Clavica UGE | Dr. Wilhelm Wimmer HRL

### Structure



Interdisciplinary Center of Excellence in biomedical engineering at the University of Bern, the University Hospital, and industry at the interface of technology and medicine.

12 independent research groups, 5 of them at sitem-insel covering Artificial Intelligence, Biomechanics, Organs-on-Chip, Rehabilitation, Robotics, Surgical Technologies, Virtual and Augmented Reality.

Service facilities in biomechanical testing, clinical research databases, medical rapid prototyping, biomicrofabrication, scientific computing, and custom component manufacturing.

### Profile

- With its clinical partners ARTORG tackles unmet healthcare needs in diagnosis, monitoring, treatment, and rehabilitation, to improve patient quality-of-life and actively shapes the digitalized healthcare future through targeted approaches
- Longstanding experience in translation, clinical validation, and commercialisation of MedTech research in Bern and beyond, including various start-up spinouts with recognized excellence
- Teaching: Master's programs AI in Medicine & Biomedical Engineering, postgraduate program Cellular and Biomedical Sciences, electives in digitalization and AI for medical students, specialist courses for clinicians in collaboration with sitem-insel and networking events with industry partners
- Collaborations: Inselspital; UPD; Imperial College; Universities of Nottingham, Oxford, Rutgers, British Columbia; Helmholtz Center; Universities of Freiburg, Stuttgart; Vienna University of Technology; EMPA, EPFL, ETHZ, HUG, University Zurich, BFH, UniBE (Center for Space and Habitability, Psychology, ZMK)

### Grants

- SNF: Ambizione / BridgeNeuro / 3D PICS / AFFIRM CT / Covid 19 / HumanCochlea / HumanHip / ImageDataValid / Interpretability / IPACHIP / MachineLearning / UreteralStentsII / VTT
- Innosuisse: Flagship SwissNeuroRehab / Brain Tissue / IMAGINE / Intuitive / Starfly / Surg Train / PASTOR / PeriVision / RESTORE / QUMEA
- EU-Funding: AIM4DoC / Geyedance / MELISSA / Oberon / RCI
- Auris / Hasler PaCE / Hasler X-Ray / Vontobel-Stiftung / Roche / Krebsstiftung / 3RCC / SPHN / JDRF
- Grants Center for AI in Medicine (CAIM) & Multidisciplinary Center for Infectious Diseases (MCID)

## Highlights



Heiko Visarius, Moderator Swiss Medtech Day; Janick Stucki, Lea De Maddalena, Lea Todeschini, AlveoliX; Sabina Sperisen, Lichtsteiner Stiftung (© Swiss Medtech)

### AlveoliX Wins Swiss MedTech Award 2022

The spin-off of the ARTORG Organs-on-Chip Technologies lab was awarded the coveted Swiss MedTech Award worth CHF 75,000 at the Swiss MedTech Day 2022. Founded in 2019, AlveoliX has created a small-scale replica of the human lung ("Lung-on-Chip") that can also mimic respiratory motions. According to the jury, this organ-on-chip technology has the potential to establish itself as the new standard in preclinical drug development, as a leading alternative to animal testing, and to significantly advance personalized medicine.

The ARTORG Center is the only Swiss research institution to have won the highest award of the Swiss medical technology industry three times in 10 years.

### Measuring Daily Noise Exposure via Smartwatches

Loud noise at work or during leisure can lead to noise-induced hearing loss or tinnitus. But monitoring by professional sound level systems is not practical in everyday life. The Hearing Research lab of the ENT Department at the Inselspital and the ARTORG Center therefore conducted a study to determine how well conventional smartwatches are suited to monitor ambient noise. The measurements of the smartwatch proved to be sufficiently accurate to warn of hazardous ambient noise. The researchers are convinced that smartwatches will play an important role in monitoring personal noise exposure and provide a widely available and cost-effective measure for otoprotection.

[Tim Fischer et al., Front Neurolo. March 2022](#)



Measuring configuration & sound level categories (© Wilhelm Wimmer)

### Sensor-Based Early Detection of Age-Related Diseases

The ARTORG Gerontechnology and Rehabilitation lab in collaboration with ISPM UniBE, the EPFL and HES-SO as well as DomoHealth has demonstrated how home-based sensors recording movement patterns could help detect health problems such as old-age depression, risk of falls or cognitive impairment at an early stage. Paired with machine learning, the assessed health states were surprisingly accurate and could help discover novel digital biomarkers. In the future, the approach could allow seniors to spend a longer self-determined life at home and relieve pressure on the healthcare system.

[Narayan Schütz et al., NPF Digital Medicine, Aug 2022](#)

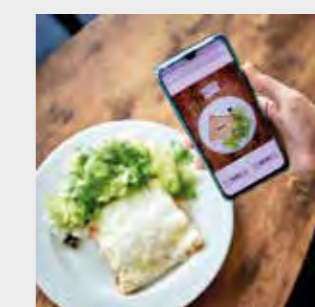


Sensors monitor health for older adults from home (© Narayan Schütz)

### Maintaining a Healthy Diet with Your Smartphone

Researchers at the ARTORG AI in Health and Nutrition lab with Oviva and the University of Zurich have shown that a smartphone can effectively track whether a person is adhering to a health-promoting Mediterranean diet (MD). MD adherence – mostly evaluated by manual user diaries and expert dietitians – can decrease non-communicable disease risk and prevent overweight and obesity. The ARTORG developed an Artificial Intelligence-powered system that recognizes nutrients from a single meal photo and, integrated into a smartphone app, outputs weekly feedback reports to users.

[Ioannis Papathanail et al., Nature Sci Rep., October 2022](#)



AI performance was tested against expert dietitians (Photo: Adrian Moser)

## Bern Center for Precision Medicine (BCPM)

Murtenstrasse 35, 3008 Bern  
[www.bcpm.unibe.ch](http://www.bcpm.unibe.ch), Twitter @PMBern



Prof. Mark Rubin  
Director

Prof. Carlo Largiadèr  
Vice-Director

Prof. Anne Angelillo-Scherrer

Prof. Nadia Mercader Huber

Prof. Christiane Zweier



Dr. Rémy Bruggmann

Prof. Sven Rottenberg

Prof. Marianna Kruithof-de Julio  
Chair of the Scientific Review Board

### Structure



The Bern Center for Precision Medicine (BCPM) is an interdisciplinary center supporting precision medicine. It comprises a management board, a scientific review committee, and an operational office. Headed by Prof. Mark Rubin, the center currently counts 92 members.

### Profile

- The BCPM strengthens the national and international position of the University of Bern and the Inselspital in precision medicine.
- The center aims to develop new medications and methods, increase the quality of treatment for patients, and relieve the healthcare system with more efficient therapies.
- The BCPM is active in research, education, networking, and outreach. External partners include universities such as the ETH Zurich, cantonal hospitals, and Weill Cornell Medicine in New York.

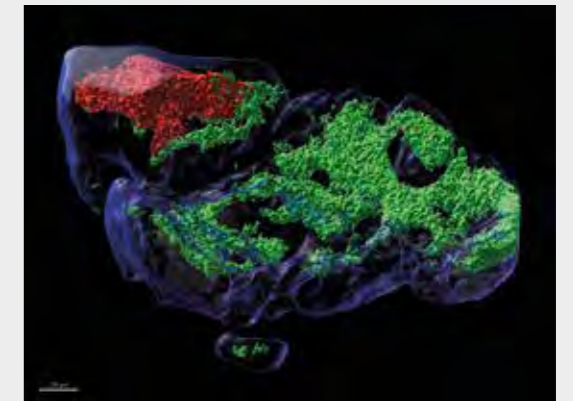
### Grants

- ERC Advanced Grant, EUR 2,5 Mio. for Sven Rottenberg: Targeting the essentialome of radiotherapy-resistant cancer (TETHER)
- Scailyte-InnoSuisse, CHF 961'607 for Konstantinos Nirgianakis: EndoSeek
- SNF, CHF 700'000 for Christoph Schlapbach: Unraveling the role of interleukin 9 in human skin inflammation
- Krebsliga, CHF 373'250 for Stephan von Gunten: Tumour glycosylation as immune checkpoint for cytotoxic lymphocytes
- SNF Sinergia, CHF 2,49 Mio für Marianna Kruithof-de Julio: PROMETEX, Metabolically-instructed personalized therapy selection for prostate cancer

## Highlights

### Research Projects

The center currently funds 32 research projects covering various medical subjects, from fundamental research to clinical application. Two calls were launched in 2022, one about facilitating ethical data sharing for research purposes and the other on cancer research. Seven interdisciplinary projects spanning from the understanding of therapy resistance to the discovery of novel markers for cancer detection, the identification of new biomarkers to stratify subpopulations eligible for immuno-therapy, and novel therapeutic targets tailored to subgroups were selected for funding. Most projects use state-of-the-art methodologies, such as single-cell transcriptomics or patient-derived organoids.



Tumor cells (red) grown within a microstructure (host tissue; green) in an organoid. Picture by Alison Ferguson.

### Clinical Genome Sequencing

Following an initiative from the BCPM, the NovaSeq 6000 sequencing machine situated at the Clinical Genomics Lab (CGL) is currently being used by both the Insel Gruppe and the University. As a result, this device is one of the busiest in Switzerland. Its users gained cutting-edge sequencing know-how, such as NGS for Microbiomics, High-Quality Microbiomic Amplicon Sequencing, Metatranscriptomics, and Metagenomics.

The Insel Gruppe has used the NovaSeq for NGS-based diagnostics in patient care. More than 1'000 exomes are analyzed annually for the diagnosis of inherited genetic diseases.

The TSO 500 gene panel, which was first evaluated in a research context, is increasingly being used for everyday clinical practice, and currently more than 1'500 analyzes are carried out annually. The CGL is the only laboratory in Switzerland that offers this analysis for patient care.

The CGL is expanding its offer to include examinations in cell-free DNA (liquid biopsy).

Thanks to the NovaSeq, both the Pathology (TSO500) and Human Genetics (Exome) divisions have been able to roughly double the sales of analyzes carried out in patient care since 2020, which would not have been possible otherwise.



Samples are being prepared for sequencing.

### Educational Module

The BCPM started its teaching endeavors in 2021 with an educational module – it offered two ECTS points and was mainly meant for pharmacy students. In 2022, the module was enlarged to three ECTS points and completed with a separate track for bioinformaticians. As a result, the module is currently part of three separate Master courses (pharmacy, bioinformatics, and biomedical sciences). It saw considerable growth in student numbers (from 12 students in 2021 to 44 students in 2022).

The primary learning goals of the module are for students to:

- understand the general concept of Precision Medicine (and be able to discuss it).
- be able to name the most important PM methodologies (and understand their role in PM research and translation).
- be able to name several examples of PM applications in different medical fields (and understand how these examples profit from the PM methodologies mentioned above).



BCPM members at one of the workshops.



## Center for Artificial Intelligence in Medicine (CAIM)

Murtenstrasse 50, 3008 Bern  
[www.caim.unibe.ch](http://www.caim.unibe.ch)



Prof. Raphael Sznitman, Director  
 Prof. Stavroula Mougialakou, Digitalization & AI Education  
 Prof. Roland Wiest, Digitalization & AI Education  
 Prof. Mauricio Reyes, Network & Outreach  
 Prof. Alexander Leichtle, Computational Facilities  
 Prof. Kuangyu Shi, Research Project Fund  
 Prof. Inti Zlobec, Research Project Fund



Prof. Claus Beisbart, Ethics Lab  
 Prof. Martino Mona, Ethics Lab  
 Prof. Rouven Porz, Ethics Lab  
 Prof. Fritz Sager, Ethics Lab

### Profile

The Center for Artificial Intelligence in Medicine is a research, teaching and translation platform investigating AI medical technologies that can facilitate the work of doctors and nurses and bring better care to patients. CAIM capitalizes on the know-how of scientific, healthcare and MedTech industry players in Bern. Its close partnership of researchers and clinicians enables a rapid translation of research results into a new generation of diagnostics, treatments, and interventions.

CAIM is a virtual Center of the University of Bern's medical faculty and the Insel-spital in partnership with the University Psychiatry Services (UPD) and sitem-insel. It connects engineers, physicians, and scientists active in AI in Medicine and fosters industry collaboration, AI technology commercialization and start-up incubation.



### Highlights

#### FDA Approval for Bernese AI Technology

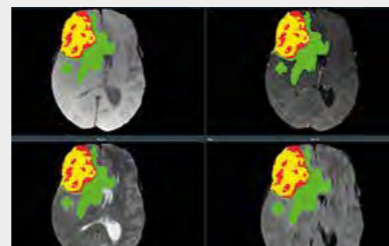
The translational potential of Bernese Artificial Intelligence research was exemplified in 2022 by two FDA approvals of AI products developed around the ARTORG Center for Biomedical Engineering Research:

The medical and image data management platform for ophthalmology Discovery by the ARTORG spinoff RetinAI received FDA clearance in May 2022.

In September, an AI system for brain tumor segmentation from multisequence MRI (today at Neosoma), developed at the Medical Image Analysis lab, also received FDA clearance. These important contributions to Med-Tech and healthcare innovation on a global scale exemplify Bern's traction for bringing digital technologies directly to the patient.

[Media release RetinAI](#)

[Media release Neosoma](#)



Automated brain tumor segmentation tool (MIA lab, ARTORG Center)



Ophthalmology data management platform Discovery (RetinAI)



[www.caim.unibe.ch/daim](http://www.caim.unibe.ch/daim)

### New Initiative for Diversity in AI Research for Medicine

The Center for Artificial Intelligence in Medicine (CAIM) has launched an initiative DAIM (Diversity for AI in Medicine) in May 2022 with the goal to promote diversity, equity, and inclusion in research into Artificial Intelligence applications for healthcare. DAIM aims to support multi-perspective and inclusive workplaces, yield academic excellence through the incorporation of multiple viewpoints and fight biases in algorithm development. The initiative encompasses activities in the areas of networking and public relations, mentoring, scientific talks, and research (the first DAIM Young Researcher Award was given out in November 2022).

### CAIM Goes Public at „Nacht der Forschung“

On the occasion of the Researchers Night of the University of Bern, CAIM presented itself for the first time to a broader audience. Owing to the slowly emerging omnipresence of Artificial Intelligence in healthcare, members of the center presented their research in different interactive stations, starting with an introduction into AI properties and its exploitation potentials for big medical data. Amongst insights into neuroradiology, surgery, cancer care, inpatient care and nutrition applications of AI, CAIM also discussed future AI developments in neuromorphic chips.

The exhibit was rounded off by a booth from the CAIM Ethics Lab asking visitors for feedback on potential fears and hopes associated with AI in medicine. Responses to an in-person discussion with written feedback on poster boards and to an online survey showed that the public sample equally saw risks and chances in AI for healthcare and underlined the importance of ongoing dialogue and public inclusion.

[Link to Uniaktuell: https://tinyurl.com/5dyw3rk4](https://tinyurl.com/5dyw3rk4)



Visitors were able to discover CAIM research in 9 booths at the Researchers' Night in September 2022



Researcher of Digital Pathology explaining his work to visitors at the CAIM exhibit

### Great Interest in the CAIM Research Symposium

The first Research Symposium of the CAIM since its official opening in March 2021 was attended by more than 100 researchers from the Bernese ecosystem around the University and University Hospital. Before a full Kuppelsaal at the University main building, the CAIM Executive Team gave updates on CAIM as a Center, its Embedded Ethics Lab, and the new initiative Diversity for AI in Medicine.

Two inspiring but also challenging keynote speeches were delivered by Dr. Andrea Ferrario, ETHZ and Prof. Dr. Leo Joskowicz, The Hebrew University of Jerusalem. The five research projects funded by CAIM for 2022-2023 in the areas of cardiology, nephrology, neuroradiology, old-age psychiatry and women's health shared insights into their work.

To conclude, two PhD students received the first CAIM Young Research Awards: Amith Kamath, ARTORG Center, and Charlotte Kern, Department of Clinical Pharmacology and Toxicology Inselspital.

[www.caim.unibe.ch/symposium2022](http://www.caim.unibe.ch/symposium2022)



Interested audiences of young and experienced researchers from data science and clinical disciplines at the Symposium



First CAIM Young Researcher Awards: Raphael Sznitman, awardees Charlotte Kern and Amith Kamath, sponsor Vicky Riesen-Giannossios, Bern Economic Development Agency

## Department for BioMedical Research (DBMR)

University of Bern, Murtenstrasse 24-28, 3008 Bern  
[www.dbmr.unibe.ch](http://www.dbmr.unibe.ch)



Prof. Mark A. Rubin  
Director DBMR

Prof. Anne Angelillo-Scherrer  
Deputy Director DBMR

Prof. Marianna Kruithof-de Julio  
DBMR Board of Directors

Prof. Carsten Riether  
DBMR Board of Directors

Prof. Volker Enzmann  
DBMR Board of Directors

### Structure

The DBMR promotes an integrative perspective to clinical research with a strong emphasis on developing translational approaches. The more than 100 groups of the department are organized in 13 Research Programs and 12 Independent Research Labs and are supported by central services responsible for administration, informatics, technical support and bioinformatics. Additionally, the DBMR is also responsible for operating state-of-the-art technology core facilities that serve the broader research community of the University of Bern.

### Profile

- Research department in Biomedicine of the Faculty of Medicine of the University of Bern
- Providing researchers from the Inselspital an infrastructure to perform translational research
- Aim: to bridge laboratory-based and biomedical patient-oriented clinical research
- Facilitating scientific interactions and instrumentation for researchers
- Teaching in the Programs: Master of Biomedical Engineering, Master of Biomedical Sciences, Bachelor of Human Medicine, Graduate School of Cellular and Biomedical Science
- External partners include: Catholic University of Louvain (BE) / CSL Behring AG (CH) / EPFL (CH) / ETH Zurich (CH) / HUG, Geneva University Hospital (CH) / Novartis (CH) / Roche (CH) / RMS Foundation (CH) / University of Basel (CH) / University of Lausanne (CH) / University of Zurich (CH) / Ludwig Maximilian University of Munich (DE) / Technical University of Dresden (DE) / Technical University of Munich (DE) / Aarhus University (DK) / The Institute of Gustav Roussy (FR) / Stanford Burnham Prebys Medical Discovery Institute (USA) / Weil Cornell Medicine (USA) / University of Connecticut (USA) / The Brigham and Women's Hospital and Dana Farber Cancer Institute (USA) / Columbia University (USA) / Yale University (USA) / Genentech (USA) / Ulsan National Institute of Science and Technology (Korea)

### Grants

- SNF NRP 79 – Advancing 3R: HeartX: Decoding cardiac regulatory landscape in an all-human model for cardiogenesis, PI: SNF Prof. Marco Osterwalder
- Congressionally directed Medical Research Programs - Ovarian Cancer Research Program: Targeting PARP inhibitor resistance. PIs: Prof. Sven Rottenberg and Dr. Intidhar Labidi-Galy (HUG)
- Swiss Cancer League grant: Understanding and overcoming mechanism of resistance of platinum-based chemotherapy, PI: Prof. Sven Rottenberg
- ISREC TANDEM 2022: NEREUS (Network based drug response and repurposing at single cell resolution), PIs: Prof. Marianna Kruithof-de Julio and Dr. Bernhard Kiss.
- Nuovo-Soldati Foundation for Cancer Research and Kurt and Senta Herrmann Foundation Research Grant: Targeting on homologous recombination deficiency in prostate cancer using in vitro models. PI: Dr. Dilara Akhoundova.
- Prostate Cancer Foundation Challenge Award: Leveraging poison introns for therapeutics and diagnostics of lethal prostate cancer. PI: Prof. Mark A. Rubin.
- SNF: Towards understanding non-canonical phosphatidylinositol kinases as vulnerabilities in prostate cancer metabolism. PI: Prof. Mark A. Rubin.
- Alzheimer's Association Research Grant: Role of child gut microbiota on adult Alzheimer's disease susceptibility. PI: ERC Prof. Ziad Al Nabhani
- Novartis Foundation: How child gut microbiota influence the lifelong immunity. PI: ERC Prof. Ziad Al Nabhani

### Highlights



#### Opening Murtenstrasse 24 - 28

The DBMR organized a mini-symposium in March 2022 with Prof. Susan Gasser (University of Lausanne) and Prof. Johann de Bono (The Institute of Cancer Research, UK) as keynote speakers. Other highlights included a talk by Prof. Willy Hofstetter, followed by the award ceremony to Dr. Noëlle Annick Dommann, the winner of the Benoît Pochon Prize 2021, and Dr. Joel Zindel, the recipient of the Johanna Dürmüller-Bol DBMR Research Award 2021.

In September 2022, the DBMR had an open-door event. The public was guided through the DBMR Core Facilities, had a virtual tour of Forensic Medicine and building technology.

#### Day of BioMedical Research 2022

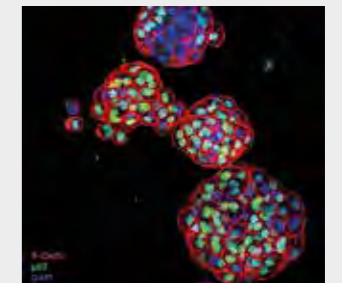
The event was held in person in July 2022. More than 110 posters were submitted, from which five were selected for the DBMR Poster Prizes, Alumni MedBern Research Prize and Best Cell Stem Poster Prize. Other highlights included the lectures of the keynote speakers: Prof. Andrea Califano (Columbia University) and Prof. Botond Roska (University of Basel) and the announcement of the Best DBMR Publication 2021, and of Dr. Emma Hodcroft as the winner of the Johanna Dürmüller-Bol DBMR Research Award 2022.



#### New Core Facility: Translational Organoid Resource (TOR)

The new Core facility led by Prof. Marianna Kruithof-de Julio offers expertise in the derivation of organoid cultures from human patient material, the optimization of culture conditions, as well as the genomic, transcriptomic and functional characterization of organoids.

Immunofluorescence image of Bladder Cancer Organoids (20x magnification) stained with anti-E-Cadherin (red), anti-p63 (green) and DAPI (blue). Courtesy: Dr. Marta De Menna



#### Awards

DBMR Travel Award: The DBMR established in 2022 an award to support young researchers at the DBMR presenting their research at an international conference. Eleven travel awards were given so far.

European Prostate Cancer Centre of Excellence (EPCCE): Urology Research and clinical care at the DBMR and the Insel was recognized as a European Prostate Cancer Centre of Excellence (EPCCE).

Pfizer Prize recognized project on commensal microbiota and B-cells: Prof. Stephanie Ganal-Vonarburg, Dr. Hai Li and Dr. Julien Limenitakis received the Pfizer Research Prize. Their study underscores the importance of a healthy bacterial flora for the host organism and how benign bacteria shape their repertoire of B-cells in the analyzed mice.



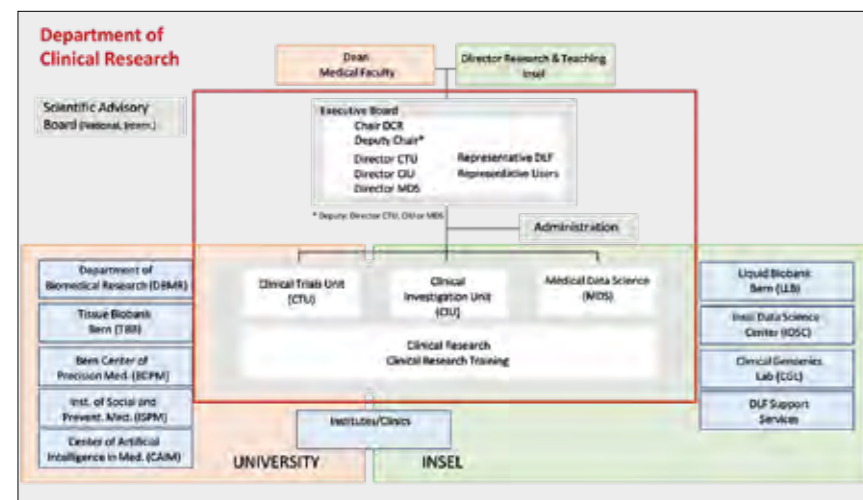
## Department of Clinical Research (DCR)

Mittelstrasse 43 and Freiburgstrasse 3 (sitem-insel), Bern  
www.dcr.unibe.ch



Prof. Eva Segelov Director from 1.12.2022	PD Dr. Sven Trelle Director CTU	Christina Huf Head Quality Management	Carmen Jörg Head Clinical Investigation Unit	Dr. Martin Jünger Head Monitoring	Dr. Martina Zimmermann, Head Monitoring ad interim	Dr. Andreas Limacher Head Statistics and Methodology	Dr. Felix Rintelen Head Clinical Study Management	Miriam Wegmann, Head Data Management
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### Structure



Complexity of clinical research has been growing steadily. The Department of Clinical Research provides an umbrella organization for facilities supporting clinical researchers both, at the Faculty of Medicine and at Inselspital. The department is currently comprised of CTU Bern and the Clinical Investigation Unit. While CTU Bern has its offices at Mittelstrasse 43, Clinical Investigation Unit operates an outpatient clinic for clinical and observational research projects in the sitem-insel building on the Inselspital campus. A full professor of clinical research will be leading the department. Prof. Eva Segelov has been appointed with a starting date of 1 December 2022.

### Profile

- To provide the scientific, regulatory, and technical expertise needed to conduct patient-oriented clinical research at all stages, from conception to completion and dissemination
- Support is provided in a modular fashion and ranges from advice and general support to full development of the design and conduct of clinical studies. In 2022 we conducted more than 300 consultations and supported more than 400 research projects
- Facilities of Clinical Investigation Unit (CIU) offer fully equipped state-of-the-art examination and treatment rooms for the conduct of study visits
- Staff contributes to undergraduate teaching for medical, pharmacy, and biomedical sciences students
- Postgraduate teaching activities involve contribution to various Certificate/Diploma/Master of Advanced Studies courses
- Research ethics and Good Clinical Practice (GCP) training form an important part of our teaching activities and are supplemented by special courses and the monthly CTU lecture
- Research partners encompass all clinical departments and institutes of the Faculty of Medicine/Inselspital, members of the Swiss Clinical Trial Organization CTU network, and several Swiss cantonal and private hospitals as well as international partners such as the World Health Organization

### Grants

We contribute to grants as project partner but not as applicant. In 2022, two clinical trials with CTU Bern as project partner received funding by the Swiss National Science Foundation within its call for Investigator-Initiated Clinical Trials.

### Highlights

#### New Director of the Department of Clinical Research



Since 1 December 2022 Eva Segelov is the Director of the Department of Clinical Research at the Medical Faculty of the University of Bern and University Cancer Center at Inselspital. Eva Segelov graduated in medicine at the University of Sydney. She is a specialist in Medical Oncology, in particular Gastrointestinal Cancers and Neuroendocrine Tumours. She is excited to take the role as Chair of the Department of Clinical Research with the mission to enhance all clinical research across University of Bern, Inselspital and affiliated health services, by harnessing innovations and opportunities with large and small industry and biotech partners, biobanks and integrated clinical data. As Head of DCR, she will oversee the current Clinical Trials Unit based at University of Bern, the Clinical Investigation Unit at sitem-insel and a new Medical Data Science professorship.

#### Clinical Trials Started

CTU Bern has been successful in supporting trials funded by the Swiss National Science Foundation Investigator-Initiated Clinical Trials program. In 2022, three projects started enrolment: STREAM is a randomized non-inferiority clinical trial evaluating whether discontinuing statins in 1,800 multimorbid older adults without cardiovascular disease is safe. DIFU evaluates whether an early revascularization strategy is beneficial in patients with diabetic foot ulcer and non-critical peripheral artery disease. Finally, the StOP? II Study is a large cluster-randomized trial investigating the potential of a short intraoperative briefing in the operating room. A total of 400 are planned to be enrolled and randomized with patient outcome data for 14,000 surgical procedures. All three trials are conducted internationally and CTU Bern was involved in developing the study design and supports the projects with Clinical Study Management, Data Management, Monitoring, and Statistics.



#### Major Projects Published

Several clinical trial projects were completed in 2022. Three of those shall be mentioned here. All were international multicenter randomized trials. PACMAN-AMI showed that the addition of a lipid-lowering drug (alirocumab, a PCSK9 inhibitor) to high-intensity statin therapy positively affects various aspects of lipid plaque development in coronary arteries of patients with acute myocardial infarction. SWIFT-DIRECT assessed whether thrombectomy alone is non-inferior to intravenous thrombolysis plus thrombectomy for treating acute stroke patients with large vessel occlusions. The results, based on 408 randomized patients, indicate that thrombolysis should not be omitted in this patient population and reconfirm the current standard of care. CLEVER-ACS enrolled 150 patients suffering from ST-elevation myocardial infarction who had undergone a percutaneous coronary intervention. They were randomized to receive mTOR inhibition using everolimus or placebo, both for five days. Unfortunately, everolimus did not reduce myocardial infarction size after 30 days.



#### ISO 9001 Certification for Clinical Investigation

Quality management is an important and critical aspect of clinical research. The operational units of the Department of Clinical Research use the ISO 9001 standard for their own quality management system. CTU Bern has been independently certified to comply with this standard since 2019. In spring 2022, Clinical Investigation was now also independently audited and has received full certification. The certificate ensures collaborators that the units follow a comprehensive and structured approach when defining processes and services. Among others, measures include an error/critical incident reporting and evaluation system and internal audits. Both units follow a risk-based approach in standardizing processes.



## Diabetes Center Berne (DCB), Innovation in Diabetes Technology

A private platform at sitem-insel, Freiburgstrasse 3, 3010 Bern  
[www.dcb-berne.com](http://www.dcb-berne.com) and [DCB Open Innovation Challenge \(dcb-innovation-challenge.com\)](http://DCB Open Innovation Challenge (dcb-innovation-challenge.com))



Meet the whole DCB Team here:  
<https://www.dcb-berne.com/en/about-us/team/>

### Structure



The Diabetes Center Berne (DCB) is a private, independent Swiss foundation established in 2017 by Willy Michel with the mission of making life with diabetes easier. DCB supports ideas and projects related to diabetes technology worldwide, by providing expertise, access to clinical research facilities and its own laboratories and funding. The aim is to bring them one step closer to market entry in a collaborative partnership. DCB works in close scientific partnership with the Department of Diabetes, Endocrinology, Clinical Nutrition and Metabolism of Bern University Hospital (UDEM) and the "Institut für Diabetes-Technologie Forschungs- und Entwicklungsgesellschaft mbH an der Universität Ulm". DCBs work is not-for-profit – the goal are new insights and innovations around diabetes management as well as a lively community.

### Profile

- Artificial pancreas & biological feedback
- Sensing & smart monitoring
- Application systems, insulin delivery
- Nutrition & metabolism
- Innovation management
- Data Sciences
- Clinical trial management
- Start-up Booster Program
- Translational development hub for the diabetes research community

### Grants

- Prof. Lilian Witthauer:
- Diabetes Center Berne Foundation / Uni Bern Financing 416'000 / year
  - Innosuisse Innovation cheque as main research partner: 15'000 CHF
  - Von-Tobel Foundation: 50'000 CHF

### Highlights



The 2022 award ceremony at the start-up night, including the winners GO-Pen and Una Health.

#### The DCB Open Innovation Challenge: One of the Largest Venture Awards in Europe

The challenge: Finding new solutions that can take diabetes management to the next level. 580+ innovators representing 54 countries on the DCB Innovation platform. Two cohorts: Diabetes Devices & Digital Diabetes. Total of 66 projects from 22 countries submitted. 100+ coaching sessions provided. 30+ dedicated experts and coaches involved. Two 5-day bootcamps with the three finalists per cohort joining DCB from France, USA, Denmark, Australia and Germany. The two winners were GO-Pen (DK) and Una Health (GER) have each received 100.000 USD funding and in-kind support.

#### The samlab Is Operational

Prof. Dr. Lilian Witthauer's Sensing and monitoring lab, short samlab, has grown. She was joined by one PhD student and one postdoc. The team works on interdisciplinary research projects to improve the management of diabetes. One focus lies on the development of novel optical sensors that allow for a delay-free glucose measurement. For this, the team has set up a fully-equipped optical lab space. Another project, the Moonwalk study, tackles the topic of detecting symptoms of nocturnal hypoglycaemia using radar signals.



The lab space of the samlab



#### New Professorship in 2023

We are looking forward to welcoming Dr. José García-Tirado in the first quarter of 2023, as second professorship, jointly established by the University of Bern and DCB. His research will be focused on closed-loop systems and conducting corresponding clinical trials.

The positions are assigned to the Chair of Diabetology and Endocrinology at the University of Bern, Prof. Christoph Stettler.

Dr. José García-Tirado



#### Growing Portfolio

If a start-up has high growth potential, the Swiss Diabetes Venture Fund (SDVF), which is unique in Europe, may be a suitable partner. The fund was founded in 2021 in partnership between the Swiss Ventures Group, Simon Michel and the DCB. The fund targets start-ups with a focus on diabetes technology. Through its partners, the SDVF combines various competencies from deal flow, company building, network, research facilities and comprehensive medical technology knowledge. There are already currently three start-ups in the fund's portfolio: Supersapiens, Digital Diabetes Analytics and Piomic. Also, already 50% of the committed capital have been reached.

Simon Michel (General Partner, GP), Mike Baur (GP), Craig Cooper (Investment Director), Derek Brandt (GP)

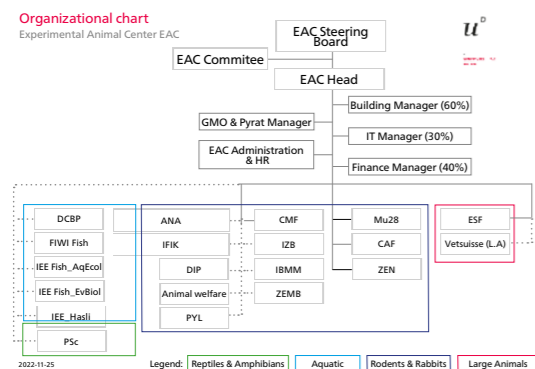
# Experimental Animal Center EAC

Murtenstrasse 35, 3008 Bern  
<https://www.eac.unibe.ch/>



Prof. Hugues Abriel, PD Dr. Alessandra Bergadano, Prof. Volker Heussler, Prof. Nadia Mercader, Prof. Robert Rieben, Prof. Sven Rottenberg

## Structure



The EAC is an interfaculty unit (Vetsuisse, Medicine and Biology) and the umbrella structure responsible for all the in-vivo research of the University of Bern. The EAC is managed by the Steering Board (SB), where all three Faculties are represented and the Executive Director. They are supported by the EAC Committee for technical questions. Further core functions are the Building, Pyrat & GMO, finances managers and the administration. The EAC SB and the EAC committee meet 6 times and 4 times per year, respectively.

## Profile

- Mission. Promoting high in-vivo research quality, animal husbandry, welfare and the 3Rs in collaboration with the Animal Welfare Office, teaching and exchange of specialist knowledge
- Values. The Culture of Care (CoC) and compliance with regulations are cornerstones of the EAC values. CoC in laboratory animal science is the commitment of the University of Bern to improving animal welfare, scientific quality, care of its staff and transparency about its activities, by going beyond the legal requirements and obligations
- Vision. The EAC strives to achieve excellence of its in-vivo research and animal welfare and position the University of Bern at national and international level as best place to learn, work and do research
- Portfolio. 20 animal facilities breeding, housing and performing high level research with SPF, SOPF and gnotobiotic rodents, rabbits, fish, amphibians and pigs. Centre of excellence for laboratory animal medicine, anaesthesia and analgesia. Site of the Swiss German ECLAM residency program <https://eclam.eu/home/pre-diploma/residency-reqts/standard/>
- Teaching and events. Fish and Amphibian research@Unibe, M20 on rabbits, pigs and fish, ESLAV summer school, surgical and microsurgical trainings
- Services. Laboratory animal facilities management, SOPF breeding, cryobiology laboratory, organisation of continuing education, regulatory compliance, veterinary pharmacy, consulting and research
- Internal partners. AWO office, Vice Rectorate Research
- External partners. SAFN, KVet, Swissmedic, BLV, LTK, AAALACi, KTVE, GV-SOLAS, ESLAV, ECLAM, AISAL, SITEM, Act-Inno, Neuroscience, Univ. of Fribourg, Dept. Otorhino and Head-Neck Surgery, CHUV, Lausanne

## Highlights



### Go Live of the New Core SOPF Mice Breeding Unit Mu28

To accommodate the increase in genetically modified (GM) mice models used, the University of Bern has built a new facility in Murtenstr. 28, expanding the capacity by 6900 cages. The goal of this unit is to promote efficient GM usage at the Unibe by implementing cryobiology and a lean production and management of the GM lines of the investigators. Its activities started in April 2021 with the establishment of all processes needed for the housing of the animals and the cryo laboratory. Currently, the GM lines are getting cryopreserved and stored, rederived or revitalised to meet the specific and opportunistic pathogen free (SOPF) health status and expanded. The vivarium transfer should be concluded and the facility fully populated by December 2023.

## Fish and Amphibian Research@Unibe

On Nov 29 and 30 2021, 17 panellists presented husbandry practices and research activities with fish and amphibians performed at the University of Bern and international specialists shared their know-how with less common species or set-up, such cephalopods, research with wild fish and welfare. 147 participants from 25 different countries attended the virtual workshop with an extremely positive feedback, with over 98% attendee satisfaction.

Some references below:

- Excellent work in putting together this program. Great chairing and animating the sessions.
- All speakers were well prepared and the delivery was just right. Thanks to the team.
- The program was of high quality with great panelists, and very good moderation of the Q&A segments.
- I did really appreciate that the majority of the speakers started their talks really from the basics. Not all topics were familiar to me, and the speakers made even ,exotic' topics understandable to researchers outside the field.

We warmly thank the panellists, the participants and a special commendation goes to the organising team!



©Universität Bern, Bild: Vera Knöpfel

## Night of Research 10 September 2022

For the first time in the history of this event, dedicated sessions, posters and activities presented the public with different aspects of animal research: animal welfare, the efforts to refine, reduce and replace "3Rs" animals in research, husbandry items as caging and enrichment. The public could observe zebrafish larvae with the telephone camera or dress up like a real veterinarian as fast as possible to win a visit in the facilities. Presentations on Culture of Care, the process to get the research approved, the use of the zebrafish as a versatile model or the pig in cardiac research. Overall the booths were well attended and the discussion with a very interested public open and peaceful. We are already looking forward to the next event!



## PhD of Dr. Sara Fuochi

On 20 April 2022, Sara Fuochi, GMO Data Manager at the EAC, successfully defended her thesis and obtained a European Label PhD in Veterinary Sciences from the Federico II University in Naples, Italy.

Dr. Fuochi's work focussed on the phenotypic characterization of wild-type rodents to bridge some crucial knowledge gaps. Particularly her work led to an accurate characterization of puberty onset curves in outbred male Long Evans rats.

[Fuochi S, et al. Puberty onset curve in CD \(Sprague Dawley\) and Long Evans outbred male rats. Lab Anim. 2022;56\(5\):471-475. doi:10.1177/00236772221078725](#)

She also characterized and published the phenotypical differences of spontaneous motor activity in some inbred and outbred mice strains using digital ventilated cages technology, obtaining the cover on the Nature portfolio journal Lab Animal.

[Fuochi S, et al. Phenotyping spontaneous locomotor activity in inbred and outbred mouse strains by using Digital Ventilated Cages. Lab Anim \(NY\). 2021 Aug;50\(8\):215-223. doi: 10.1038/s41684-021-00793-0](#)

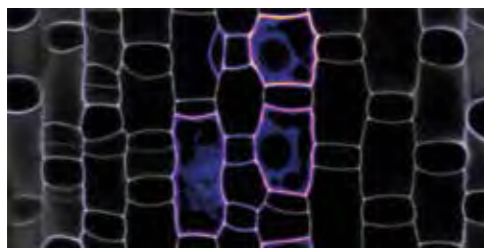
## Microscopy Imaging Center (MIC)

c/o Theodor Kocher Institute, Freiestrasse 1, 3012 Bern  
[www.mic.unibe.ch](http://www.mic.unibe.ch)



Prof. Britta Engelhardt Chair, MIC-Board Representative of the Medical Faculty	Prof. Sabine Kässmeyer MIC-Board Representative of the Vetsuisse Faculty	Prof. Michael Raissig MIC-Board Representative of the Faculty of Science.	Prof. Ruth Lyck MIC-Board MIC coordinator	Dr. Guillaume Witz Scientific Assistance Bioluminescence and BigData	Dr. Yury Belyaev Scientific Assistance Light Microscopy
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### Structure



A polarity protein (pink) guides the formation of the „breathing pores“ in grasses. (Michael Raissig, Institute of Plant Sciences, University of Bern)

The MIC is the center of excellence for high-end microscopy in the life sciences at the University of Bern. The mission of the MIC is to disseminate expert knowledge and provide technical support in high-end microscopy, to implement new technologies, to administer the MIC instrument portfolio and to ensure central access to equipment. MIC provides teaching on Master and PhD level and offers training for scientific staff at all levels. Services of the MIC concern image analysis, large image data volume handling and processing, sample preparation and introduction into microscope operation. Yearly highlights of the MIC are the MIC Research Day, the Summer School for the students of the Cutting Edge Microscopy PhD specialization program and the MIC Symposium.

### Profile

- Instruments, users and usage hours. 83 instruments are registered at the MIC. In 2022, this equipment was used by 508 researchers in a total of 82'323 usage hours
- Instrument types. 33 wide field microscopes, 3 slide scanners, 14 laser scanning microscopes, 4 two-photon microscopes, 5 spinning disc microscopes, 4 stereo microscopes, 6 transmission electron microscopes, 6 scanning electron microscopes, 1 light sheet microscopes, 2 atomic force microscopy systems, 1 mass cytometer, 1 imaging mass cytometer and 3 micro computed tomography (micro-CT) instruments
- Services. Web-based booking system for microscopes; Imaging and image and data analysis; Handling of large data sets; Sample preparation; Training; Newsletter; Publication of news, courses, events and other activities on the MIC webpage ([www.mic.unibe.ch](http://www.mic.unibe.ch))
- Teaching and events. Lecture series on Advanced Microscopy. MIC workshops, MIC trainings, instrument demonstrations, MIC research day, MIC symposium
- PhD program Cutting Edge Microscopy (CEM). The main aim of the CEM program is to provide an interdisciplinary training program to PhD students to become first-class experts in biological imaging. The unique and interdisciplinary framework established by the MIC provides the necessary infrastructure and expert knowledge. The program is scientifically directed by MIC members Prof. Benoît Zuber and Dr. Steven Proulx and administered by the MIC coordinator Prof. Ruth Lyck. In 2022, 19 students participated in the CEM program of whom 6 students received their certificate of graduation
- Tight collaboration with Science IT support (SciTS) of the University of Bern for high quality support of MIC users in data handling and image analysis
- Excellent cooperation with the Graduate School for Cellular and Biomedical Sciences (GCB) and individual master's programs to optimize the MIC teaching portfolio
- External partners: Swiss Society for Optics and Microscopy (SSOM); Life Sciences Switzerland (LS2), Intersection Microscopy; Swissphotonics; Scientific Volume Imaging b.v. (SVI); Swiss Microscopy and Imaging Core Facility Network

### Grants

- MIC members Prof. Britta Engelhardt and Dr. Steven Proulx, both Theodor Kocher Institute, received together with other applicants the SNSF Sinergia „Fluid Dynamics of the Central Nervous System: 3D Functional Anatomy & Pathophysiology in Mouse Models“
- MIC member Prof. Christian Soeller, Institute of Physiology, and other colleagues from the Faculties of Veterinary Medicine, Natural Sciences and Medicine received the SNSF R'ÉQUIP „A MINFLUX Optical Super-Resolution Microscope to Investigate Molecular Scale Structure-Function Relationships“

### Highlights

#### Nacht der Forschung 2022

At the Nacht der Forschung on September 10, 2022, the room of the MIC was decorated with various posters about the MIC and about microscopy. Activities included „Microscopy for everyone“ on 6 teaching microscopes and an excursion into virtual reality, which beamed the guest into the brain of a mouse or into a fish head. In parallel, microscopists offered lectures on exciting topics. A total of around 30 helpers from the MIC committee, friends of the MIC and students of the PhD program Cutting Edge Microscopy were on duty in 3 shifts from 4:00 p.m. to midnight. Further activities of MIC committee members were offered in the University's main building by PD Dr. Stefan Tschanz and Prof. Benoît Zuber. Interested conversations and happy children's faces testified to the fascination of microscopy.



#### Summer School and Study Trip 2022

In May 2022, the students of the PhD program Cutting Edge Microscopy (CEM) visited the Institute de génétique et biologie moléculaire et cellulaire (IGBMC) in Strasbourg. A visit to the beautiful center of Strasbourg rounded off the program. On 30 June and 1 July 2022, the annual summer school for the CEM students took place in Zäziwil. The first day was dedicated to scientific presentations by the PhD students. An intensive training in scientific presentation techniques took place on the second day. The beautiful landscape, the pleasant accommodation and the Appenberg games contributed to a perfect learning atmosphere.



Study Trip to the Institute de génétique et biologie moléculaire et cellulaire (IGBMC)



Titan Krios G4 cryo-transmission electron microscope

#### New Electron Microscopes

Two state-of-the-art cryo-electron microscopes (EMs), the Aquilos 2 cryo-focused-ion beam scanning EM and Titan Krios G4 cryo-transmission EM, were set up at the Institute of Anatomy in 2022. This multi-million franc investment places UNIBE at the forefront of protein and cell structure biology. The MIC thanks the joint effort of MIC board with the MIC committee members Prof. Benoît Zuber, Prof. Wanda Kukulski and Prof. Dimitrios Fotiadis and the strong support of the Rectorate, in particular of the former and current Vice Rectors for Research Prof. Daniel Candinas and Prof. Hugues Abriel, as well as of the Swiss National Science Foundation, the Medical Faculty, and the Institute of Anatomy and the Institute of Biochemistry and Molecular Medicine. With this acquisition, the University of Bern joins EPFL and the Universities of Lausanne and Geneva in the world-renowned Dubochet Center for Imaging.

#### MIC Symposium 2022

The MIC Symposium 2022 on „Imaging cellular dynamics across scales“ took place on November 18, 2022 at UniS. The invited scientific speakers Prof. Francesca Peri, University of Zurich, Prof. Suliana Manley, EPFL, Prof. Miki Ebisuya, EMBL Barcelona and Prof. Joachim Goedhart, University of Amsterdam spoke about latest achievements in imaging across scales. Prof. Christian Soeller and Prof. Olivier Pertz formed the scientific committee of the MIC and presented state-of-the-art microscopy at the University of Bern. The various presentations illustrated how each biological scale requires a complementary set of microscope technology, specific image analysis algorithms, as well as a variety of genetically encoded fluorescent probes. In the end, it was a spectacular day with stunning microscopy documenting how entertaining biological processes can be!



Prof. Olivier Pertz, who represented the Science faculty on the MIC board from 2018 to 2022, was ceremoniously bid farewell.

## Multidisciplinary Center for Infectious Diseases (MCID)

Hallerstrasse 6, 3012 Bern  
[www.mcid.unibe.ch](http://www.mcid.unibe.ch)



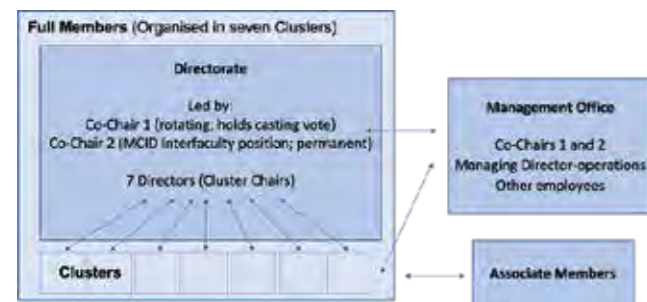
Prof. Volker Thiel (Co-Chair 1)   Prof. Carmen Faso (Co-Chair 2)   Prof. Rudolf Blankart (Chair, Economics)   Prof. Nicola Low (Chair, Epidemiology)   Prof. Stephanie Ganal-Vonarburg (Chair, Immunity)   Prof. Stephen Leib (Chair, Microbiology)   Prof. Volker Heussler (Chair, Neglected Diseases)



Prof. Manuela Funke-Chambour (Chair, Patient-Focused Research)   Prof. Claus Beisbart (Chair, Society and Law)

Meet the members here:  
[https://www.mcid.unibe.ch/about\\_us/membership/index\\_eng.html](https://www.mcid.unibe.ch/about_us/membership/index_eng.html)

### Structure



The MCID is the newest strategic center of the University of Bern. The MCID has 70 Full Members, of which 40 are affiliated to the Medical Faculty. Members are organized into seven discipline clusters; Economics, Epidemiology, Immunity, Microbiology, Neglected Diseases, Patient-Focused Research and Society and Law. Each cluster has a Chair and these, together with MCID Co-Chair 1 and 2 constitute the Directorate. Working in full cooperation with the MCID Directorate is the MCID Management Office; comprising Co-Chairs 1 and 2, the Managing Director, Teaching and Outreach Coordinator and Business Development Manager.

### Profile

- Strategic center of the University of Bern, established through generous funding from the Stiftung Vinetum
- Mission to facilitate the study and mitigation of healthcare, societal, ethical and economic risks from infectious diseases
- Aim: Determination of the origin of risks: Systematic investigations into infectious disease threats and exacerbating factors
- Aim: Preparation for risks: Development of sentinel and preparedness tools for future infectious disease risks
- Aim: Management of risks: Solutions to manage biomedical and societal impacts of infectious diseases on animal life, human life, and livelihoods
- As part of its first funding phase the MCID funds 23 research projects, of which 11 are led by members of the Medical Faculty (total funds 8.4 Mio CHF). Amongst successful applicants are 11 recipients of Early Career Researcher funding.
- MCID funds three Core Activities, which serve MCID-funded projects and conduct their own research: BReady Cohort, BioPreparedness BioBank, Ethics and Policy Lab (the first entirely and the second partly affiliated to the Medical Faculty)

### Grants

- Successful application to the University of Bern EnglL "additional courses in English" scheme (12 PP)

### Highlights



#### First MCID-funded projects begin

In response to the first MCID call for project funding applications, launched in June 2021, 17 projects were awarded funding and began in early 2022. These projects, many of which involve applicants from different research disciplines working together, include topics linked to three themes covering different aspects of infectious disease research; determination of the origin of risks, preparation for risks and management of risks.



#### MCID Core Activities begin operations

At the center of the MCID are three Core Activities; the BReady Cohort, the BioPreparedness BioBank and the Ethics and Policy Lab. These activities began operations in mid-2022 with the hiring of project managers for each activity. The MCID Core Activities pursue independent and long-term research aims while providing services to MCID researchers and strong collaborations with those involved in MCID-funded projects.

#### MCID funds six Early Career Research Grants for Women

As a result of a funding call launched in March 2022, the MCID has awarded Early Career Research Grants for Women. The topics of these research projects, to begin in January 2023, range from pathogen surveillance in garden wildlife, to novel strategies for boosting vaccine-induced immune responses to Influenza and governmental blame deflection during the Covid-19 pandemic.



#### MCID Opening Event

On the 9th and 10th June 2022, the MCID held its Official Opening Event, held at the Vetsuisse campus and attended by over 100 participants. The event, eagerly anticipated for more than a year since the launch of the center in January 2021, was open to invited participants. The Official Opening event took place on the afternoon of 9th June followed by a scientific symposium on 10th June, featuring presentation of MCID-funded projects and keynote presentations from external speakers.



#### University of Bern "Night of Research"

The MCID participated at the University of Bern's 4th Night of Research with a station entitled "Warning, infectious". Members of the public were invited to participate in a range of activities linked to infectious diseases and representing many of the disciplines involved in the MCID.

## NeuroTec

Freiburgstrasse 3, 3010 Bern  
<https://www.neuro-tec.ch/>



Prof. Claudio Bassetti, Chairman Strategic Board  
 Prof. Kaspar Schindler, Director  
 Prof. Tobias Nef, Vice-Director  
 Prof. Athina Tzovara, Research Group Leader  
 SNF Prof. Maxime Baud, Research Group Leader  
 Dr. Markus Schmidt, Research Group Leader

### Structure



Many neurological disorders such as epilepsy, Parkinson's, multiple sclerosis, Alzheimer's or stroke are chronic. However, current hospital- and appointment-based patient care provides «snap-shot»-like information only which does not allow to understand the longitudinal aspects of chronic neurological disorders. At NeuroTec, an interdisciplinary research and development platform located at the Swiss Institute for Translational and Entrepreneurial Medicine (sitem) and run by the Department of Neurology in close collaboration with the ARTORG Center, an interdisciplinary team of physicians, engineers and data scientists strives at closing this information gap. New devices and methods that allow to record digital biomarkers in the everyday out-of-hospital life of patients are tested. The goal is to monitor the individual course of a patient's disease and to thus improve personalized diagnostics and therapies.

### Profile

- Teaching: Neurotechnology for students of the Master program in Biomedical Engineering; Rehabilitation Technology for students of the European Stroke Master program; Artificial Intelligence (AI) for medical time series, for MSc in AI in Medicine; Advanced Python for MSc in Bioinformatics; Advanced electrophysiology from neuronal firing to chronic recordings of electroencephalography (EEG) over months
- Research: Sensor technology to quantify motor and non-motor symptoms in patients with neurodegenerative diseases; Assistive technology for brain injured patients; Studying neural mechanisms of auditory processing in sleep and wakefulness with the use of invasive electrophysiological recordings and high-density scalp EEG; Measuring, quantifying and modulating cortical excitability acutely and chronically in epilepsy patients
- External Partners: Centre Suisse d'Electronique et de Microtechnique (CSEM), Neuenburg; Wyss Center For Bio- And Neuroengineering, Geneva; IBM, Zürich; University of California, San Francisco; Aix-Marseille University

### Grants, received as center/platform

- Innosuisse Flagship: The New Model of Digital Neurorehabilitation along the Continuum of Care (SWISSNEUROREHAB), 11.2 Mio CHF; (Lead: CHUV) 2022 - 2027
- Innosuisse Project: Development and Evaluation of a digital Care Assistant (Lead: University of Bern, Partners: FH Bern & Qumea AG, Solothurn)
- CAIM Grant for the Development of a Digital Care Assistant (Partner: Prof. S. Klöppel, UPD)
- SNSF: Project grant: 2020-2023 Sensory predictions in the human brain
- Fondation Pierre Mercier pour la science: 2021-2024 Neurobiology of outcome representation in Switzerland's citizen-centered society
- NVIDIA: Grant for academic hardware: 2022 ,Improving diagnosis of sleep disorders from brain signals with deep learning'
- Eccellenza Professorship (M. Baud), 2 Mio CHF over 2022-2027
- CURE Award from the Citizens United for Research in Epilepsy – 250,000 \$ over 2023-2025



The NeuroTec loft is an instrumented apartment, in which sensors are tested under real-world conditions.

### Digital Biomarkers for Clinical Outcome Assessments

Using connected sensing devices to remotely monitor health is a promising way to help the transition of healthcare from a rather reactive to a more precision medicine oriented proactive approach. This transition will be particularly relevant considering the rapid population ageing. Sensor derived digital measures of health, such as digital biomarkers or digital clinical outcome assessments may be used to monitor health status or the risk of adverse events like falls. In this study, we introduce a set of non-intrusive digital measures to monitor a person's activity, behavior and physiology. Applying the resulting digital exhaust to real-world data, we then demonstrate the possibility to create multiple digital clinical outcome assessments that are in correlation with existing clinical scores and are highly relevant for ageing.

[Schütz N et al. A systems approach towards remote health-monitoring in older adults: Introducing a zero-interaction digital exhaust. NPJ Digit Med. 2022 Aug 16;5\(1\):116.](#)

### SPHYNCS Study

The Swiss Primary Hypersomnolence and Narcolepsy Cohort Study (SPHYNCS) is a prospective, multicenter cohort study for the systematic evaluation of the clinical presentation and course of narcolepsy type 1 and other central disorders of hypersomnolence. With its multi-omics approach, SPHYNCS is designed to identify novel biomarkers to improve and accelerate diagnosis of these rare diseases. The multimodal design combines classical clinical data with new methods, including long-term monitoring with wearable technologies (activity tracker such as Fitbit™), which has led to the identification of the first potential biomarkers in the interim analyses. At the leading study site in Bern, patients and healthy control subjects are recruited at the Sleep-Wake-Epilepsy-Center of the Inselspital and assessed at NeuroTec.

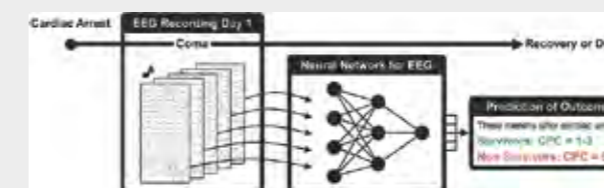
[Dietmann A, et al. The Swiss Primary Hypersomnolence and Narcolepsy Cohort study \(SPHYNCS\): Study protocol for a prospective, multicentre cohort observational study. J Sleep Res. 2021 Oct;30\(5\):e13296](#)



Activity is tracked by different wearables, such as the Fitbit™ device.

### AI for predicting coma outcome

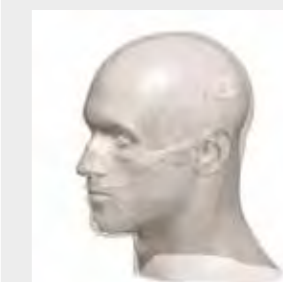
Coma after cardiac arrest is one of the leading causes of admission in intensive care units. Assessing the integrity of neural functions in coma is an open challenge which relies mainly on visual expert scoring of physiological signals. In our work, we show that artificial neural networks (ANNs) can assist medical experts by predicting the chances of coma patients to regain consciousness based on neural responses to sounds. ANNs can also augment clinical knowledge by additionally predicting the outcome of patients that would have uncertain prognosis with existing clinical tests.



Predicting outcome from coma with artificial neural networks. Adapted from Aellen et al., Tzovara, Brain, in press.

### Implantable Subscalp EEG System

In close collaboration with the sleep-wake-epilepsy center (SWEC) and the Wyss Center for Bio- and Neuroengineering in Geneva, we are developing and testing a novel EEG system. This EEG system is designed to be implanted via minimally-invasive surgical techniques and to have capacity to record over months. This subscalp EEG will enable ultra long-term monitoring of brain disorders characterized by abnormal brainwaves, such as epilepsy and severe sleep disorders.



Subscalp EEG system



## Swiss Institute for Translational and Entrepreneurial Medicine (sitem-insel)

Freiburgstrasse 3, 3010 Bern  
[www.sitem-insel.ch](http://www.sitem-insel.ch)



Dr. Simon Rothen  
CEO

Dr. Christian Rosser  
COO and  
Director sitem-insel School

Dr. Stefanie Hofer  
CCO and HR

Dr. Julie Risse  
CBO

Anita Newby  
CFO

Prof. Rudolf Blankart  
Director sitem-insel Promoting Services

### Structure

The Swiss Institute for Translational and Entrepreneurial Medicine, sitem-insel, is located at the Insel Campus Bern and benefits from its proximity to the Swiss University Hospital (Inselhospital) as well as to the University of Bern. Under its roof a wide variety of units from industry, research and education to service-providers are joined and drive innovation for the benefit of the patient. By bringing innovation to the patient sitem-insel strengthens Bern as a medical location, and networks people from different disciplines to guarantee the highest quality.



### Profile

- National Center of Excellence for Translational Medicine; bringing innovation to the patient
- Non-profit public-private partnership in close cooperation with the University of Bern, the Inselhospital, industry and start-ups.
- Reducing silos between different disciplines by bringing together clinic and industry, research and education
- Diverse and huge network creating a unique ecosystem
- Research and development infrastructure in a state-of-the-art building catalyzes a multidisciplinary collaborative approach to drive 'bench to bedside' innovation
- More than 98% occupancy in platform facilities. 60% Medical devices, 30% medicinal and biotech products, 10% diagnostics
- More than 32 start-ups and companies in incubator phase at sitem-insel, additional 13 start-ups in the newly created Sitem StartUp Club with its Sitem MedTech HUB
- Promoting the best minds in science and medicine with our in-house Sitem School (Continuing Education) as well as a Clinical Anatomy Training and Research (CATR) unit
  - o Continuing Education in
    - Translational Medicine and Biomedical Entrepreneurship
    - Medical Device Regulatory Affairs & Quality Assurance
    - Artificial Intelligence in Medical Imaging
    - International students from 11 countries
  - o Surgical training and product development in the CATR unit, Industry Courses – under development

### Grants, received as center/platform

- Screen4Care, funding from Innovative Medicines Initiative 2 Joint Undertaking (JU) under grant agreement No 101034427
- Krebsliga: Comparative Effectiveness and cost-effectiveness of cervical cancer prevention policies in Zambia No KFS-5447-08-2021
- Smaragd: Smart Radiology goes Digital – Natural language processing in radiology, Innosuisse No. 59228.1 IP-ICT
- The Commonwealth Fund: Preparing for the Silently Growing Pandemic of Antimicrobial Resistance: Innovative Economic Incentives to Fix the Broken Market, No 20213398b
- MCID (multi): menoBalance App: Use of AI methods to design a personalised chronic and infectious disease management medical device
- MCID (single): A decision-making framework under severe uncertainty for optimizing future pandemic responses

### Highlights

#### 1<sup>st</sup> Swiss Translational Medicine Conference

sitem-insel hosted and organized the first national conference on translational medicine. With international speakers and guests, the fully booked conference attracted great attention beyond the country's borders. With this conference, sitem-insel strengthens its claim to play a leading role in translational medicine in Switzerland. At the same time, sitem-insel once again sends a strong signal for the medical location Insel Campus Bern. The morning was dedicated to the Translational Ecosystem and had the focus with the „Swiss Expert's Talk“ on Translational Medicine in the academic environment. The afternoon then focused, among other things, on the international perspective and the international panel discussion "The View from Abroad". Among the speakers were Mary Tolikas, Chief Innovation Officer from Dana Farber Cancer Institute in Boston, Ulf Nehrbass, CEO of the Luxembourg Institute of Health, Nicole Schaad, Deputy Head of the Research and Innovation Department of SERI or Luc Zimmer, Professor of Neuropharmacology at the Université Claude Bernard in Lyon.



#### Various Achievements of sitem-insel's Own Units

Our Clinical Anatomy Training and Research (CATR) unit has doubled the number of courses, course days and clients during 2022. 84 courses and workshops were organized in 2022. The CATR is a state-of-the-art facility, dedicated to surgical training and development of medical devices. We organize and host courses and workshops for medical experts, societies, foundations, hospitals, and private companies in different fields of medicine. Within the sitem-insel School, we currently offer 24 modules of studies on the topics of:

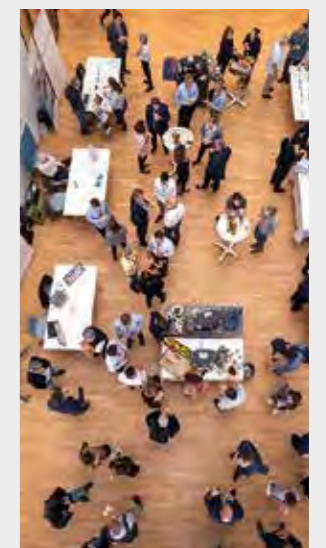
- Translational Medicine and Biomedical Entrepreneurship (TMBE)
- Medical Device Quality Management and Regulatory Affairs (MDRQ)
- Artificial Intelligence in Medicine, for clinicians

We celebrated the Kick-Off of one cohort in the MDRQ program and one in the TMBE. We had 20 applications for scholarships and were able to on-board 12 successful candidates. The Promoting Services with the professorship of Regulatory Affairs, the Center of Excellence in Decision Analytic Modelling and Health Economic Research (COE DAMHER) and innovation@sitem are involved in no less than 14 projects along the translational medicine pathway. The projects span from regulatory support in implementation projects, to projects that aim to change the translational environment for antibiotics by changing the regulatory incentives.



#### Growing the sitem-insel Community

The community within the building has substantially developed further. Construction work on the new platform „Dynamic Biplane Radiographic Imaging and Motion Analysis for Musculoskeletal Biodynamics Research“ started in the second half of this year. The Inselhospital Bern, in collaboration with Empa, Dübendorf and sitem-insel, is building a novel, state-of-the-art Musculoskeletal Biodynamics Laboratory for musculoskeletal joint disease research with clinical applications, and with a DBRI system at the heart of the set-up. In addition, the Innovation Office of the University of Bern has moved into the sitem-insel building and thus into the center of innovation activities on the Insel Campus Bern. With an established close collaboration and several successful joint events, sitem-insel plans to further intensify our work together. In the last quarter of the year, the entire 'Teaching and Research Directorate' of the Insel Group has moved into the sitem-insel building, complementing the Clinical Research Department and the MR Methodology Group. With the close proximity to this important department of the Inselgroup, we hope to further foster the collaboration with the Inselhospital.



## Translational Imaging Center (TIC)

Freiburgstrasse 3, 3010 Bern  
[www.tic-sitem.ch](http://www.tic-sitem.ch)



Prof. em. Lutz Nolte  
Managing Director

Prof. Roland Wiest  
Medical Director

Prof. Christoph Gräni  
Cardiology

Prof. Jan Gralla  
Neuroradiology

Prof. Fabian Krause  
Orthopedics

Prof. Fred Mast  
Psychology

Prof. Lia Bally  
Diabetology, Endocrinology and Metabolic Medicine



Prof. Daniela Schweizer  
Vetsuisse

Prof. Hendrik von Tengg  
Radiology

Prof. Sebastian Walter  
Psychiatry

### Structure



The Management of the Translational Imaging Center (TIC) is constituted by representatives of the key collaborating clinics and research institutes of the MR research consortium. Its primary tasks are to ensure scientific, medical and organizational quality in accomplishing tasks and achieving desired goals of a first in class translational research.

### Profile

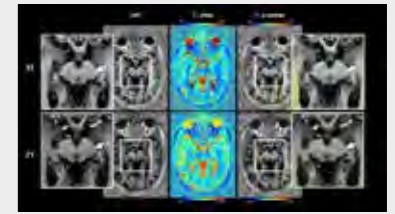
- MR methodology
- MR imaging at 3 and 7 T in radiology and neuroradiology, neurosurgery, neurology, radiation oncology, cardiology, metabolism and diabetology, psychiatry, psychology and veterinary medicine
- MRI services and consulting for basic and clinical research, epidemiological studies and clinical imaging
- Translational research with industry partners
- Education in UHF Imaging
- Research partners (selection): Siemens Healthineers, University of Vienna, University of Geneva

### Grants

- Introduction of High Field Optimized Fast 3D MR Spectroscopic Imaging for IDH Typing of Gliomas and Assisted Surgical Neuro Navigation ( Swiss National Science foundation 182569, Prof. Slotboom, Dr. Kiefer)
- Metabolic Fingerprints from Magnetic Resonance: Levels, Maps, and Microstructure (Swiss National Science foundation 175984, Prof. Kreis, Prof. Bally, Prof. Slotboom)
- MISSION Deuterium Metabolic imaging of the brain at ultra high field MRI: feasibility study of spectroscopic methods for exploration of brain metabolism without ionizing radiation, Swiss National Science foundation 2007997 Prof. Slotboom, Prof. Kreis, Prof. Bally, Dr. Radojewski)
- Pre-MITRA project, Cardiac MRI in patients with severe secondary mitral regurgitation (Swiss National Science foundation 32003B\_197754/1, Prof. Gräni)
- Antifibrosis therapy in minipig model (Inno Suisse Grant 40379.1 IP-LS, Prof. Gräni)
- Bridging gaps in the neuroimaging puzzle: advanced techniques for comprehensive mapping of brain anatomy and multi-scale network activity SNF Ambizione Grant 185909, Dr. Jorge)
- Strengthening memory formation for retrieval despite amnesia (Swiss national foundation Advanced Grant 209374, Prof. Henke)

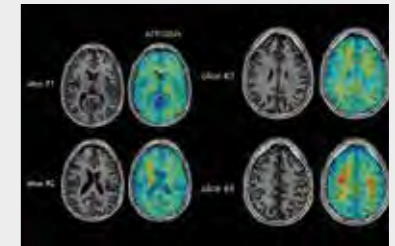
### A Submillimeter T1 Atlas for Subject-Specific Abnormality Detection at 7T (Radojewski)

In a collaborative effort of several national and international institutions, we created a new atlas of normative T1 values from MP2RAGE acquisitions with 0.6 mm isotropic resolution. The established normative atlas allows characterizing tissue alterations in single-subject comparisons at 7T and shows greater anatomical details compared with 3T MRI. The method has been applied to multiple sclerosis, small vessel disease and epilepsy.



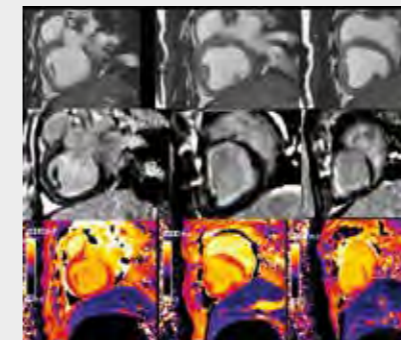
### Neuro metabolic imaging at Ultra High Field (Kreis, Slotboom, Radojewski)

We currently conduct SNSF projects on metabolic imaging at 7T using an in house developed patented MRSI technique. The first project aims at improving the metabolic imaging of the IDH-mutation status as well as the 1p/19q codeletion status in brain tumors. We could show that both genetic factors can be determined non-invasively in the whole brain measurement in approximately 9 minutes. Several relevant metabolites can be detected, as e.g. ATP/GSH (figure on the left). In another project, we focus on deuterium metabolic neuro imaging of glucose metabolism in the brain. The method will be applied to study brain aging and dementia but also neurovascular disorders and diabetes.



### Fibrosis Imaging in Cardiac Magnetic Resonance (Gräni)

In an InnoSuisse funded project of with HAYA Therapeutics, targeting long non-coding RNAs for the safer and more effective tissue-specific treatment of fibrotic diseases is analyzed in a pre-clinical minipig myocardial infarction model. Pre- and post interventional evaluation of cardiac left ventricular remodeling, myocardial scarring and diffuse fibrosis is analyzed in cardiac magnetic resonance (figure on the left) on the 3.0 Tesla TIC scanner.



### Combined Electroencephalography and Functional Magnetic Resonance Imaging at 7T (Jorge)

Electroencephalography (EEG) and functional MRI (fMRI) can be combined to monitor brain function with high temporal and spatial precision. Our team, including partners at Neuroradiology and Neurology of Inselspital, CSEM, Geneva University, Brain Products and Siemens, has developed an advanced framework for acquisition & analysis of EEG-fMRI at 7T with high signal quality and full safety, currently among the most advanced in the world. This allows us to study the neuronal origins of network interactions across the brain, down to specific layers of the cortex. It may also allow us to describe epileptic seizure propagation with higher precision.



## University Cancer Center (UCI)

Inselspital, Bern University Hospital, Freiburgstrasse 10, 3010 Bern  
[www.tumorzentrum.insel.ch](http://www.tumorzentrum.insel.ch)



Prof. Daniel M. Aebersold  
Chairman and Board of Directors

Prof. Michael Mueller  
Vice-Chairman and Board of Directors

Prof. Johannes Heverhagen  
Board of Directors from April 2022

Prof. Adrian Ochsenbein  
Board of Directors

Prof. Aurel Perren  
Board of Directors

Prof. Andreas Raabe  
Board of Directors

Prof. George Thalmann  
Board of Directors



Prof. Jörg Beyer  
Managing Director

Christian Ziegler  
Head Coordination and Quality Management

Aleksandra Aleksandrowicz  
Quality Management Officer

Sonja Läderach  
Assistant

Peter Rüegg  
Content Manager

## Structure

### University Cancer Center Inselspital (UCI)



Twelve organ-specific cancer centers constitute the core of the UCI – supported by interdisciplinary services and expert groups focusing on special aspects of cancer care.

## Highlights

### International Cancer Survivorship Symposium

February 2022 – The First International Cancer Survivorship Symposium organized in cooperation with the Department of General Internal Medicine, the Division of Pediatric Hematology and Oncology (both at the Inselspital, Bern), the Institute of Social and Preventive Medicine, University of Bern, and the Department of Health Sciences and Medicine, University of Lucerne. 229 professionals participate, 24 abstracts are submitted on the topics follow-up care, fatigue/ psychosocial problems, late effects, fertility.



### Foundation of New GIST Center

April 2022 – UCI supports foundation of a treatment center for gastrointestinal stromal tumors.



### Patient Information Day

May 2022 – UCI invites the public to a patient information day on early detection of cancer.



### Race for Life

September 2022 – UCI is main sponsor and active participant of the annual charity bicycle marathon on the Bundesplatz in Bern.



### Swiss Sarcoma Symposium

September 2022 – The Swiss Sarcoma Symposium, organized by the Sarcoma Center.



### Fifth Anniversary

November 2022 – UCI is recertified by the German Cancer Society DKG. Furthermore, UCI celebrates five years as a Certified Oncology Center.

## University Neurocenter

Inselspital, 3010 Bern  
[www.insel.ch/de/das-inselspital/universitaeres-neurozentrum-bern](http://www.insel.ch/de/das-inselspital/universitaeres-neurozentrum-bern)

### Structure

The University Neurocenter Bern, representing the clinical and scientific cooperation of the University Clinics for Neurology, Neurosurgery and the Institute of Diagnostic and Interventional Neuroradiology as well as Neuropediatrics and Psychiatry has been founded in 2012. Within the last 10 years it has been developed to the largest neurocenter in Switzerland with > 400 beds, >1'400 collaborators, >60'000 outclinic patients, >8'000 in-hospital patients, and >3'500 operations/interventions each year.

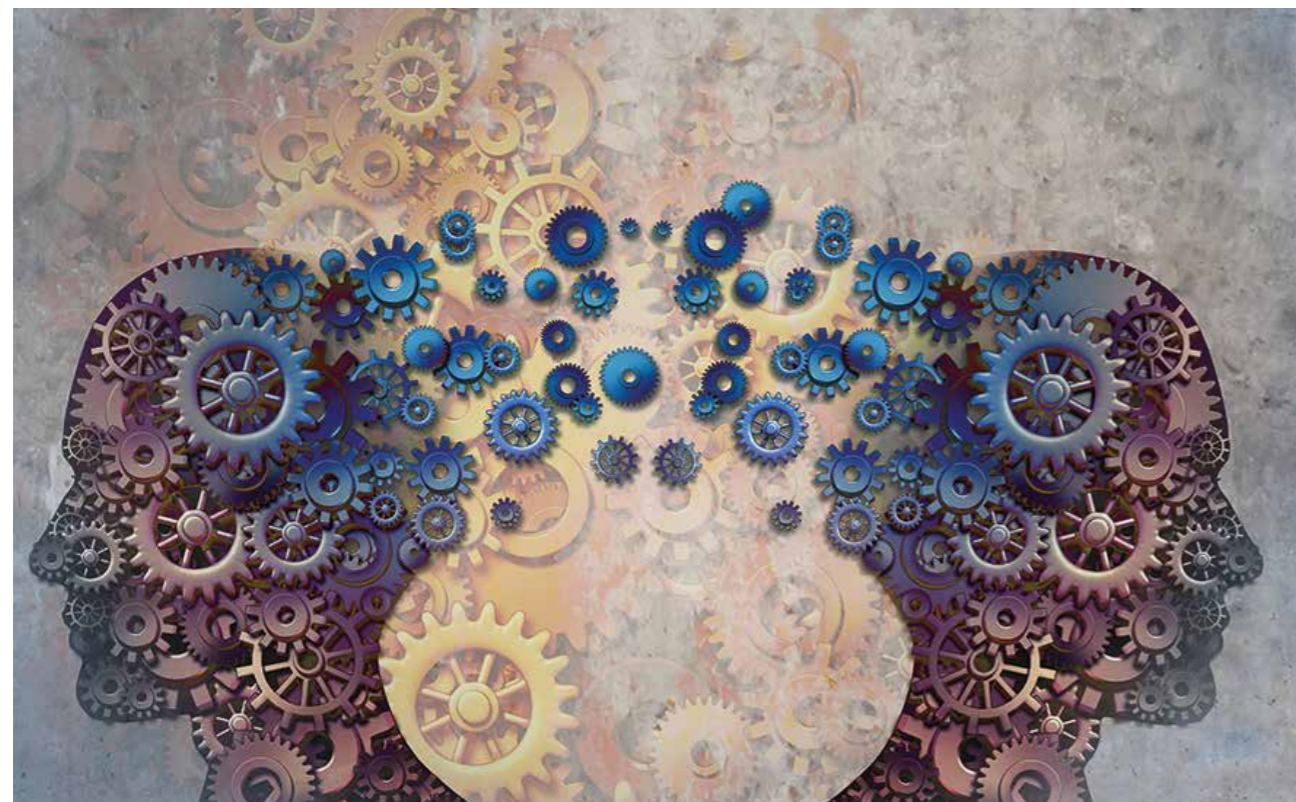
### Profile

Research areas with strong interdisciplinary approaches within the Neurocenter include the following:

- stroke, including complex neurovascular diseases
- sleep-wake-epilepsy, including epilepsy surgery
- advanced neuroimaging (high-field MR, including 7 Tesla imaging, intraoperative imaging, post-processing and machine learning)
- neuroimmunology/multiple sclerosis
- movement disorders, including functional neurosurgery for Parkinson's disease, neurological and psychiatric disorders
- neurorehabilitation including computer-assisted systems and robotics
- intraoperative surgical technologies: neuromonitoring, robotics, augmented reality navigation associated developments, targeted procedures and 3D printing and simulation techniques
- Systems neuroscience
- neurodegeneration/dementia
- External Partners: Universities and large hospitals in Switzerland and abroad, other research institutions, industry

### Grants

See separate lists in the reports of the University Clinics for Neurology, Neurosurgery and the Institute of Diagnostic and Interventional Neuroradiology as well as Neuropediatrics and Psychiatry.



## Highlights

### Master of Advanced Studies in Stroke Medicine

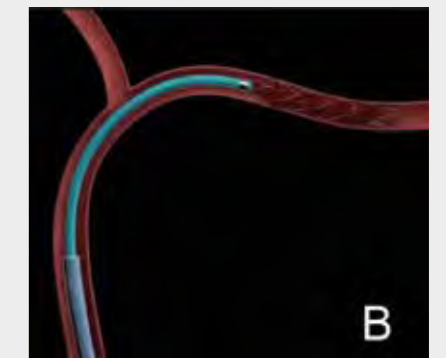
The University of Bern was selected to establish the European Stroke Master Program of the European Stroke Organisation (ESO). The program has been implemented in close collaboration with the European Stroke Organisation. An international faculty of world leading stroke experts has provided lectures, seminars and workshops in close collaboration with the local faculty of the Stroke Center Bern at the University of Bern. In addition to virtual modules, the first onsite module took place at the University Hospital Bern.



### International Landmark Trials in Acute Stroke Treatment

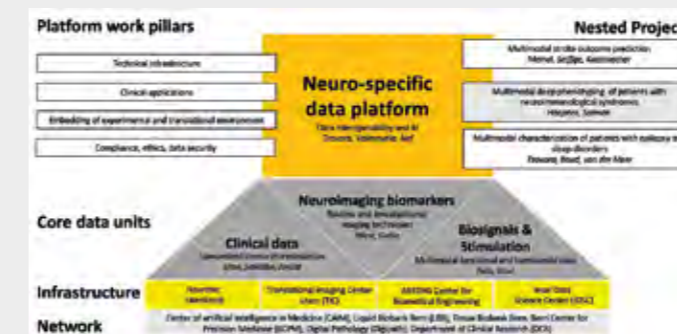
The interdisciplinary trial SWIFT DIRECT led by neurologists and neuroradiologists of the Neurocenter and Stroke Center Bern showed that combined intravenous thrombolysis and endovascular treatment had higher recanalization rates (97%) and tended to have a more favorable outcome compared with endovascular treatment alone. These results have a worldwide impact on acute stroke management.

[Fischer U, Kaesmacher J, \(...\) Arnold M, Bassetti CL, ... Gralla J. Lancet. 2022 Jul 9;400\(10346\):104-115. doi:10.1016/S0140-6736\(22\)00537-2.](#)



### A Data Platform for Integrated Neuroscience

A data platform for integrated neuroscience has been developed within the call "Strategische Forschungsförderung" of the Medical Faculty (2021-2023). To overcome problems of large scale data analytics and promote digitalisation, we complement existing networking activities by establishing a highly curated, domain-wide neurospecific platform for deep phenotyping in neuroscience focusing on stroke, neuro-immunology, sleep medicine and epilepsy.



### Inauguration of Swiss Sleep House Bern

In November 2022, the opening of the Swiss Sleep House Bern took place. The interdisciplinary Sleep House combines sleep experts in the fields of neurology, psychiatry, psychology, and biology and aims to improve Sleep Health in the Canton Bern (see also report of University Sleep Wake and Epilepsy Center on the following 2 pages).

## University Sleep-Wake-Epilepsy-Center (SWEC)

Inselspital, 3010 Bern  
<http://www.neurologie.insel.ch/de/unser-angebot/schlaf-wach-epilepsie-zentrum-swez>



### Structure

The interfaculty and interdisciplinary University Sleep-Wake-Epilepsy Center (SWEC) was founded in 2013 and recognized as a University Center in 2015. The mission of the SWEC is threefold: 1) to provide comprehensive care for patients with sleep/wake disorders and/or epilepsy 2) to advance basic, translational and clinical research and 3) to teach on pre- and postgraduate levels. Basic, translational and clinical researchers as well as medical and other health professionals representing the fields of neurology, pulmonology, psychiatry, pediatrics, psychology, data science and engineering collaborate to enable rapid, precise and individualized prevention, diagnostics and therapies. SWEC is supported by the Interfaculty Research Cooperation grant "Decoding Sleep" (6 MCHF, 2018-2023), the Inselspital, SNSF, and third-party fundings.

### Profile

#### Education

- Postgraduate Master in Sleep Medicine
- Bernese Sleep-Wake Epilepsy Days
- Lectures in Neuroscience Series (<http://www.neurologie.insel.ch/de/lehre-und-forschung/lehre/fortbildungen>)
- BENEFRi PhD in Neuroscience (<https://physiologie.unibe.ch/benefri/>)

#### Research

- Molecular and systems physiology of sleep-wake circuits and functions including animal models of sleep and brain disorders (narcolepsy, epilepsy, stroke, dementia)
- Interactions between sleep and brain in neurological and psychiatric disorders
- Promotion of brain, mental and body health through sleep-related interventions

#### Infrastructure

- Clinical laboratories of the Departments of Neurology, Pulmonology, Psychiatry, Pediatrics and Psychology
- Experimental research laboratories from the Zentrum für Experimentelle Neurologie (rodents, human).
- NeuroTec ([www.neuro-tec.ch](http://www.neuro-tec.ch))

#### Partnerships

- External Partners: Centre Suisse d'Électronique et de Microtechnique (CSEM), Neuchatel; IBM, Zürich; ETH, Zürich; Wyss Center for bio- and neuro-engineering Geneva; Università della Svizzera italiana (USI); Ente Ospedaliero Cantonale (EOC); University of Zürich; University of Lausanne

### Grants

SNF Grants: In 2022, a total of 17 grants were led by researchers of the SWEC. The following 6 grants were newly awarded or started in 2022:

- Exploring the Cellular Impact of Neural Oscillations. Sinergia CRSII5\_213495. Total amount: CHF 1'232'218. PI: A. Adamantidis with co-PI C. Robles, U Muenchen
- Hypothalamic control of REM sleep. Project Grant 310030E\_205524. Total funded: CHF 287,009; PI: M. Schmidt

- Dynamical control of seizures. Eccellenza 203339. Total funded: CHF 1,753,875; PI: M. Baud
- ICTALS 2022 - The tipping point. Scientific Exchanges 210474. Total funded: CHF 24'800. PIs: C. Rummel and M. Baud
- Become your own SLEEPexpert. IICT 205828. Total amount: CHF 2,431,232. PI: C. Nissen. (Note: C. Nissen has been appointed full professor in Geneva in 2022).

#### Non-SNF Grants awarded in 2022:

- Interdisciplinary Grant UniBE CHF 145'920. Closed-loop control of sleep-waves in the epileptic brain. Together with the Institute for Informatics; PIs: M. Baud, A. Tzovara
- CURE Epilepsy award: Forecasting cycles of seizure in people with genetic generalized epilepsy, CHF 250,000 over two years; PI: M. Baud
- NVIDIA: Grant for academic hardware: 2022 ,Improving diagnosis of sleep disorders from brain signals with deep learning'; PI: A. Tzovara

### Highlights

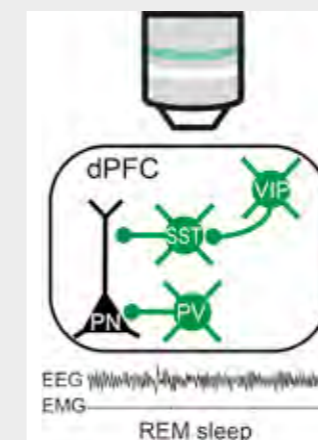
#### Inauguration of Swiss Sleep House Bern

In November 2022, the opening of the Swiss Sleep House Bern took place at Tiefenauspital Bern. The Interdisciplinary Sleep House involves sleep experts in the field of neurology, psychiatry, psychology, and biology and aims to improve Sleep Health including insomnia in the Canton Bern offering in addition to classical consultations a walk-in and homediagnosics concept.



#### 26th Bernese Sleep-Wake-Epilepsy Days

Our traditional multidisciplinary congress took place from 2 - 4 November 2022. The three-day event brought national and international experts from clinical and research fields to the Swiss capital. Beside the Sleep-Wake-Epilepsy Symposium, the three-day event included a new module by the Swiss Working Group for Sleep, Epilepsy & Neurodegeneration, the Interfaculty Research Cooperation (IRC) symposium, a workshop on sleep in competitive sports and a symposium on the interactions between light and sleep, organized by the Center for Experimental Neurology (ZEN). This year's Bernese Sleep Award went to Prof. Carlos Schenck, and the Bernese Epilepsy Award to Prof. Keith Vossel.



#### REM Sleep, Cortical Activity and Emotional Memories

This study identifies for the first time a decoupling between low somatic, and high dendritic, activities in pyramidal neurons from the cortex specifically during REM sleep in mice. This mechanism controls the excitability of the cortex to optimize the encoding of emotional memories during sleep. This work was performed by Mattia Aime and colleagues under the supervision of Prof. A. Adamantidis.

[Aime M, Calcini N, Borsa M, Campelo T, Rusterholz T, Sattin A, Fellin T, Adamantidis A, Paradoxical somatodendritic decoupling supports cortical plasticity during REM sleep. Science. 2022 May 13;376\(6594\):724-730. doi: 10.1126/science.abk2734. Epub 2022 May 12.](https://doi.org/10.1126/science.abk2734)

## Institutes at the University of Bern

Institute of Anatomy  
Institute of Biochemistry and Molecular Medicine (IBMM)  
Institute of Complementary and Integrative Medicine (IKIM)  
Institute of Dental Medicine (ZMK)  
Institute of Forensic Medicine (IRM)  
Institute for the History of Medicine (IMG)  
Institute for Infectious Diseases (IFIK)  
Institute for Medical Education (IML)  
Institute of Pathology  
Institute of Pharmacology (PKI)  
Institute of Physiology  
Institute of Primary Health Care (BIHAM)  
Institute of Social and Preventive Medicine (ISPM)  
Theodor Kocher Institute (TKI)



## Institute of Anatomy

Baltzerstrasse 2, 3012 Bern  
[www.ana.unibe.ch](http://www.ana.unibe.ch)



Prof. Valentin Djonov  
Director



Prof. Nadia Mercader Huber  
Co-Director



Prof. Benoît Zuber  
Co-Director



Prof. Johannes Schittny  
Group Leader



PD Dr. Edik Babiychuk  
Group Leader



PD Dr. Elisabeth Eppler



PD Dr. Ruslan Hlushchuk  
Group Leader



PD Dr. Asparouh Iliev  
Group Leader



PD Dr. Stefan Tschanz  
Central Services Leader

### Profile

- The Institute of Anatomy has 98 employees of 23 different nationalities.
- With nearly 16'000 teaching hours, the Institute of Anatomy is by far the single largest teaching institution of the entire Medical Faculty. It delivers 10% of the entire teaching of the Medical Faculty and more than 50% of the teaching of the preclinical disciplines (Institute of Anatomy, Institute of Biochemistry and Molecular Medicine, Institute of Medical History, Institute of Physiology, and Theodor Kocher Institute).
- The Institute teaches macroscopic anatomy, microscopic anatomy, histology, and embryology. It leads 4 teaching blocks in the medical Bachelor curriculum. It teaches students of the Medical Faculty, Vetsuisse Faculty, and Phil. nat. Faculty, as well as students of the Graduate School of Cellular and Biomedical Sciences (GCB).
- The research conducted by 9 groups at the Institute of Anatomy is diverse but shares a significant use of advanced imaging technologies. The research topics covered range from cardiac development and repair, to pulmonary development, to structure and function of respiratory cilia, to structure of bacterial pore forming toxins, to cellular control of the damages inflicted by this class of toxins, to neuroinflammation and brain infections, to ultrastructure and function of synapses, to microCT-based imaging development, and to novel radiotherapy approaches (e.g., microbeam radiation therapy).
- With a large number of advanced electron-, light-, and x-ray microscopes, the Institute of Anatomy is an important contributor to the Microscopy Imaging Center (MIC).
- The Bernese Anatomy is the leading house in Switzerland in the field of clinical anatomy. We organize clinical courses in almost every medical field with the main aim to help the education of young residents and doctors. There are courses for training in certain surgical techniques and testing new surgical devices such as newly invented prosthesis and implants.
- In the nationally most important center for the diagnosis of primary ciliary dyskinesia (PCD-UNIBE, collaboration of the Department of Paediatrics, Inselspital and the Institute of Anatomy) more than 65 patient samples were analyzed, including functional and ultrastructural microscopy. 5 PCD cases were diagnosed, corresponding to the majority of cases found in 2022 in Switzerland.
- The Institute maintains active collaborations with 46 institutions located in countries around the world, including Australia, Denmark, Finland, France, Germany, Kenya, Israel, Italy, Latvia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

### Grants

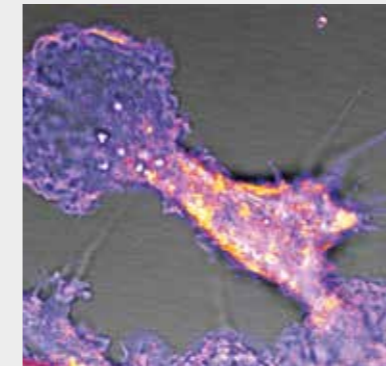
- 7 SNF grants, 5 EU grants, 45 international/third party grants.

## Highlights



### New State-of-the Art Electron Microscopes

Two state-of-the-art cryo-electron microscopes from Thermofisher Scientific were set up this year. The Aquilos 2 cryo-focused-ion beam SEM and Titan Krios G4 cryo-TEM place UNIBE at the forefront of protein and cell structural biology. This multi-million franc investment would not have been possible without the support of the Rectorate, and in particular of the former and current Vice Rectors for Research Prof. Daniel Candinas and Prof. Hugues Abriel, as well as of the Swiss National Foundation, the Medical Faculty, and the Institute of Biochemistry and Molecular Medicine, especially Prof. Wanda Kukulski and Prof. Dimitrios Fotiadis, and of the Microscopy Imaging Center of the University of Bern. With this acquisition, the University of Bern is joining EPFL and the Universities of Lausanne and Geneva in the world-famous Dubochet Center for Imaging.



### Understanding the Role of Bacteria in Neuroinflammation

PD Dr. Asparouh Iliev and his team made a significant discovery regarding the mechanisms by which the human pathogen *Streptococcus pneumoniae* modulates host immune responses. Their Nature Communications publication reports that the toxin pneumolysin plays a major role in neuroinflammation by increasing the release of proinflammatory cyto- and chemokines from glial cells. This occurs through enhanced endocytosis and the uptake of bacterial ligands. This new information sheds light on the ways in which this particular pathogen can disrupt immune function and may lead to the development of more effective treatments for infections caused by *S. pneumoniae*.

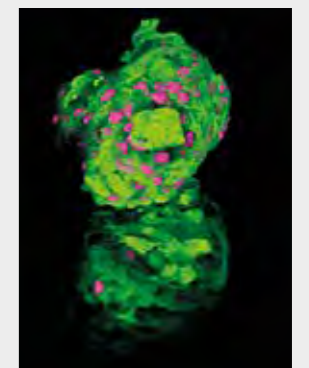
### SSAHE PhD Prize Awarded to Dr. Verdiana Trapetti

Dr. Verdiana Trapetti has been recognized for her exceptional PhD thesis by receiving the PhD prize from the Swiss Society for Anatomy, Histology, and Embryology. Conducted under the supervision of Prof. Djonov, her research focused on synchrotron microbeam radiation therapy (S-MRT), a promising new approach for the treatment of cancer. Specifically, Dr. Trapetti explored the use of S-MRT in the treatment of lung cancer and melanoma, and made significant contributions to our understanding of the biological mechanisms underlying the differential responses of normal and tumor tissues to this form of radiation therapy. Throughout her thesis, Dr. Trapetti published 15 papers, including four as the first author.



### Controlling Cardiac Cell Fate Identity

The research group of Nadia Mercader, in collaboration with the labs of Proff Benoît Zuber (Anatomy) and Marco Osterwalder (DBMR), has made an important discovery about the role of Wilms Tumor 1 protein in the control of cardiac cell fate identity. They found that this protein acts as a block to cardiomyocyte differentiation and can even lead to the transdifferentiation of these cells into epicardial-like cells. These findings were published in the journal *Development* (doi: 10.1242/dev.200375). These results highlight the complex role of Wilms Tumor 1 protein in cardiac development and may have implications for the treatment of cardiovascular diseases.



## Institute of Biochemistry and Molecular Medicine (IBMM)

Bühlstrasse 28, 3012 Bern  
[www.ibmm.unibe.ch](http://www.ibmm.unibe.ch)



Prof. Dimitrios Fotiadis  
Managing Director

Prof. Jürg Gertsch  
Deputy Director

Prof. Wanda Kukulski  
Co-Director

Prof. Christine Peinelt  
Co-Director

Prof. Hugues Abriel  
Vice-Rector for Research

Prof. Christiane Albrecht

Prof. Peter Bütikofer



Prof. Thomas Lemmin

PD Dr. Martin Lochner  
Lecturer

### Profile

- Basic and specialized teaching in biochemistry, molecular and pharmaceutical biology, and molecular medicine, teaching activities in the faculties of Medicine, Natural Science and Vetsuisse to pre- and postgraduate students (GCB)
- Eight research groups
- Interdisciplinary research on structure, function and pharmacology of membrane proteins (transporters, ion channels and receptors), with a strong emphasis on the roles of these membrane proteins in human diseases such as cancer, neuropsychiatric and cardiac disorders, pre-eclampsia and pathogen infection
- Unravel working mechanisms of specific membrane proteins, discover new therapeutic targets
- Leading House of the NCCR TransCure - Excellence in Membrane Transport Research
- D-BSE & D-CHAB, ETH Zürich, Swiss Institute of Bioinformatics, University of Geneva, School of Medicine, Novartis Institutes of Biomedical Research, Basel, Switzerland; University of Nottingham, Department of Pharmacology, University of Cambridge, MRC LMB Cambridge, UK; Max-Planck-Institute, Munich, Technical University of Munich, Freising, Germany; Institute for Research in Biomedicine (IRB Barcelona), University of Barcelona, Spain; Laboratory of Molecular Electron Microscopy, The Rockefeller University, New York, NIH, NIAAA, Rockville, USA, PeterMac Institute, Melbourne, Australia

### Grants

- Swiss National Science Foundation NCCR TransCure (leading house), NCCR Molecular Systems Engineering
- SNSF project grants No. 310030\_200380; 310030\_201158; 31003A\_173155; 310030\_189220; 310030\_184980; 197408; 310030\_184783; 310030\_204972; National Research Program Covid-19 (NRP 78) from the SNSF, grant No. 198314
- SNSF Sinergia grants No. CRSII5\_183481, CRSII5\_180326 and Swiss 3R Competence Centre (3RCC) grant No. OC-2019-019
- Eccellenza Professorship (PCEFP3\_194606)
- DALM Helmut Horten Stiftung (Project Funding for Young Researchers), Hans Sigrist Fondation (Three-Year-Fellowship), Marie Skłodowska-Curie Actions (nAChRs-CRC-PCa-IF-RI), MD-PhD Fellowship (SNSF)

### Highlights



#### Prof. Hugues Abriel is the New Vice-Rector for Research

As of January 2022, Prof. Hugues Abriel took over the Vice-Rectorate Research at the University of Bern. He served as Director of the Department for BioMedical Research and the IBMM, and President of Div. 3 of the SNSF research council. Prof. Hugues Abriel brings to the board of the University longstanding knowledge of the university and extensive leadership experience in the management of research institutions. He kept his part-time function as an IBMM group leader focusing on teaching and research.

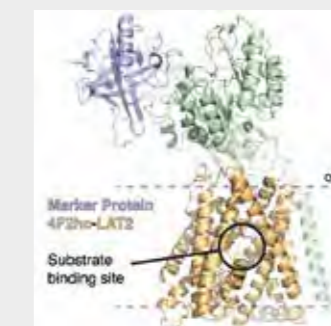
### Final Year and Legacy of the NCCR TransCure

From 2010 until 2022, the National Center of Competence in Research (NCCR) TransCure brought together transport physiologists, structural biologists and chemists from several Swiss universities, with the University of Bern being the host institution ([www.nccr-transcure.ch](http://www.nccr-transcure.ch)). These research groups focused their research on membrane transporters and ion channels. On August 2022, an international conference was organized at the University of Bern to celebrate the network's end. The main legacies of the 12-year-long NCCR TransCure period are: (1) a complete reshaping of the IBMM as a cutting-edge multidisciplinary research and educational institute focusing on membrane biology, (2) the Screening, Profiling and Analytical Facility (SPAF), and (3) the participation to the creation of the Bernese branch of the Dubochet Center of Imaging (DCI Bern).



### Structure of a Human Heteromeric Amino Acid Transporter (HAT)

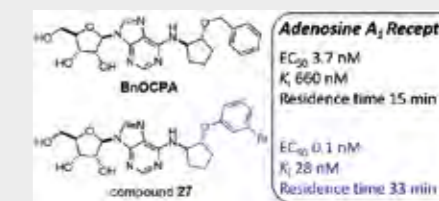
HATs are membrane protein complexes mediating transport of specific amino acids and derivatives thereof across biological membranes. Over-expression, malfunction or absence of HATs are associated with diseases such as autism spectrum disorder, aminoaciduria or cancer. Elucidation of the structure of the important HAT 4F2hc-LAT2 in complex with a theranostic marker protein has provided important molecular and mechanistic insights. In addition, for the cryo-electron microscopy (cryo-EM) community the described HAT/marker protein complexation strategy also offers a new tool to solve structures of rather small proteins at higher resolution by cryo-EM (Jeckelmann J.-M. et al., Sci. Rep., 2022).



Structure of the complex between a theranostic marker protein and human 4F2hc-LAT2. The location of the substrate binding site is highlighted with a circle.

### Synthesis and Discovery of Potent and Subtype-Selective Adenosine A1 Receptor Agonists

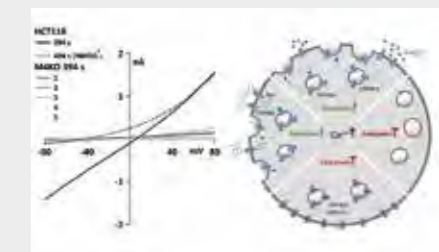
Adenosine receptors (ARs) belong to the family of G protein-coupled receptors (GPCRs), which are targeted by over 30% of all approved drugs. Four subtypes are widely expressed in the human body and implicated in various diseases. We have developed BnOCPA, an A1R-selective agonist, exhibiting analgesic properties devoid of cardiorespiratory depression. In this work, we report the synthetic development and in vitro pharmacological characterisation of BnOCPA congeners with improved potency, affinity and A1R-selectivity that we corroborated by computational and mutagenesis studies (Preti et al., J. Med. Chem., 2022).



Improved potent and A1R-selective agonists (e.g., compound 27) developed in this study.

### A Novel Role for TRPM4 in Exocytosis

In our study, we propose a novel mechanistic model of TRPM4 contribution to calcium-induced exocytosis in colorectal cancer cells. After an increase in the intracellular calcium concentration, the TRPM4 channels are activated and they inwardly conduct monovalent ions. Calcium also activates TRPM4 channels in the vesicular pool and the conductivity of TRPM4 in this vesicular pool, rather than in the plasma membrane, results in the translocation of these vesicles and their fusion with the plasma membrane (Stokłosa et al., Cells, 2022).



TRPM4 currents in colorectal cancer cells and mechanistic model.



## Institute of Complementary and Integrative Medicine (IKIM)

Inselspital, Freiburgstrasse 46, 3010 Bern; von Roll Campus, Fabrikstrasse 8, 3012 Bern  
[www.ikim.unibe.ch](http://www.ikim.unibe.ch)



Prof. Ursula Wolf  
Director



Dr. Stephan Baumgartner  
(PD Univ. W/H, DE)  
Deputy Director

### Profile

- Teaching students of medicine, dental medicine and pharmacology
- Research profiles:
  - Patient centered translational and clinical research in Complementary and Integrative medicine. Investigating pharmacological and non-pharmacological therapies, developing of new methodology.
  - Investigation of efficacy, effectiveness and mode of action of pharmaceutical preparations used in Complementary and Integrative Medicine
- External partners: University Hospital Inselspital, e.g. Depts. of Radiooncology, Oncology, Intensive Care, Reconstructive Surgery, Rheumatology, Anesthesiology Bern, Switzerland; Hospital of Fribourg (HFR), Fribourg, Switzerland; Swiss Group for Clinical Cancer Research SAAK, Switzerland; Empa, St. Gallen, Switzerland; OST University of Applied Science Buchs, Switzerland; Neuchâtel Platform of Analytical Chemistry, University of Neuchâtel, Switzerland; Society for Cancer Research, Arlesheim, Switzerland; Institute of Integrative Medicine, University of Witten/Herdecke, Germany; University of Tübingen, Germany; ARCIIM Institute/Filderklin, Filderstadt, Germany, Bischoff Textil AG, St. Gallen, University of Geneva; ISS Inc. Champaign, IL, USA; Multidisciplinary Laboratory of Pharmaceutical Sciences, Faculty of Pharmacy, Federal University of Rio de Janeiro, Brazil; University of Pécs, Hungary, University of Zurich, University Hospital Zurich, Switzerland, University of Fribourg, Switzerland, Pontificia Universidad Javeriana, Bogotá, Colombia; Oakland University, Rochester, MI, USA; University College London UCL, UK

### Grants

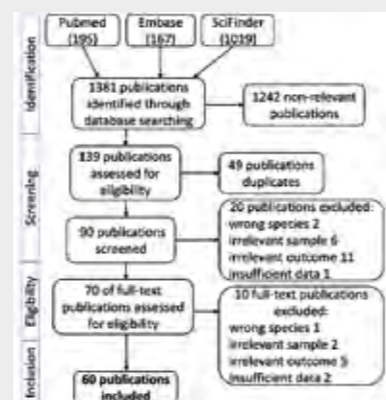
- Swiss National Science Foundation: SNF Bridge Discovery 20B2-1\_180983 / 1
- Swiss National Science Foundation: Congress International Society on Oxygen Transport to Tissue
- Swiss Cancer League, Cancer Research Switzerland: 4259-08-2017
- Software AG Foundation (SE-P14441, SE-P14525)
- Swiss State Secretariat for Education, Research, and Innovation / Leading House for the Latin American Region (University of St. Gallen): SMG 1928

### Highlights

#### Therapeutic Potential of Resin from Larix Decidua to Treat Ulcerating Wounds

This review summarizes evidence regarding a possible role of resin from the species *Larix decidua* Mill. [Pinaceae] for treating ulcerating wounds. The results show that among the phytochemical classes, terpenoids were the major components of this species, especially in the resin. The summarized biological experiments revealed antimicrobial, antioxidant and anti-inflammatory effects, with promising potential for the extracts and isolated compounds. The molecular mechanisms and toxicological effects are not yet conclusively known. Based on our results, we conclude that *L. decidua* has a promising potential for the treatment of ulcerating wounds. Future efforts should be dedicated to the evaluation of *L. decidua* resin's therapeutic use considering its antiseptic action and proposed wound healing properties.

Batista JVC, Uecker A, Holandino C, Boylan F, Maier J, Huwyler J, and Baumgartner S. *Frontiers in Pharmacology*, 2022.

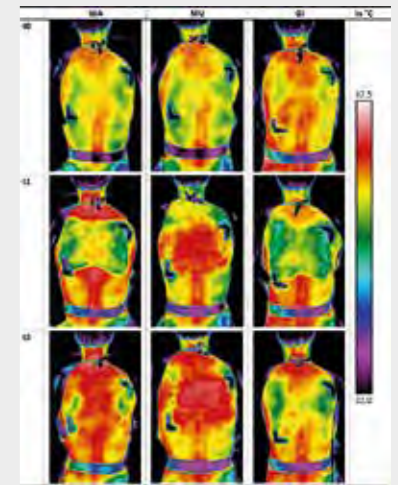


Methodological workflow of the systematic review on *Larix decidua* Mill.

#### Effects of Chest Compresses with Mustard or Ginger on Warmth Regulation in Healthy Adults

Chest compresses with mustard (MU) or ginger (GI) are a complementary treatment option for respiratory tract infections. Since little is known about their specific thermogenic qualities, we carried out the study. Participants received MU, GI, and warm water (WA) in a random order on three different days. Skin temperature of the posterior trunk was significantly higher with MU compared to both, WA and GI at t1 (primary endpoint) and to GI at t2. Self-perceived warmth of the posterior trunk was higher with MU and GI compared to WA at t1 and remained higher with GI at t2. Overall warmth perception increased significantly with GI, and did not change with WA ( $d=0.36$ ) between t0 and t1. MU and GI led to different effects on warmth regulation, i.e. both induced self-perceived warming of the posterior trunk, but skin temperature increased only with MU. Further research should focus on effects of GI or MU chest compresses on clinical outcomes in respiratory tract infections.

Vagedes J, Kuderer S, Vagedes K, Szöke H, Kohl M, Joos S, Beissner F, Wolf U. *Evidence-based complementary and alternative medicine eCAM*, 2022.

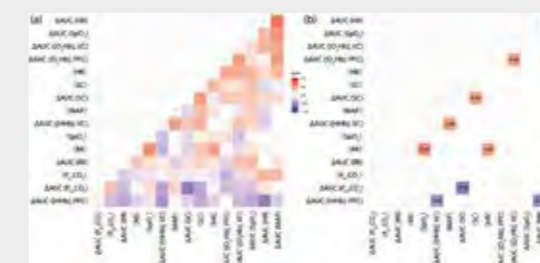


Skin temperatures of the posterior trunk of a participant, at t0=start, t1=removal and t2=10min after removal.

#### Importance of Systemic Physiology in Individual Hemodynamics Assessed by SPA-fNIRS

In previous investigations with systemic physiology augmented functional near-infrared spectroscopy (SPA-fNIRS) neuroimaging, we found large inter-subject variability in cerebral hemodynamics and oxygenation during experiments combining colored light exposure and cognitive tasks. Here, we investigated the role of systemic physiology on the variability. Healthy subjects performed under blue and red light exposure verbal fluency tasks. The visual cortex showed a stronger deoxy-hemoglobin concentration response during blue light than during red light exposure, influenced by individually different baseline blood pressure values. There were also other correlations between the fNIRS and systemic physiology signals. Our study demonstrates the necessity of the SPA-fNIRS approach when investigating intersubject variability of hemodynamics and oxygenation.

Scholkmann F, Zohdi H, Wolf U. *Brain Sciences*, 2022.

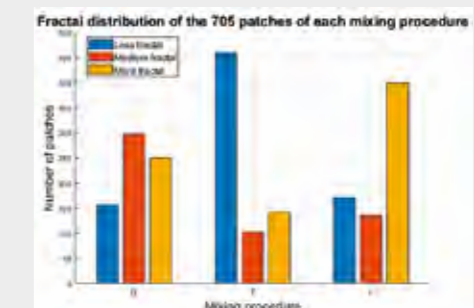


(a) Correlation matrix of the area under the curve and mean baseline values of all biosignals (b) with only statistically significant ( $p < 0.05$ ) correlations.

#### Deep Learning Applied to Analyze Patterns from Evaporated Droplets of Viscum Album Extracts

We describe a methodology based on deep learning for analyzing self-assembled, fractal-like structures in evaporated droplets. An extensive image database of such structures of the plant extract *Viscum album* Quercus  $10^3$  was used, prepared by three different mixing procedures (turbulent, laminar, diffusion based). Pattern analysis had two stages: automatic selection of patches with rich texture along the database and clustering of patches in accordance with prevalent texture by means of a Dense Convolutional Neural Network. Significant differences were found between the production modalities. Patterns obtained by laminar flow showed the highest fractal structure, and patterns obtained by the turbulent mixture exhibited the lowest fractality. Our approach is the first to analyze, at the pure image level, the clustering properties of regions of interest within a database of evaporated droplets.

Acuña C, Mier y Terán A, Kokornaczyk MO, Baumgartner S, Castelán M. *Scientific Reports*, 2022.



Fractal distribution of patterns obtained from evaporated droplets of *Viscum album* extracts subjected to different mixing procedures (D = diffusion, T = turbulent, L = laminar)

## Institute of Dental Medicine (ZMK)

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[www.zmk.unibe.ch](http://www.zmk.unibe.ch), [www.facebook.com/zmkbern](https://www.facebook.com/zmkbern)



Prof. Hendrik Meyer-Lückel Executive Director Director of the Clinic of Restorative, Preventive and Pediatric Dentistry	Prof. Vivianne Chappuis Director of the Clinic of Oral Surgery and Stomatology	Prof. Christos Katsaros Director of the Clinic of Orthodontics and Dentofacial Orthopaedics	Prof. Martin Schimmel Director of the Clinic of Reconstructive Dentistry and Gerodontology	Prof. Anton Sculean Director of the Clinic of Periodontology	Prof. Ralf Schulze Head of Division of Oral Diagnostic Science
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### Profile

- Undergraduate dental curriculum (for 3rd, 4th and 5th year students) with theoretical and practical courses
- Postgraduate curriculum (3–4 years) leading to specialty and / or MAS degrees
- Postgraduate refreshing courses in dental radiation protection
- Continuing Dental Education Master Courses
- Fundamental, translational and clinical research in most aspects of dentistry
- Research collaborations: WHO Collaborating Centre for Epidemiology and Community Dentistry, Milan, Italy; Department of Cariology, Institute of Odontology, Sahlgremska Academy, University of Gothenburg, Sweden; Department of Operative Dentistry, Periodontology and Preventive Dentistry RWTH Aachen, Germany; Department of Odontology, School of Dentistry, University of Copenhagen, Denmark; University of Texas Health, USA; University of Oslo, Norway; University of São Paulo – FOU SP / FOB, Brazil; Indiana University, USA; Federal University of Minas Gerais, Brazil; Johannes-Gutenberg University of Mainz, Germany, Hochschule Rhein Main, Wiesbaden Germany and Technical University of Dortmund, Germany
- Interdisciplinary diagnosis and rehabilitation of oral diseases and defects
- Undergraduate dental curriculum (for 3rd, 4th and 5th year students) with theoretical and practical courses

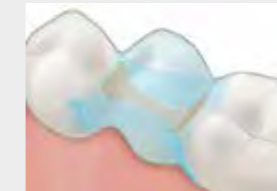
### Grants

- Endowed professorship for preventive dentistry and oral epidemiology of the Lutz Zürrer Foundation
- Research Internships Abroad – São Paulo Research Foundation
- Nakao Foundation
- International Team for Implantology (ITI)
- Buser Implant Foundation
- Swiss Dental Association (SSO)
- German Research Foundation (DFG)
- Swiss Government Excellence Scholarships for Foreign Scholars
- Swiss Society for Reconstructive Dentistry (SSRD)

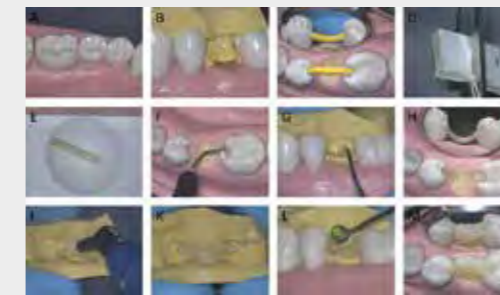
## Highlights

### Restorative Dentistry – Clinical

In this retrospective, single-center, practice-based study direct fiber reinforced composite fixed partial dentures offered an immediate, micro-/minimal-invasive, inexpensive short- and medium-term solution to replace missing teeth, even if no box-shaped proximal cavity was prepared.



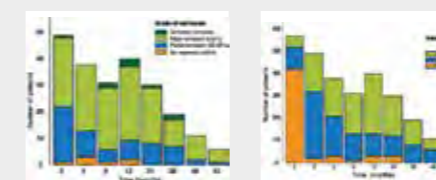
[Perrin P, Meyer-Lueckel H, Wierichs RJ. J Dent. 100: 103438. doi:10.1016/jdent.2020.103438.](#)



### Oral Medicine – Stomatology and Dermatology – Clinical

Clinical study presenting the outcome of 57 patients treated for symptomatic oral lichen planus with topical tacrolimus 0.03% as a mouth rinse. After a non-response to topical corticosteroids complete or major objective remission was observed in 28%, 62%, 87%, 97%, after 3, 6, 12, 24 months respectively. At baseline 73% of patients reported of a severe impairment when eating. Subjective improvement was achieved in 16%, 48%, 69%, 83% after treatment duration of 3, 6, 12, 24 months respectively. This is the first study reporting on the treatment adaptation over a period of 3 to 24 months when using topical tacrolimus on the oral mucosa, with a gradual reduction of treatment frequency in conjunction to an adequate clinical response.

[Utz S, Suter VGA, Cazzaniga S, Borradori L, Feldmeyer L. Outcome and long-term treatment protocol for topical tacrolimus in oral lichen planus. J Eur Acad Dermatol Venereol. 2022;36\(12\):2459-2465. doi:10.1111/jdv.18457.](#)



### Periodontology

This randomized controlled clinical trial investigated the impact of enamel matrix derivative on early wound healing after recession coverage using the modified coronally advanced tunnel flap together with a connective tissue graft from the palate. Clinical parameters as well as markers of inflammation were assessed during the first weeks of healing. No differences for both clinical and molecular markers were found between the groups. Furthermore, the follow-ups after 6 months and 5 years revealed no differences between the groups neither.

[Stähli A, Duong HY, Imber JC, Rocuzzo A, Salvi GE, Katsaros C, Ramseier CA, Sculean A. Clin Oral Investig. 2022 Aug 25:1–9. doi:10.1007/s00784-022-04691-8. PMID: 36002594.](#)  
[Stähli A, Imber JC, Raptis E, Salvi GE, Eick S, Sculean A. Clin Oral Investig. 2020 Feb;24\(2\):1043-1051. doi:10.1007/s00784-019-03008-6. Epub 2019 Jul 9. PMID: 31290017](#)

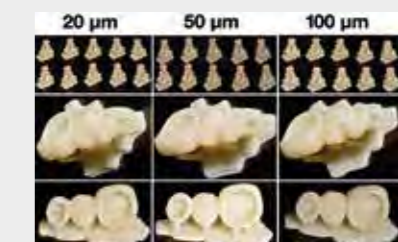


Before recession coverage (A), 6 months (B) and 5 years (C) after recession coverage surgery.

### Prosthodontics & Implant Dentistry – Laboratory

Three-dimensional printing has facilitated the fabrication processes in dentistry. However, knowledge on the effect of layer thickness on the trueness of 3D-printed fixed partial dentures (FPDs) is lacking. For the tested 3D-printed resin, 20- and 50-mm-layer thickness interim fixed partial dentures presented lower deviations. Therefore, these FPDs may require less chairside adjustment and have better marginal adaptation than when a 100-mm-layer thickness is used.

[Çakmak G, Cuellar AR, Donmez MB, Abou-Ayash S, Lu WE, Schimmel M, Yilmaz B. J Prosthet Dent 2022. doi:10.1016/j.prosdent.2022.04.015.](#)

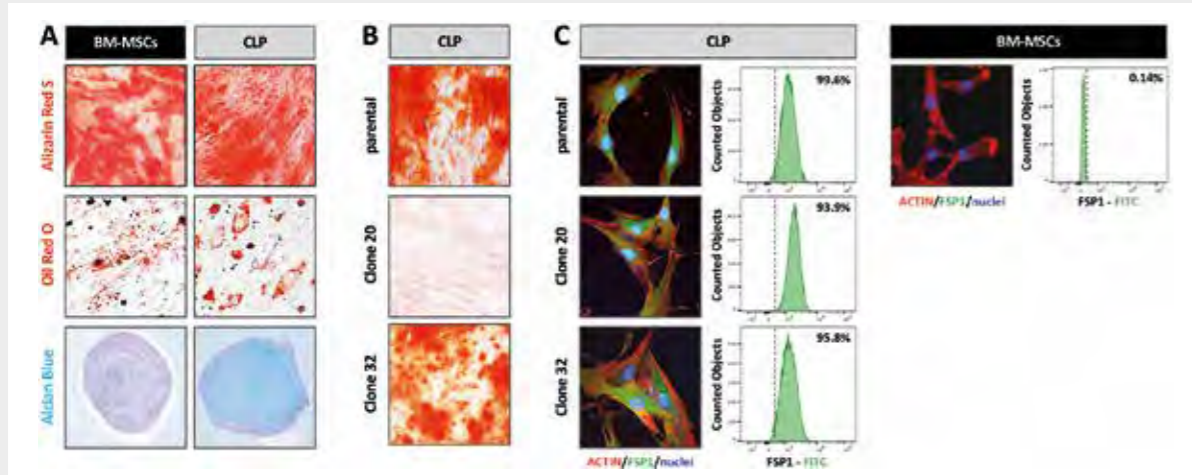


## Laboratory for Oral Molecular Biology

The focus of our laboratory is to advance translational- and patient-oriented research on cleft lip/palate (CLP). Based on recent evidence suggesting that fibroblasts possess multipotent properties similar to mesenchymal stem cells, we tested CLP-derived fibroblasts, which can be isolated from excessive and usually discarded lip tissue obtained during the corrective surgery to close the cleft lip, for their stem cell-like properties. We observed that CLP fibroblasts present a multilineage differentiative, proliferative, and immunomodulatory capacity similar to bone marrow-derived MSCs (BM-MSCs). Since CLP fibroblasts represent highly heterogeneous cell populations, we assessed the possibility of having subclones within our cultures with higher stem cell-like characteristics.

However, a single cell clonal analysis allowed us to show that none of the single cell-derived clones had a superior multipotent character when compared to the parental CLP population and that all clones maintained their fibroblast identity as assessed by the expression of fibroblast specific protein 1 (FSP1), which is not present in BM-MSCs. Our data suggest that CLP lip fibroblasts might be a novel potential autologous cell source for personalized regenerative medicine of clinical benefit for CLP patients.

Original publication: [Discovery and characterization of heterogeneous and multipotent fibroblast populations isolated from excised cleft lip tissue](#); Parisi L, Rihs S, La Scala GC, Schnyder I, Katsaros C, Degen M. *Stem Cell Res Ther.* 2022 13:469.

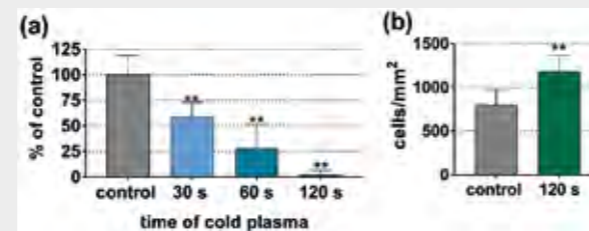


A) Similar to BM-MSCs, CLP fibroblasts can be differentiated into bone- (Alizarin Red S), fat- (Oil Red O) and cartilage- (Alcian Blue) forming cells. B) Single cell-derived clones possess various capacities to differentiate into bone-forming cells, but no clone has superior potential compared to parental CLP. C) Single cell-derived clones retain FSP1 expression in more than 90% of the population (left) while BM-MSCs are devoid of FSP1 (right). Black dashed lines in the FACS plots indicate the threshold of unstained samples.

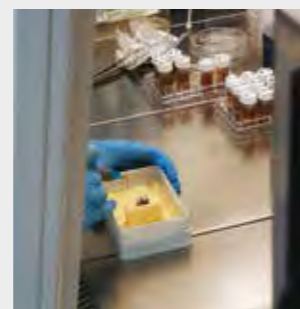
## Laboratory of Oral Microbiology

The laboratory evaluates in vitro new treatment options for periodontal and peri-implant therapy. Both standard microbiological methods as well as different biofilm models are used. Supported by the Association for Dental Infection Control, the potential of a propolis as an ingredient in an oral health care product was evaluated. Another focus was on a cold-plasma device designated to use in periodontal and peri-implant therapy (Jungbauer et al., *Antibiotics* (Basel) 2022;11:752).

Further, the laboratory is partner of an Innosuisse project (PI Jürgen Burger, School for Biomedical and Precision Engineering, University Bern) where the biofilm-removing capacity of prototypes of ultrasonic dental mini-scalers is checked in periodontal pocket models being closely related to dental practice.



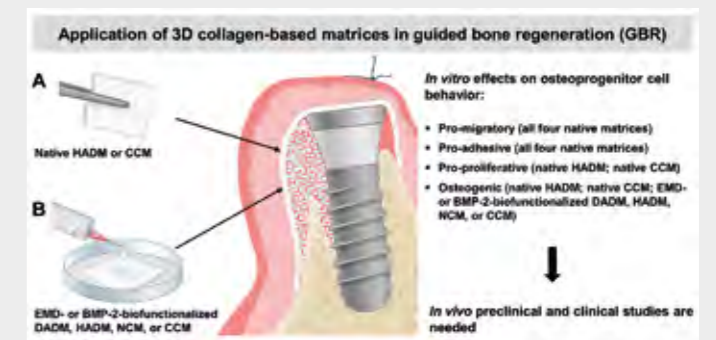
Cold plasma decreases activity of peri-implant biofilm (a) and increases adhesion of oral fibroblasts (b) to titanium specimens.



Evaluation of a prototype of an ultrasonic dental mini-scaler.

## Laboratory of Oral Cell Biology

Three-dimensional (3D) collagen-based matrices may represent an alternative to autologous soft tissue grafts in periodontology and implant dentistry. We have investigated the adsorption and release of various growth factors from four clinically used 3D matrices (Nica et al., *Materials* 2020) as well as the behavior of primary human oral fibroblasts, periodontal ligament cells and two osteoprogenitor cell lines cultured on them. The investigated oral cell types showed significantly enhanced ability to adhere to the matrices as well as to efficiently repopulate an artificially generated wound gap covered by the matrices (Lin et al., *Materials* 2020). In contrast to genes encoding bone matrix proteins that were induced by all matrices, the expression of advanced osteogenic differentiation markers was significantly increased in osteoprogenitor cells grown on a hydrated acellular dermal matrix and a ribose-crosslinked collagen matrix only (Lin et al., *Front Bioeng Biotechnol* 2021; 9:708830). Short clinically relevant pre-coating of the biomaterials with enamel matrix derivative or recombinant human bone morphogenetic protein-2 significantly boosted the osteogenic differentiation of the osteoblast precursors on all matrices. Our data support the application of the 3D collagen-based matrices, either in a native or biofunctionalized state, in GBR and as a treatment modality for bone defects in daily practice.



Schematic representation of GBR with the use of autogenous bone or bone substitute material (white granules) for bone augmentation and a collagen matrix (pointed by arrows) as a barrier. The selective ingrowth of bone-forming cells into a bone defect site may be improved by the osteoinductive properties of the native hydrated acellular dermal matrix (HADM) or ribose-crosslinked collagen matrix (CCM) (A), or the EMD- or BMP-2-biofunctionalized dried acellular dermal matrix (DADM), non-crosslinked collagen matrix (NCM), HADM or CCM (B). The clinical application of the matrices in GBR is strongly supported by their positive effects on the migratory, adhesive, proliferative, and differentiation properties of osteoprogenitor cells observed in vitro. Future in vivo pre-clinical and clinical studies are needed to prove the suggested application.

## Oral Diagnostic Science

The main research focus of the Division is development and enhancement of radiographic imaging methods. In a cooperative research project with computer scientists (Universities of Mainz, Dortmund and RheinMain University Wiesbaden) currently methods to i) correct motion-beset CBCT-reconstructions (DFG-project SCHU-1496/7) and ii) to compute a 3D-head model from panoramic radiographs are under development. Both projects in specific steps apply artificial intelligence (AI)-algorithms. A new project is now being initiated which reconstructs a CBCT-volume by means of an AI-algorithm mapping intensities to coordinates. In addition, quality assurance projects are conducted, e.g. for the new German DIN acceptance-test standard for intraoral, panoramic and cephalometric radiography (revision of DIN 6868-151).



Reconstructions of motion-impaired data from a real patient. Informed consent was obtained prior to publishing this image.

[Schulze R. CBCT artefact-burden of zirconia-based as compared to titanium implants for different beam energies: an analytical approach. \*Sci Rep\* 12, 15276, 2022](#)

[Wolf TG, Castañeda-López F, Gleißner L, Schulze R, Kuchen R, Briseño-Marroquín B. Detectability of simulated apical lesions on mandibular premolars and molars between radiographic intraoral and cone-beam computed tomography images: An ex-vivo study. \*Sci Rep\* 12\(1\):14032, 2022](#)

## Institute of Forensic Medicine (IRM)

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Director



Prof. Wolfgang Weinmann  
Deputy Director,  
Forensic Toxicology  
and Chemistry



PD Dr. Sandra Lösch  
Physical  
Anthropology



Dr. Matthias Pfäffli  
Traffic Medicine



PD Dr. Antoine Roggo  
Medical Law



Prof. Christian Schyma  
Forensic  
Medicine and  
Imaging (F&E)



Dr. Silvia Utz  
Forensic Molecular  
Biology (DL)



PD Dr. Wolf-Dieter Zech  
Forensic  
Medicine  
and Imaging (DL)



Dr. Martin Zieger  
Forensic  
Molecular  
Biology (F&L)

### Profile

- Research: Each of the six departments conducts research projects within the context of forensic sciences. The Institute of Forensic Medicine in Bern is world leading in forensic physics and ballistics, forensic imaging, anthropology and alcohol consumption markers. Furthermore forensic genetic projects and traffic medicine projects have been successfully performed
- Teaching: The Institute of Forensic Medicine in Bern (IRM) is responsible for the training and continuing education of students of medicine and jurisprudence, medical personnel and the institutions of the administration of justice and the police
- External Partners: Institute of Legal Medicine, University of Bonn, Germany; Institute of Legal Medicine, University of Schleswig-Holstein Kiel, Germany; Center for Medical Image Science and Visualization, CMIV, Linköping University, Sweden; Institute of Forensic Medicine, University Medical Center Freiburg, Germany; Department of Chemistry and Biochemistry, University of Bern; Institute for Mummies and the Iceman - EURAC research, Bozen, Italy; Max-Planck Institut für evolutionäre Anthropologie, Leipzig, Germany; Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Verona, Rovigo e Vicenza, Italy

### Grants

- Swiss National Science Foundation (grant No. 320030\_179466/1; 10531FL\_197103; IZSEZO\_211879; 210956)

### Highlights



Ballistic laboratory

#### 3 Dimensional Analysis of the Bullet Flight

The new building in which the Institute of Forensic Medicine is established since autumn 2021 comprises a 9 m long room reserved for shooting experiments. This space was transformed into a veritable ballistic laboratory. A customized framework allows to position two high-speed video cameras exactly at any place including the professional light sources. Observed from different angles of view, the projectiles cannot escape our analysis.

#### Revision of the DNA Profiles Act

In April 2022, the referendum deadline for the revised DNA Profiles Act expired. In future, forensic DNA phenotyping will be permitted in Switzerland. It is intended to enable the law enforcement authorities to make statements about the probable appearance of a possible perpetrator based on DNA traces. Specifically, the prediction of eye, hair and skin color, age and biogeographical ancestry will initially be legally permissible. However, the law contains a delegation norm that allows the Federal Council to add further external characteristics via ordinance law. The Institute of Forensic Medicine has already begun to validate the new analysis procedures for forensic practice. Staff members of the Institute of Forensic Medicine were able to contribute their expert knowledge at various stages of the legislative process and were continuously involved in drafting the ordinance law in 2022. In the course of the ongoing revision, we continued to critically examine the various aspects of phenotyping. For example, during the consultation procedure, the wish was expressed by various parties not to restrict the scope of phenotyping by law and to allow prediction for medically relevant characteristics. However, the theoretical admissibility of such comprehensive phenotyping must be considered at least questionable. We have contributed to the debate by conducting an extensive analysis of the European legal framework with the aim of defining the fundamental rights barriers to forensic DNA phenotyping more precisely at the European level.

M. Zieger, J Law Biosci 9(2) (2022), <https://doi.org/10.1093/jlb/ljac024>.



## Institute for the History of Medicine (IMG)

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[www.img.unibe.ch](http://www.img.unibe.ch)



Prof. Hubert Steinke Director	Dr. Pascal Germann Senior Assistant	Stefan Hächler Head of Archive	Dr. Manuel Kaiser Head of Collection	Bruno Müller Head of Library	Dr. Magaly Tornay Ethics Project
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### Profile

- Teaching students of medicine at the Universities of Bern, Basel and Fribourg, master students at the pharmacy and the biomedical engineering program as well as history students at the Philosophical Faculty and health professions students at the Bern University of Applied Sciences
- Small institute with 1 professor, 1 assistant and further scientists in SNSF-funded projects
- Rich library (100,000 vols.), archive documenting local and Swiss medicine (paper and digital), large collection of medical objects from University and University Hospital
- Research on medical theory and practice 18th to 20th century, Albrecht von Haller and the 18th century Republic of Letters, history of medical ethics, history of the quality of life concept
- External partners: Institute of History and Institute of Germanic Languages and Literatures, University of Bern; Institute of Biomedical Ethics and History of Medicine, University of Zurich; Institute of Medical Humanities, University of Lausanne; Institute of Medical Humanities, University of Fribourg; Institute for Philosophy, TU Münster; Center for the History of Science, Technology and Medicine, Manchester; Institute for the History and Ethics of Medicine, Erlangen; History Department, Maastricht University

### Grants

- Swiss National Science Foundation grant "Online-edition of Albrecht von Haller's book reviews and letters: knowledge production in the network of the emerging scientific community" (10FE15-198247)
- Swiss National Science Foundation grant "Governing by values: on the history of medical ethics and bioethics in Switzerland" (No. 100011\_184880)

### Highlights

#### Medical History and the Public

The Institute held a conference on „Medical History and the Public“ on 11 November. Public attention to medical history has increased in the context of the Covid 19 epidemic. Experts from Switzerland and abroad discussed how medical historians can best bring their professional perspective to the public discussion on health and medicine.



#### Archives of The Medical Society of the Canton of Bern

The Institute has taken over the archives of the Medical Society of the Canton of Bern, which was founded in 1809. The majority of the approximately 500 boxes date from the 20th century and document, for example, the change in the image of the doctor, the fight against the state and health insurance companies or study reforms. The Institute now has central archival holdings on the medical profession at national (FMH), cantonal and regional (district associations) level. This is an ideal starting point for research planned by the Institute on the history of the medical profession.



Annual meeting 1887, including a number of faculty members among which the society's president Theodor Kocher at the centre

#### Historicizing Biomedical Ethics

As part of the SNSF-funded research project on the history of biomedical ethics drawing on the archives of the Swiss Academy of Medical Sciences at IMG, three sub-projects are progressing and have been presented at various venues during the year: A dissertation on the history of human experimentation and animal studies; a second dissertation in legal history on norms and legitimation by procedure; and a postdoc project on moral material and the changing valuation of the body and its various parts.



Seed bank, from a public report in the archives of the IMG

#### Bern Museums Night

The Institute manages the medical collections of the University and of the Inselspital. This year, the collection participated in the Bern Museums Night on 21 March. Over 800 visitors flocked to our show depot on Murtenstrasse to marvel at the objects, take part in guided tours and learn more about the collection, medicine, and research in Bern. A highlight was the „sewing workshop“, which was particularly popular with children.



## Institute for Infectious Diseases (IFIK)

Friedbühlstrasse 51, 3010 Bern  
[www.ifik.unibe.ch](http://www.ifik.unibe.ch)



Prof. Stephen Leib, Director  
 PD Dr. Franziska Suter-Riniker, Deputy Director  
 Prof. Siegfried Hapfelmeier-Balmer, Deputy Head Research  
 Dr. Peter Keller, Head Innovation & Development  
 Dr. Katharina Summermatter, Head Biosafety Center  
 PD Dr. Ronald Dijkman  
 Prof. Andrea Endimiani  
 Prof. Bruno Gottstein



PD Dr. Lucy Hathaway  
 PD Dr. Markus Hilty  
 PD Dr. Andreas Kronenberg, Head anresis.ch  
 PD Dr. Christoph Niederhauser  
 PD Dr. Alban Ramette  
 Prof. Parham Sendi

### Profile

- The IFIK covers the entire spectrum of microbiology integrated in research, education and diagnostic services, including virology, bacteriology, mycology, parasitology, molecular diagnostics and infection serology.
- Certified by Swissmedic and accredited for patient care in public hospitals by ISO/IEC 17025 (STS 0363).
- Home to the Swiss National Centre for Antibiotic Resistance (anresis.ch) and the Swiss National Reference Centre for Pneumococci, both mandated by the Federal Office of Public Health.
- Fourteen research groups in the fields of antimicrobial resistance, applied biosafety, central nervous system infection, diagnostic innovation, experimental virology, microbial genomics and host-microbiota interaction, experimental microbiomics, mucosal infections and parasitology.
- Teaching programs for students of medicine, dental medicine, pharmacology, biomedical sciences, and biology and for candidates of the FAMH postgraduate training in Clinical Microbiology.

### Grants

- Swiss National Science Foundation: 200382; 205389; 196062, 196644, 197083; 192067; 189136; 179260; 169791; NRP 79 grant 206400; 167066, 192514, Sinergia grant 180317; NCCR "Microbiomes" (<https://nccr-microbiomes.ch/>)
- Swiss Personalized Health Network (SPHN): Personalized Swiss Sepsis Study
- Innosuisse: 36198.1 IP-LS; 53709.1 IP-LS
- University of Bern: Interfaculty Research Cooperations „One-Health“ and „Decoding Sleep“, and „Bern Center for Precision Medicine“
- SNF special call on coronavirus: 31CA30\_196062; 31CA30\_196644
- Swiss national SARS-CoV-2 genomic and variants surveillance program (FOPH)

### Highlights



Biosafety Level 3 Laboratory of the IFIK @ sitem-insel

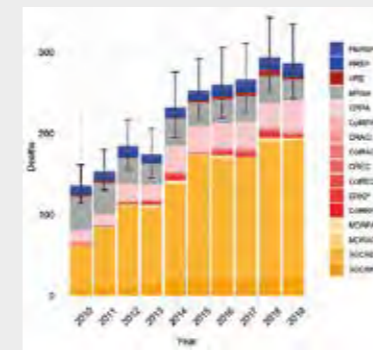
#### Biosafety Center

The WHO has established a Scientific Advisory Group for the Origins on Novel Pathogens (SAGO) to advise the WHO on studies into the origins of emerging and re-emerging pathogens of epidemic and pandemic potential. The head of the IFIK's Biosafety Center is one of the 25 members and has also been assigned as chair of the newly established Technical Advisory Group on Biosafety (TAG-B). The TAG-B provides independent advice to the WHO on setting strategic priorities and action plans relating to biosafety and biosecurity.

#### Increasing Burden of Bacterial Antimicrobial Resistance in Switzerland

The Swiss Centre for Antibiotic Resistance ANRESIS estimated the burden (i.e. the number of deaths and other parameters) caused by infections due to antibiotic-resistant bacteria in Switzerland from 2010 to 2019 using an adapted approach of the ECDC. It was shown that the burden increased significantly and that estimates differed considerably depending on the linguistic region and the hospital type. By using this approach, a more accurate burden estimation on a national level was possible in turn enabling improved comparisons between countries and the identification of regional deficits.

For more information we refer to [www.anresis.ch](http://www.anresis.ch)



Estimated deaths caused by infections with different antibiotic-resistant bacteria in Switzerland from 2010 to 2019.

#### Whatever Comes

In 2022, IFIK's clinical microbiology unit met several challenges: thanks to automated molecular analytics, testing in the 4th and 5th waves of the COVID-19 pandemic could be performed efficiently. On 19 May 2022, IFIK reported the first case of monkeypox infection in Switzerland. For this newly emerging viral disease, IFIK quickly established a diagnostic workflow for patient care. Furthermore, since July, the IFIK has noted a historical increase in skin and throat diphtheria with toxin production. As part of the clarification of several outbreak clusters, more than 50 diphtheria isolates were sequenced by November 2022. All in all - whatever comes along can be processed quickly and efficiently by diagnostics at IFIK.



Reported travel routes to Switzerland of *Corynebacterium diphtheriae* positive cases in two outbreaks at an asylum centre, Switzerland, July–September 2022 (n = 10) (DOI: 10.2807/1560-7917.ES.2022.27.44.2200811)



2022 UniBe Venture Fellows. From left to right: Olivier Schären and Matheus Notter Dias. © Universität Bern / Manu Friedrich

#### Two UniBe Venture Fellowships Granted to IFIK Researchers

For the first time, the University of Bern has awarded four „UniBe Venture Fellowships“ to support entrepreneurial young researchers and their promising innovation projects. Two IFIK researchers were awarded. Matheus Notter Dias for developing a novel antimicrobial against *Helicobacter pylori* with the planned spin-off Enzoxa and Olivier Schären to support the planned spin-off Santella dedicated to developing intestinal vaccines against avian pathogenic *E. coli*.



Biopreparedness Biobank

#### Establishment of the MCID Biopreparedness Biobank

Funded as a core activity of the Multidisciplinary Center for Infectious Diseases (<https://www.mcid.unibe.ch/>), the Biopreparedness Biobank enables the storage and the provision of environmental, human and animal high-consequence pathogens. In addition, the collection is enriched by synthetic viral genomes hosted in yeast and produced upon request in collaboration with IVB, VetSuisse faculty. The biobank relies on standardized processes to guarantee samples quality and traceability, facilitated by an automated storage system in the BSL-3 facility.

## Institute for Medical Education (IML)

Mittelstrasse 43, 3012 Bern  
[www.iml.unibe.ch/en/iml](http://www.iml.unibe.ch/en/iml)



Prof. Sissel Guttormsen, Director IML (in the centre), Dr. Sandra Trachsel, Department Head MME, Dr. Kai Schnabel, Department Head AUM, Prof. Sören Huwendiek, Department Head AAE; Dr. Philippe Zimmermann, Department Head ASCII (from left to right)

### Profile

- Competence Centre for Medical Education, supporting development of competency in health professionals to provide optimal patient care. Serving the Bern Medical Faculty, and other national and international medical schools and institutions
- Developing, investigating and improving effective Digital Learning and Teaching tools and methodologies
- Improving and developing assessment methods, electronic and online assessment approaches through research, and developing instruments for online assessment; provision of extensive assessment services

### Selected Grants

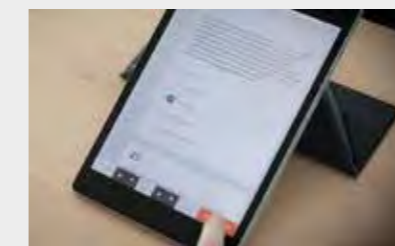
- EU-Project: «Developing, implementing, and disseminating an adaptive clinical reasoning curriculum for healthcare students and educators». Project coordinator: University of Augsburg. Project head: PD Dr. I. Hege. Project partners IML: Prof. S. Huwendiek, Dr. F. Wagner
- SNF 100019\_200811: «Digital Learning and Teaching (DLT)»: Implementing effective digital learning and teaching in higher education beyond the Covid-19 pandemic. Main applicant: Prof. S. Guttormsen. Co-Applicant: Dr. K. Schnabel. Project partners: Prof. S. Huwendiek (IML), Dr. C. Schirlo (Uni Luzern), Dr. Dr. S. Gysin (Uni Luzern), Dr. D. Tolks (LMU München and Leuphana Universität Lüneburg, Germany). PhD candidate: Dr. med. A. Gogollari (IML)
- SNF 100019\_200831: «From threat to challenge»: Improving medical students' stress response and communication skills performance through stress arousal reappraisal and preparatory worked example-based learning when breaking bad news to simulated patients. Main applicant: PD Dr. C. Berendonk. Project partners: Prof. S. Guttormsen (IML), Dr. F. Schmitz (IML), Dr. P. Gomez (Uni Lausanne), Prof. U. M. Nater (Uni Vienna). PhD candidate: M. Bosshard (IML)
- NFP 74: Smarter Health Care «Spiritual Care in Chronic Pain»: The significance of the spiritual dimension in medical treatment/nursing will be investigated in chronic pain patients. Project head: Prof. S. Peng Keller, Faculty of Theology, University of Zürich. Co-Applicants: Prof. M. Rufer. Psych. Poliklinik Uni ZH, Prof. N. Biller-Andorno (Uni ZH), Prof. A. Bischoff (HEdS-FR), Prof. R. Spirig (Pflgewissenschaften Uni ZH), Prof. S. Guttormsen, IML (Lead project C)
- ERS (European Respiratory Society): «How to improve continuing professional development to foster physician's competencies & patient treatment». PhD Adv.: Prof. S. Huwendiek, PhD candidate S. Ram
- Stiftung Krebsforschung Schweiz: «Communication with cancer patients and their families about approaching death: Scaffolding conceptual and practical learning for health professionals». Main applicant: Prof. S. Guttormsen. Project partners: Dr. K. Schnabel (IML), Prof. S. Eychmüller, University Centre for Palliative Care, Inselspital, Bern, Dr. S. Zambrano (ISPM)
- Health 2030: «Precision Medicine for FRONTLINERS», a multi-support learning platform for the daily practice of frontline care professionals. Project head: I. Guessous HUG/UNIGE. Project partners: Profs. S. Guttormsen, J. Cornuz, Unisanté/UNIL, G. Waeber, CHUV/UNIL <https://www.frontliners.ch>

### Highlights

#### 50<sup>th</sup> anniversary IML

The Institute for Medical Education (IML) celebrates its 50<sup>th</sup> anniversary in the academic year 2021/22. Join us on a journey through time over five decades.

<https://tinyurl.com/4f23z2es>



Example exam with tablet

#### Swiss Federal Licensing Exam in Human Medicine Carried out Entirely Digital for the First Time

More than 1200 prospective doctors from six faculties took the written part of the Federal Licensing Exam in Human Medicine electronically for the first time. The switch from paper to tablets went smoothly.

<https://tinyurl.com/5n948enj>



#### Digital Assessments and Evaluations with Examic Valuatic

10 years after the first fully digital OSCE exam with Examic EOSCE, the first version of its successor «Valuatic» was released in 2022. Valuatic is a software platform designed to provide even more comprehensive functions for a variety of assessment and evaluation types than EOSCE.

<https://tinyurl.com/39dhdwhx>



Expert advice makes the difference

#### Building clinical competencies for tomorrow's pharmacists

Two new courses co-designed and implemented by the IML, «patient-oriented pharmaceutical care» and «triage and clinical skills», prepare students in the best possible way for their future work in the pharmacy.

<https://tinyurl.com/2h5tasmz>

#### Compassion training for a better understanding of patients

For this project, an interprofessional team designed and delivered a seminar on reintroducing compassion into medical practice, aimed at medical students in their final Master's year at the University of Bern. Detailed project description published in Medical Education's Really Good Stuff section.

*Full citation: Felber, S. J., Lerch, S. P., Bauer, D., Liaudet, F., Eychmüller, S., & Lörwald, A. C. (2023). Compassion training: Towards a better understanding of patients through self-exposure. Medical education.*

<https://tinyurl.com/562ke53n>



## Institute of Pathology

Murtenstrasse 31, 3008 Bern  
www.pathology.unibe.ch



Prof. Aurel Perren  
Director

Prof. Alessandro Lugli  
Deputy Director

Prof. Christoph Müller  
Head of Experimental Pathology

Prof. Inti Zlobec  
Head of Digital Pathology

### Profile

- Teaching students of medicine, dental medicine, pharmacy, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- 8 research groups in experimental and clinical tissue medicine focus on translational and basic research in cancer, immunology and inflammation. List to the publications: <https://tinyurl.com/ym7u86cm>
- National Partners: Bern Center for AI in Medicine (CAIM); Div. of Hematology, University Hospital, Zurich Institute of Immunobiology, Cantonal Hospital St. Gallen; University of Basel
- International Partners: University of Calgary, Canada; Signal Processing Lab, EPFL; Radboud Medical Center, Nijmegen, (NL); Members of the International Tumor Budding Consortium; Universitätsklinikum Essen, Germany; Dept. of Biomedicine, Neurology and Neurosciences, Stanford University Medical Center, USA; Sanquin Research, Amsterdam; Charité, University Hospital, Berlin; Surgery Dep., San Raffaele, Milan, Italy; David Geffen School of Medicine, Dermatology, UCLA, Los Angeles, Centre de Recherches en Cancérologie de Toulouse - CRCT, Toulouse, France; Biotechnology and Cell Signaling, University of Strasbourg, France

### Grants

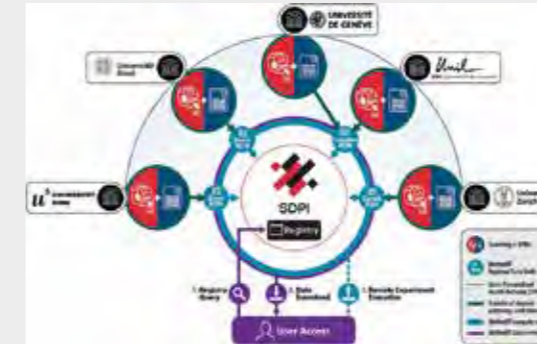
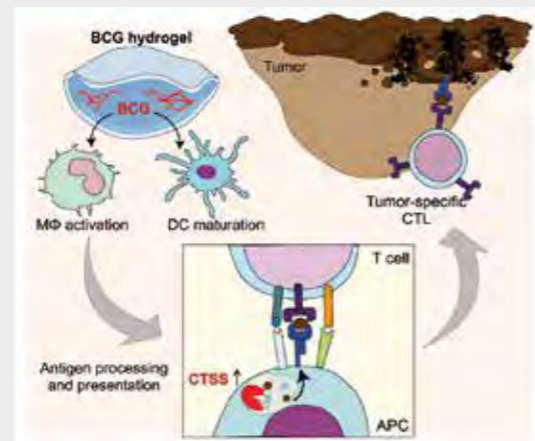
- Swiss National Science Foundation (8)
- Swiss Cancer Research/Swiss Cancer League (7)
- Stiftung für klinisch-experimentelle Tumorforschung/Krebsliga (4)
- Rising Tide Foundation (2)
- Uniscientia Stiftung (1)

### Highlights

#### With a Hydrogel against Black Skin Cancer

Researchers at the University of Bern have developed a therapy option that activates the body's own defense system against black skin cancer. Components of a bacterium are embedded in gel and applied directly to the area of the tumor. In the model, the gel was shown to reduce tumor growth, inhibit its spread to other organs and thereby prolong survival. In a next step, the gel will be tested for its efficacy in patients in clinical trials.

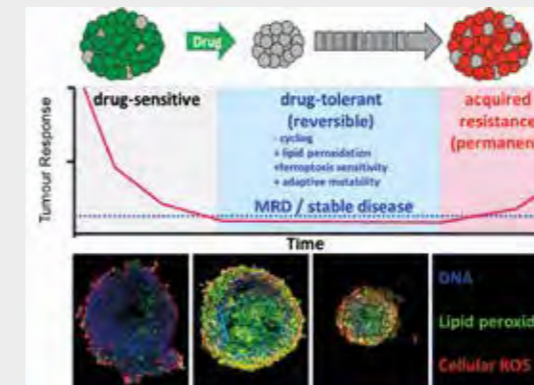
Group M Schenk



### SDPI

The Swiss Digital Pathology Infrastructure (SDPI) aims to develop a unified national digital pathology network bringing together pathology data and images from the five university hospitals (with subsequent inclusion of cantonal and private institutes) to the Swiss Personalized Health Network (SPHN). The infrastructure will provide unprecedented access to well-curated, structured clinicopathological datasets for the development and implementation of novel integrative methods for analysis of clinical outcomes and treatment response and enable the large-scale integration of histological images for research purposes. SDPI will facilitate and strengthen inter-institutional collaboration in technology, clinical development, and research at a national and international scale, promoting improved patient care via precision medicine.

#### An Early Offensive against Acquired Therapy Resistance in PanNET



Graphical description of the three phases of acquired drug resistance and associated phenotypes (top) with corresponding micrographs (bottom) of chronically treated PanNET spheroids showing hallmarks of DTPs (enhanced lipid peroxidation).

Acquired drug resistance (ADR) is a major clinical challenge to all current cancer treatments, including chemo, radiation, targeted, and immune therapies, and accounts for 90% of cancer mortality. Given the stochastic nature of ADR, multiple different resistance mechanisms often co-evolve within in the same tumour or across metastatic lesions in the same patient. This project seeks to identify and test novel strategies to target drug-tolerant persister cells (DTPs), which comprise an early, reversible bottleneck phase of ADR. RNAseq and high content imaging-guided molecular and phenotypic analysis will delineate the early dynamic changes during DTP development in 2D and 3D ADR models of PanNET.

Group Marinoni/Perren/Sadowski

#### Clinical, Pathological and Molecular Characterization of Adult Medulloblastomas for Targeted Therapy: A Multicenter Cohort Study

Medulloblastomas are the most common aggressive pediatric brain tumors with molecularly defined groups. Medulloblastoma has been also described rarely in postpubertal and adult patients. The lack of studies exclusively on adult medulloblastomas means that the therapeutic approach in these patients is mainly based on existing data from studies on pediatric medulloblastomas. However, adult patients do not have a satisfactory clinical outcome after therapy, therefore we will study a large cohort of adult medulloblastomas and medulloblastoma relapses on a clinical, pathological and molecular level. This will be the basis for for developing a targeted therapy adapted to their molecular profile.

Group Vassella



Classic histomorphology of an adult medulloblastoma.



## Institute of Pharmacology (PKI)

Inselspital, INO-F, 3010 Bern  
[www.pki.unibe.ch](http://www.pki.unibe.ch)



Prof. Andrea Huwiler  
Director a.i.

Prof. Hans-Uwe Simon  
Deputy Director

Prof. Thomas Kaufmann

SNF Prof. Georgia Konstantinidou  
until July 2022  
Research Assistant I

Prof. Stephan von Gunten

Prof. Shida Yousefi

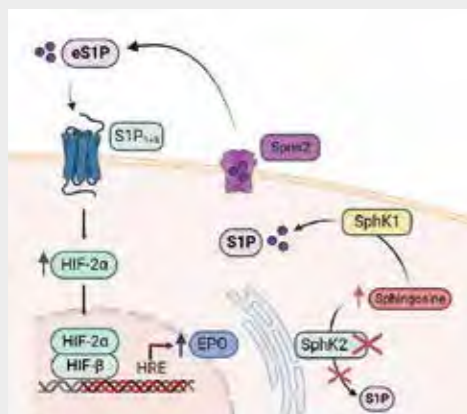
### Profile

- Teaching students of medicine, dental medicine, pharmacy, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- 6 research groups
- Investigation of pathophysiological processes that contribute to inflammation and tumor diseases
- Aim: Discovering new drug targets; developing and validating new drugs in preclinical models
- External Partners: Institutes of Biochemistry, Experimental Immunology and Molecular Cancer Research, University of Zürich, Zürich, Switzerland; Department of Pharmacology, Toxicology and Clinical Pharmacy, Institute of Pharmacy, University of Tübingen, Tübingen, Germany; Pharmazentrum Frankfurt/ZAFES, University Hospital and Goethe University, Frankfurt/Main, Germany; Department of Medicine, University of Toronto, Toronto, Canada; Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, USA; Department of Clinical Immunology and Allergology, Sechenov University Moscow, Russia; Swiss EoE Research Group, Olten, Switzerland, University Kazan, Russia

### Grants

Swiss National Science Foundation (grant No. 310030\_184816; 310030-153346/1; 31003A\_173215; 310030\_184757/1; 310030-201199; 310030-212418; 310030E\_205559 / 1 (co-applicant); SNF Professorship (PP00P3\_194810/1); Swiss Cancer League (KFS-3941-08-2016; KFS-4958-02-2020; KFS-515-08-2020); Bürgi-Fonds; Novartis Foundation for Biological-Medical Research; Bern Center for Precision Medicine (BCPM) Grant; Innosuisse-Swiss Innovation Agency #40922.1 IP-LS; #52202.1 IP-LS (co-applicant); Russian Government Program (075-15.2021-600); China Scholarship Council

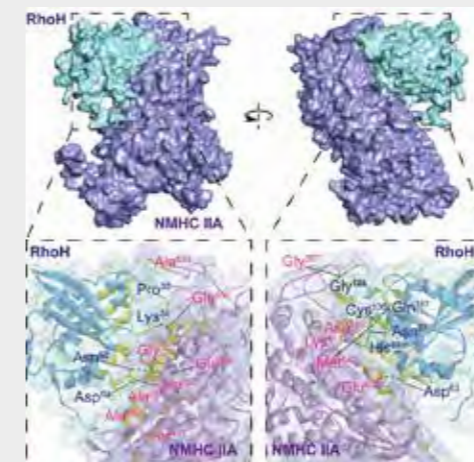
### Highlights



### Sphk1 and Sphk2 Differentially Regulate HIF-2 $\alpha$ and Erythropoietin Synthesis in Renal Interstitial Fibroblasts.

In this study, we show that in mouse kidney interstitial fibroblasts, S1P acts via S1P1+3 receptors to upregulate Epo synthesis through stabilization of the transcription factor HIF2 $\alpha$ . In cells lacking the S1P generating enzyme SphK1, a decrease of S1P and thus of Epo is observed. In cells lacking SphK2, the accumulated sphingosine is directed into the Sphk1 pathway leading to increased S1P export and binding to S1P1+3 to upregulate Epo. These data suggest that selective inhibition of Sphk1/ Sphk2 could serve useful in pathological conditions characterized by abnormal Epo production.

Hafizi et al. (2022), doi: 10.3390/ijms23115882



RHOH is an intracellular brake limiting neutrophil effector functions

### RHOH is an Intracellular Brake Limiting Neutrophil Effector Functions

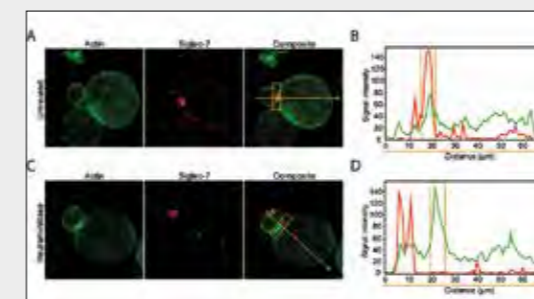
In contrast to molecular changes associated with increased inflammatory responses, little is known about intracellular counter-regulatory mechanisms which control signaling cascades associated with functional responses of neutrophils. Here, we identified a molecular brake, RHOH, which limits neutrophil effector functions such as degranulation and the formation of neutrophil extracellular traps (NETs). Mechanistically, RHOH is induced under inflammatory conditions and binds to non-muscle myosin heavy chain IIA (NMHC IIA) (see figure). Taken together, we describe a new intracellular regulatory axis involved in controlling the strength of a neutrophilic inflammatory response.

Peng S et al, PLOS Biology 20 (2022), e3001794. <https://doi.org/10.1371/journal.pbio.3001794>

### Glyco-Immune Checkpoints in Cancer

Cancer cells decorate their surface with distinct complex sugars that shield them from attack by immune cells. These sugars are bound by inhibitory Siglec-7 receptors that prevent the anti-tumor activities of cytotoxic T cell subsets with otherwise high functional and metabolic capabilities. This ligand-receptor interactions fend off the formation of an effective functional immunological synapse required to eliminate the targeted cancer cell. Our research projects Siglec-7 glyco-immune checkpoints as potential therapeutic targets in different types of solid tumors and leukemia.

Haas et al., Front Immunol 2022; 13:996746



### Restriction of Extracellular Lipids Renders Pancreatic Cancer Dependent on Autophagy

Mutant KRAS-driven tumors are metabolically programmed to support their growth and survival, which can be used to identify metabolic vulnerabilities. In the present study, we aimed to understand the role of extracellularly derived fatty acids in KRAS-driven pancreatic cancer. We show that depletion of extracellularly derived lipids either by serum lipid restriction or suppression of ACSL3, triggers autophagy, a process that protects PDAC cells from the reduction of bioenergetic intermediates. Combined extracellular lipid deprivation and autophagy inhibition exhibits anti-proliferative and pro-apoptotic effects against PDAC cell lines in vitro and promotes suppression of xenografted human pancreatic cancer cell-derived tumors in mice. Therefore, we propose lipid deprivation and autophagy blockade as a potential co-targeting strategy for PDAC treatment.

Saliakoura et al. J Exp Clin Cancer Res (2022) 41:16  
<https://doi.org/10.1186/s13046-021-02231-y>





Prof. Marcel Egger, Managing Director; Prof. Thomas Nevian, Codirector; Prof. Walter Senn, Codirector; Prof. Katja Odening, Codirector; Prof. Christian Soeller, Codirector; Prof. Jan Kucera; Ass. Prof. Stéphane Ciocchi



Ass. Prof. Jean-Pascal Pfister; PD Dr. Shankar Sachidhanandam; Dr. Mihai Petrovici; Prof. em. Stephan Rohr, Emeritus; Prof. em Ernst Niggli, Emeritus

## Profile

- The Department of Physiology performs basic and translational research in cardiac- and neurophysiology.
- The five research groups in cardiac physiology investigate mechanisms that lead to heart failure and arrhythmias. They use state-of-the-art electrophysiology and imaging techniques and computer simulations to elucidate basic mechanisms of action potential generation, propagation, excitation-contraction coupling and mechano-electrical feedback and arrhythmia mechanisms on the subcellular, cellular, tissue and organ level in health and disease. The research projects are importantly supported by developments of novel experimental methods at the nano-to the whole organ scale.
- The common theme of the six research groups in neurophysiology is to understand neuronal network dynamics in the brain in health and disease. New strategies are developed to treat chronic pain, and to re-build brain computation in novel soft- and hardware algorithms. The formation of emotional memories, anxiety, depression and perceptual vision are studied from molecules to single cells and neuronal networks with electrophysiological, two-photon imaging, optogenetic and behavioral approaches. The computational neuroscience groups develop probabilistic models of brain function at different levels ranging from single synapses to cognition.
- The Department of Physiology is predominantly engaged in the education of students of human and dental medicine. We cover the entire field of human physiology with lectures and practical courses. Lecturers of our institute also participate in the training of students in veterinary medicine, pharmacy and the "Master in Biomedical Engineering". Our institute coordinates the master program in Biomedical Sciences (BMSc) and contributes to the BeNeFri program in Neuroscience and other interfaculty lecture series.
- Research partners: Humboldt University, NeuroCure Cluster of Excellence, Berlin, Germany; Department of Pharmacy and Drug Science, University of Bari Aldo Moro, Bari, Italy; Department of Medicine, Wisconsin Institutes for Medical Research, University of Wisconsin, USA; Kirchhoff Institute of Physics, University of Heidelberg, Heidelberg, Germany; Medizinische Hochschule Hannover, Germany; Mayo Clinic, Rochester, USA; Maastricht University, NL; Amsterdam University, NL; University of Miami, USA; Imperial College, London; University of Oslo, Institute of Clinical Medicine; KU Leuven, Experimental Cardiology; University of Queensland (AUS), School of Biomedical Sciences

## Grants

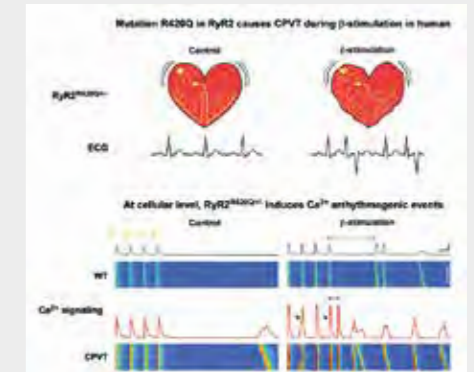
- NIH RO1 Grant "Polyunsaturated fatty acids as anti-arrhythmic agents ( Odening)
- EJR-RD Grant "Silence LQTS" (Odening)
- ERC Consolidator Grant (Nevian)
- ERC Starting Grant (Ciocchi)
- SNF Professorship Grant (Ciocchi, Pfister)
- Human Brain Project (Petrovici, Senn)
- SNF Synergia Grant (Senn)
- IFK Decoding Sleep (Nevian, Senn)

## Highlights

### Cardiac Arrhythmogenesis in a Mouse Model of CPVT

Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT) is a cardiac arrhythmia. It is observed in the presence of mutations of the Ca<sup>2+</sup> release channel (a.k.a. RyR) and results in their abnormally high Ca<sup>2+</sup> sensitivity, prominent during  $\beta$ -AR stimulation and their phosphorylation. Our findings suggest that the balance between Ca<sup>2+</sup> loading and leak via mutated and phosphorylated RyRs is an important determinant for arrhythmogenicity. This may be relevant for patients harboring RyR mutations.

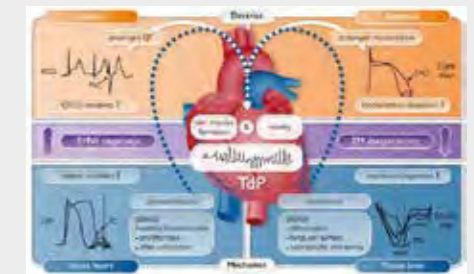
[Lopez R et al. J Mol Cell Cardiol 170, 1–14 \(2022\).](#)



### Electromechanical Reciprocity and Arrhythmogenesis Long QT Syndrome

In this State-of-the-Art review we introduced the concept of "electromechanical reciprocity" - the mutual influencing of excitation-contraction and mechano-electrical feedback in the beating heart - in the long-QT syndrome. We highlight how an altered electromechanical reciprocity can create a „sensitized“ electromechanical substrate, in which inadvertent electrical or mechanical stimuli such as local afterdepolarizations, aftercontractions, or dyssynchrony can trigger abnormal impulses and cause arrhythmias. This knowledge will help us to develop novel antiarrhythmic therapy approaches in LQTS.

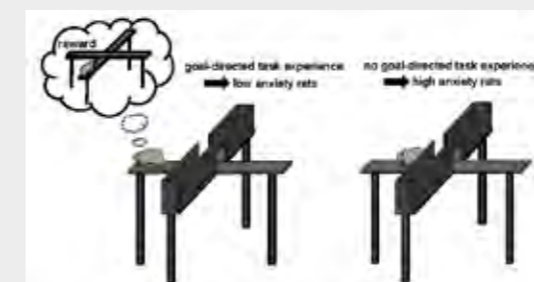
[Odening KE, et al. Eur Heart J 2022;43\(32\):3018-3028.](#)



### Anxiety-Related Activity of Ventral Hippocampal Interneurons

The ventral hippocampus (vH) is a brain region involved in anxiety. There, the activity of pyramidal neurons is controlled by GABAergic interneurons, which are an important target of anxiolytic drugs. We showed that these cells were selectively active when rats entered an anxiogenic environment. Rats with prior goal-related experience exhibited low-anxiety behavior that correlated with larger activity of vH interneurons during exploration compared to high-anxiety rats. This suggests that vH interneurons may underlie different anxiety states.

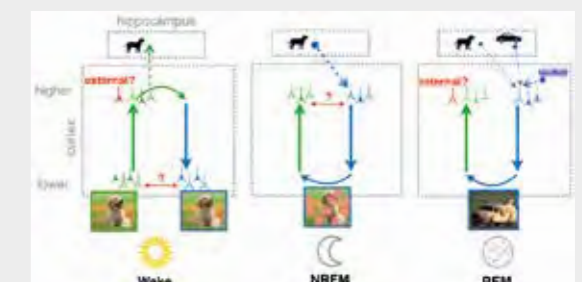
[Forro et al. \(2022\) Prog Neurobiol, 219: 102368.](#)



### Creative Dreaming in REM Sleep

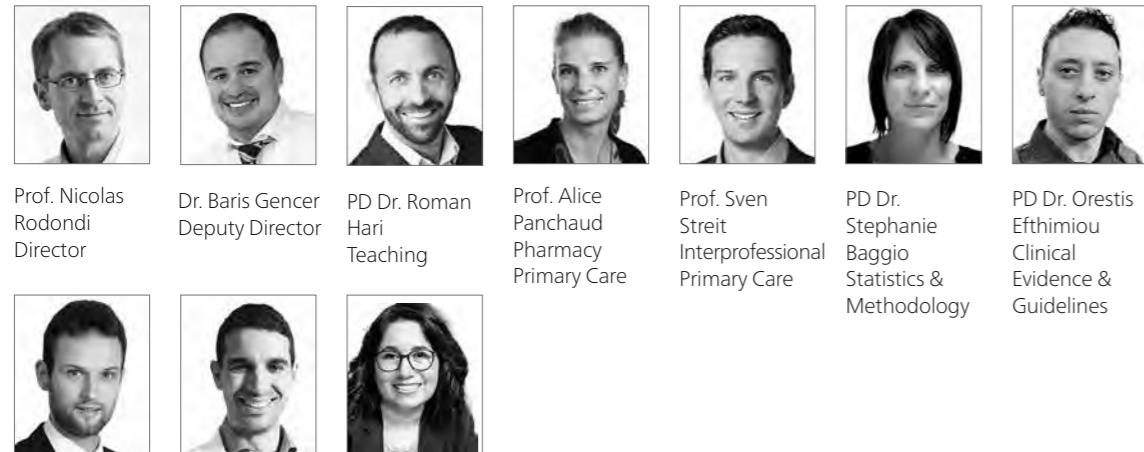
The cognitive function of sleep is classically identified in terms of memory consolidation. While during wakefulness, sensory inputs are stored in the hippocampus, the hippocampal memory is replayed during Non-Rapid Eye Movement (NREM) sleep. We extend this classical sleep model with a functional role for REM sleep, in which creative dreams reorganise sensory representations and memories. Such creative REM dreams help to recognize novel objects in images.

[N. Deperrois, M. Petrovici, W. Senn, J. Jordan, eLife, 2022.](#)



## Institute of Primary Health Care (BIHAM)

Mittelstrasse, 43, 3012, Bern  
www.biham.unibe.ch



Prof. Nicolas Rodondi Director	Dr. Baris Gencer Deputy Director	PD Dr. Roman Hari Teaching	Prof. Alice Panchaud Pharmacy Primary Care	Prof. Sven Streit Interprofessional Primary Care	PD Dr. Stephanie Baggio Statistics & Methodology	PD Dr. Orestis Efthimiou Clinical Evidence & Guidelines
PD Dr. Manuel Blum Career	Prof. Reto Auer Substance Use	Dr. Patricia Chocano Ageing				

### Profile

- Research in primary health care, epidemiology and public health
- Promote evidence based, high value, safe and patient centered health care
- Training next generation of primary care physicians & pharmacists and strengthen the development of primary care at cantonal and national level
- New Master's program in Pharmacy
- External Partners: Leiden University Medical Center, The Netherlands; Department of Medicine & Epidemiology and Biostatistics, UCSF, CA, USA; The Thyroid Studies Collaboration on 5 continents; Division of Pharmacoepidemiology and Pharmacoeconomics, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts, USA

### Grants

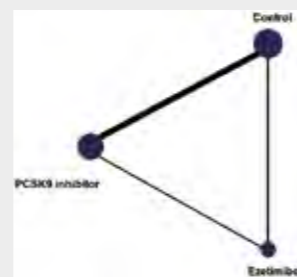
- STREAM-75, Discontinuing Statins in Multimorbid Older Adults without Cardiovascular Disease (IICT SNF)
- ESTxENDS IICT SNSF, Swiss Cancer Research, Tobacco Prevention Found
- BE-SAFE – Implementing a patient-centred and evidence-based intervention to reduce Benzodiazepine and sedative-hypnotic use to improve patient SAFETY and quality of care (HORIZON Europe)
- DROPIT trial: Deprescribing inappropriate proton-pump inhibitors in Swiss primary care settings (IICT, SNSF)
- OPERAM – European Union's HORIZON 2020 & Long Term (SNF)
- Methylphenidate vs. placebo in detained people with attention-deficit/hyperactivity disorder: RCT (SNF)
- Thyroid Studies Collaboration – (SNF) Swiss Heart Foundation, 2020-2021 (two ongoing grants)

### Highlights

#### Impact of New Lipid Drugs for the Reduction of Cardiovascular Event

With an international team, we investigated the role of additional cholesterol lowering drugs in reducing overall cardiovascular risk. Based on a network meta-analysis of randomized trials, we found that these drugs benefit only adults at high heart disease risk, but not in those with intermediate or low risk. The drugs assessed were ezetimibe and proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors. We develop new recommendations that represent a shift from the traditional focus on lowering cholesterol levels to a focus on reducing an individual's overall cardiovascular risk.

SU Khan, et int., N Rodondi. *BMJ* 2022;377:e069116.



Network diagram of ezetimibe, PCSK9 inhibitor and control arms on cardiovascular outcomes in patients taking maximally tolerated statin therapy

#### Edoxaban Versus Warfarin in High-Risk Patients with Atrial Fibrillation

ENGAGE AF-TIMI 48 was a multicenter randomized, double-blind, controlled trial in 21,105 patients with atrial fibrillation (AF) randomizing higher-dose edoxaban regimen (HDER) 60 mg, lower-dose edoxaban regimen (LDER) 30 mg, or warfarin, with a median follow-up of 2.8 years. Versus warfarin, HDER was associated with significant reductions of net clinical outcome in most of the high-risk subgroups (e.g. elderly, moderate renal dysfunction,...). This secondary analysis from this large trial helps for the management of anticoagulation in these challenging patients.

Gencer B., et al. *Am Heart J.* 2022 May;247:24-32.



Annualized event rates (%) of the net clinical outcomes with edoxaban vs warfarin by the number of risk factors.

#### Quality of Chronic Care for Patients with Type 2 Diabetes in GP Practices

This was the first study in Switzerland to examine the effects of clinical specialized medical assistant's work. It compared the treatment of patients with type 2 diabetes in 22 practices with and without CSMA in Switzerland and included 170 patients. One of the key findings was that the practices with CSMA achieved equally good results in terms of treatment quality, satisfaction with treatment, and treatment burden as GP practices without CSMA.

Ansorg AK, et al. *Swiss Med Wkly.* 2022;152:w30180



Number of consultations with clinical specialized medical assistants in GP practices

#### Ten-year Changes in Colorectal Cancer Screening in Switzerland

In the Swiss health Interview Survey, conducted every 5 years, we assess the proportion of the Swiss population with colorectal cancer (CRC) screening in 2007, 2012 and 2017. We found CRC screening increased sharply from 33% to 48% over the last 10 years, mostly for colonoscopies. Younger participants, those with only basic insurance and high deductible had significantly lower screening rates. Organized screening programs such as the one recently launched in Bern, which frees participants from the franchise, might thus be an answer to potential financial barriers to screening.

Scheider R, et al., *Prev Med Rep.* 2022 May 6;27:101815.

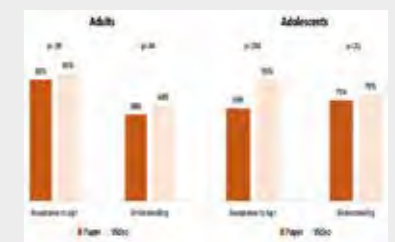


Weighted proportions of 50–75-year-old respondents tested for colorectal cancer in the Swiss Health Interview Survey 2007, 2012 and 2017.

#### Informed Consent in Vulnerable Population: a RCT among Detained Persons

In this RCT testing a general informed consent for research among a vulnerable population, detained adults and adolescents were randomized into two groups, who received either a paper-based or an audiovisual material providing information about informed consent. Adults had similar acceptance rates in both groups (p=.39) with a better understanding in the audiovisual group (p=.04), whereas adolescents had a higher acceptance rate in the audiovisual group (p=.006) with similar understanding in both groups (p=.11). The results of this study suggest that detained persons are not reluctant to participate in research but efforts should be made for appropriate informed consent.

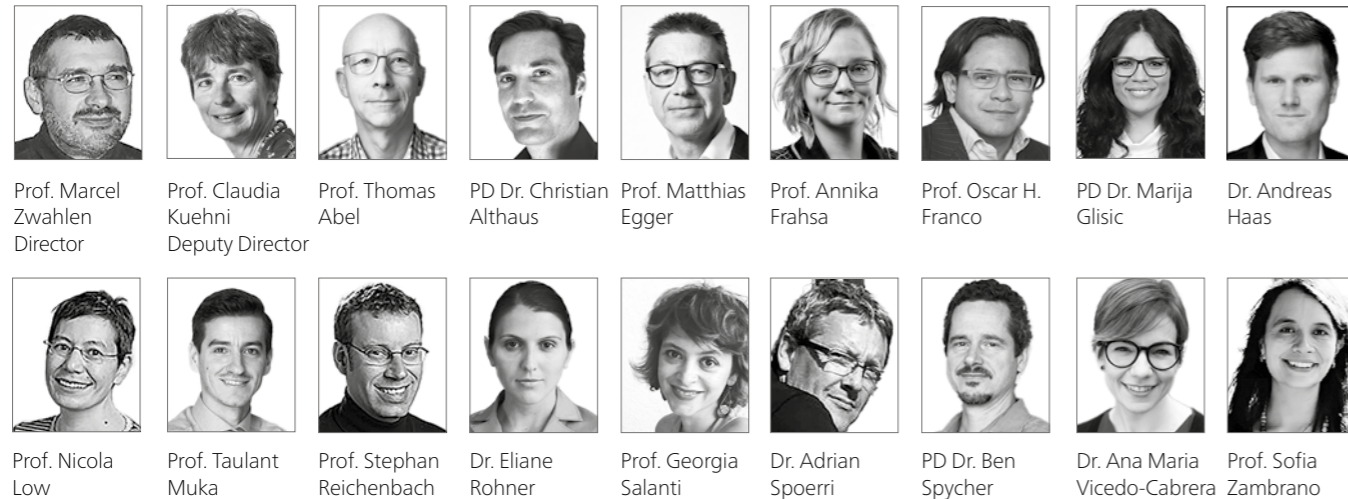
Baggio S, et al., *JAMA Network Open.* 5(10), e2235888-e2235888



Comparison of Audiovisual and Paper-Based Materials Informed Consent for Research in Prison in adults and adolescents

## Institute of Social and Preventive Medicine (ISPM)

Mittelstrasse 43, 3012 Bern  
www.ispm.unibe.ch



### Profile

- ISPM participates in University teaching programs for students of medicine, pharmacology, biomedical engineering and biomedicine (including students from the University of Fribourg). It engages in PhD and postgraduate programs of the University of Bern and SSPH+ and offers three CAS.
- ISPM's research profile covers health areas from cardio-metabolic to HIV, cancer, childhood and adolescents, NCDs to environmental influence, with the tiers of development of new methods and lifestyle and behavior reaching across all fields.
- External partners: Oeschger Center for Climate Change Research; Paraplegieforschung Schweiz, Center for Space and Habitability of the University of Bern, Clinics of the University Hospital Bern; Schulich School of Medicine&Dentistry, University of Western Ontario, Canada; Fundacion Universitaria de Ciencias de la Salud, Colombia; Federal State Budgetary Organization National Cardiology Research Center of the Ministry of Health of the Russian Federation; Harvard University.

### Grants

- SNSF: 1 Starting Grant, 2 project grants (320030\_212519, IZSEZ0\_213181), 1 Postdoc Mobility
- 1 Horizon Europe and SERI
- Swiss Cancer League, 4 MCID grants, 1 SPHN grant

### Highlights

#### Physician Emotions, Wellbeing and Medical Communication

Increasing evidence shows that emotions play an important role in decision making. However, in medicine, the impact of physician emotions remains unexplored, mainly because emotions are viewed as negatively affecting clinical judgement. Unattended emotions can have personal consequences for physicians, for example leading to burnout. Physician emotions can also trigger ethical and clinical conflicts, affecting patient care and the health system.

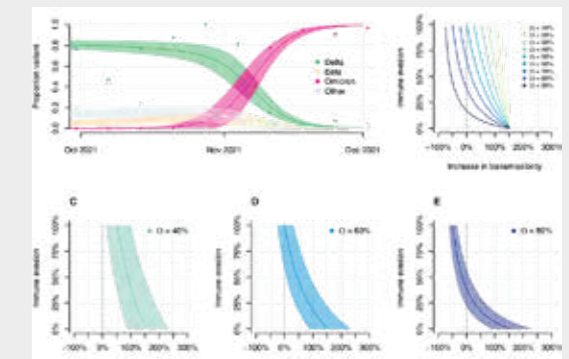
SNF Prof. Sofia Zambrano and her research team are employing a variety of methodological approaches to explore different facets of physician emotions from the perspectives of key stakeholders. Through her research, she aims to deepen the understanding of how physician emotions can be best integrated in the practice of medicine to improve physicians' wellbeing, enhance medical communication, and thus have an impact on patient care.



Prof. Sofia Zambrano

### SARS-CoV-2 Research

As in the two previous years, researchers from ISPM published important results on the evolution and impact of the SARS-CoV-2 pandemic. One study assessed the historical dimension of the COVID-19 pandemic by analyzing over 100 years of mortality data in Switzerland, Sweden, and Spain, three militarily neutral countries in the 1918 World War. In all three countries, the peaks of monthly excess mortality in 2020 were greater than most monthly excess mortality since the 1918 influenza pandemic, documenting the historic dimensions of the COVID-19 pandemic in 2022, being the second-largest infection-related mortality disaster in these three countries. A second, international study, documented the genomic profile and the early transmission dynamics of the SARS-CoV-2 variant Omicron that emerged in South Africa in late 2021 and has become dominant globally since. Mathematical models developed at ISPM allowed to describe the strong immune evasion of Omicron with important implications for infection control measures. Finally, in a third study, the Mental Health COVID-19 study group (over 100 scientists led by G. Salanti) reviewed the changes in mental health as documented in published studies involving hundreds of thousands of participants. A moderate increase in symptoms of depression and anxiety were observed among the general population during the first two months of the pandemic, with substantial variation by population after that period.



Growth of the SARS-CoV-2 variant Omicron in Gauteng, South Africa, and the relationship between increased transmissibility and immune evasion.

### Heat and Cold-Related Mortality

The Climate Change & Health team led a relevant publication on heat and cold-related mortality in Switzerland. Using high-resolution data on temperature and mortality between 1969 and 2017, the authors estimated that heat and cold were responsible for 80 deaths per 100 thousand population annually. More importantly, they observed that population ageing could have amplified heat-related impacts and attenuated the decline in cold-related mortality during the last decades. Led by Evan de Schrijver and Ana M. Vicedo-Cabrera, it was published in the journal Environmental Health Perspectives, with high visibility in several media channels in Switzerland.



Evan de Schrijver

### New Research Focus on Patient Safety

Prof. Dr. David Schwappach joined ISPM in 2022 to establish a research focus on patient safety, supported by a cooperation between the Swiss Medical Association (FMH) and ISPM. The burden of preventable health care harm is substantial and exceeds that of many health conditions. With this research focus, we aim to identify and understand the nature and prevalence of hazards in health care and develop innovative approaches to improve patient safety. This research is interdisciplinary in nature, based on strong collaboration with clinicians, and makes use of different quantitative and qualitative methods, including observations, experiments, survey studies, and analyses of routinely collected data.



David Schwappach

## Theodor Kocher Institute (TKI)

Freiestrasse 1, 3012 Bern  
[www.tki.unibe.ch](http://www.tki.unibe.ch)



Prof. Britta Engelhardt Director and Research Group Leader	Prof. Ruth Lyck Research Group Leader	Dr. Urban Deutsch Research Group Leader	Dr. Gaby Enzmann Principal Investigator	Dr. Steven Proulx Research Group Leader
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### Profile

- The TKI hosts 4 research groups studying central nervous system immunity in health and disease with a focus on multiple sclerosis, stroke, Alzheimer's disease, and brain metastasis of tumors by employing advanced in vitro and in vivo imaging approaches.
- Teaching bachelor and master students of the Medical, Science and Vetsuisse Faculties in lectures and practical classes in immunology, vascular and cell biology. Educating graduate students of the Graduate School for Cellular and Biomedical Sciences (GCB). Coordinating the national PhD programs "Cell Migration" and "Cutting Edge Microscopy".
- External partners: Anne Astier and Roland Liblau, INSERM, CNRS, Toulouse, France; Eric Thouvenaut, INSERM, CNRS, Montpellier, France; Renaud Du Pasquier, CHUV Lausanne; Katrine Qvortrup, Denmark Technical University, Lyngby, Denmark; Mette Rosenkilde, University of Copenhagen, Denmark; Doron Merkler, University of Geneva; Markus Schwanninger, University of Lübeck, Germany; Aaron J. Johnson, Mayo Clinic, Rochester, MN, USA; Mirjam Schenk, Institute of Pathology, University of Bern; Michael Detmar, ETH Zurich, Vartan Kurtcuoglu, University of Zurich; Bert Müller, University of Basel, Yann Decker, University of the Saarland; Germany; Paola Luciani, University of Bern; Eric Shusta, University of Madison Wisconsin, Madison, USA; James McGrath, University of Rochester, NY, USA; Anna Oevermann, Vetsuisse, University of Bern

### Grants

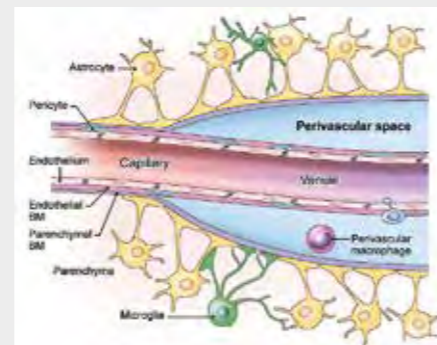
- NIH R61/R33, Fidelity Bermuda Foundation, Horizon 2020 ITN ENTRAIN, Swiss MS Society, CSL Behring, Novo Nordisk Foundation, ARSEP
- Stiftung Synapsis - Alzheimer Forschung Schweiz AFS, Heidi Seiler Stiftung
- SNSF (310030E\_189312; 310030\_189080; 310030\_189226; 4078PO\_198297)

### Highlights

#### Defining the Perivascular Space in Neuroinflammation

This year we have contributed to a review article as part of a special issue of *Neuron* focused on Neuro-immune Interactions. Along with prominent neurologist Prof. Hans Lassmann of the University of Vienna, neuroradiologist Prof. Daniel Reich of the NIH and others, we have summarized the current state of knowledge regarding the role of perivascular spaces in the development of multiple sclerosis and other neuroinflammatory disorders.

[Ineichen et al, Neuron 110 \(21\), 3566-358.](#)



Scheme of the brain perivascular space

#### Pushing the Limits of Neuroanatomy

In a collaboration with Prof. Vartan Kurtcuoglu, University of Zurich and Prof. Bert Müller, University of Basel, we have generated first-of-its-kind in vivo data of the mouse brain using the light source at ESRF - The European Synchrotron Radiation Facility in Grenoble, France. In a project now funded by a SNSF-Sinergia grant of 3.1 million CHF, we aim to define the anatomy of the cerebrospinal fluid spaces in mice from its source at the choroid plexuses to its routes of outflow along cranial nerves to lymphatic vessels. The research will have relevance for neuroinflammatory and neurodegenerative disorders.

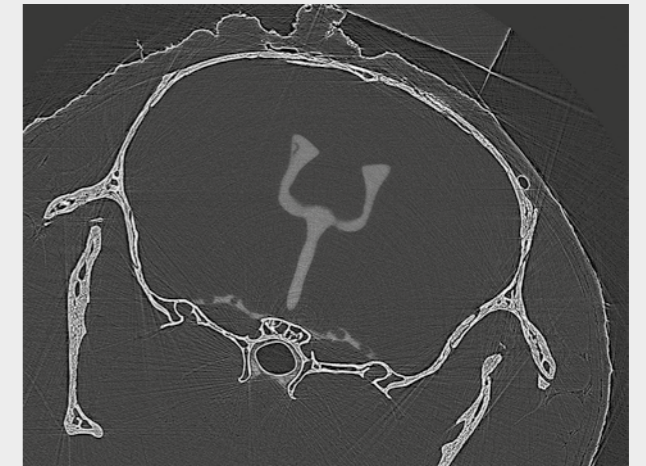
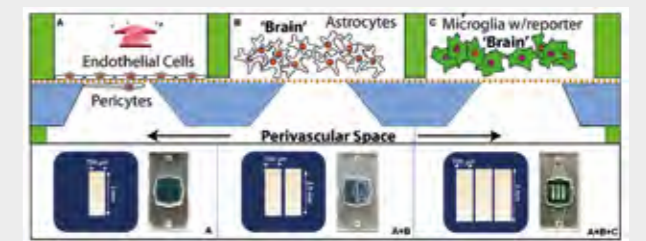


Image of a synchrotron brain scan

#### A Human Blood-Brain Barrier (BBB) Platform to Study BBB Dysfunction in Neuroinflammation

Within an international consortium funded by the National Institutes of Health (USA; R61/R33) and coordinated by Prof. James McGrath (University of Rochester, NY, USA) we have developed the modular  $\mu$ SiM device which allows the establishment and validation of the entire pluripotent stem-cell derived neurovascular unit composed of brain microvascular endothelial cells, astrocytes and pericytes. The  $\mu$ SiM provides a new tool to study BBB dysfunction in MS.

[McCloskey et al, Adv Healthcare Mat, 2022, 20220804.](#)



The  $\mu$ SiM device

#### Keynote Lecture of Prof. Britta Engelhardt at BBBelgium

Belgian researchers with a focus on the brain barriers have established a network to strengthen brain barriers research nationally but also internationally. Prof. Britta Engelhardt had the pleasure to give a Keynote Lecture on the role of the brain barriers in maintaining CNS immune privilege at the inauguration meeting of BBBelgium in Hasselt on 30 November 2022.



Steering Committee and Keynote Speakers of BBBelgium inauguration meeting

## Departments at the University Hospital, Inselspital

Department of Anaesthesiology and Pain Medicine  
Department of Angiology  
Department of Cardiac Surgery  
Department of Cardiology  
Department of Clinical Chemistry  
Department of Cranio-Maxillofacial Surgery  
Department of Dermatology  
Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM)  
Department of Diagnostic and Interventional Neuroradiology  
Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)  
Department of Emergency Medicine  
Department of ENT, Head and Neck Surgery (HNO)  
Department of General Internal Medicine  
Department of Geriatrics  
Department of Hematology and Central Hematology Laboratory  
Department of Human Genetics  
Department of Infectious Diseases  
Department of Intensive Care Medicine  
Department of Medical Oncology  
Department of Nephrology and Hypertension  
Department of Neurology  
Department of Neurosurgery  
Department of Nuclear Medicine  
Department of Obstetrics  
Department of Ophthalmology  
Department of Orthopedic Surgery and Traumatology  
Department of Osteoporosis  
Department of Pediatric Surgery  
Department of Pediatrics  
Department for Plastic and Hand Surgery  
Department for Pulmonary Medicine and Allergology  
Department of Radiation Oncology  
Department of Rheumatology and Immunology  
Department of Thoracic Surgery  
Department of Urology  
Department of Vascular Surgery  
Department for Visceral Surgery and Medicine



## Department of Anaesthesiology and Pain Medicine

Inselspital, 3010 Bern  
www.anaesthesiologie.insel.ch



Prof. Frank Stüber  
Director and Chair

PD Dr. Lutz Lehmann  
Vice Chair

Dr. Nadja Fislser  
Head of HR

PD Dr. Martin Luginbühl  
Chair Spital Tiefenau

Reto Thomann  
Head of Nursing

Prof. Markus Lüdi  
Head of Research

### Profile

- Embracing all dimensions of modern anaesthesia care, serving patients and partners alike, we search for new ways to minimize the impact of anaesthesia on organ systems and to develop sustainable policies towards shared decisionmaking in acute care medicine.
- Our close collaboration with interventional and surgical partners allows us to add value to all peri-interventional and peri-operative processes, with direct benefits for acute care patients.
- Our research teams address a wide range of questions, all of which aim to significantly improve peri-operative care of patients from all our interventional and surgical partners.

### Grants

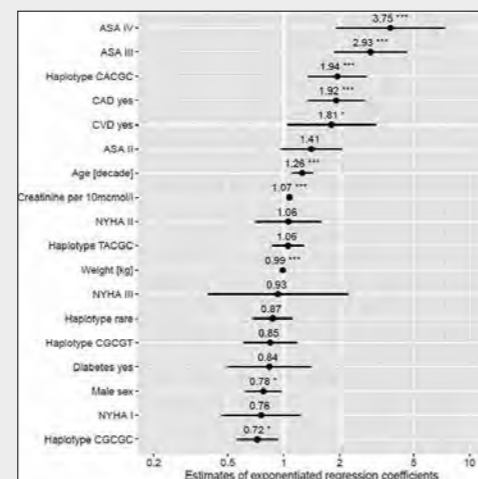
- Switzerland Innovation Park to PD Dr. Thomas Riva
- Fondation J. Dürmüller-Bol to Dr. Alexander Fuchs
- Swiss Society for Intensive Care Medicine (SGI) Young Investigator research grant to Dr. Alexander Fuchs
- CSL Behring to Prof. Patrick Wüthrich
- BINZ Foundation to Dr. Richard Steffen

### Highlights

#### NPPB Haplotype's Impact on BNP/NT-proBNP Plasma Levels

Plasmatic natriuretic peptide (NP) levels can help stratify peri-operative risk but genetic variability in plasmatic NP levels was recently described. Hahn et al. genotyped 427 patients undergoing surgery for single-nucleotide polymorphisms (SNPs) to assess the impact of genetic NP variability. They found specific haplotypes associated with increased ASA physical status and coronary artery disease as indicators of increased perioperative risk.

Markus Hahn et al. Cells, 2022



Exponentiated generalized linear model to assess haplotype effects on NT-proBNP

#### "NECTARINE" Trial Studying Peri-Operative Red Blood Cell Transfusion in Neonates and Infants

This multicentre observational trial studied the peri-operative red blood cell transfusion practice in Europe. Specifically, the authors assessed clinical practices in accordance with current guidelines in relation to patient outcome, and found that lower transfusion-triggering haemoglobin thresholds in clinical practice than suggested by current guidelines.

Alexander Fuchs et al. Eur J Anaesthesiol, 2022.



The NECTARINE trial revealed lower transfusion-triggering haemoglobin thresholds than recommended by guidelines

#### Analgesia and Quality of Recovery after Prostatectomy

Optimal analgesia after surgical prostatectomy is key for the quality of recovery. In this prospective, randomized trial, 133 consecutive patients were randomized to bilateral transversus abdominis plane block (TAP), spinal anaesthesia, or systemic administration of lidocaine. Quality of recovery did not differ between the groups, suggesting that less invasive approaches, such as intravenous lidocaine infusion, might be a suitable analgesic strategy after prostatectomy.

Christian M. Beilstein et al. Eur J Pain, 2022.



Plots of individual scores shown for each treatment group.

#### Changes in Carbon Dioxide During High-Flow Nasal Oxygenation in Apnea

This trial assessed the change of arterial partial pressure of carbon dioxide in surgical patients treated with different flow rates of 100% oxygen. The authors found that a considerable range of humidified oxygen flow rates during apnea was associated with similar increases of arterial partial pressure of carbon dioxide. This finding indicates that there is no additional ventilatory effect of high-flow nasal oxygen.

Thomas Riva et al. Anesthesiology, 2022.

#### Arterial blood gas analysis

PH	7.43	(7.35-7.45)
PCO <sub>2</sub> (KPa)	5.0	(4.6-6.0)
PO <sub>2</sub> (KPa)	7.1	(9.5-13.5)
Bicarbonate (mmol/l)	24.2	(21.0-25.0)
Oxygen saturation (%)	88	(96-100)

A sample readout of blood gas analysis as employed during high-flow nasal oxygenation with apnea in clinical routine.

#### Electrical Impedance Tomography Measurement of Atelectasis During Procedural Sedation in Small Children

This prospective observational cohort trial aimed at investigating the variability of below-normal ventilated parts of infants' lungs ("silent spaces") during procedural sedation in paediatric outpatient treatments. The authors found that newly formed atelectases had completely resolved 2 h after sedation, and confirmed that procedural sedation is a safe technique even in small children.

Thomas Riva et al. J Clin Anesth, 2022.



Setup of the loose-fitting belt with 16 evenly spaced electrodes around the infant's chest, between the 4th and 6th intercostal space.

## Department of Angiology

Inselspital, Freiburgstrasse, 3010 Bern  
[www.angiologie.insel.ch/](http://www.angiologie.insel.ch/)



Prof. Iris Baumgartner Director and Chief Physician	Prof. Yvonne Döring Head of Research	PD Dr. Marc Schindewolf Consultant and Deputy Director	Dr. Alexander Rosenov Consultant	Dr. Rafael Kammer Consultant	Dr. Benny Wohlfarth Consultant	Dr. Mirco Kempter Physician and Head of Phlebology	Györgyi Hamvas Clinical Study Manager
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### Profile

- Teaching programs, student lectures and courses (clinical skills), PBL, weekly internal & Medical Division Cardiovascular lectures
- Research projects comprise analysis, classification and computational hemodynamic modeling of congenital vascular malformations, risk factor analysis and risk factor modulating therapies in peripheral artery disease, basic atherosclerosis and atherothrombosis research, integration of omics technologies in research of vascular malformations and atherosclerosis, drug therapy and endovascular management of venous thromboembolism
- External Partners: Switzerland: Department of Angiology from University Hospital Basel & University Hospital Zürich; Cantonal Hospital Luzern; Department of Vascular Surgery, Cantonal Hospital St.Gallen; Germany: Institute for Cardiovascular Prevention, University Hospital LMU Munich; West German Morbus Osler Center, University Hospital Essen; Department for Vascular and Endovascular Surgery, LMU Munich; Center of Cardiology & Angiology, University Medical Center Mainz; USA: Heart and Vascular Center, University Hospital Denver, Colorado; Italy: Department of Pharmacological and Biomolecular Sciences, University of Milan; United Kingdom: Cardiovascular Strategic Research Initiative Institution, University of Cambridge; Canada: Department of Human Genetics, McGill University, Montreal; Belgium: De Duve Institute, University of Louvain, Brussels

### Grants

- Novartis Foundation for Medical-Biological Research „Unravelling the role of vascular ChemR23 expression in atherosclerosis“, Prof. Yvonne Döring
- Nachwuchsförderungs-Grant (Insel Gruppe) for „Protected Research Time“, Dr. Sarah Bernhard
- Project grant SF Board 2022 for the project „Novel Targeted Approach for the Visualisation of Inflammation using a novel 18F-AzaFol radiotracer for PET Imaging in Large Vessel Vasculitis“ together with Prof. Britta Maurer, Director Rheumatology and Immunology and Prof. Axel Rominger, Director Nuclear medicine, Prof. Iris Baumgartner, Director Angiology and Prof. Yvonne Döring, Head of Research Angiology
- Project funding as part of SFB 1123 Atherosclerosis, Project: „CCR8-driven immune functions on group 2 innate lymphoid cells (ILC2s) in atherosclerosis“, Prof. Yvonne Döring together with Prof. Christian Weber (LMU, Munich)
- DZHK Funding Cooperation with external partners, Project: „Inflammation – thrombosis crosstalk in patients with high cardiovascular risk“, Prof. Yvonne Döring together with PD Dr. Heidi Noels (RWTH Aachen)
- Nachwuchsförderungs-Projekt pool, Dr. Aleksandra Tuleja
- COMET career program University of Bern, Dr. Manovrithi Thakur
- Early career Award by International Society on Thrombosis and Haemostasis (ISTH) committee, Dr. Manovrithi Thakur
- Travel Award Department of BioMedical research (DBMR), Dr. Manovrithi Thakur

### Highlights

#### News from the Angiology Departement

As of 01.04.2022, Dr. Patrick Stähli joined the IDSC as a Data Scientist to support research projects from angiology and vascular surgery. In addition, Fabrice Helfenstein joined the Clinical Trials Unit Bern (CTU) as of 01.09.2022, as a Biostatistician to support researchers from angiology and vascular surgery with study design, data management, analysis and writing of the study protocol as well as publications.



Dr. Patrick Stähli (r.), Fabrice Helfenstein (l.)

#### News from the Angiology Departement

Night of Research 2022: Prof. Yvonne Döring and her lab had a booth on the topic of Atherosclerosis and blood vessels.

f.l.t.r. Dr. Berenice Martinez, Bryce Evans, Prof. Yvonne Döring, Mark Siegrist, Anais Yerly



#### USGG Awards Dr. Sarah Bernhard

Dr. Sarah Bernhard did receive two awards at this year's annual Meeting of the Unions of Vascular Societies of Switzerland (USGG):

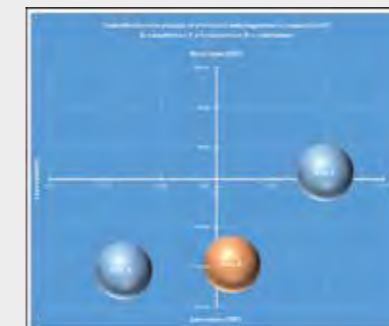
- Förderungspreis 2022 for her work „Deep next-generation whole exome sequencing for the detection of somatic-mosaic mutations in arteriovenous malformations to enable advances in personalized therapeutic decision making“.
- Award for best Presentation 2022 on her work “Next-generation sequencing for the detection of somatic-mosaic mutations in extra-cranial arteriovenous malformations“.



#### Cost-effectiveness Analysis of Alternative Anticoagulation in Suspected Heparin-Induced Thrombocytopenia (HIT)

HIT is a life-threatening complication associated with high medical costs. Factor Xa inhibitors gradually replace approved treatment with intravenous direct thrombin inhibitors despite their off-label indication, because of easier management and favorable economic profile. This cost-effectiveness analysis evaluates on- and off-label therapies with argatroban, fondaparinux and rivaroxaban in patients with suspected HIT. Primary data were integrated in a decision tree model reflecting important HIT-associated clinical events. Off-label fondaparinux and rivaroxaban were more clinically effective than argatroban, with averted adverse events of 0.820, 0.834, and 0.917 for argatroban, fondaparinux, and rivaroxaban, respectively. Treatment with fondaparinux resulted in less cost and more AEs averted, hence dominating argatroban and could be a viable alternative to argatroban.

[Tuleja et al. Blood Adv. 2022.](#)

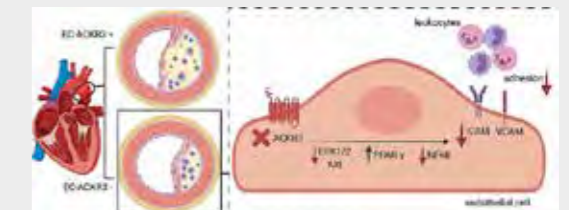


Fondaparinux costs less and confers more benefits than argatroban in patients with suspected HIT

#### Endothelial ACKR3 Drives Atherosclerosis by Promoting Immune Cell adhesion to vascular Endothelium

The endothelium is the starting point of vascular inflammation underlying atherosclerosis, and we could previously demonstrate that the chemokine axis CXCL12–CXCR4 plays an important role in disease development. However, the role of ACKR3, the alternative and higher affinity receptor for CXCL12 remained to be elucidated. We could now show for the first time that arterial endothelial deficiency of ACKR3 attenuates atherosclerosis as a result of diminished arterial cell adhesion as well as invasion of immune cells. Collectively, our findings indicate that arterial endothelial ACKR3 fuels atherosclerosis by mediating endothelium-immune cell adhesion, most likely through inflammatory MAPK and NF-κB pathways.

[Gencer\\*, Döring\\* et al. Basic Res Cardiol. 2022.](#)  
 \*equal contribution



Graphical summary of EC-ACKR3-mediated processes (created with BioRender.com). Deficiency of ACKR3 in arterial endothelial cells leads to decreased atherosclerotic lesion sizes concomitant with decreased endothelial-immune cell adhesion. Endothelial ACKR3 silencing leads to down-regulation of adhesion molecules and phosphorylated ERK1/2, Akt and NF-κB p65, which are inflammatory pathways involved in cell adhesion. Meanwhile, PPAR-γ, which suppresses NF-κB, is upregulated.



## Department of Cardiac Surgery

Inselspital, Freiburgstrasse, 3010 Bern  
<http://www.herzchirurgie.insel.ch/de/>



Prof. Matthias Siepe Director and Chief Physician	Prof. Alexander Kadner Head Center for Congenital Heart Disease, Congenital Cardiac Surgery	Prof. Florian Schönhoff Consultant Cardiac Surgeon, Aortic Surgery	Dr. David Reineke Consultant Cardiac Surgeon	Prof. Sarah Longnus Leader Preclinical Research	Dr. Paul Libera Clinic Manager, Medical Education (medical students and interns)
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### Profile

- The Department of Cardiac Surgery forms an integral part of the first cardiovascular center in Switzerland that incorporates a common organizational and management structure, along with the departments of cardiology, vascular surgery and angiology. Together, the teams of heart surgery and cardiology address the full spectrum of congenital and acquired cardiac diseases in one location. Dismantling of the financial and structural boundaries between the departments facilitates advancement in patient- and future- oriented medicine. At the core of the reorganization, is the establishment of disease-centered teams comprising surgical, interventional, diagnostic and ward doctors who work together to provide optimal patient care.
- With the appointment of Prof. Matthias Siepe as Clinic Director for cardiac surgery on March 15, 2022 and Prof. Drosos Kotelis as Clinic Director for vascular surgery on June 1, 2022, the former joint department was restructured as individual, specialized cardiac and vascular departments.

### Grants

- Strategic Funding Board of the Faculty of Medicine, UniBe. "Ex-vivo Heart Perfusion – Technology that innovates cardiac transplantation and precision therapies": CHF 750'000; 2022-2025 (Principal Applicant)
- SNSF. "Cardiac graft preservation and evaluation in transplantation with donation after circulatory death": CHF 189'902; MD-PhD Grant, 2021-2024 (Principal Applicant)
- SNSF. "Cardiac metabolism as a basis for sex differences in ischemic tolerance and a target for reperfusion therapy in heart transplantation with donation after circulatory death": CHF 632'000; Project Grant, 2022-2026 (Principal Applicant)
- SNSF. "Unravelling consequences of SARS-CoV-2 mediated inflammatory immune responses in heart and vasculature": CHF 1'951'700; NRP 78 Covid-19; 2020-2023 (Project Partner; PI Y. Döring, Angiology)
- Swiss Heart Foundation. "New approaches for evaluation of cardiac grafts obtained with donation after circulatory death: the era of machine perfusion": CHF 90'000; 2021-2023 (Principal Applicant)

### Highlights

#### SFB Grant

Our translational research proposal, "Ex-vivo Heart Perfusion – Technology that innovates cardiac transplantation and precision therapies," was funded by the Faculty of Medicine and UniBe. Headed by Prof. Matthias Siepe, this collaborative research work brings together multiple local, as well as international, partners to develop and expand the use of ex-vivo heart perfusion. To push the boundaries of this new technology, we will investigate not only its potential to optimize graft evaluation and viability in heart transplantation, but we will also explore beyond heart transplantation to reveal its capabilities for novel cardiac precision therapies.



Ex-vivo Heart Perfusion

#### Summary & Conclusion

- Prevalence of AADA patients  $\leq$  30 years in 7914 cases was 3.8%
  - AADA most frequently associated with either presence of CTD (36.7%) arterial hypertension (33.1%)
  - Surgery may be performed with good results (in-hospital mortality 8.6 and excellent mid- to long-term outcomes (>80% alive after 12 years))
  - Number of young patients with positive family history for AADA is significant (9.4% overall; 17.7% in CTD)
- screening & genetic testing strongly recommended in 1st degree relatives

Prize of EACTS and STS for „Dissection in the Young“



Dr. M. Nucera (M)

### Awards and Prizes

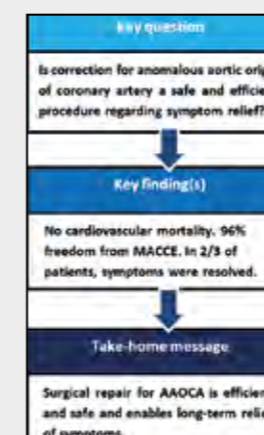
Prof. Florian Schönhoff was awarded the joint prize of the European Society of Cardiothoracic Surgery (EACTS) and the American Society of Thoracic Surgeons (STS) for his work „Dissection in the Young“ as the best work in the field of aortic surgery at the EACTS Annual Meeting. Prof. Schönhoff is the senior author of a multi-centre study including 16 centers in Europe, the USA and Asia that included 8000 patients with acute aortic dissection and evaluated results in patients under 30 years of age. The study demonstrated that the majority of these young patients had either connective tissue disease or arterial hypertension. Importantly, a relevant proportion of these young patients had a family history of aortic aneurysms. Consistent screening of all first-degree relatives could therefore have prevented many of these events (Lühr et al.; EACTS 2022).

Dr. Maria Nucera was awarded the Schweizer Gesellschaft für Herz- und thorakale Gefässchirurgie (SGHC) Young Surgeons Award 2022 in recognition of her work on "The impact of sex and gender on aortic events in patients with Marfan syndrome". Dr. Manuel Egle won the best poster prize at the Life Science Switzerland (LS2) Cardiovascular Research Meeting 2022.

### Safety and Efficacy of Surgical Correction of Anomalous Aortic Origin of Coronary Arteries

This retrospective, multicenter study describes the outcomes, with regard to symptom relief, for patients with anomalous aortic origin of coronary artery (AAOCA) after surgical correction between 2009 and 2022. Right-AAOCA was present in 56 patients (79%), left-AAOCA in 11 patients (15%), and single coronary ostium AAOCA in 4 patients (6%). Coronary unroofing was performed in 72% of patients, coronary reimplantation in 28% and an additional neo-ostium patchplasty in 13%. In 39% of patients, a concomitant cardiac procedure was performed. During follow-up, no cardiovascular related death was reported. Three patients (4.2%) underwent postoperative CABG due to insufficient correction for AAOCA. Seven patients (9.9%) required postoperative temporary mechanical circulatory support. In a subgroup of 34 symptomatic patients with isolated AAOCA correction, 70% were completely asymptomatic after surgery, 12% showed symptom improvement, and 18% did not obtain symptom improvement.

Pregaldini F. et al.; EJCTS.



Surgical Correction of Anomalous Aortic Origin of Coronary Arteries

### OCS Hearts

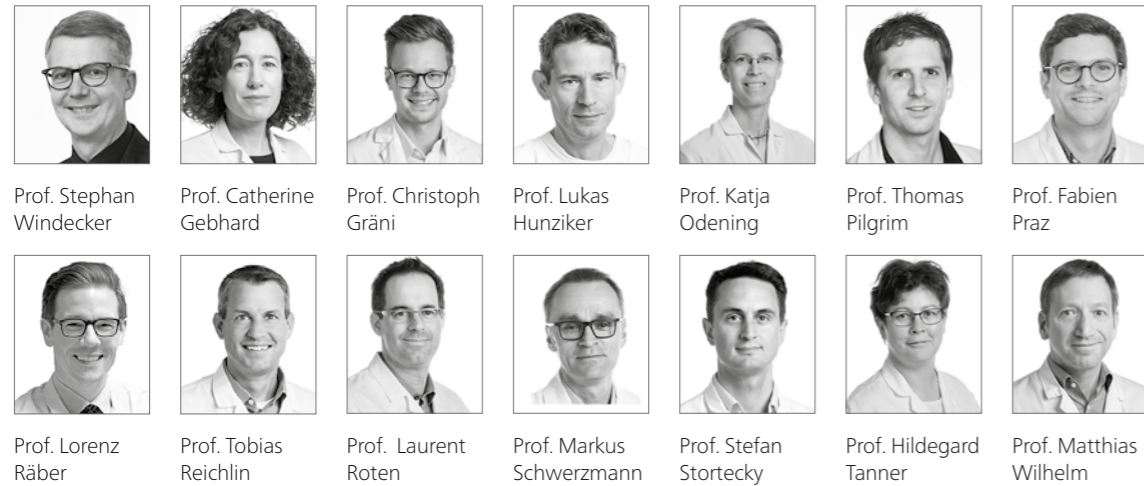
It is our great pleasure to announce the initiation of ex-vivo heart perfusion for heart transplantation in Berne, and in Switzerland, in 2022! Although heart transplantation is the gold-standard therapy for improving quality of life and mortality in patients with advanced heart failure, the limited number of acceptable donor hearts is a major obstacle. The Transmedics™ OCS Heart ex-vivo perfusion system was developed to address this problem by enabling the safe transplantation of hearts that would otherwise not be possible. The collaborative effort to initiate this approach, led by Dr. David Reineke, Mr. Hansjörg Jenni, and Prof. Matthias Siepe on the side of cardiac surgery, is expected to substantially improve donor heart availability and places Berne among the global leaders in heart transplantation techniques.



First OCS heart in Switzerland

## Department of Cardiology

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www.kardiologie.insel.ch



Prof. Stephan Windecker, Prof. Catherine Gebhard, Prof. Christoph Gräni, Prof. Lukas Hunziker, Prof. Katja Odening, Prof. Thomas Pilgrim, Prof. Fabien Praz, Prof. Lorenz Räber, Prof. Tobias Reichlin, Prof. Laurent Roten, Prof. Markus Schwerzmann, Prof. Stefan Stortecky, Prof. Hildegard Tanner, Prof. Matthias Wilhelm

### Profile

- Teaching at multiple levels: clinical specialty training, undergraduate and graduate students, supervision of MD, Master and PhD students
- Continuous medical education program
- Broad range of clinical research activities, encompassing investigations of devices for the minimal-invasive treatment of coronary artery disease, thromboembolic disease, valvular heart disease, electrophysiological disorders and heart failure and pharmacological therapies. Research in cardiac multimodality imaging methods including CT, MRI and echocardiography.
- Translational research (cardiac electrophysiology, arterial hypertension)
- Partners: University and Cardiology Units at tertiary care hospitals in Switzerland and abroad, Clinical Trials Unit Bern, CVRC, ETH, CSEM, industry partners

### Grants

- EU Grant Horizon 2020 CORE MD "Coordinating Research and Evidence for Medical Devices", grant agreement No 965246, Prof. Windecker, Dr Siontis, Prof. Bally (Endocrinology)
- SNF ICT Grant «Multimodal prehabilitation for major surgery in elderly patients to lower complications and to increase cost effectiveness. A randomized, prospective, multicenter, multidisciplinary trial PREHABIL» Prof. Wilhelm, Prof. Wüthrich (Anesthesiology)
- CAIM Research Grant "Artificial Analysis of Quantitative CMR Output Data to Better Risk Stratify Patients with Suspected Myocarditis", Prof. Gräni, Dr Safarkhanlo
- SNF NFP 79 Grant "HeartX: Decoding cardiac regulatory landscapes in an all-human model for cardiogenesis", Prof. Osterwalter, Dr. Zuppinger, Prof. Barozzi (Wien)

### Highlights

#### Adult Congenital Heart Disease

Effect of phosphodiesterase-5 inhibition with Tadalafil on systemic right ventricular size and function. In adult patients with subaortic (systemic) right ventricles (RV), progressive deterioration of RV systolic function is common and is associated with adverse outcomes. We conducted a double blind, randomized, placebo-controlled, multi-center study, comparing Tadalafil versus placebo (1:1 ratio) in adults with systemic RV. We enrolled 100 adults. Right ventricular systolic function, exercise capacity and neuro-hormonal activation remained stable over a three-year follow-up period. No significant treatment effect of Tadalafil was observed.

M Greutmann et al., Late breaking science presentation at ESC 2022, submitted for publication.

#### Atherosclerosis and Myocardial Infarction

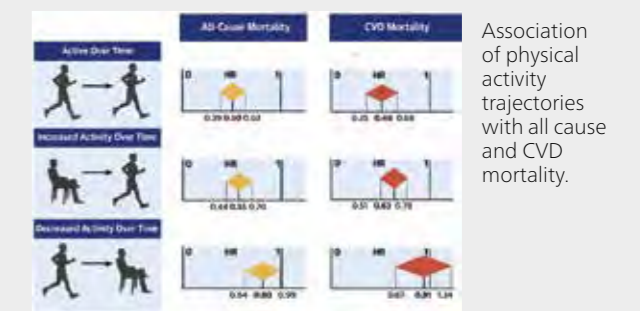
Coronary plaques that are prone to rupture and cause adverse cardiac events are characterized by large plaque burden, large lipid content, and thin fibrous caps. The effect of the proprotein convertase subtilisin kexin type 9 inhibitor alirocumab added to statin therapy on plaque burden and composition remains largely unknown. The PACMAN-AMI double-blind, placebo-controlled, randomized clinical trial enrolled 300 patients with acute myocardial infarction undergoing percutaneous coronary intervention at nine academic European hospitals. The patients were submitted to serial intra-coronary imaging using IVUS, NIRS and OCT. The addition of subcutaneous biweekly alirocumab, compared with placebo, to high-intensity statin therapy resulted in significantly greater coronary plaque regression, reduction in lipid burden and increase in fibrous cap thickness in non-infarct-related arteries after 52 weeks.

L Räber et al., JAMA; 2022 May 10;327(18):1771-1781.

#### Physical Activity and Coronary Artery Disease

The purpose of this study was to determine the association of longitudinal physical activity (PA) trajectories with all-cause and cardiovascular disease (CVD) mortality in patients with coronary heart disease (CHD). The systematic review of a total of 9 prospective cohorts included 33,576 patients. It illustrates how patients with CHD may benefit by preserving or adopting an active lifestyle. The observation that the benefits of past activity can be weakened or lost if PA is not maintained may be confounded by disease progression.

N Gonzalez-Jaramillo et al., J Am Coll Cardiol; 2022;79(17):1690-1700.

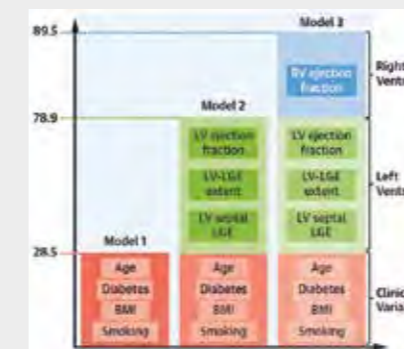


Association of physical activity trajectories with all cause and CVD mortality.

#### Cardiac Imaging and Myocarditis

Risk-stratification of myocarditis is based on functional parameters and tissue characterization of the left ventricle (LV), whereas right ventricular (RV) involvement remains mostly unrecognized. Among 1125 consecutive patients, 736 met the clinical diagnosis of suspected myocarditis and were followed for 3.7 years. In a series of nesting multivariable Cox regression models, the addition of RV Ejection Fraction improved prognostication compared with models including only clinical variables or clinical parameters plus LV function and tissue characterization.

B Bernhard et al., JACC Cardiovascular Imaging, 2022.

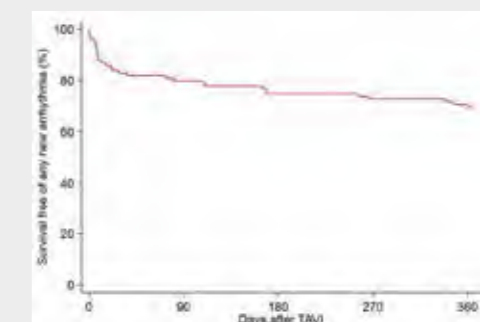


Independent and incremental role of right ventricular function on prognostic model fit in patients with suspected myocarditis.

#### Arrhythmias and Aortic Stenosis

Transcatheter aortic valve implantation (TAVI) is associated with new onset brady- and tachyarrhythmias which may impact clinical outcome. One hundred patients undergoing TAVI received an implantable cardiac monitor (ICM) within 3 months before or up to 5 months after TAVI. Patients were followed-up for 12 months after discharge from TAVI for the occurrence of atrial fibrillation (AF), bradycardia ( $\leq 30$  bpm), advanced atrioventricular (AV) block, sustained ventricular and supraventricular tachycardia. Rhythm monitoring for 12 months after TAVI revealed new arrhythmias, mainly AF, in almost one third of patients. Atrial fibrillation burden was higher in patients with prevalent compared to incident AF. Selected patients may benefit from short-term remote monitoring.

N Nozica et al., Front Cardiovasc Med; May 2022 (9):876546.



Kaplan-Meier survival curve free of any new arrhythmia recorded by the ICM after TAVI.

## Department of Clinical Chemistry

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Prof. Martin Fiedler Director  
 Prof. Carlo Largiadèr Deputy Director  
 Prof. Ursula Amstutz  
 Prof. Alexander Leichtle  
 Prof. Mojgan Masoodi  
 Prof. Michael Nagler  
 Prof. Jean-Marc Nuoffer  
 PD Dr. Alexander Lämmle

### Profile

- Teaching students of medicine, biomedicine, bioinformatics, biochemistry, pharmacy, biology, epidemiology, as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- 7 research groups
- Research focus: translational research, clinical research, and precision medicine
- Aim: to translate scientific knowledge into clinically useful bio-markers and digital algorithms for more individualized treatments
- Specific research topics: pharmacogenomics and drug metabolism, liquid biopsy, inherited metabolic diseases, clinical cytomics, thrombosis and haemostasis, and computational medicine
- External Partners: Canadian Pharmacogenomics Network for Drug Safety, University of British Columbia, Vancouver, Canada; Laboratory of Biometry, University of Thessaly, Greece; Department of Statistics and OR, Complutense University of Madrid, Madrid, Spain; Mayo Clinic Cancer Center, Mayo Clinic, Rochester, Minnesota, USA; Department of Medical Oncology & Hematology, Cantonal Hospital, St. Gallen, Switzerland; mitoNet (DACH-research Network for mitochondrial medicine)

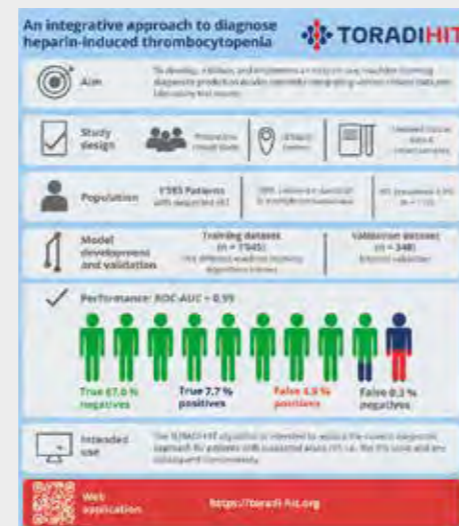
### Grants

- Swiss National Science Foundation (grant No. 310030-163205; 310030-188762; 179334; 162691; 320030-212583, BioLink funds-185419; Spark CRSK-3-190977 (co-applicant); Spark grant No: 190686; Kohortenstudie Gross 201385 (co-applicant); 196059 (project partner)
- Swiss Personalized Health Network: Project "L4CHLAB" (co-applicant), 2018DEV22:Swiss BioRef
- Fondation Johanna Dürrmüller-Bol
- PIPKIN-Foundation

### Highlights

#### TORADI-HIT: A Machine-Learning Algorithm for the Rapid Diagnosis of Heparin-Induced Thrombocytopenia

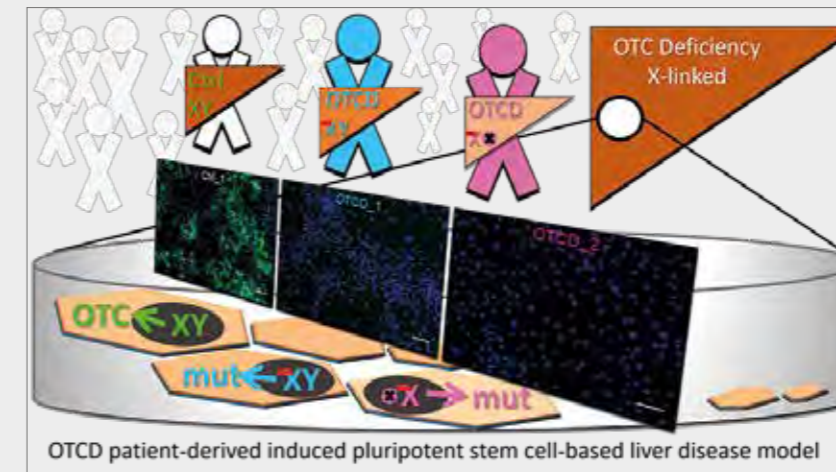
Supported by a research grant of the Swiss National Science Foundation (SNSF), we developed a user-friendly machine-learning (ML) algorithm that integrates diverse clinical and laboratory data to diagnose heparin-induced thrombocytopenia (HIT) more accurately than existing diagnostic tools: <https://toradi-hit.org>. The TORADI-HIT model uses flexible machine-learning algorithms and integrates clinical characteristics, which are commonly available, and routinely used laboratory tests. The algorithm was developed and validated in a specially designed prospective cohort study including 1'393 patients with suspected HIT from 10 study centers. In the validation dataset (25% of patients), the AUROC of all models was 0.99. Compared to the currently recommended diagnostic algorithm (4Ts score, immunoassay), the numbers of false-negative and false positive individuals were significantly reduced. The TORADI-HIT diagnostic algorithm can be used as a role model for the development and implementation of ML algorithms in various clinical settings.



H. Nilius/ M. Nagler, Nov 24;55:101745. doi: 10.1016/j.eclim.2022.101745.

#### Clinical Implementation of DPYD Pharmacogenetic Testing to Prevent Early-Onset Fluoropyrimidine (FP)-Related Toxicity in Cancer Patients in Switzerland

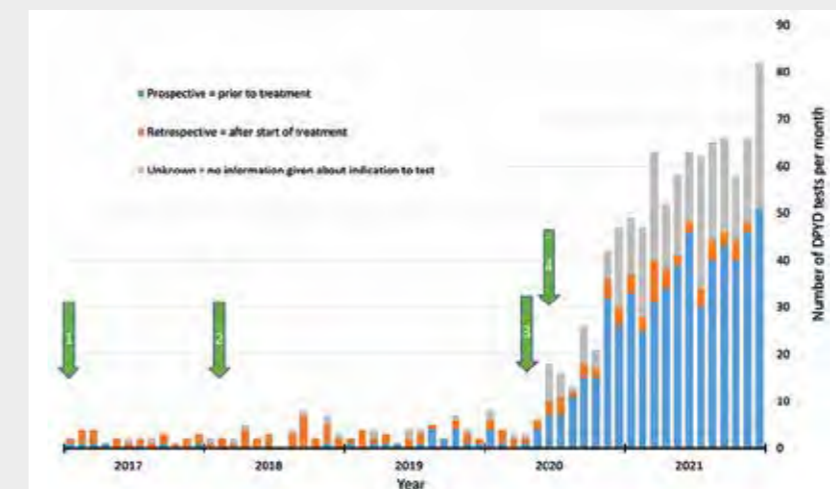
In January 2017, the Swiss Federal Office of Public Health introduced the reimbursement of dihydropyrimidine dehydrogenase gene (DPYD) risk variant testing to prevent early-onset FP-related toxicity by the compulsory health insurance based on evidence for the clinical relevance and cost-effectiveness of pre-treatment testing. This led, however, not to an increase in DPYD testing at our diagnostic center from 2017 to 2019. In contrast, a 14-fold increase was observed upon the release of recommendations for pre-therapeutic DPYD testing in April 2020 by the European Medicines Agency. The increase was mainly observed in three geographic regions of Switzerland, where partner institutions of previous research collaborations regarding FP-related toxicity are located and who acted as early-adopting institutions of DPYD testing. Our data high-light the important role of early adopters as accelerators of clinical implementation of pharmacogenetic testing by introducing these policies to their working environment and educating health workers from their own and nearby institutions.



Begré et al. 2022. *Front. Pharmacol.* 18:13:885259. doi: 10.3389/fphar.2022.885259.

#### Aquaporin 9 Induction in Human iPSC-Derived Hepatocytes Facilitates Modeling of Ornithine Transcarbamylase Deficiency

In addition to establishing the first induced pluripotent stem cell (iPSC)-based model of this most common, life-threatening urea cycle disorder, this work overcomes a roadblock that has prevented faithful modeling of urea cycle disorders in general. For this, we identified deficiency of the membrane channel protein aquaporin 9 as the reason for why human iPSC-derived hepatocytes generally have low capacity for urea secretion. Overcoming this deficiency genetically or pharmacologically allowed us to demonstrate functional ureagenesis in human iPSC-derived hepatocytes and investigate defects in urea cycle activity in cells derived from patients with ornithine transcarbamylase deficiency. By replicating genotype/phenotype correlation and facilitating drug screening, our model addresses long-standing clinical challenges associated with ornithine transcarbamylase deficiency, including unpredictable disease course and lack of effective treatments.



Laemmle et al. *Hepatology.* 2022 Sep;76(3):646-659. doi: 10.1002/hep.32247.

## Department of Cranio-Maxillofacial Surgery

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www.skq.insel.ch



Prof. Benoît Schaller Director and Chief Physician	Prof. Nikola Saulacic Head of Research Group	Dr. Michael Blumer Consultant	Dr. John-Patrik Burkhard Scientific Associate	Dr. Sherin Khalil Resident	Prof. Tateyuki Iizuka Senior Consultant	Inga Grigaitiene Laboratory Bone Biology	Thuy-Tran Nguyen Laboratory Bone Biology
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### Profile

- Teaching students of medicine and dentistry at the University of Bern, postgraduate education and training for specialization in Oral and Maxillofacial Surgery on the European (EU) level
- Education and training of young academics by providing various clinical and scientific fellowship programs in international cooperations
- 3 research groups consisting of international team members. We mainly conduct preclinical research with the specific aim of transferring research results into clinical practice. Our research therefore has a strong translational character
- Investigation of the biological process of bone and soft tissue regeneration in connection with the use of various bone substitutes and bone grafts
- Development of titanium and biodegradable osteosynthesis devices
- Technical development of 3D-Print-technologies in clinical practice of Cranio-maxillofacial Surgery
- Bone & Joint Research Program: Orthopedic Research – Gantenbein & Hofstetter Lab & Cranio-Maxillofacial Surgery Research – Saulacic Lab, DBMR
- External Partners: Metal Physics and Technology, Department of Materials, ETH Zurich, Zurich, Switzerland; Advanced Research Center, School of Life Dentistry at Niigata, Nippon Dental University, Japan; National Dental Centre Singapore, SingHealth, Duke-National University of Singapore, Singapore; Department of Periodontology, College of Dental Medicine, Nova Southeastern University, Florida, USA; Department of Veterinary Clinical Sciences, Faculty of Veterinary, University of Santiago de Compostela, Lugo, Spain; International Bone Research Association (IBRA), Basel, Switzerland; Geistlich Pharma, Wolhusen, Switzerland

### Grants

- Swiss National Science Foundation Synergia Grant (No. 180367 / 1)
- Clinical Research Grant Maxillofacial Surgery, International Bone Research Association/IBRA
- AO Foundation Research Fund (No. AOCMFS-19-15K) Research Grant (No. 1287\_2018)
- Osteology Young Researcher Grant, Osteology Foundation (No. 18-077)
- Geistlich Pharma AG, Wolhusen, Switzerland

## Highlights

### Pumping the Periosteum

A key research focus of our group is to identify the regulatory mechanism of supraosteal bone formation induced by mechanical manipulation of periosteum. We aim to assess the mechanobiological principles governing hard tissue formation. Results of a preliminary study indicated that an alternated activation and relaxation of periosteum (periosteal pumping) enhanced the apposition of new bone (Fig. 1). A uniform layer of dense new bone was found, with several layers of new bone oriented parallel to each other. This preliminary study showed that the original bone thickness may be doubled by pumping the periosteum without elevation of the distraction plate. Furthermore, the introduction of relaxation after two activations was beneficial in terms of bone formation as compared to the positive control (conventional distraction) in an intra-oral model. The quality of newly formed bone resembled the original bone. The signs of bone remodelling were observed at different extent in all sections (Fig. 2). The bone fluorochrome labelling revealed the bone formation at the treated sites, and to less extent in the negative control. Thus, a mandibular bone has a potential of endogenous regeneration induced by periosteal distraction. This was confirmed in an ongoing study by the highest gene expression and most intensive modeling- and remodeling-based bone formation at mid-consolidation period. Pumping of periosteum could be an attractive alternative to the autogenous block bone grafting in the treatment of extended bone deficiencies.

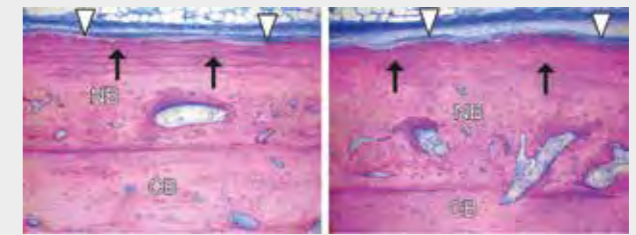


Fig. 1. Histological section showing newly formed bone (NB) on top of the old calvarial bone (CB), with new bone layers (arrows) covered with osteoid (arrowheads).

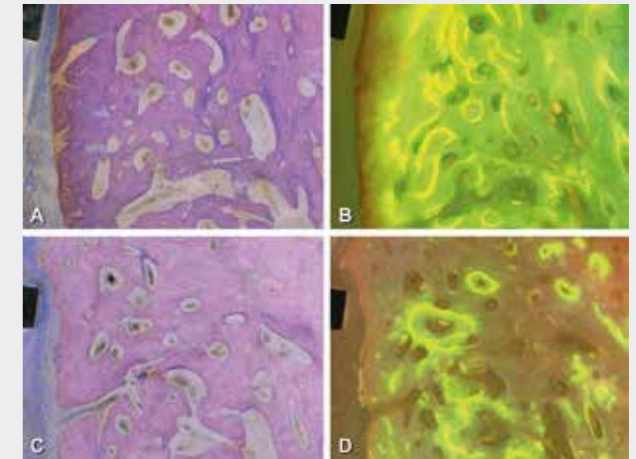
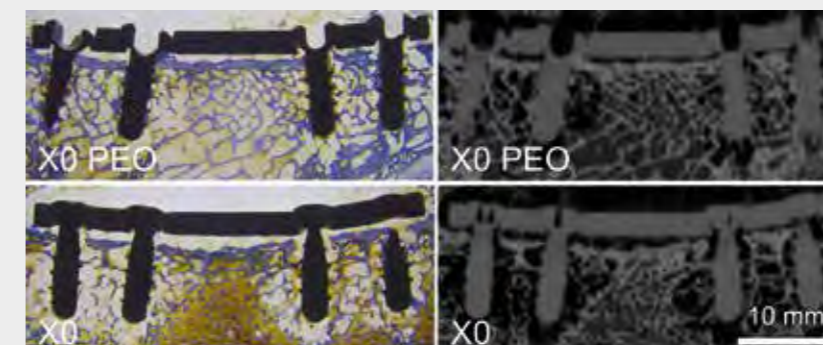


Fig. 2. Representative histological sections of the treated sites. A and B, pumping group; C and D, negative control. The signs of lamellar bone remodelling is present, with the labeled new bone of the corresponding areas.

### In Vivo Evaluation of Ultrahigh-Purified Mg Alloys Plate/Screw Systems in a Midface Fracture Model

The first in vivo part of the research on the evaluation of magnesium plate and screw systems was successfully completed (Sinergia SNF Grant). The clear advantage of the coated (Figure: XO PEO: histological examination on the left and micro-CT on the right) magnesium implants (less bone cavities in the surrounding bone) compared to the uncoated (XO) was confirmed by all examinations. The second in vivo study with the midface fracture model could be adapted accordingly. Therefore, only coated implants were used in the pilot study of the second phase. Initially, the stability of the magnesium osteosynthesis system used was insufficient to support the midface fractures. The plate/screw fixation systems were adapted accordingly and retested in vitro. This second in vivo phase evaluation is currently in progress.



## Department of Dermatology (DERK)

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Prof. Luca Borradori  
Chairman

PD Dr. Laurence Feldmeyer

Prof. Robert Hunger

Prof. Eliane Müller

Prof. Dagmar Simon

Prof. Christoph Schlapbach

Prof. Nikhil Yawalkar  
Deputy  
Chairman

### Profile

- Investigation how T cell metabolism and T cell function are linked in inflammatory skin diseases
- Investigation of the skin-specific cytokine interleukin 9 (IL-9) and its role in skin inflammation
- Investigation of epithelial barrier dysfunction and type 2 inflammation
- Translational and precision medicine studies in cutaneous T cell lymphoma
- Dissect the autoimmune response in pemphigus with focus on multi-omics characterization of the autoantibody-mediated tissue damage and skin blistering
- A comprehensive systems biology approach to stem cell-mediated skin homeostasis implicating genetic, epigenetic, transcriptional, biochemical and biophysical circuits
- Investigation of bioelectricity to enhance wound healing and harmonize skin homeostasis
- Clinical trials with novel biologics and targeted therapies for atopic dermatitis, psoriasis, hidradenitis suppurativa and melanoma
- Partners: Institute for Research in Biomedicine, Bellinzona; Huashan Hospital, Fudan University, Shanghai; Department of Immunology, University Hospital, Zurich; C.H.U. Henri Mondor, Paris; University Hospital, Düsseldorf; Universitätsklinikum Marburg; Institute of Molecular Systems Biology, ETH, Zurich; Centro Studi GISED, Bergamo; Lübeck Institute for Experimental Dermatology, University of Lübeck; Department of Information Technology and Electrical Engineering, ETH Zürich; Department of Dermatology and Cutaneous Biology, Thomas Jefferson University, Philadelphia; The Regional Dermatology Training Centre, Tanzania

### Grants

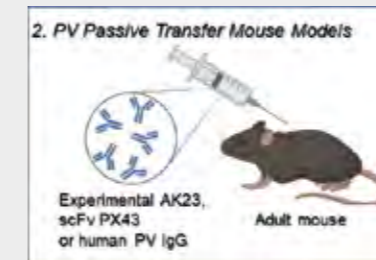
- Swiss National Science Foundation (SNSF) Project grant: Unraveling the role of IL-9 in human skin inflammation; CHF: 700'000; 2020–2024
- SNSF Synergia grant: Unravel Principles of Self-organization in Injured Tissue", CHF 2'943'631, 2021-2022
- Ruth & Arthur Scherbath Foundation: Role of PPAR- $\gamma$  + Th2 cells in allergic skin inflammation. 2021-2022
- VCCI Foundation to Advance Medical and Translational Research, CHF 264'603
- Private Donation R. Bolliger, CHF 384'000

### Highlights

#### European Guidelines for the Management of Bullous Pemphigoid

An international group of 52 experts under the coordination of L. Borradori completed the management recommendation for the most frequent and severe autoimmune blistering diseases of the skin, bullous pemphigoid. New clinical information, diagnostic tools and evidence-based interventions and novel targeted treatments options are critically reviewed.

[Borradori L, et al. Updated S2 K guidelines for the management of bullous pemphigoid initiated by the European Academy of Dermatology and Venereology \(EADV\). J Eur Acad Dermatol Venereol. 2022; 36:1689-1704.](#)



Translation of large molecular data sets obtained in cell and organ cultures and mouse models the human setting in pemphigus vulgaris. PV, pemphigus vulgaris; AK23: experimental PV antibody; scFv PX43, pathogenic single-chain antibody cloned from a human PV patient by phage display.

#### A Novel Human Model to Apply Precision Medicine in Pemphigus Vulgaris

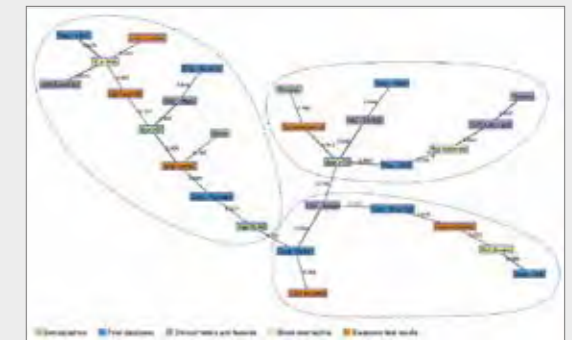
Pemphigus vulgaris is a severe autoimmune blistering disease affecting stem and progenitor cell compartments in the skin and hair follicles. To establish a comprehensive hierarchical network of pathological mechanisms involved in the disease by using systems biology with multiple omics techniques, an international Consortium has joined forces. The goal is to obtain a more holistic molecular perspective of pemphigus vulgaris, which paves the way for novel treatments and precision medicine. Experimental approaches will exploit cell cultures, skin explants and mouse models as well as experimentally generated pemphigus vulgaris antibodies.

[Hartmann V, Hariton WV, Rahimi S, et al. The human skin organ culture model as an optimal complementary tool for murine pemphigus models. Laboratory Animals. 2023;0\(0\). doi:10.1177/00236772221145647. \(\\* contributed equally\)](#)

#### Characteristics of Dermatological Patients with Blood Eosinophilia

Dermatoses associated with blood and tissue eosinophilia pose a diagnostic challenge. A pattern analysis of demographic, clinical, and laboratory data of patients with skin diseases and blood eosinophilia revealed an association of blood eosinophil levels with distinct clinical phenotypes and diagnostic findings. The obtained results will facilitate the workup and management of affected patients.

[Radonjic-Hoesli S et al. Characteristics of dermatological patients with blood eosinophilia: a retrospective analysis of 453 patients. J Allergy Clin Immunol Pract. 2022; 10:1229-1237.e8.](#)



Semantic map showing the strongest connections among blood eosinophils levels, histopathologic patterns, and diagnoses in patients with dermatoses associated with blood eosinophilia

#### The Molecular Landscape of Cancer-Associated Stroma in Cutaneous Squamous Cell Carcinoma

Cutaneous squamous cell carcinoma (cSCC) is one of the most common cancers. Cancer-associated stroma (CAS) is central to tumor development and critically affects therapy response. Perineural infiltration represents a major risk factor for cSCC and likely influences CAS reprogramming. The latter remains poorly characterized in cSCC. To address this question, we analyzed CAS and matched normal stroma from several cSCC cases by laser-capture microdissection (LCM) using RNA-sequencing. Our analysis reveals extensive stromal reprogramming strongly driven by changes in immune cells. The results were independently validated by immunohistochemistry. Our analyses elucidate the molecular landscape of CAS in cSCC and identify the presence of immunosuppressive mechanisms, which are of direct relevance for improving cancer immunotherapy approaches.

[Beebe E, et al.. Defining the molecular landscape of cancer-associated stroma in cutaneous squamous cell carcinoma. J Invest Dermatol. 2022;142:3304-3312.e5.](#)

## Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM)

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Prof. Lia Bally



Prof. Maria Balmer



Prof. Regula Everts



PD Dr. Michel Hochuli



Prof. Markus Laimer



Prof. Zeno Stanga



Prof. Christoph Stettler



PD Dr. Roman Trepp



Prof. Lilian Witthauer

### Profile

- Nine research groups covering the areas of Diabetes Technology, Metabolic Science and Modelling, Nutritional Profiling and Food Science, Artificial Intelligence/Data Science and Decision Support, Peptide Analytics
- Under-graduate, graduate and post-graduate education in Metabolic Science
- Postgraduate education (CAS in Sex and Gender-specific Medicine, Certificate Course Clinical Nutrition)
- External partners: University of Bern, ETH Zurich and Lausanne, CHUV, University Hospital and University of Zurich, University of Basel, University of St. Gallen, CSEM, Universities of Cambridge, Manchester, Swansea (UK), Lyon, Rotterdam, Padova, Cologne, Graz, Munich, Nürnberg, Toronto, Duke, Yale, Berkeley

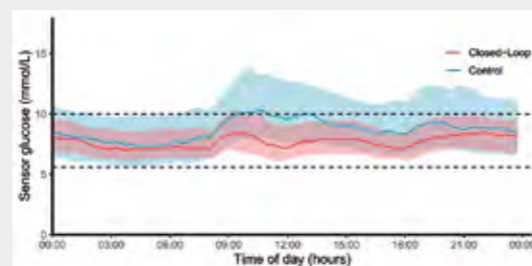
### Grants

- SNSF Eccellenza Grant (PI Prof. L. Bally), SNSF Eccellenza Professorial Fellowship (PI Prof. M. Balmer)
- SNSF Sinergia Program (PI Prof. C. Stettler),
- European Foundation for the Study of Diabetes (EFSD, PI Prof. L. Bally)
- SNSF Project Grants (PIs Prof. M. Laimer, Prof. C. Stettler, Prof. R. Everts, PD Dr R. Trepp)
- InnoSuisse Projects (PIs Prof. L. Bally, Prof. L. Witthauer, Prof. C. Stettler)
- Further Funding Sources: Swiss Diabetes Foundation, VonTobel Foundation, DLF, Diabetes Center Berne DCB, Dexcom Inc. ISS, Nestlé Health Science ISS, Swiss National Kidney Foundation, Helmut Horten Foundation, Scherbarth Foundation, Swiss Heart Foundation, Vontobel Foundation, Novonordisk ISS, Boehringer Ingelheim ISS, Bangarter Rhyner Foundation, Nutricia ISS, Foundation Rolf Gaillard, Swiss Foundation for Nutrition Research, Dürmüller Boll

### Highlights

#### Perioperative Fully Closed-Loop Glucose Control

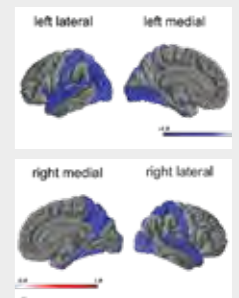
Glycemic control in patients with diabetes is a major challenge in hospital settings. Fully closed-loop insulin delivery systems provide a novel approach. In patients undergoing elective surgery at the University Hospital Bern, fully closed-loop versus standard insulin therapy resulted in superior glucose control (5.5hrs more in target) without increasing the risk of hypoglycemia. The fully closed-loop approach may therefore provide an innovative solution to increase the quality and safety of inpatient diabetes management whilst addressing pertinent challenges in healthcare logistics.



Fully closed-loop insulin delivery improves diabetes control in surgical patients

#### Cortical Thickness and Cognition in Phenylketonuria (PKU)

Adults with PKU show cerebral abnormalities associated with subtle cognitive impairments. We investigated cortical thickness/surface area in 30 adults with early-treated PKU and relationship to cognitive function and metabolic control. Adults with PKU showed widespread reductions in cortical thickness despite good metabolic control in childhood and adolescence. Alterations were unrelated to metabolic parameters and showed only a weak relationship to working memory and cognitive performance.



Group differences in cortical thickness between patients and controls

#### Microbiota-Immune-Axis in Diet-Induced Obesity



Despite the chronic immune activation, obese and diabetic patients are considered immunosuppressed leading to an increased risk for and inferior outcome during infections. In a translational project in collaboration with the Department of Dermatology we perform in-depth analysis of chronic wounds in obese mice and humans with the aim to characterize the metabolic communication between the microbiota, the infecting pathogen and the host.

Woundomics – metabolic wound microenvironment in obesity and diabetes



Detection of hypoglycemia using non-invasive sensor signals and machine learning

#### Non-Invasive Hypoglycemia Detection

We lead an international consortium with partners from ETH Zurich/Lausanne, Universities St. Gallen, Munich and Nürnberg, developing novel approaches to non-invasively detect hypoglycemia. Taking advantage of cutting-edge machine learning methodology and innovative sensor signals the group developed systems to detect hypoglycemia while driving cars (based on car-derived data and gaze behavior data) and in daily life (based on consumer-grade wearable data). The latest development is the evaluation of voice as a biomarker to detect hypoglycemia.

#### Moonwalk Project

In a consortium of engineers, clinical scientists and entrepreneurs we investigate whether glucose levels in people with diabetes have an influence on nocturnal motion. Motion during sleep is assessed with a ceiling-mounted radar sensor (QUMEA). Wrist worn smartwatches complement the tracking of physiological symptoms for reference. The overarching aim is to develop algorithms which can be integrated into a warning system for nocturnal hypoglycemia in nursing homes and long-term care.



Radar sensors to detect hypoglycemia

#### SGLT-2-I in Type 1 Diabetes

SGLT-2 inhibitors limit glucose reabsorption in renal tubular cells, and are effective in treating heart failure and chronic kidney disease in patients with and without type 2 diabetes. In addition, they generate a favourable metabolic state, responsible for many of the beneficial effects. On the other hand, an increased risk of ketoacidosis has been documented in people with type 1 diabetes, limiting use in this population. A series of studies using deep phenotyping aims to improve our understanding of the metabolic changes induced by SGLT-2 inhibitors in differing situations.



Deep phenotyping to improve understanding of metabolic effects of SGLT-2 inhibitors

## Department of Diagnostic and Interventional Neuroradiology

Inselspital, Freiburgstrasse 4, 3010 Bern  
[www.neurorad.insel.ch](http://www.neurorad.insel.ch)



Prof. Jan Gralla Chairman and Physician in Chief	Prof. Roland Wiest Deputy Chairman	PD Dr. Christoph Ozdoba Physician in Chief (SLS)	Michela Mordasini Head of Medical Technical Neuroradiology
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### Profile

- **Neurovascular research:**  
The research group focuses on treatment strategies for neurovascular diseases (aneurysms, AVM) and especially the evaluation and treatment of acute ischemic stroke. The researchers combine preclinical development of techniques in bench-top and animal models and evaluate their application in large-scale international clinical studies (Swift direct). Furthermore, the group evaluated robotic approaches in neurovascular treatment.
- **Advanced Neuroimaging and Artificial Intelligence Technology in Neuroradiology:**  
The research of the Support Center of Advanced Neuroimaging (SCAN) focuses on the translation of quantitative imaging methods, artificial intelligence technology and automated image analysis into clinical practice, sequence development and methodological counselling for neuroimaging studies. In this domain, the researchers of the SCAN have participated in international neuroimaging trials (e.g. ENIGMA Epilepsy and NIH-funded ENIGMA Parkinson's disease), neuroimaging challenges and data analysis networks in cerebrovascular research, neuro-oncology, neuro-immunology, sleep-related disorders, epilepsy and neurodegenerative disorders.
- **CSF Hypo- und Hypertension Syndromes:**  
The multidisciplinary group of the Neurocenter develops new imaging modalities and interventional/surgical treatment options for patients with CSF leakage syndromes and idiopathic intracranial hypertension.
- **Translational imaging / Ultra High Field MRI:**  
Methodological and translational research projects encompassing structural, advanced and molecular neuroimaging are executed at the Translational Imaging Center (TIC) in sitem-insel. The core areas of research encompass advanced diagnostic procedures in presurgical epilepsy, brain aneurysms and small vessel disease, neuroimmunology and brain tumor research.

### Grants

- Horizon 2020 INSPIRE MED (Marie Skłodowska-Curie grant 813120).
- NIH Grant 1R01NS1007513-01A1
- SINERGIA CRSII5\_180365 and and CRSII5\_20590
- SPHN Driver Project IMAGINE
- SNF grants 170060, 182569, 190817 195801, 189136, 160107, 204593, 325230
- Innosuisse 43087.1 IP-LS
- SISF Grants (UHF MRT: Gluco-CEST, Deuterium Imaging, Neuroinfection, Intracranial stenoses, Aneurysms)
- SWISS Heart foundation (Covid 19, posterior circulation stroke, intracranial stenosis)

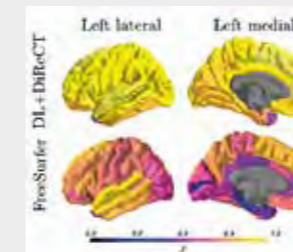
### Highlights



#### Stroke / SWIFT Direct: Landmark Trial Underlines Importance of Combined Therapy

A large multicenter randomized-controlled trial led by Investigators from Neuro-radiology and Neurology tested if endovascular stroke therapy is equally effective without intravenous thrombolysis. While the trial could not demonstrate non-inferiority of thrombectomy alone, the trial contributed to the overall perception that the benefit of additional thrombolysis may not be large. After publication of the primary paper, the data are now pooled with an international trial consortium with the intention to gain more insights from subgroup analyses. The trial results are discussed extensively, have shaped updated guidelines and are of particular importance for countries with limited healthcare resources and areas affected by thrombolytic drug shortage.

The value of thrombolytic therapy in addition to endovascular treatment was unknown. SWIFT DIRECT tested if patients have similar outcomes when undergoing endovascular treatment alone.



Color-coded Pearson correlation coefficients of the regional average cortical thickness between pairs of non-enhanced and contrast-enhanced MRI. The proposed deep learning-based morphometry tool reliably provides more consistent measures between both image types than the current reference standard.

#### A New Framework for Brain Morphometry

A new method to quantify subtle gray matter atrophy caused by neurodegenerative disorders in the sub-voxel range ( $< 0.1$  mm) has been developed and independently validated by external researchers. DL+DiReCT can measure significantly smaller changes than the reference methods. DL+DiReCT was able to detect changes in the range of 0.02mm, while the reference methods achieve require at least 0.06mm atrophy. We have demonstrated that AI enables reliable and significantly accelerated, highly sensitive high throughput analyses of longitudinal brain atrophy in patients with multiple sclerosis and epilepsy. We further extended the method to contrast-enhanced MRI, which now enables access to larger datasets in clinical cohorts. The methods are of relevance for monitoring of new therapies in neurodegenerative disorders (dementia, Alzheimer's, progressive MS) and for early diagnosis in prodromal stages of the disease evolution.

#### A Platform for Integrated Neuroscience

The interdisciplinary project has been granted by the medical faculty the (strategic research funding) and started in autumn 2021 with the setup of an exchangeable data platform (Medical Blocks) to integrate multiscale data formats for neuroscience. The project hosts 3 nested projects of the MB Neuro in stroke research, neuroimmunology and epileptology/sleep research.

Within the project, we have devised a platform for the integration of multidimensional data formats that enable a connection to common data formats used in pre-clinical and clinical research (quantifiable and numeric clinical and behavioural data, scores, biosignals, laboratory value, and images). The system provides access to data for research purposes and enables data pseudonymization and full anonymization. The "framework for brain morphometry" enables automated image analysis within the nested projects.

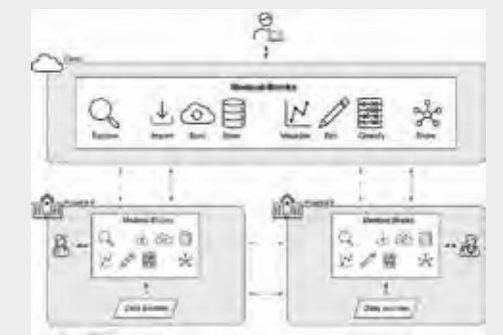


Illustration of Medical-Blocks in a research collaboration via cloud or direct connection. Data exchange can be executed manually over the web UI, semiautomatically using standalone applications, or fully automated via blocks triggered upon new data being available. Researchers can explore, manage, and analyze data through Medical-Blocks. For collaboration, metadata (e.g. cohort size and fully anonymized datasets) can be shared with other researchers.

## Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)

Inselspital, Tiefenau Hospital, Hospitals in Aarberg, Münsingen, Belp, Riggisberg  
[www.radiologie.insel.ch](http://www.radiologie.insel.ch)



Prof. Andreas Christe, Director SLS; Dr. Keivan Daneshvar, Senior Physician; Prof. Lukas Ebner, Senior Consultant; PD Dr. Rainer Josef Egli, Senior Physician; Prof. Johannes Heverhagen, Director; Prof. Adrian Huber, Senior Consultant; Dr. Till Lerch, Resident Physician; Dr. Sylvia Nyilas, Resident Physician

PD Dr. Verena Obmann, Senior Physician; Dr. Alan Peters, Senior Physician; Prof. Alexander Pöllinger, Senior Physician; PD Dr. Thomas Ruder, Senior Consultant; Dr. Florian Schmaranzer, Senior Resident; Prof. Hendrik v. Tengg-Kobligk, Deputy Director

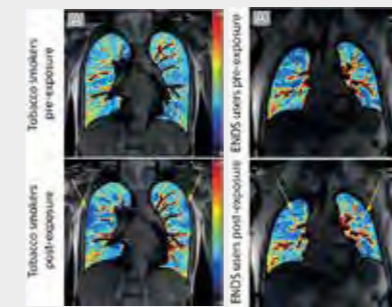
### Profile

- Teaching medical students, biomedical engineering students, FaGes, and radiographers
- Currently performing 15 self-initiated studies, 12 cooperation-studies, and supporting ca. 161 ongoing clinical studies
- Research topics include artificial intelligence, contrast media, multiparametric imaging, advanced image analysis, structured reporting, digitalization of workflow, non-invasive tissue characterization with multiparametric MRI
- Aiming at prevention, diagnostic improvement, navigation during intervention, as well as treatment and workflow planning
- External partners: Radiological Physics, Radiology and Nuclear Medicine, University of Basel; German Cancer Research Center (DKFZ), Heidelberg; ETH Zurich and EPFL/CHUV Lausanne; Ohio State University, Columbus, USA; Departments of Radiology and Biomedical Engineering at Case Western Reserve University, Cleveland, USA; Duke University Hospital, Dept. of Radiology, NC, USA; Department of Medicine and Surgery, University of Parma, Italy; Yale University School of Medicine, New Haven, CT, USA; Swiss Working Group for Clinical Cancer Research (SAKK), Bern; SITEM Bern; Switzerland Innovation Park, Biel; Mechanical Systems Engineering, EMPA Dübendorf; Berner Fachhochschule (BFH)

### Grants

- Innosuisse: SmaRaGD (Smart Radiology Goes Digital/Smarte Radiologie wird digital) - Digitalisierung der Radiologie mit KI-unterstützten strukturierten Befunden und Anamnese-Chatbot, Dr. Knud Nairz, Prof. Dr. med. Hendrik von Tengg-Kobligk and Consortium from Industry and Academia
- SNSF Grant: Interpretability-Guided Deep Learning for Medical Image Analysis: Applications to Medical Image Classification, Retrieval and Segmentation, Prof. Dr. med. Alexander Pöllinger and partners
- SSSR 2022 award (Swiss Society of Radiology), "Can Gadolinium contrast agents be replaced with saline for direct MR arthrography of the hip? A retrospective study with arthroscopic comparison", Dr. med. Florian Schmaranzer (last author)
- Prize for best oral presentation, ESSR 2022 (European Society of Musculoskeletal Radiology), "Deep Learning Based Fully Automated 3D Models of Hip Labrum based on MR arthrography are feasible and allow detection of differences in labrum volume among different hip deformities: A pilot study", Dr. med. Florian Schmaranzer (last author)
- Trainee Research Prize, RSNA 2022, "Femoral Version: Reliable and Reproducible MRI Measurement Compared to CT Using Fast 3D T1 Images Without Leg Holder", Dr. med. Till Lerch

## Highlights



The figure shows the increased lung perfusion in tobacco smokers (left, yellow arrows) and the decreased lung perfusion in ENDS users (right, yellow arrows).

### MRI Shows Lung Perfusion Changes after Vaping and Smoking

This study examined the immediate effects of electronic nicotine delivery systems (ENDS) and tobacco smoke on lung ventilation and perfusion with noncontrast-enhanced matrix pencil MRI and lung function tests in 44 adults including tobacco smokers, ENDS users, former tobacco smokers and controls. MRI and lung function tests were performed before and after exposure to the different regimens (tobacco smoke, ENDS, control). MRI showed decreased lung perfusion after exposure to tobacco smoke, and an increase in lung perfusion after the use of ENDS. This study was a collaboration with Prof. Funke-Chambour from the Inselspital Department of Pneumatology.

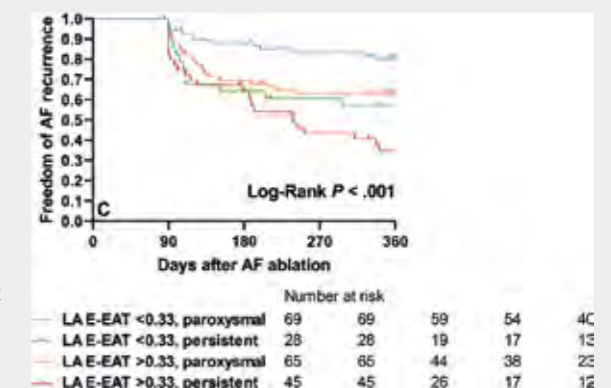
[Nyilas S. et al., Radiology. 2022 Jul;304\(1\):195-204. doi: 10.1148/radiol.211327. Epub 2022 Apr 5.](https://doi.org/10.1148/radiol.211327)

### The Relationship between Enhancing Left Atrial Adipose Tissue at CT and Recurrent Atrial Fibrillation

This study is a retrospective investigation of the relationship between left atrial (LA) enhancing epicardial adipose tissue (e-EAT), a potential marker for the metabolic activity of EAT on cardiac CT, and atrial fibrillation (AF) recurrence after AF ablation. Total and LA EAT segmentation, and LA e-EAT volume fraction determination on preprocedural noncontrast and contrast-enhanced cardiac CT scans of 212 patients who underwent their first AF ablation, including 64% paroxysmal AF and 36% persistent AF, showed that LA EAT was independently associated with AF recurrence after AF ablation.

This study was a collaboration with Prof. Reichlin from the Inselspital Department of Cardiology.

[Huber A.T. et al., Radiology. 2022 Oct;305\(1\):56-65. doi: 10.1148/radiol.212644.](https://doi.org/10.1148/radiol.212644)



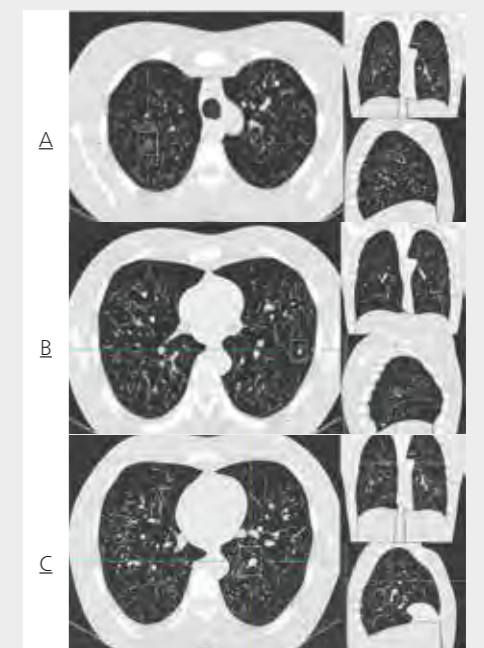
The graph shows the time to AF recurrence after AF ablation in patients with e-EAT below and above the mean (0.33), divided by AF phenotype (paroxysmal vs. persistent). LA e-EAT above the mean and persistent AF are cumulative predictors of AF recurrence.

### Diagnostic Validation of a Deep Learning Nodule Detection Algorithm in Low-Dose Chest CT: Determination of Optimized Dose Thresholds in a Virtual Screening Scenario

This study was conducted to evaluate the effect of dose reduction on the performance of a deep learning (DL)-based computer-aided diagnosis (CAD) system regarding pulmonary nodule detection in a virtual screening scenario using 68 anthropomorphic chest phantoms equipped with 329 nodules with four sizes (5 mm, 8 mm, 10 mm, 12 mm) and scanned with nine tube voltage/current combinations. The results suggested that the modification of tube voltage and tube current has a significant impact on the performance of deep learning-based CAD software, nodule size and composition have no significant impact on the software's performance. Optimal tube voltage/current combination for the examined software was found to be 80 kV/50 mAs.

[Peters A.A. et al., Eur Radiol. 2022 Jun;32\(6\):4324-4332. doi: 10.1007/s00330-021-08511-7.](https://doi.org/10.1007/s00330-021-08511-7)

Examples of true positive findings (A, B) and false positive findings (C)





## Department of Emergency Medicine

Inselspital, INO-C, 3010 Bern  
[www.notfallzentrum.insel.ch](http://www.notfallzentrum.insel.ch)



Prof. Aristomenis Exadaktylos FRCEM MSc Director and Chief Physician	Dr. Beat Lehmann Deputy Chief Physician	Prof. Wolf Hautz MME, Head of Research, Diagnostic Error and Patient Safety	Prof. Thomas Sauter MME Tele-emergency medicine and e-health
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### Profile

- Teaching medical students, residents and postgraduate nursing students in emergency medicine and point of care ultrasonography
- 3 research focus areas: diagnostic quality, tele-emergency medicine and e-health, applied emergency medicine
- 9 research groups in these three focus areas
- Extensive international cooperations with ARTORG Center for Biomedical Engineering Research, Diabetes Technology, Institut für Gebirgsnotfallmedizin EURAC, Bozen, CHUV Lausanne, HUG Genf, Max Planck Institute for Human Development Berlin, Institute of Educational Measurement, University of Oslo, Norway, Sarah Lawrence College, New York University School of Medicine, USA, Charité Berlin, Germany, Erasmus Medical Center Rotterdam, The Netherlands, ISPM at University of Bern, MSc programme "Global Health – Disaster Medicine", National and Kapodistrian University of Athens, Greece, Swiss Tropical and Public Health Institute Basel, Faculty of Remote, Rural and Humanitarian Healthcare of the Royal College of Surgeons of Edinburgh

### Grants

- SNF Projects as lead investigators:
  - The digital diagnostician: how information technology affects medical diagnoses (SNF No. 187284)
- SNF Projects as co-investigators:
  - lOw-dose CT cOmPared to Lung UltraSonography vs standard care for the diagnosis of pneumonia in the elderly: a multicentre randomized controlled study (SNF No. 197398)
  - AI-multi-omics-based Prognostic Stratification of COVID-19 Patients in Acute and Chronic State (SNF No. 198388)
  - DETECT - Dizziness Evaluation Tool for Emergent Clinical Triage (SNF No 173081)
- European Union funding as lead investigators
  - TeamUp: Understanding and improving team decision making in uncertain environments (EC No. 894536)
- European Union funding as co-investigators
  - DIGIPREDICT: Edge A deployed Digital twins for Predicting disease progression and need for early intervention in infectious and cardiovascular diseases beyond COVID-19 (EC No. 101017915)
  - Medical First Responder Training using a Mixed Reality Approach featuring haptic feedback for enhanced realism (EC No. 101021775)
  - Tools4Teams: Research Training to Design and Implement Tools Supporting Safe Teamwork in Healthcare
- Further external funding from foundations and industry
- Foundational professorship for tele-emergency medicine and e-/m health
- BAG and SEM funded projects in migrant health
- Career funding for young clinical scientists
- Fellowships for two advanced female scientists

## Highlights

### Virtual Reality to Reduce Acute Pain

Pain is one of the most common, but also one of the most complicated complaints people have in the emergency room. The Virtual Inselspital Simulation Lab, [www.visl.ch](http://www.visl.ch), Emergency Telemedicine University Bern, together with the University Emergency Department at Inselspital, has been able to demonstrate the benefits of virtual reality in pain management in a pilot evaluation study and is now using virtual reality technologies for pain management in routine clinical care. At the Virtual Inselspital Simulation Lab and the Telenotfallmedizin Universität Bern, we are conducting research on Medical Extended Reality in medical education and clinical application. Virtual Reality is also used as a research tool in team research.



VR for acute pain in the ED



### 1<sup>st</sup> Summer School on Refugee and Migrant Health

In Summer 2022, we launched the first intensive training course on refugee and migrant health. It provided a unique opportunity to impart specialist knowledge to prepare health professionals for the challenges in treating patients with a migration background. Over two weeks, participants from all over the world listened to a series of lectures, and took part in discussions and learning scenarios with international experts across several different healthcare disciplines. This cumulated in the planning of public health projects, which were presented to an expert panel who provided valuable feedback. In real humanitarian aid tents and with virtual reality glasses, people got an insight into the life in refugee camps, also by engaging with experts from humanitarian aid organisations and film discussions.

[www.migration-health.com](http://www.migration-health.com)

### Study Nurse Unit Up and Running

Randomized controlled trials are the gold standard of clinical research. At the same time, RCTs are logistically challenging and come with substantial regulatory burdens. This is particularly true for RCTs in emergency situations, where time is limited and patients are often not in a state to give informed consent. Over the last years, the department of emergency medicine has established a study nurse unit under the management of Cornelia Lambrigger, that is not capable of running even the most difficult form of prospective clinical trials successfully.



Our Study Nurse Team

## Department of ENT, Head and Neck Surgery

Inselspital, 3010 Bern  
[www.hno.insel.ch](http://www.hno.insel.ch)



Prof. Marco Caversaccio  
Chairman

Prof. Roland Giger

Prof. Georgios Mantokoudis

Prof. Martin Kompis

Prof. Eberhard Seifert

Prof. Stefan Weder (Group leader)

Prof. Lukas Anschutz (Group leader)

PD Dr. Wilhelm Wimmer

### Profile

- Teaching students of medicine and dentistry in ENT
- Teaching and supervising graduate students at the ARTORG Center (Hearing Research Lab) and Sitem-Insel AG
- Training of young ENT surgeons on a daily basis and in internal courses
- Courses in audiology, biomedical acoustics, digital signal processing and phoniatrics for speech therapists
- Research collaboration with the Hearing Research Laboratory at the ARTORG Center to develop and integrate new technologies for the treatment of hearing loss
- Research projects in ENT oncology and the treatment of vestibular loss
- External Partners: Department of Otorhinolaryngology, University Hospital of Zurich, Switzerland; ORL University Hospital Modena, Italy; Nottingham Hearing Biomedical Research Department, University of Nottingham, UK; Johns Hopkins University, Department of Neurology, USA, Harvard Medical School, Department of Otolaryngology Head and Neck Surgery, USA

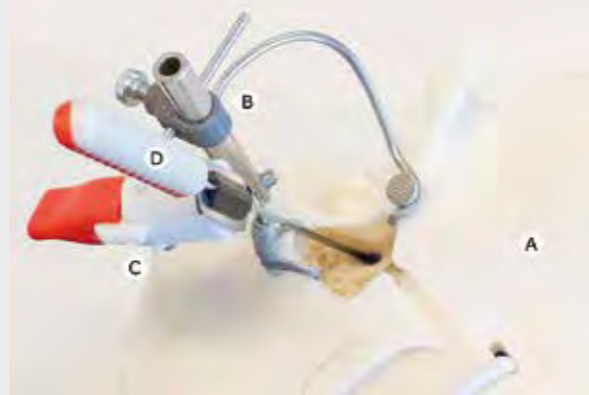
### Grants

- SNF Grant, The Human Auditory System in Motion (320030\_192660 / 1)
- SNF Grant, DETECT Study (320030\_173081)
- SNF Grant, Physiological Role of Torsion in the Cochlea (205321\_200850)
- Innosuisse Grant, Personalized Tinnitus Relief in Hearing Aids (PASTOR)
- Prof. Dr. Lukas Anschutz: Teacher of the Year Award 2022
- Dr. Diego Rodriguez: 2nd Lecture Price Spring Assembly Lausanne

### Highlights

#### Cochlear Implant Technology

We are working on the advancement of cochlear implants (CIs) and implantation technology. CIs are hearing prostheses with an electrode array that is inserted into the inner ear to enable deaf people to hear again. Our group is developing new instrumentation for minimally invasive insertion of electrode arrays into the cochlea. CIs can also be used as a measurement device. The technique is called telemetry and allows measurement of electrode impedances and responses to the epithelium as well as nerve responses. Telemetry-based impedance could be used to estimate the position of the electrode contacts in the cochlea or to monitor the degree of hearing preservation after surgery. Algorithms developed in our group can assist surgeons in inserting electrodes and provide them with feedback on the functional and structural integrity of the inner ear.



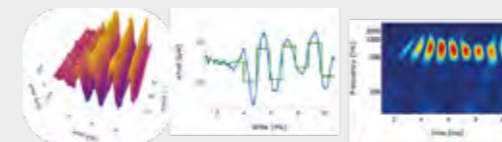
Cochlear Implant Insertion Tool prototype

[Aebischer et al., IEEE TBME. 2022.](#)

#### Electro-Cochleographic Assessment Tool of Cochlear Health

Indications for cochlear implants (CIs) have expanded to patients with residual hearing. It is therefore mandatory to better comprehend the impact of the implant on cochlear health. Electrocochleography (EcochG) records electrical potentials generated in the inner ear in response to acoustic stimuli. Previous studies have demonstrated that signals reflect the remaining neurosensory cells. In our project, we aim to develop a monitoring tool, which enables the objective assessment of the inner ear function in CI recipients. This might lead to new surgical and therapeutic strategies in the future.

[Schuerch et al., Eur Arch Otorhinolaryngol. 2022.](#)  
[Schuerch et al., J Vis Exp. 2022.](#)  
[Schuerch et al., Front Neurol. 2022](#)

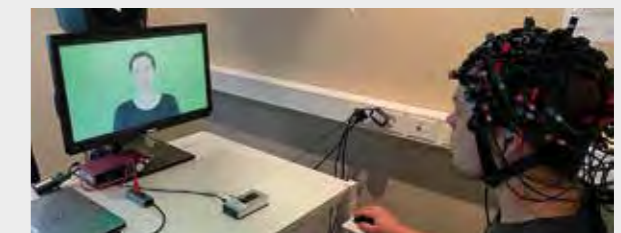


Tested objectivation methods: correlation analysis, Hotellings T2-Test and a Deep Learning

#### Predicting Speech Understanding in Cochlear Implant Candidates

Cochlear implants (CI) are an established treatment for profound hearing loss. However, the results of speech understanding after implantation vary widely. About 25% of patients who receive a CI do not gain the expected benefit in regards to speech understanding. Up to now, there are no reliable indicators (biomarkers) available to predict the success of a CI preoperatively. There is growing evidence that different hearing results are due to plastic brain changes. Functional near infrared spectroscopy (fNIRS) is a functional imaging technique ideal for recording functional brain networks in CI candidates and carriers. Using the fNIRS technology, we want to identify biomarkers for postoperative speech understanding in CI candidates. This will significantly improve the counseling and selection of implant candidates.

[Bálint et al., JMIR Research Protocols. 2022.](#)



Measurement of cortical brain activation during performance of a speech comprehension task

#### Smartwatches in Audiology



Tinnitus Measurements

Loud noise at work or during leisure time can cause hearing loss or tinnitus. However, monitoring by professional sound level meters is not practical in everyday life. We are therefore evaluating smartwatch-based applications for monitoring noise exposure. We believe that smartwatches will play an important role in the assessment of personal noise exposure and should be used as widely available and cost-effective means of hearing protection for clinical research. Ongoing work of our group is further focused on the use of smartwatches for clinical diagnostics purposes in tinnitus, hearing loss, and vertigo.

[Fischer et al., Front Neurol. 2022.](#)

#### Tinnitus Research Award

For his outstanding PhD thesis on "Bayesian Brain-Inspired Computational Modeling of Tinnitus and Residual Inhibition" Dr. Suyi Hu was awarded the research price 2022 of the Swiss Tinnitus League worth CHF 2'000 on 8 January 2022. Suyi Hu investigates the potential of computer modeling to develop new quantitative strategies in tinnitus research. His dissertation demonstrated the potential of computer modeling to quantitatively link experimental observations with theoretical hypotheses, opening a potentially new tinnitus research direction in the sense of personalized medicine, allowing for more refined subtyping and patient-specific diagnosis and individual prediction of treatment outcomes.

[Hu et al., Trends Hear. 2021.](#)



Award Ceremony

## Department of General Internal Medicine

Inselspital, 3010 Bern  
www.innermedizin.insel.ch



Prof. Drahomir Aujesky Director  
Prof. Nicolas Rodondi Chief Physician  
Dr. Martin Perrig Chief Physician  
Prof. Manuel Haschke Chief Physician  
Prof. Maria Wertli  
PD Dr. Christine Baumgartner  
PD Dr. Tobias Tritschler



PD Dr. Manuel Blum  
PD Dr. Carole Aubert  
PD Dr. Evangelia Liakoni  
PD Dr. Felix Hammann  
PD Dr. Stefan Weiler

### Profile

- Research focus: multimorbidity, venous thromboembolism, anticoagulation, variation in care, overtreatment, de-prescribing, thyroid diseases, primary care, epidemiology, public health, chronic pain, opioid use, drug metabolism and safety, nicotine dependence, pharmacometrics, machine learning, quality of care
- 8 research groups
- Overall aim: To improve quality of care and to promote evidence-based, high-value, safe, patient-centered, data-informed, and sustainable health care
- Teaching (lectures, clinical teaching, skills training, small group teaching) and assessment (practical and theoretical examinations) of students in medicine, pharmacy, and dental medicine
- High-quality post-graduate training of general internal medicine and specialty residents
- International academic partners: Division of General Internal Medicine, University of Pittsburgh Medical Center, USA; Ottawa Hospital Research Institute, University of Ottawa, CA; Leiden University Medical Center, NL; Division of Hospital Medicine and Clinical Pharmacology/Experimental Therapeutics, Department of Medicine, Department of Epidemiology and Biostatistics, and Center for Tobacco Control Research and Education, University of California, San Francisco, USA; The Thyroid Studies Collaboration on 5 continents; Department of Neurobiology, Care Sciences and Society, Institute of Environmental Medicine, Division of Physiotherapy, Karolinska Institutet, Stockholm, Sweden; Occupational and Industrial Orthopaedic Center, New York University Langone Orthopedic Hospital, New York, USA; Division of Research, Kaiser Permanente Northern California, Oakland, USA; The European Drug Emergencies Network Research Group; Global Health Institute Barcelona, Spain; Kenya Medical Research Institute, Nairobi, Kenya; Clinical Pharmacy Research Group and Pharmacy Department, Université Ca-tholique de Louvain, Brussels, Belgium
- Swiss academic partners: Institute of Primary Health Care (BIHAM), University of Bern; Clinical Trials Unit (CTU), University of Bern; Venous thromboembolism network including 22 Swiss university and non-university hospitals; Institute of Biostatistics, Epidemiology, Biostatistics and Prevention, University of Zürich; Department of Health Sciences, Helsen, Dübendorf; Horten Center for Patient Oriented Research and Knowledge Transfer, University of Zürich, Zürich; Department of Internal Medicine, Centre Hospitalier Universitaire Vaudois, Lausanne; Department of General Internal Medicine and Division of Medicine for the Aged, Hôpitaux Universitaires Genève, and University Clinics of Dental Medicine, University of Geneva, Geneva; HFR Fribourg, University of Fribourg, Fribourg; Department of Internal Medicine and Department of Psychosomatics, University Hospital Basel, and Swiss Tropical and Public Health Institute, Basel

### Grants

- Swiss National Science Foundation (SNSF) Investigator Initiated Clinical Trial (IICT) grants no. 193052 and 185616.
- SNSF Research Program 74 (NFP74) grant no. 167465.
- SNSF grants no. 179346, 189132, 192850, 200606, 201072, 201672, 205067, and 206639.
- Staatssekretariat für Bildung, Forschung und Innovation EU-Rahmenprogramme no. 20.00116
- Novartis Foundation for Medical-Biological Research, Bangerter-Rhyner Foundation, Swiss Society of General Internal Medicine Foundation, Swiss Heart Foundation, smarter medicine, Kollegium für Hausarztmedizin, Eurospine Task Force Research Grant, UNITAID: BOHEMIA (Broad One Health Endectocide-based Malaria Intervention in Africa), SUVA Forschung Medizin, Stiftung für Krebskranke Kinder Regio basiliensis, Bundesamt für Gesundheit, International Network of Venous Thromboembolism Clinical Research Networks (INVENT-VTE).
- Intramural grants: UniBE ID Grant, CTU Bern

## Highlights



Between-group differences in thyroid-related quality of life symptoms score at 12 months and at the end of study, stratified by baseline anti-thyroid peroxidase (TPO) status.

### Thyroid Antibodies and Levothyroxine Effects in Subclinical Hypothyroidism

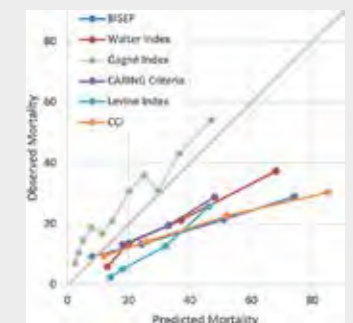
Antithyroid antibodies increase the likelihood of developing overt hypothyroidism, but their clinical utility remains unclear. To determine whether older adults with subclinical hypothyroidism and positive antibodies derive more clinical benefits from thyroid hormone treatment than those with negative antibodies, we pooled individual participant data from two randomized controlled trials including 660 participants who were randomly assigned to thyroid hormone treatment or placebo. Positive antithyroid antibodies were not associated with more benefits on clinical outcomes (i.e., quality of life, improvement in handgrip strength, cardiovascular outcome) when treated with thyroid hormones compared to placebo.

Lyko C, et al. *J Intern Med.* 2022;292(6):892-903.

### Comparison of 6 Mortality Risk Scores for Prediction of 1-Year Mortality in Older Adults with Multimorbidity

The most appropriate therapy for older adults with multimorbidity may depend on life expectancy, and several scores have been developed to predict 1-year mortality risk. To compare the performance of 6 scores in predicting the 1-year mortality risk in hospitalized older adults with multimorbidity, we performed a secondary analysis of the OPERAM trial that included multimorbid, polymedicated persons aged  $\geq 70$  years admitted to hospital. Our findings suggest that all 6 of the 1-year mortality risk scores examined had moderate prognostic performance, discriminatory power, and calibration. Overall, none of these mortality risk scores outperformed the others, and thus one cannot be recommended over others for daily clinical practice.

Schneider C, et al. *JAMA Netw Open.* 2022;5(7):e2223911.

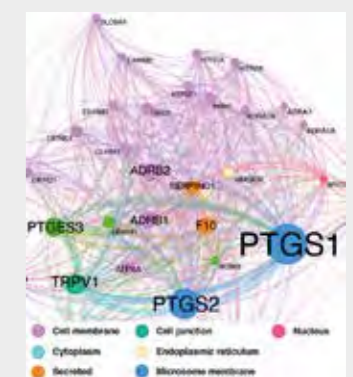


Calibration plots of 6 mortality risk scores for 1-year mortality.

### Drug-Disease Severity and Target-Disease Severity Interaction Networks in COVID-19 Patients

While drug-drug interactions are a well-recognized phenomenon, pre-existing drug therapy can alter the course of diseases for which it had not been prescribed. Using network graph analysis, we investigated interactions between drugs, their targets, and disease progression in COVID-19. Surprisingly, we found a greater share of patients with diabetes and cardiac co-morbidities in the non-severe cohort, which received treatment with dipeptidyl peptidase-4 (DPP4) inhibitors, suggesting DPP4-inhibitors may be repurposing candidates against SARS-CoV-2. At the target level, we observed that the target location might have an influence on disease progression. This could potentially be attributed to the disruption of functional membrane micro-domains (lipid rafts), which in turn could decrease viral entry and thus disease severity.

Schöning V, Hammann E. *Pharmaceutics* 2022;14(9):1828.



Molecular target network for the non-severe COVID-19 cohort. Weights of nodes or edges positively correlate with drug use or target engagement. PTGS1/2: Prostaglandin G/H synthase 1/2; TRPV1: Transient receptor potential cation channel subfamily V member 1; PTGS3: Prostaglandin E synthase 3; F10: coagulation factor X; ADRB1/2: beta-1/2 adrenergic receptor; SERPINC1: antithrombin-III.

## Department of Geriatrics

Inselspital, Freiburgstrasse 46, 3010 Bern  
[www.geriatrie.insel.ch](http://www.geriatrie.insel.ch)



Prof. Andreas Stuck  
 Chair Spital  
 Department Director

Dr. Franz Fäh  
 Belp and Spital  
 Tiefenau

Prof. Andreas Schönenberger  
 Clinical  
 Director

Dr. Dominic Bertschi  
 Senior Fellow

Dr. Anna Stuck  
 Senior Fellow

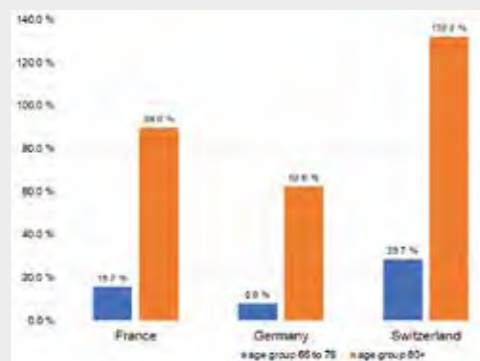
### Profile

- Clinical profile: Inpatient geriatric rehabilitation unit (50 beds, Spital Belp), inpatient geriatric acute care unit (40 beds, Spital Tiefenau), orthogeriatrics unit in collaboration with Department of Orthopedics and Traumatology (Inselspital)
- Teaching profile: Geriatric core curriculum in geriatrics for medical students, at University of Bern, course for dental medicine students, residency training programs
- Research profile: geriatric assessment, orthogeriatrics, sarcopenia, osteoporosis, nutrition, gait speed, physical function, TAVI, frailty, grip strength. Research ist organized in collaboration with internal partners (audiology, cardiology, primary healthcare osteoporosis, orthopedics, CTU, ARTORG and others)
- External partners: Department of Geriatrics, University of Basel, University Hospital Basel; Geriatrics, University of Geneva, University Hospital Geneva; Department of Geriatrics, University of Lausanne, University Hospital Lausanne; Department of Geriatrics, University of Zurich, University Hospital Zurich; Rehabilitation Center Kliniken Valens, Valens; Department of Internal Medicine, Hospital San Giovanni, Bellinzona; National Institute of Gerontology and Geriatrics , Ana Aslan, Bucharest, Romania; Department of Medicine and Surgery, University of Milano-Bicocca, Milan, Italy; Department of Geriatrics and Medicine, University of Florence, Florence, Italy

### Grants

- Swiss Personalized Health Network: Swiss Frailty Network and Repository 2018 to 2022 (Co-Investigator: CHF 1.785 Mio)

### Highlights



### Health Care for Older Adults in Europe

Andreas Stuck was invited to submit a report on the current status of health care for older adults in Europe. Geriatric medicine is now an accepted specialty field in 23 European countries. The number of adults aged 80 years and older is expected to double until 2050 (orange bars, left side). In contrast to other regions in the world, the number of young old adults will only minimally increase (blue bars). The report formulates key objectives to address this challenge.

Stuck AE, Masud T. Health care for older adults in Europe: how has it evolved and what are the challenges? *Age Ageing*. 2022; afac287.



### Swiss Frailty Network

We published first results in the context of the Swiss Personalized Health Network. This will help to define the role of frailty screening at hospital admission.

Stuck AK, Schilling N, Bertschi D et al. in: Predictive Abilities of the Frailty. *J Frailty Aging*. 2022;11(4):387-392. doi: 10.14283/jfa.2022.44.



### Frailty in Day Hospital Patients

In this project, Anna K. Stuck explored the predictive ability of the clinical frailty scale (CFS) among geriatric day hospital patients. She identified cut-offs that might help in hospital discharge planning in geriatric patients: the panel depicts the prediction of admission of patients to nursing home care based on initial frailty status.

Andres D, Imhoof C, Bürge M, Jakob G, Limacher A, Stuck AK. *Int J Environ Res Public Health* 2022, 19, 6276. doi: 10.3390/ijerph19106276.

### Geriatrics and Undergraduate Teaching

We coordinated several projects to improve our understanding of how to optimally cover geriatric medicine contents in undergraduate medical training. The word cloud summarizes key topics identified in a broad review. Based on these findings we developed novel training sessions for our medical students in Bern.

von Streng Paats T, Masud T, Huwendiek S, Blundell A, Vassallo M, Stuck AE. Geriatric medicine learning objectives and entrustable professional activities in undergraduate medical curricula. *Age Ageing*. 2022 May 1;51(5):afac100. doi: 10.1093/ageing/afac100.

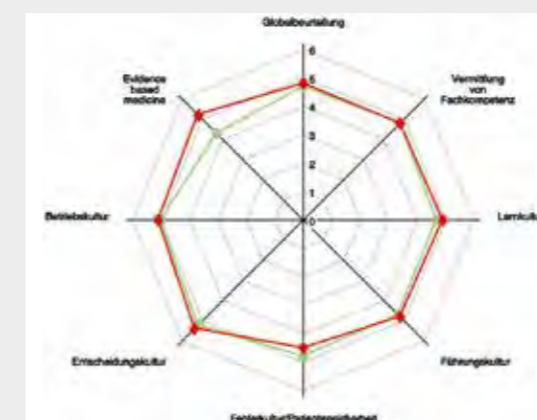
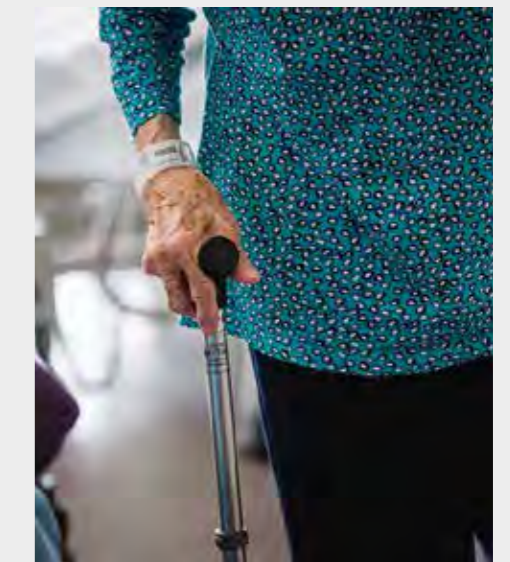
Masud T, (...) Stuck AE. A scoping review of the changing landscape of geriatric medicine in undergraduate medical education. *European Geriatric Medicine* 2022. doi: 10.1007 / s41999-021-00595-0.



### Sarcopenia

In collaboration with University Geriatrics in Basel Dominic Bertschi further explored prevalence and correlates of sarcopenia in geriatric patients, as a basis for better management of geriatric inpatients.

Bertschi D, et al. Impact of sarcopenia on daily functioning: a cross-sectional study among older inpatients *Aging Clin Exper Res* <https://doi.org/10.1007/s40520-022-02175-z>.



### Journal Club for Residents at our Department

The green lines in the picture demonstrate average ratings of postgraduate teaching in internal medicine and geriatric departments in Switzerland (6 is the best rating). To address the below average ratings of teaching in evidence based medicine, Franz Fäh introduced combined videoconference teaching sessions for our residents at the three sites (Insel, Belp, Tiefenau). In addition to case discussions, we also developed a novel interactive journal club seminar. As a result, ratings of teaching in evidence-based medicine at our department (red lines in the picture) is now excellent. Promoting the field of geriatric medicine, including academic geriatrics, among clinical residents is key to address the existing shortage of geriatricians.

## Department of Hematology and Central Hematology Laboratory

Inselspital, 3010 Bern  
www.hzl.insel.ch



Prof. Anne Angelillo-Scherer  
Director



Prof. Alicia Rovó  
Deputy Director



Prof. Sara Meyer  
Head of Hemato-Oncology



Prof. Vera Ulrike Bacher  
Academic Head of Morphology & Hematological Immunophenotypisation



Prof. Johanna A. Kremer Hovinga  
Head Reference Center Hemophilia & Academic Head Hemostasis Laboratory



PD Dr. Michael Daskalakis  
Head of Transfusion Medicine, Apheresis & Cell Therapy Laboratory



Prof. Nicolas Bonadies  
Head Clinical Study Management/ Biobanking



PD Dr. Monica Schaller Tschan  
Coordinator undergraduate teaching & Graduate School for Cellular and Biomedical Sciences



Prof. Sacha Zeerleder  
Group Leader



PD Dr. Ramanjaneyulu Allam  
Group Leader

### Profile

- Teaching students of medicine, dental medicine, pharmacy, biomedical sciences as well as graduate students at the Graduate School of Graduate School for Cellular and Biomedical Sciences (GCB) of the University of Bern
- 9 research groups; research focus: investigation of epidemiological and pathophysiological processes as well as diagnosis, prognosis and therapeutic approaches of blood-related disorders, pathophysiological processes that contribute to inflammation and tumor diseases
- Clinical Study Management Unit (currently 24 ongoing studies)/ Biobanking
- Largest clinical cell therapy program in Switzerland
- External partners: Steering committee and Advisory Board of Hereditary TTP Registry ([www.ttpregistry.net](http://www.ttpregistry.net)); University of Oklahoma Health Sciences Center, Norman, OK, US; American Society for Transplantation and Cellular Therapy – Survivorship Special Interest Group, EBMT Chronic Malignancies Working Party (CMWP); DKFZ Heidelberg, Heidelberg, Germany; Hematology, Basel University Hospital, Basel, Switzerland; MRC Cambridge Stem Cell Institute, University of Cambridge, Cambridge, UK; University Hospital Zurich and ETH Zurich, Zurich, Switzerland; Swiss MDS Registry and Biobank; Silence Therapeutics Silence Therapeutics GmbH, Berlin, Germany & plc, London, UK

### Grants

- Swiss National Science Foundation (grant No. 310030-192635, 320030-189090, 310030-185233; 314730\_173127; NFP78 "COVID-19 (4078P0\_198255); R' EQUIP 316030\_183501)
- Landsteiner Foundation for Blood Transfusion Research (LSBR1719), Amsterdam, The Netherlands
- Product and Process Development Cellular Products Sanquin (PPOC) program Sanquin (PPOC-17-44), Amsterdam, The Netherlands
- Swiss Cancer Grant (KFS-5158-08-2020), SAKK Grant 33/18
- Bernese Cancer League, Jacques und Gloria Gossweiler Stiftung
- 3rd Call for Proposals for Personalized Health and Related Technologies PHRT project #2019-717
- IIR grant (H16-36165) from Baxalta US Inc., Novartis CINC424BCH01R, CSL Behring AG, Alexion, unrestricted grant from Silence Therapeutics

### Highlights

#### Development of a Laboratory Diagnostic Algorithm for Intraocular Lymphoma

An interplay of cytopathology, multiparameter flow cytometry, digital droplet PCR (ddPCR), and imaging methods contributes highly to the sometimes difficult detection of intraocular lymphoma.

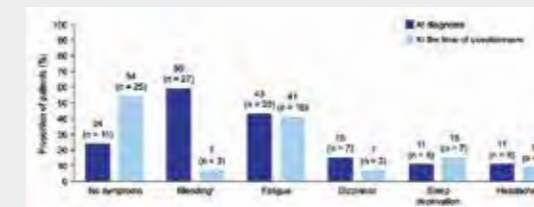
[Shumilov E, Mazzeo P, ... Bacher U; Curr Oncol 2022; 29\(2\): 766; doi: 10.3390/curroncol29020065.](#)



#### Real-world Impact of Primary Immune Thrombocytopenia (ITP) and Treatment with Thrombopoietin Receptor Agonists (TPO-RAs) on Quality of Life Based on Patient-Reported Experience: Results from a Questionnaire Conducted in Switzerland, Austria, and Belgium

Many factors affect health related quality of life in patients with ITP. Of patients receiving TPO-RAs, none experienced bleeding at the time of the questionnaire; they also showed a more positive perspective for some outcomes than those not using TPO-RAs. However, fatigue was not reduced by any treatment.

[Rovó A et al. PLoS ONE 2022 17\(4\): e0267342; doi: org/10.1371/journal.pone.0267342.](#)

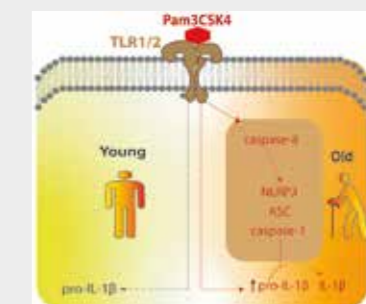


Symptoms at diagnosis and at the time of the questionnaire. Data in the figure are presented as the proportion of patients reporting each symptom within the total cohort (N = 46).

#### Increased Inflammasome Activation Associates with Aging and Chronic Myelomonocytic Leukemia (CMML) Disease Severity

- (1) Aging causes increased sensitivity to NLRP3 inflammasome activation at a cellular level, which may explain increased inflammation and immune dysregulation in older individuals.
- (2) NLRP3 inflammasome activation was dysregulated in a cohort of CMML patients and positively correlated with disease severity.

[Andina et al., J Immunol. 2023, 210:580-589. doi: 10.4049/jimmunol.2200412.](#)

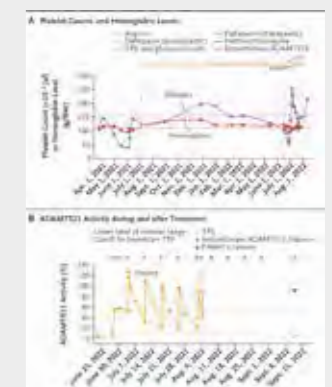


Schematic figure showing that Pam3CSK4 directly activates NLRP3 inflammasome in monocytes from older but not from younger healthy donors. This way of activation is akin to LPS inducing the alternative NLRP3 inflammasome which is depend on caspase 8.

#### Recombinant ADAMTS13 for Hereditary Thrombocytopenic Purpura (TTP)

A 27-year-old patient with a history of severe obstetrical complications and arterial thrombosis was diagnosed with hereditary TTP due to severe ADAMTS13 deficiency in the 30th week of her second pregnancy. When the acute episode of hereditary TTP became plasma-refractory and fetal death was imminent, recombinant ADAMTS13 was administered. The patient's platelet count normalized, and the growth of the fetus stabilized. At 37 weeks a boy was delivered.

[Asmis L et al NEJM 2022, 22;387\(25\):2356-2361. doi: 10.1056/NEJMoa2211113.](#)



Key maternal and fetal or neonatal measures over time.

## Department of Human Genetics

Inselspital, 3010 Bern  
<http://www.humangenetik.insel.ch>



Prof. Christiane Zweier  
 Director and Chair

PD Dr. André Schaller

Dr. Anne Gregor

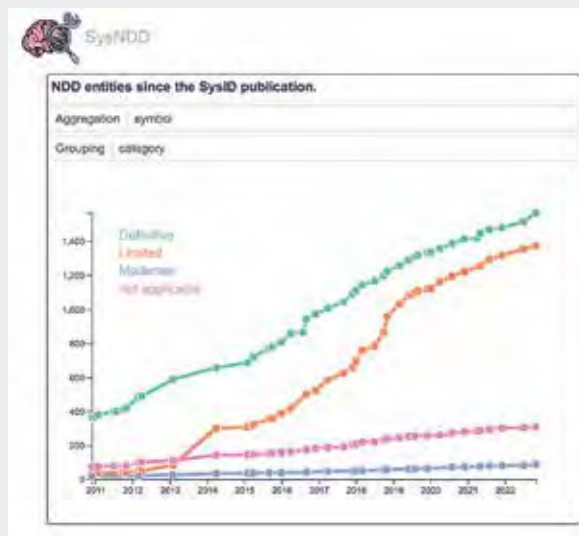
### Profile

- Teaching students of medicine and biology
- Providing training in Medical Genetics (FMH and FAMH)
- Offering PhD training in programs of the Graduate Schools of the University of Bern
- Two research groups
- Identification of new disease genes for neurodevelopmental, mitochondrial and rare disorders
- Clinical and mutational characterization of neurodevelopmental, mitochondrial and rare disorders
- Drosophila melanogaster as a model organism to functionally characterize disease mechanisms and to investigate genetic interactions
- iPSC and other cell-based models to investigate pathomechanisms
- External partners: University Hospitals Switzerland, Institute of Human Genetics, Erlangen, Germany; Department of Human Genetics, University Hospital Leipzig, Germany; Department of Human Genetics, Radboud University Nijmegen, Netherlands; Department of Neuroscience, Erasmus MC Rotterdam, Netherlands; ORPHANET; ERN ITHACA; numerous collaborations with geneticists worldwide

### Grants

- DFG ZW 184/6-1, 2019-2022 (Zweier)
- BCPM young investigator award, 2022-2023 (Gregor)

### Highlights



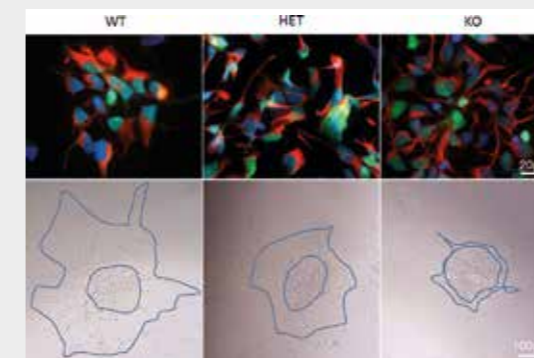
Analysis from SysNDD, displaying the increasing number of NDD related genes in the last decade

### SysNDD Database

To obtain an overview on the clinical and molecular landscape of neurodevelopmental disorders (NDDs) and to facilitate diagnostics and research, Christiane Zweier has been involved for many years in establishing and updating a manually curated database with published NDD genes and associated diseases and phenotypes (previously SysID: [www.sysid.dbmr.unibe.ch](http://www.sysid.dbmr.unibe.ch)). Together with collaboration partner Bernt Popp (Charité, Berlin), we now built the new SysNDD database (<https://sysndd.dbmr.unibe.ch>), which currently contains 1566 definitive NDD genes associated with 1719 disease entities and >1300 NDD candidate genes. SysNDD is supported by the European Reference Network (ERN) ITHACA, and we are working on data harmonization and integration with Orphanet.

### FBXO11 Deficiency Impairs Neuronal Differentiation and Migration

Recently, we identified de novo FBXO11 variants as causative for a variable neurodevelopmental disorder (NDD). To better understand the molecular consequences resulting from FBXO11 haploinsufficiency, we created a neuronal disease model using human induced pluripotent stem cells and CRISPR/CAS9 technology. Through transcriptome analysis and subsequent functional studies, we found that loss of FBXO11 impairs neuronal differentiation and migration and identified the stemness factor NANOG as a likely mediating factor. This might explain at least part of the pathogenesis of FBXO11-associated NDDs.

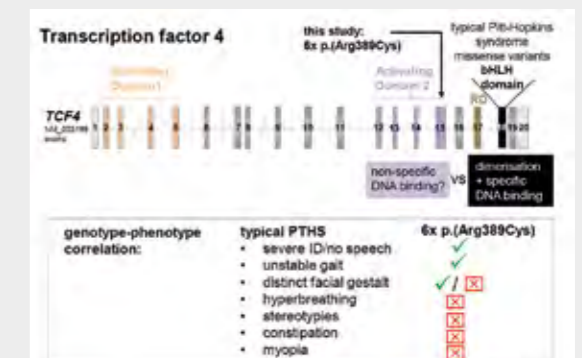


FBXO11-deficient neural precursor cells (top row) and neurospheres with migration defects (bottom row)

### Novel Genotype-Phenotype Correlation for TCF4-Related Neurodevelopmental Disorders

Truncating variants or missense variants in the bHLH domain of transcription factor TCF4 cause Pitt-Hopkins syndrome, a syndromic neurodevelopmental disorder (NDD) characterized by severe intellectual disability, a distinct facial gestalt, epilepsy and hyperbreathing. We now identified a recurrent, de novo missense variant in TCF4 - upstream of the bHLH domain within the activating domain 2 - in six individuals with a rather non-specific NDD overlapping with but not typical for Pitt-Hopkins syndrome. This constitutes a new genotype-phenotype correlation for TCF4-related NDDs with some impact on TCF4 missense variant interpretation.

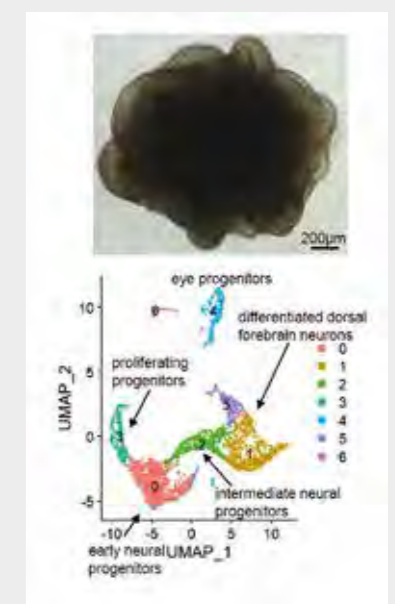
[Popp et al., Clin Genet. 2022 Dec;102\(6\):517-523.](https://doi.org/10.1002/ajmg.b.32222)



While missense variants in the bHLH domain of TCF4 cause the distinct, recognizable Pitt-Hopkins syndrome, the recurrent variant p.(Arg389Cys) is associated with an unspecific NDD

### Modelling LHX2-Associated Neurodevelopmental Disorder (NDD) in Human Brain Organoids

Dr. Anne Gregor has acquired funding by a BCPM young investigator grant to establish human brain organoid culture and single-cell RNA sequencing to study the pathomechanisms associated with loss of LHX2. Recently, we established LHX2 as a novel NDD related disease gene. The objective of this project is to better understand the role of pathogenic variants in LHX2 in NDDs. We have generated an iPSC-based model of heterozygous loss-of-function variants in LHX2 using CRISPR/CAS9 technology. Currently, we are establishing a cerebral organoid model from control and loss-of-function iPSC lines to assess defects in neuronal development. Single cell transcriptomics is being performed to decipher developmental programs or neuronal populations abrogated by LHX2 deficiency. Collectively, understanding pathomechanisms of LHX2-associated NDDs might provide ideas for novel therapeutic options in the future.



Cerebral organoid at day 30 (top) and UMAP of single cell sequencing of a cerebral organoid (bottom)

## Department of Infectious Diseases

Inselspital, 3010 Bern  
[www.infektiologie.insel.ch](http://www.infektiologie.insel.ch)



Prof. Andri Rauch Deputy Head of Department, Head Outpatient Clinic	PD Dr. Christine Thurnheer Head ID Consult Services Hospitalized Patients	Prof. Hansjakob Furrer Chairman and Head of Department	Dr. Philipp Jent Head of Infection Control
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### Profile

- Teaching students of medicine in Infectious Diseases (ID). Clinical skills training, problem based learning modules, practical months. Teaching students of Dental Medicine and Biomedicine and Biology
- Accredited for postgraduate education in Infectious Diseases and Tropical Medicine
- Cohort Studies: 1. Swiss HIV Cohort Study (A. Rauch Chair of Scientific Board): Swiss and international collaborations. 2. Swiss Transplant Cohort Study (C. Hirzel Chair of ID Board)
- Infection prevention: Healthcare-associated infections and research partnering with a number of clinical specialties of the Insel Group, IFIK, external surveillance systems Anresis and Swissnoso
- Clinical aspects and epidemiology of infectious diseases with clinical partners Insel Group and Institute for Infectious Diseases (IFIK). ID in people who inject drugs
- Research collaboration and implementation science within SubSaharan Africa: G. Wandeler via SNF, IEDA/NIH; C. Staehelin ESTHER project in Guinea-Conakry; Dr. S. Zimmerli, Harare Zimbabwe
- Publications: <https://boris.unibe.ch/view/divisions/DCD5A442BB13E17DE0405C82790C4DE2.html>
- External Partners: Swiss Centre for Antibiotic resistance, Anresis; Swissnoso, Swiss HIV Cohort Study; leDEA, International Epidemiology Databases to Evaluate AIDS, NIH, Bethesda, USA; Swissnoso; Swiss Transplant Cohort Study; Fungal Infections Network of Switzerland; EUROSIDA; Swiss Tropical and Public Health Institute, Basel; Kirby Institute, Sydney, Australia; Centre Hospitalier Macenta Guinée-Conakry

### Grants

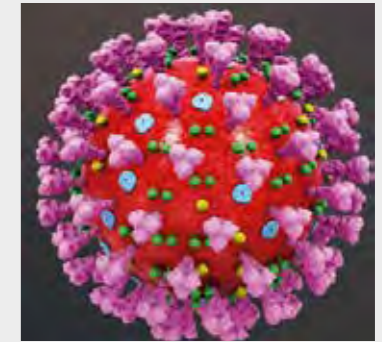
- SNF Project grants: 32003B\_179500 J. Marschall; 324730\_179567 A. Rauch; 33CS30\_177499 A. Rauch, H. Furrer (co-applicants); 31CA30\_196245 A. Rauch (co-applicant); 31CA30\_196615 P. Jent (co-applicant)
- SNF Professorship PP00P3\_211025; SNF IICT 33IC30\_205829; Krebsliga Schweiz KLS-4879-08-2019 all G. Wandeler
- SNF SPARK 19097, A. Atkinson
- SPHN Personalized Swiss Sepsis Study (PSSS), H. Furrer (co-applicant)
- SF Board Grants 2022 "Immune responses and inflammation following vaccination in immuno-suppressed persons: A prospective translational multi-cohort study", led by Ch. Thurnheer; «Towards reducing infections after healthcare-associated interventions», Co-Lead Ph. Jent

## Highlights

### Involvement in Handling of the COVID-19 Pandemic

Throughout the year 2022, our department was substantially involved in the handling of the pandemic, e.g.:

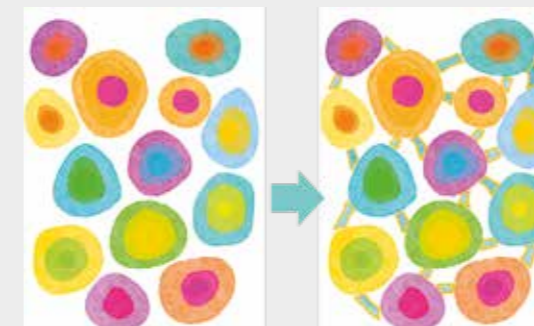
- As unit responsible for pandemic planning and epidemiology experts in the pandemic strategy and internal policy making.
- As consulting unit in the treatment of COVID-patients
- As prevention and control team in the training and setup of dedicated isolation units and more
- Medical lead and organization of the COVID Vaccination Center on the INSEL Campus



### SF Board Grant: Immune Responses and Inflammation Following Vaccination in Immuno-Suppressed Persons

The above mentioned multidisciplinary project for the SF Call Inflammation & Infection led by PD Dr. Christine Thurnheer and involving Rheumatology, Oncology, Neurology was funded. From our department PD Dr. Cédric Hirzel, Prof. Andri Rauch and PD Dr. Cornelia Staehelin are involved.

This multidisciplinary project benefits from and capitalizes on the Bern tertiary medicine infrastructure through close collaborations of both specialist clinics and core facilities to answer unsolved questions regarding vaccination in immunocompromised persons.



### Habilitations and Faculty Membership for Academic Excellence in Research

We congratulate

- Prof. Gilles Wandeler for his Faculty Membership for academic excellence in research
- PD Dr. Cornelia Staehelin for her habilitation in Infectious Diseases and Tropical Medicine
- PD Dr. Cédric Hirzel who leads our consultation for immunocompromised patients to his habilitation in Infectious Diseases



### 80% as Standard Employment to Promote Equality

In response to the needs and preferences of the current generation of ID fellows, we initiated a pioneering adjustment of the organization and planning of the ID fellowships in our clinic: Since summer 2022, standard employment for clinical fellows is 80% instead of 100%. The aim of this adjustment is to provide better opportunities for persons with parenting responsibilities and to promote equality. This change was welcomed and appreciated by our team, sparked interest in other clinics and institutions and we are interested to observe how it will evolve.



## Department of Intensive Care Medicine

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Prof. Joerg C. Schefold  
 Director a. i. since 10/22  
 Chief physician

Franziska Tschannen  
 Head of IIMC  
 Nursing

Brigitte Hämmerli  
 Head of ICU  
 Nursing

Felix Zürcher  
 Head of  
 Management  
 Services

Prof. Carmen A. Pfortmueller  
 Head of  
 Research

Prof. Stephan Jakob  
 Director and  
 Chief physician  
 until 09/22

### Profile

- Four pillars of research: clinical research, experimental research, laboratory research, nursing science
- Key focus: organ dysfunction, fluid management, metabolism/immune responses, post-resuscitation care, and severe infections
- Broad spectrum of scientific activity (i. e. systematic reviews, meta-analysis, international and national multi-center trials, IITs, animal models on the pathophysiology of cerebral, circulatory and gastrointestinal function)
- Network of collaborations: internal (including ARTORG, Departments of Infectious Disease, Nephrology, Neurosurgery and Cardiovascular Surgery) and external collaboration (CRIC, ANZICS) networks and further important stakeholders (extended patient/relative care, Institute for Physiotherapy, Nursing Science)

### Grants

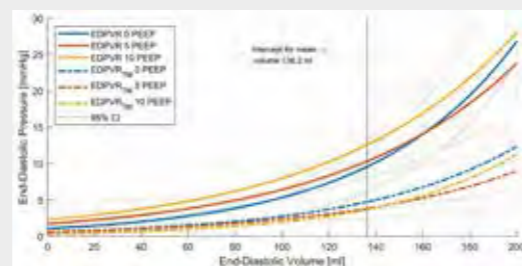
- Innosuisse innovation project, Selective Adsorption in Sepsis- towards clinical implementation. Innovation project No. 42313.1 IP-LS
- SNF Research Project Grants #320030\_176216 Prophylaxis and Treatment of Staphylococcus spp. Intravascular and Extravascular Infections with Bacteriophages (2018–2022)
- SNF Research Project Grants #310030\_212584 What's in a dose? Refining phage and antibiotic dosing for effective treatment of multidrug resistant bacterial infections (2022–2026)
- SNF Research Project Grant, Investigator Initiated Clinical Trials (IICT), Project: FICUS Trail, No: 198778

### Highlights

#### The Effects of Positive End-Expiratory Pressure on Cardiac Function: a Comparative Echocardiography-Conductance Catheter Study

We could show that in patients under non-invasive mechanical ventilation such measurements worsen dependent of the level of positive end-expiratory pressure, while they remain stable in the gold standard measurement (conductance catheter) with transmural cardiac pressures. We conclude that echo measurements of diastolic function under mechanical ventilation are influenced by the changing cardiac loading conditions.

Berger D et al., *Clinical Research in Cardiology*, 2022, DOI:10.1007/s00392-022-02014-1.

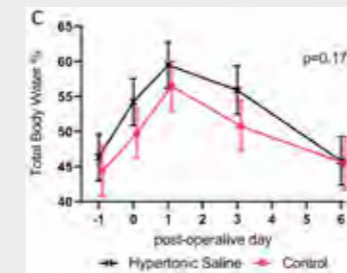


This figure is modified by Berger et al., 2022/04/06, The effects of positive end-expiratory pressure on cardiac function: a comparative echocardiography-conductance catheter study, *Clinical Research in Cardiology*, 111, 6. This figure is licensed under a Creative Commons Attribution 4.0 International Licence. To view a copy of this licence, visit <https://creativecommons.org/licenses/by/4.0/>

#### Efficacy of Phage Therapy in Preclinical Models of Bacterial Infection: a Systematic Review and Meta-Analysis

Phase 1/2 RCTs that evaluated phage therapy failed to prove its efficacy. Our systematic review and meta-analysis with focus on assessing phage therapy efficacy in animal models identified a possible disconnect between research and clinical practice, whereby phage therapy use in preclinical studies did not align with use in humans (ie, dosing, time of administration). These issues should be addressed when designing next preclinical experiments.

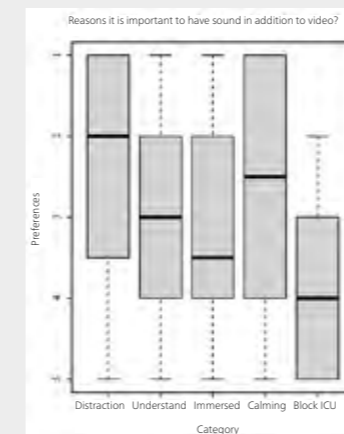
Gómez-Ochoa S.A. et al., *The Lancet Microbe*, 2022, DOI:10.1016/S2666-5247(22)00288-9.



#### Effects of Small Volume Resuscitation with Hypertonic Saline on Body Water Distribution in ICU Patients after Cardiac Surgery

Small volume resuscitation with hypertonic saline at ICU admission after cardiac surgery does neither influence peri-operative body water distribution nor results in differences in body water distribution later on. Our observational data suggests that in the initial phase, pronounced sodium excretion facilitated by previously accumulated fluids is presumably the predominant factor influencing body water. No effect on sodium re-distribution and delayed fluid accumulation was detected in this study.

Waskowski J et al., *Intensive Care Medicine*, 2022, DOI:10.1007/s00134-022-06812-z.



#### Visual and Auditory Stimulation for Patients in the Intensive Care Unit: A Mixed-Method Study

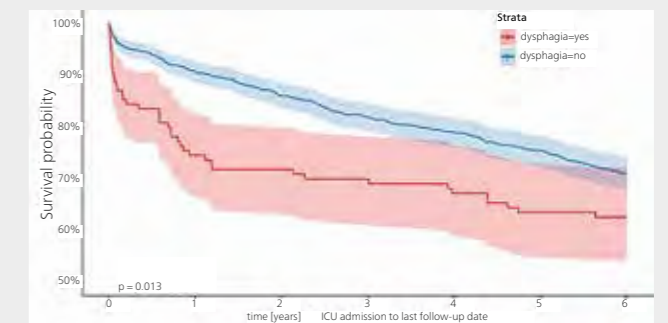
The aim of this study was, to determine what type, content and duration of visual and auditory stimuli should be provided to intensive care unit patients during their hospitalization. It was shown that visual and/or auditory stimuli would benefit patients. Visual stimuli should not exceed 10–15 min, while auditory stimuli should not exceed one hour.

Naef A.C. et al., *Intensive and Critical Care Nursing*, 2022, DOI:10.1016/j.iccn.2022.103306. <https://creativecommons.org/licenses/by/4.0/>.

#### Dysphagia Post-Extubation Affects Long-Term Mortality in Mixed Adult ICU Patients-Data from a Large Prospective Observational Study with Systematic Dysphagia Screening

Presence of dysphagia was associated with increased hazards for death for up to 1 year after ICU admission. Our data underline effects of post-extubation dysphagia on long-term clinical outcomes in affected critically ill patients.

Zuercher P et al., *Critical Care Explorations*, 2022, DOI:10.1097/CCE.0000000000000714.



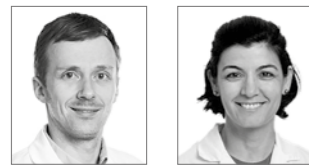


## Department of Medical Oncology

Freiburgstrasse 41, 3010 Bern  
www.onkologie.insel.ch



Prof. Adrian Ochsenbein   Prof. Thomas Pabst   Prof. Jörg Beyer   Prof. Urban Novak   Prof. Martin Berger   Prof. Rory Johnson   Prof. Carsten Riether



Dr. Simon Häfliger   Dr. Berna Özdemir

### Profile

- Teaching students of medicine, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- Research groups involved in basic, translational and clinical research
- GOLD lab with focus on long non-coding RNAs (lncRNAs) links NCCR RNA and disease with clinical oncology
- Research focus in translational medicine in the field of Immuno-Oncology and Hematooncology
- Up to 200 patients per year are treated in clinical interventional phase 1-3 trial
- Largest center for CAR-T cell therapies in Switzerland
- Certified phase 1 trial unit
- Development of Biomarkers to further optimize personalised treatment in the field of gastrointestinal oncology
- Gender medicine

### Grants

- Swiss Cancer Research: Improving outcomes for men with germ-cell cancer through a supra-regional second opinion online portal and national expert advice
- SNF - Targeting Immune Checkpoints to Eliminate Leukemia Stem Cells
- SNF - Deciphering the Interplay of Regulatory T Cells and the Gut Microbiota in the Regulation of Myeloid Leukemia Stem Cells
- Swiss Cancer Research (Krebsliga) – IL-21/IL-21R signaling in leukemia stem cells
- Förderung Kompetenzfeld Inselspital: «A personalized multi-omics discovery and validation platform for recurrent head and neck squamous cell carcinoma»
- SPHN - Swiss Personalized Oncology

### Highlights

#### Revisiting Drug Dosing in Oncology

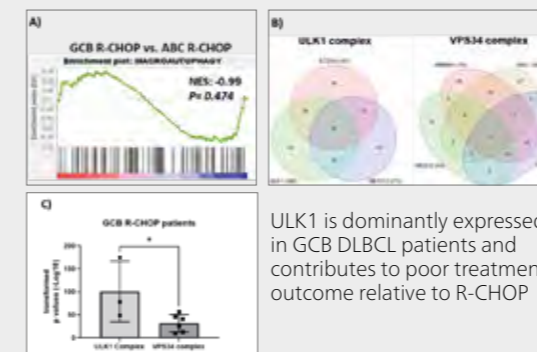
Dr. Berna Özdemir presented her research on sex difference in anticancer treatment toxicity and the potential clinical implications for patients in a documentary for the Japan Broadcasting Corporation (NHK). Her research supports a critical re-evaluation of the standard surface area-based drug dosing and adjustments according to gender differences.



#### ULK1 Blockade Preferentially Targets Germinal Centre B-cell – Diffuse Large B-Cell Lymphoma Subtype by Attenuating Autophagy, c-MYC and Inflammation

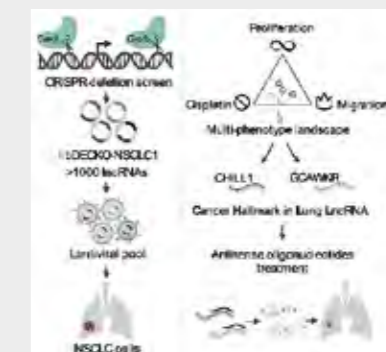
We hypothesized that autophagy facilitates cytoprotection and contributes to drug resistance in diffuse large B-cell lymphoma (DLBCL). We analyzed the gene-expression profile of 360 primary DLBCL patients from a randomized clinical trial (REMO-DL-B, Davies et al, Lancet Oncol, 2019) GCB-DLBCL patients treated with R-CHOP harbor increased autophagy signatures that potentially dictate the treatment outcome. ULK1 inhibition sensitizes GCB cell lines to Ibrutinib via a diverse role in regulating NF- $\kappa$ B, c-MYC and inflammation. Unlike ABC, where ULK1 blockade promotes immunogenic-dependent cell death.

Mandhair et al, ASH Annual Meeting 2022, Abstract Nr. 4187, and manuscript in preparation



#### New Therapeutic Pipeline for Non-Small Cell Lung Cancer

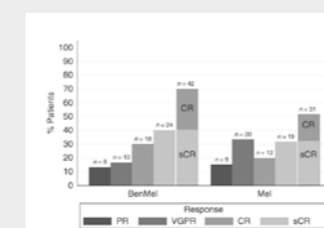
The Laboratory for Genomics of Long Noncoding RNAs and Disease (GOLD Lab) have developed such a discovery pipeline based on the latest CRISPR-Cas genome-editing technology. This technology enables researchers to «delete» many thousands of regions of DNA from tumour cells in a single experiment, thereby identifying regions that may be targeted for therapy. In a recently-published article, the group demonstrate the power of this approach in addressing one of the greatest unmet medical needs today: KRAS-mutated non-small cell lung cancer (NSCLC). Amongst hundreds of tested DNA sites, the researchers identified two particularly promising hits encoding exotic genes called «non-protein coding RNAs» (lncRNAs). The researchers developed novel drugs targeting these lncRNAs, and showed that they could inhibit the growth of tumour cells in a variety of model systems.



Esposito R, Polidori T et al., Cell Genomics, doi: 10.1016/j.xgen.2022.100171.

#### Novel High-Dose Chemotherapy Regimen for Myeloma Patients

This prospective clinical trial is an investigator initiated trial recruiting 120 patients at the Inselspital. We compared in a 1:1 randomized phase II design standard high-dose chemotherapy (HDCT) with high-dose Melphalan to an experimental HDCT with high-dose bendamustine combined with standard melphalan before autologous stem cell transplantation as first-line consolidation in myeloma patients. We found that the rate of complete remissions after transplantation was higher in the experimental Bendamustine/Melphalan arm than in Melphalan-only treated patients (70.0% vs. 51.7%; p = 0.039). This prospective trial may have identified a novel standard for high-dose chemotherapy before autologous stem cell transplantation for myeloma patients.



Farag S et al., Bone Marrow Transplant, doi: 10.1038/s41409-022-01681-y.

Fig. 1 Response rates at day 100 following ASCT in both treatment groups: melphalan (Mei) and bendamustine/melphalan group. PR: partial response, VGPR: very good partial response, CR: complete response, sCR: stringent CR.

#### Splenic Red Pulp Macrophage Provide a Niche for CML Stem Cells and Induce Therapy Resistance

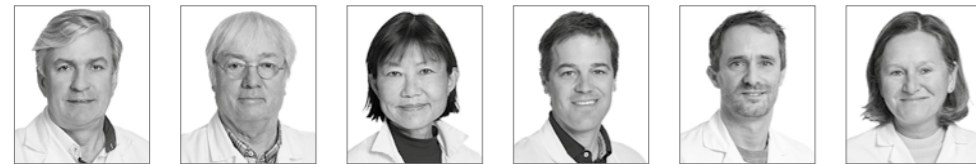
In this study, we show that in the leukemia stem cells (LSCs) do not only accumulate in the bone marrow but also in the spleen in chronic myeloid leukemia (CML). We found that splenic red pulp macrophages (RPM) form a niche that maintains CML LSCs in a quiescent state, resulting in disease progression and resistance to therapy. Pharmacologic and genetic depletion of RPM reduced LSCs and decreased their cell cycling activity in the spleen. Gene expression analysis revealed enriched stemness and decreased myeloid lineage differentiation in spleen leukemic stem cells.

Bührer et al. Leukemia, doi: 10.1038/s41375-022-01682-2.



## Department of Nephrology and Hypertension

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Prof. Bruno Vogt, Clinic Director  
Prof. Dominik Uehlinger, Deputy Clinic Director  
Prof. Uyen Huynh-Do, Consultant Physician  
Prof. Daniel Fuster, Consultant Physician  
PD Dr. Daniel Sidler, Consultant Physician  
Prof. Geneviève Escher, Lab Head

### Profile

- Teaching programs for students in medicine and biomedical sciences (BMS), supervision of bachelor and master students for their elective modules and master thesis, supervision and mentoring of PhD students for Cellular and Biomedical Science (GCB)
- 8 research groups
- Investigation of the mechanisms that contributes to renal function loss upon hypoxia and chronic allograft failure, formation of kidney stones, development of renal fibrosis and atherosclerosis, as well as factors influencing the steroid hormone metabolism
- Aim: improving diagnostic tools and implement of novel therapeutic approaches to enhance patient care
- External partners: Departement of Chemistry and Biochemistry, University of Bern, Switzerland; Institute of Biochemistry and Molecular Medicine, University of Bern, Switzerland; Departement of Pharmacology and Toxicology, University of Lausanne, Switzerland; Institute of Social and Preventive Medicine, University of Lausanne, Switzerland; Institute of Pharmaceutical Sciences of Western Switzerland, Geneva, Switzerland; Institut des Cordeliers, Collège de France, Paris, France; Departement of Biochemistry and Biophysics, Stockholm, Sweden; University of Nottingham, Nottingham, UK; University of Cambridge, Cambridge, UK; Università Cattolica del sacro Cuore, Rome, Italy; University of Stellenbosch, South Africa; Baker Heart Research Institute, Melbourne, Australia; University of Texas Southwestern Medical Center, Division of Nephrology, Dallas, USA; Johns Hopkins University, Department of Physiology, Baltimore, USA

### Grants

- Swiss National Foundation (310030\_182482; 310030\_172974; 310030\_204972; 310030\_215719; 331C30\_166785; 4078P0\_198281)
- Sinergia (CRSII5\_180326)
- Boehringer Ingelheim
- University of Bern (CRF\_01Fuster)
- Vifor Pharma

### Highlights

#### Empagliflozin in Kidney Stone Formers - SWEETSTONE Trial

Kidney stones are a global healthcare problem, characterized by high recurrence rates and substantial morbidity. Effective medical prophylaxis is an unmet need. The SWEETSTONE trial is an investigator-initiated randomized, double-blind, placebo-controlled, crossover study to assess the impact of empagliflozin on urine supersaturations (RSRs) of calcium oxalate, calcium phosphate and uric acid in non-diabetic calcium and uric acid kidney stone formers. RSRs are established proxies for the risk of stone formation incorporating the key stone promoters and inhibitors measured in clinical routine. The recruitment target of 46 participants was reached in Q4 2022, first results are expected in Q2 2023. ClinicalTrials.gov #: NCT04911660

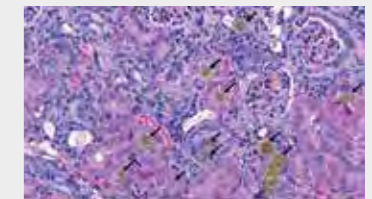
Protocol details: <https://bmjopen.bmj.com/content/12/3/e059073.share>



SWEETSTONE study design

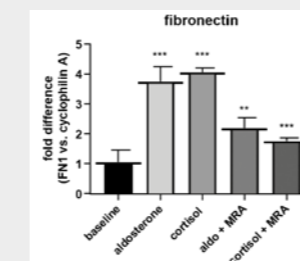
#### Adenine-Induced Nephropathy Reduces Atherosclerosis in ApoE Knockout Mice

Atherosclerosis is the main cause of death in patients with chronic kidney disease (CKD). To study the atheroprotective role of the kidney, CKD was induced with Adenine in ApoE KO mice. Adenine led to a tubular damage illustrated by crystal deposition, enhanced urinary Na<sup>+</sup>, Ca<sup>+</sup> and Pi excretion, reduced urinary pH, Urea<sub>Urine</sub>/Urea<sub>Serum</sub> and Creatinine<sub>Urine</sub>/Creatinine<sub>Serum</sub> ratios. Despite similar level of lipoproteins in serum, mice with Adenine were protected against atherosclerosis because of enhanced cholesterol efflux and lipids elimination in feces.



Adenine crystal deposition (black arrow) and apoptotic cell nuclei (dotted black arrow) in kidney of ApoE KO mice fed with adenine.

Scherler L et al., *Biomolecules* 2022.

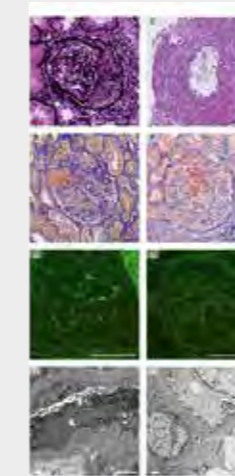


Expression of fibronectin mRNA in mesangial cells.

#### Increased Glucocorticoid Metabolism in Diabetic Kidney Disease

Mineralocorticoid receptor antagonists (MRAs) are beneficial in the treatment of diabetic nephropathy, also in low aldosterone conditions. Why? An alternative activation of the mineralocorticoid receptor (MR) was suspected. Glucocorticoid metabolism and cortisol inactivation was increased in diabetic patients being part of a rescue strategy. The MR and its pro-fibrotic signaling were stimulated by aldosterone and cortisol in mesangial cells. The positive treatment effect of MRAs in low aldosterone patients is promoted by inhibiting cortisol to activate the MR.

Ackermann D et al., *PLoS One* 2022.



#### De Novo Vasculitis after mRNA-1273 (Moderna) Vaccination

The mRNA-1273 (Moderna) vaccine is a lipid nanoparticle-encapsulated mRNA-based vaccine that encodes the prefusion stabilized full-length spike protein of SARS-Cov-2, the cause of the Covid-19 pandemic, and showed high efficacy in randomized-controlled trials at preventing severe Covid-19 illness. Aside from transient local and systemic reactions, no safety concerns were initially identified. We reported the first two patients that developed de novo vasculitis shortly after receiving the mRNA-1273 (Moderna) vaccine. Appearance of acute kidney injury concurrently with serious systemic symptoms shortly after the second dose in both cases strongly suggested a causal mechanism.

Anderegg M A et al., *De novo vasculitis after mRNA-1273 (Moderna) vaccination*, *Kidney Int.* 2021 Aug;100(2):474-476.

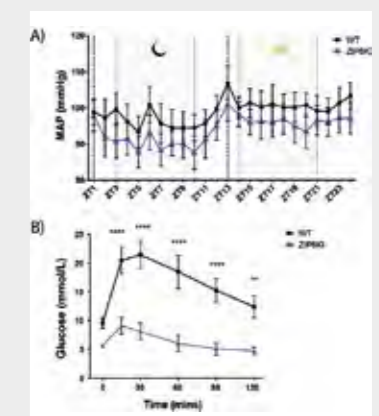
Histopathological findings of kidney biopsies from both patients, including immunofluorescence and transmission electron microscopy

#### The Allelic Variant A391T of Metal Ion Transporter ZIP8 (SLC39A8) Leads to Hypotension and Enhanced Insulin Resistance

Based on the results of GWAS on the variant A391T of the metal ion transporter ZIP8, we generated ZIP8 KI mice carrying this polymorphism. ZIP8KI mice exhibited striking changes in cobalt, palladium, mercury, and platinum in tissues. They had reduced arterial blood pressure, exhibited remarkable insulin resistance, and were protected from hyperglycemia when challenged by dietary sucrose. Targeting ZIP8 could open new strategies for the treatment of hypertension and diabetes.

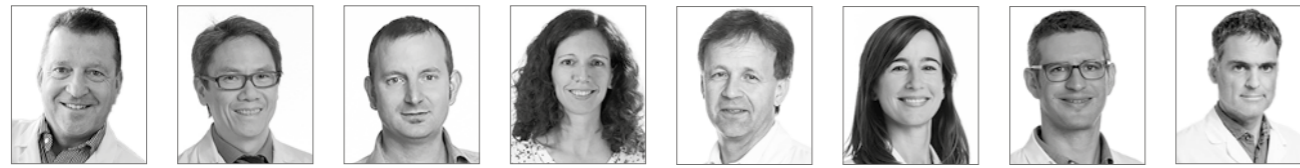
Verouti et al., *Front Physiol.* 2022.

Mean arterial blood pressure (MAP) measured by telemetry (A) and plasma glucose concentration during glucose tolerance test in mice challenged with 2% sucrose.



## Department of Neurology

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Prof. Claudio Bassetti  
Clinic Director

Prof. Andrew Chan  
Deputy Clinic Director

Prof. Antoine Adamantidis  
Extraordinarius

Ass. Prof. Tenure Track Athina Tzovara  
(double affiliation with Phil Nat)

Prof. Marcel Arnold

Prof. Selma Aybek  
(SNSF Professorship)

Ass. Prof. Maxime Baud  
(SNSF Professorship)

Prof. Adrian Guggisberg



Prof. Mirjam Heldner

Prof. Simon Jung

Prof. Paul Krack

Prof. Vincent Pernet

Prof. Christoph Schankin

Prof. Kaspar Schindler

Prof. David Seiffge

Prof. Werner Z'Graggen

### Profile

- Clinical, translational, basic and technological research
- Topics and teams: sleep, stroke, epilepsy, neuroimmunology, neurorehabilitation, Parkinson/movement disorders, functional neurological disorders, dementia/neurodegeneration, biomarkers
- Teaching at multiple levels: Students of medicine and biomedicine, graduate and postgraduate students
- Promotion of young researchers through internal funding scheme (focus on excellence and diversity)
- External partners: Universities and large hospitals in Switzerland and abroad, other national and international research institutions, industry
- Research and teaching highlights: Inauguration of consultation and treatment platform Sleep House Bern; start of the first cohort (33 students) of the international Master of Advanced Studies in Stroke Medicine; granting of assistant professorship to Prof. Dr. med. Dr. sc. nat. Maxime Baud, due to his SNSF Eccellenza professorial fellowship

### Grants

- SNSF career funding grants awarded in 2022: Prolongation SNSF professorship (Prof. Selma Aybek)
- SNSF all grants (project/ career funding): 21 grants (6 grants awarded in 2022): 15 running grants: 185362, 188761, 197009, 197709, 200668, 200800, 202166, 205524, 203339, 208177, 211848, 185362, 210268, 210834, 210997
- Horizon 2020: 2 running grants (MSCA-ITN-2020 956977; MSCA-ITN-2019 860035)
- Innosuisse: 2 running grants (Flagship PFFS-21-64; 55424.1 IP-LS)
- Others: Swiss Heart Foundation, Swiss Academy of Medical Sciences, Bangerter-Rhyner Foundation, Baasch-Medicus Foundation, Parkinson Schweiz

### Highlights

#### How Sleep Helps to Process Emotions

Rapid eye movement (REM) sleep is associated with emotional memory consolidation in the brain, yet its cellular substrate remains unclear. Our study identified a neuronal mechanism that triages positive from negative emotions during REM sleep through a fine-tuning of the excitation/inhibition balance amongst neuronal circuits of the prefrontal cortex. This discovery reveals the cellular dynamics underlying the brain electroencephalogram and open new perspectives for therapeutic treatment of maladaptive processing of traumatic memories, as post-traumatic stress disorders or anxiety disorders.

Aime M, Calcini N, Borsa M, Campelo T, Rusterholz T, Sattin A, Fellin T, Adamantidis A. *Science*. 2022 May 13;376(6594):724-730. doi:10.1126/science.abk2734. Epub 2022 May 12.



#### Forecasting Epileptic Seizures Over Days

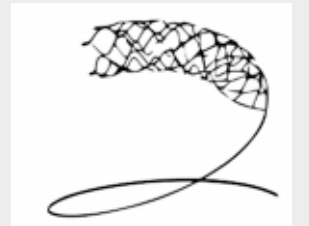
People with epilepsy experience stress, anxiety, and other morbidity stemming from the unpredictability of seizures. Mitigating this uncertainty by forecasting seizures may soon become a clinical reality. We discovered that days-long cycles of epileptic brain activity recorded by an implanted EEG device help determine seizure risk. This year, we showed that cycles of brain activity can be leveraged to train forecasting algorithm in a subset of patients and forecast seizures in other, previously unseen patients, attesting to the generalizability of seizure forecasting.



Leguia MG, (...) Proix T, Baud MO. *Epilepsia*. 2022 Sep 8. doi:10.1111/epi.17406. Online, ahead of print.

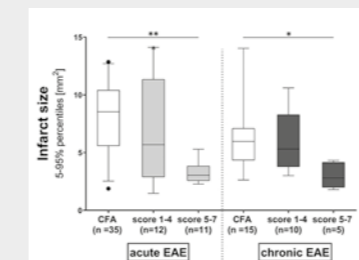
#### Excellent Results in Acute Stroke Treatment

The international RCT SWIFT Direct led by the Stroke Center Bern compared acute stroke treatment with mechanical thrombectomy (MT) alone with MT plus intravenous thrombolysis. Noninferiority of MT alone was not shown. The combined treatment group had higher recanalization rates (97%) and tended to have a more favorable outcome. The results of the Trial have a worldwide impact on acute stroke management.



Stent retriever for mechanical recanalization

Fischer U, Kaesmacher J, (...) Arnold M, Bassetti CL, et al. *Lancet*. 2022 Jul 9;400(10346):104-115.

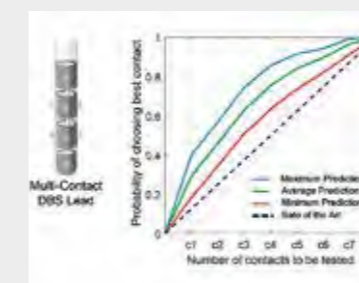


Reduced stroke size in mice with severe autoimmune disease (EAE) score

#### Positive Effect of CNS Antigen-Specific Neuroinflammation on Ischemic Stroke

As cerebral ischemia and autoimmune neuroinflammation share similar pathomechanisms, mutual interactions have been investigated by inducing experimental ischemic stroke in a multiple sclerosis model. Paradoxically, infarct size was inversely correlated with clinical severity of autoimmune disease. This was associated with myeloid cells with an anti-inflammatory phenotype. Thus, CNS autoimmunity had a positive influence on primary tissue damage after experimental stroke indicating very early involvement of CNS antigen-specific, myeloid cell-associated anti-inflammatory immune mechanisms.

Guse K, (...) Thiele L, Remlinger J, Salmen A, Hoepner R, (...) Chan A. *Neurol Neuroimmunol Neuroinflamm*. 2022 Jun 8;9(4):e1168.



Neurophysiology-based prediction of the optimal stimulation contact

#### Toward Automated Deep Brain Stimulation Programming for Movement Disorders

Deep brain stimulation is an established therapy for patients with movement disorders. The state-of-the-art clinical approach is however limited by the time-consuming manual screening procedure required to select the optimal stimulation parameters. Strategies to accelerate this process are needed. This work demonstrates that the algorithmic selection and combination of multi-modal brain signal symptom biomarkers and anatomical data, can inform the selection of the optimal stimulation contacts and ultimately improve the patient's care.

Shah A, (...) Debove J, (...) Lachenmayer ML, Michelis J, (...) Krack P, (...) Tinkhauser G. *Neuromodulation*. 2022 Feb 23;S1094-7159(22)00038-1. doi:10.1016/j.neurom.2022.01.017. Online ahead of print.

## Department of Neurosurgery

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Prof. Andreas Raabe   Prof. Werner Z'Graggen   Prof. Claudio Pollo   Prof. Philippe Schucht   Prof. Kathleen Seidel   PD Dr. Ralph Schär   PD Dr. David Bervini

### Profile

- Our clinical research commitment is driven by the need to improve and refine neurosurgical operations and perioperative management. Focusing on this area, we examine and test how to translate increasingly frequent emerging new technologies into neurosurgical practice. Another focus are clinical studies and trials to investigate different managements or treatments. In our laboratory of regenerative experimental medicine we aim at the development and improvement of therapeutic strategies for neurodegenerative diseases.
- Teaching profile: lectures and workshops for medical students, medical students in-house rotations, co-organizers of the lecture series "Disease and Repair at the CNS" for master students of the gcb Bern. Mentoring for PhD students of the gcb and ghs Bern.
- Laboratory of Hemodynamic and Cardiovascular Technology, EPFL Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland; Schweizer Zentrum für Elektronik und Mikrotechnologie, Neuchâtel, Switzerland; Department of Neurosurgery, Freiburg University Hospital, Freiburg, Germany; Department of Neurobiology Research, University of Southern Denmark, Odense, Denmark; Department of Clinical Neurophysiology, Aarhus University Hospital, Aarhus, Denmark

### Grants

- Schweizerische Herzstiftung: Novel patient-specific cerebrovascular 4D surgical simulator
- SNF Grant 4 years: HORAO – Polarimetric visualization of Healthy brain fiber tracts for tumor delineation during neurosurgery
- Krebsliga: Resurge – Randomized Controlled Comparative Phase II Trial on Surgery for Glioblastoma Recurrence
- Novartis Stiftung: Functional and metabolic changes in Central Poststroke Pain syndrome: a clinical and neuroimaging study

### Highlights

#### Intraoperative Neurophysiology to Guide Surgery for Pain Treatment

During spinal cord stimulation (SCS) for pain, we aimed to demonstrate the feasibility of using motor evoked responses to intraoperative double-train stimulation to guide lead placement and matching of intraoperative contacts with postoperative electrode programming under general anesthesia. The sites where dorsal column responses of the targeted dermatomes were detected were considered optimal for lead placement (intraoperative best contacts). In this proof-of-concept study, we were able to demonstrate that SCS lead placement using a double-train stimulation paradigm performed under general anesthesia is a safe and feasible technique, offering reliable prediction of contacts for postoperative programming and excellent pain-paresthesia coverage.

[Neuromodulation 2022 May 19, DOI: 10.1016/j.neurom.2022.03.009](https://doi.org/10.1016/j.neurom.2022.03.009)



Figure: Illustrative recordings obtained from stimulation via the epidural placed electrode in a patient undergoing SCS for cervical pain. Left window: Response pattern of right dorsal column with single response after the first but no response after the second train for deltoid, biceps and extensor muscles on the right side (red color). Middle window: Response pattern of left dorsal column (black). Right window: Response pattern of left corticospinal tract with a response after the first and after the second train (black color)



#### HORAO

A major challenge in neuro-oncological surgery is the intraoperative identification of fiber tracts and the differentiation between tumorous and healthy tissue. In search of an innovative approach to overcome this challenge, neurosurgeons at Inselspital launched the HORAO project, which consists of a crowdfunding challenge and a subsequent crowdsourcing challenge. Following that crowdsourcing competition, a research collaboration with the winning team of researchers from Ecole Polytechnique started in 2019 and resulted in securing a 4-year Sinergia Grant from the SNSF in 2021. After an initial, promising series of near-in-vivo measurements in 2021 at the Department of Neurosurgery, University of Bern the HORAO research team has grown and continues with enhanced expertise, now re-enforced with a machine-learning sub-group.

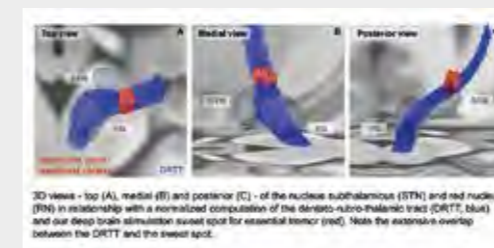
#### 4D-Simulator Breakthrough in Brain Surgery

Aneurysm operations in the brain rank among the most delicate procedures in neurosurgery. A team of specialists from both the Departments of Neurosurgery at the Inselspital (PD Dr. med. David Bervini) and the ARTORG Center of the University of Bern has developed an award-winning 4D simulator technology dedicated to the training of cerebrovascular neurosurgery. The simulator reproduces the visual and haptic experience of the procedure based on three-dimensional realistic replicas of skull, brain, blood vessels and blood flow (4th dimension) of the patient's anatomy. The 4D simulator also offers new dimensions in planning surgery for single patients and in the training of neurosurgery specialists, during and after their residency. The 4D simulator project has been supported by Innosuisse- Schweizerische Agentur für Innovationsförderung, the Swiss Heart Foundation and was awarded with the Ypsomed Innovation prize (1<sup>st</sup> prize 2021).



#### Towards Automatic DBS Targeting and Programming

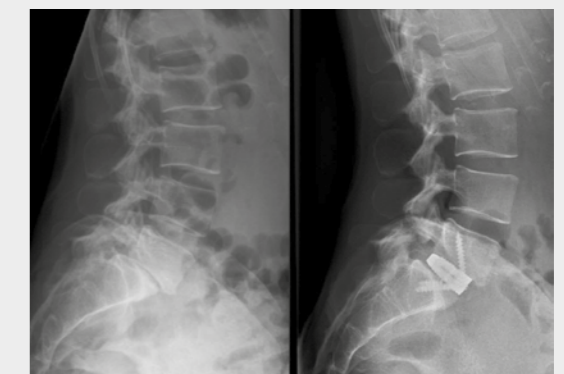
After implementation of a successful STN DBS probabilistic programming algorithm in patients with Parkinson Disease, we were able to localize a probabilistic sweet spot for tremor obtained from a large multicenter data-base. This tremor sweet spot is located below the thalamus and shows a close anatomical correlation with the dentorubrothalamic tract (DRTT) (see figure). We published our results in *Annals of Neurology*. This will improve DBS programming as well as targeting of this non directly visible MRI target in patients with Essential Tremor. In parallel, we are continuously increasing the accuracy of our automated DBS programming introducing deep learning algorithms (Master Thesis).



#### Spine

Surgery is the treatment of choice for symptomatic L5-S1 isthmic spondylolisthesis in patients with progressive low back pain and radicular pain refractory to conservative treatments. As opposed to the more traditional posterior approach to the lumbar spine, our research group was able to demonstrate the safety and efficacy of the anterior lumbar interbody fusion with a stand-alone cage procedure for low-grade isthmic spondylolisthesis. This technique eliminates the need for additional posterior fixation, thereby sparing patients potential lumbar muscle trauma. This study has added to the paucity of evidence on this important topic.

[Jesse CM et al. Brain and Spine 2022.](https://doi.org/10.1007/s00381-022-05800-0)



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Prof. Axel Rominger, Director; Prof. Ali Afshar-Oromieh, Deputy Director; PD Dr. Federico Caobelli; Prof. Paul Cumming; PD Dr. Eleni Gourni; PD Dr. Thomas Pyka; PD Dr. Hendrik Rathke; Prof. Kuangyu Shi

### Profile

- Research in preclinical and GMP-related radiopharmacy, biomedical engineering, instrumentation, dosimetry, and artificial intelligence. Preclinical PET imaging, clinical PET imaging in the context of oncological, neurological and cardiovascular diseases (early diagnosis, differential diagnosis) with the aim to improve molecular imaging techniques. Further establish the therapeutic spectrum in Nuclear Medicine with the advent of novel radioligand therapies.
- Teaching students in the field of medicine, biomedical engineering and radiochemistry. Education of NM technologists.
- External Partner: Dept. of Nuclear Medicine, University of Heidelberg; Dept. of Nuclear Medicine, Technical University Munich; Dept. of Nuclear Medicine, Ludwig-Maximilian-University Munich; Fudan University Shanghai, China; Institute of Nuclear Chemistry, Johannes Gutenberg-University Mainz; Kindai University Osaka, Japan; MGH PET Core, Harvard Medical School, USA; Dept. of Molecular Pharmacology, UCLA, USA; School of Medical Technology, Peking University, Beijing, China; Dept. of Nuclear Medicine, Shanghai Jiaotong University, China; UC Davis, USA.

### Grants

- Swiss National Science Foundations (grant no. 200021\_188914; IZKSW3\_188350; 310030\_192704)
- Swiss Cancer League (KFS-4723-02-2019)
- Berner Krebsliga
- Berger Janser Stiftung (grant no. 11/2019)
- JGGF
- BCPM
- Foundation for Clinical and Experimental Tumor Research
- SBFI (grant no. 101073231)
- Novartis Foundation for medical-biological Research (grant no. 22B128)
- Parkinson Schweiz

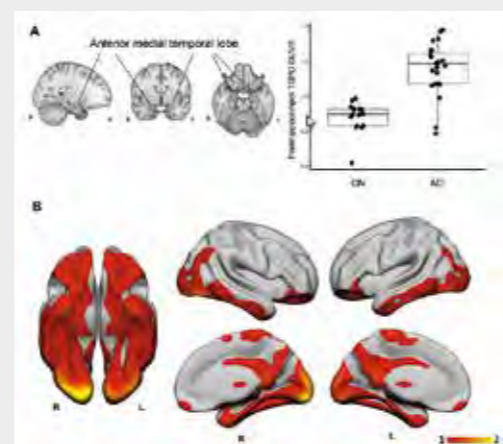
### Highlights

#### Microglial Activation and Connectivity in Alzheimer Disease and Aging

Microglial activation distributes preferentially along highly connected brain regions, similar to tau pathology. These findings support the important role of microglia in neurodegeneration.

Rauchmann et al., *Ann Neurol* (2022) 92(5):768-781.

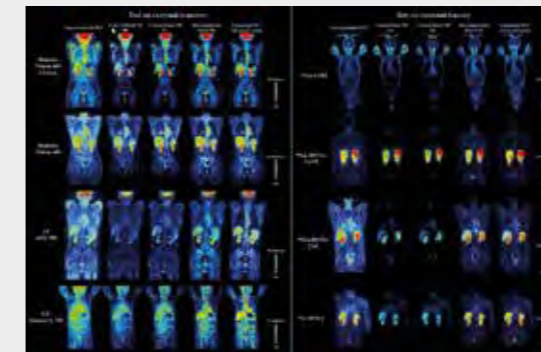
(A) Voxelwise group comparison between AD and cognitively normal controls  
(B) Distribution of the mean SUVR TSPO-PET binding pattern within the AD group.



#### Using Domain Knowledge for Robust and Generalizable Deep Learning-Based CT-Free PET Attenuation and Scatter Correction

This study employs a simple way to integrate domain knowledge in deep learning for CT-free PET imaging. Even with the training from one tracer on one scanner, the effectiveness and robustness of our proposed approach are confirmed in tests of various tracers on different scanners.

Guo et al., *Nat Communications* (2022) 13(1):5882.

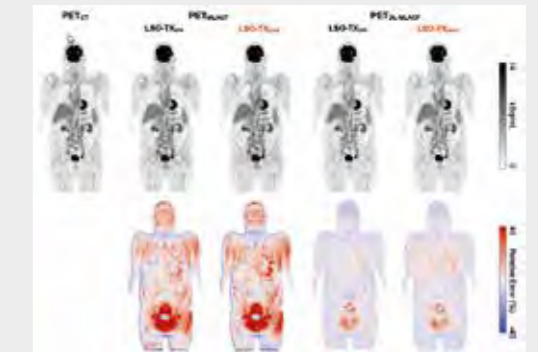


Exemplary test results of the new algorithm in comparison to standard algorithms from various scanners and various tracers

#### Quantitative Evaluation of a Deep Learning-Based Framework to Generate Whole-Body Attenuation Maps Using LSO Background Radiation on Ling Axial FOV PET Scanners

We describe a deep learning-based method to accurately generate  $\mu$ -maps from PET emission data and LSO background radiation, enabling CT-free attenuation and scatter correction in large axial field of view PET scanners.

Sari et al., *EJNMMI* (2022) 49(13):4490-4502.

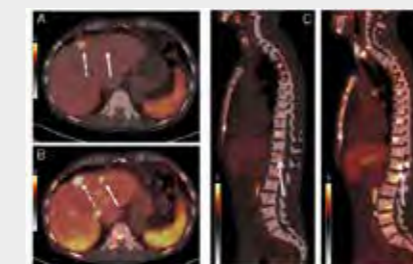


Top row: PET images of a representative subject reconstructed using the CT-, MLACF-, and deep learning-enhanced MLACF-based attenuation maps.

#### Combined [68Ga]Ga-PSMA-11 and Low-Dose 2-[18F]-FDG PET/CT Using a Long-Axial Field of View Scanner for Patients Referred for [177Lu]-PSMA-Radioligand Therapy

Additional low-dose 2-[18F]FDG-PET/CT is feasible as part of a same-day imaging protocol and can help reveal lesions of low PSMA avidity as part of therapy assessment for [177Lu]-PSMA radioligand therapy and demonstrates higher sensitivity compared to [68 Ga] Ga-PSMA-11 PET/CT alone in some patients.

Alberts et al., *Eur J Nucl Med Mol Imaging*, 2023 Feb;50(3):951-956.

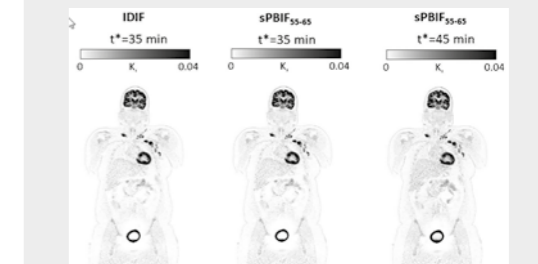


Example images for a patient with mismatch lesions in (A/C) PSMA-PET, (B/D) PSMA+FDG-PET.

#### Feasibility of Using Abbreviated Scan Protocols with Population-Based Input Functions for Accurate Kinetic Modeling of [18F]-FDG Datasets from a Long Axial Field of View PET Scanner

We demonstrate the feasibility of performing accurate [18F]-FDG Patlak analysis using scaled population-based input functions with only 20 min of PET data from a large axial field of view PET scanner.

Sari et al., *Eur J Nucl Med Mol Imaging*, 2023 Jan;50(2):257-265.



Whole-body Patlak  $K_i$  images were generated using 30 min of dynamic PET data with image derived input function (IDIF) and scaled population-based input function.

## Department of Obstetrics and Gynecology

Frauenklinik, Friedbühlstrasse 19, 3010 Bern  
[www.frauenheilkunde.insel.ch](http://www.frauenheilkunde.insel.ch); [www.dbmr.unibe.ch](http://www.dbmr.unibe.ch)

### Division of Obstetrics and Feto-Maternal Medicine



Prof. Daniel Surbek  
Director Research and Teaching

Prof. Luigi Raio  
Deputy Director Group Leader

PD Dr. Beatrice Mosimann  
Group Leader

PD Dr. Marc Baumann  
Group Leader Coordinator Clinical Research

Prof. Andreina Schoeberlein  
Co-Head Research Laboratory Prenatal Medicine

Prof. Martin Müller  
Group Leader

#### Profile

Areas of Scientific Investigation:

- Stem cells, exosomes, non-coding RNA and Astroglial function in perinatal brain damage and neuroregeneration
- Sars-CoV-2 infection in pregnancy: clinical outcome and placental disease
- Transmembrane transporter and biomarker in preeclampsia and preterm birth
- Molecular signature of circulating free DNA in maternal blood in adverse pregnancy outcome
- Clinical research in preterm birth, labor induction, postpartum hemorrhage, screening for pre-eclampsia and gestational diabetes, maternal-neonatal microbiome development
- Teaching: preclinical and clinical at master, MD and PhD level; postgraduate preclinical / clinical training
- External Research partners: Dept. Pediatrics and Neonatology, Maastricht University; Dept. Neurosurgery, Cellular and Molecular Physiology, Yale University; Dept. Obstetrics, Peking Union Medical College Hospital (PUMCH); Dept. Obstetrics, Schiller University Jena; Biolncept, LLC, Cherry Hill, New Jersey; Dept. of Obstetrics, CHUV, Lausanne

#### Grants

- EU Grant COST: International network for translating research on perinatal derivatives
- Bangerter Foundation: Mesenchymal stem cells-derived exosomes as a neuroregenerative therapy
- CTU Grant: Preimplantation factor: Biomarker for preterm birth?
- Medical Faculty PRT Grant (protected research time): Gestational diabetes
- Grant SGGG / Bayer: Astroglial function in perinatal brain damage
- Investigator-initiated trial grant Vifor: Patient blood management in obstetrics
- Swiss National Science Foundation: TransCure (NCCR) (regarding publication Lüscher BP et al)
- Perinatal medicine intramural fund: Several grants for clinical studies

#### Highlights

##### Selected publications in 2022

- [Lüscher BP et al. Glucose Transporter 9 \(GLUT9\) Plays an Important Role in the Placental Uric Acid Transport System. Cells. 2022 Feb 11;11\(4\):633.](#)
- [Renz P et al. A Novel Murine Multi-Hit Model of Perinatal Acute Diffuse White Matter Injury Recapitulates Major Features of Human Disease. Biomedicine 2022 Nov 4;10\(11\):2810.](#)
- [Favre G et al. COVID-19 mRNA vaccine in pregnancy: Results of the Swiss COVI-PREG registry, an observational prospective cohort study. Lancet Reg Health Eur 2022 May 29;18:100410.](#)
- [Radan AP et al. Gestational diabetes is associated with SARS-CoV-2 infection during pregnancy: A case-control study. Diabetes Metab 2022 Jul;48\(4\):101351.](#)
- [Braun F et al. Evaluation of a Wearable System for Fetal ECG Monitoring Using Cooperative Sensors. Annu Int Conf IEEE Eng Med Biol Soc. 2022 Jul;2022:3131-3134.](#)

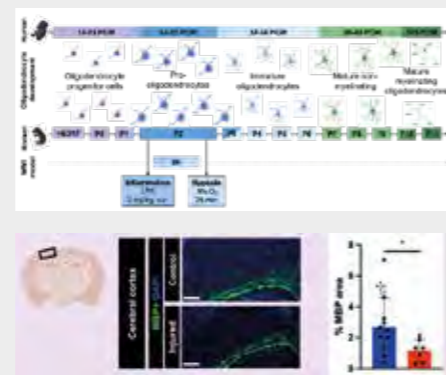


Fig 1&2 Murine 2-hit inflammatory-hypoxic model for acute diffuse perinatal white matter injury (Renz P et al.)

## Division of Gynecology and Gynecological Oncology



Prof. Michael Mueller  
Director and Head Research

Prof. Annette Kuhn

PD Dr. Sara Imboden

PD Dr. Stefan Mohr

Dr. Franziska Siegenthaler

Dr. Brett McKinnon

Dr. Thomas Andrieu

Dr. Lea Dümpelmann

#### Profile

- Endometriosis studies (Pathophysiology, endometriosis associated pain, development of a non-invasive diagnostic tool, recurrence and treatment non-response, impact on fertility and pregnancy)
- Pathophysiology of gynaecologic cancers
- Quality of life before and after urogynaecologic interventions
- Physiologic and pathophysiologic changes of the pelvic floor during exercises
- Transgender studies
- External partners: Scailyte; Roche Diagnostics International Ltd; Center for Gender Variance, Univ. of Basel; Berner Fachhochschule, Bern; Dell Medical School, Univ. of Texas, Austin; Croydon Univ. Hospital, London; Dept. of Obstetrics & Gynaecology, Inst. for Molecular Biosciences, Queensland; Clinical Pathology & Cytology, Karolinska Univ. Hospital, Stockholm; Dept. of Urogynaecology, Princess-N-Hospital, Southampton; Dept. of Obstetrics & Gynecology, Ospedale Santa Chiara di, Trento; Norwegian Radium Hospital, Oslo University Hospital, Oslo, Norway

#### Grants

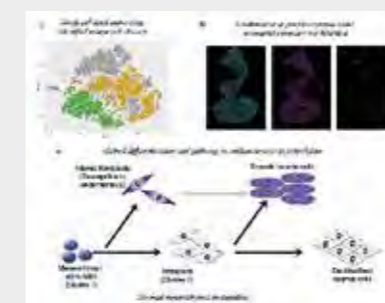
- SNF scientific exchanges
- Bern Center for Precision Medicine (BCPM)
- Innosuisse – Swiss Innovation Agency
- Stiftung für Klinisch-experimentelle Tumorforschung
- Schweizerische Arbeitsgemeinschaft für Klinische Krebsforschung (SAKK)
- Foundation for clinical-experimental cancer research

#### Highlights

##### Altered Differentiation of Endometrial Mesenchymal Stromal Fibroblast is Associated with Endometriosis Susceptibility

The aetiology of endometriosis remains unknown. Analysing the transcriptome of endometrial mesenchymal cells we identified a subset with altered maturation, which provides alterations in growth profiles and is more common in endometriosis women. These cells could facilitate lesion establishment and offer non-invasive diagnostic potential

[McKinnon, B et al Comms Bio. 2022, 5\(600\).](#)



Altered mesenchymal fibroblasts through divergent maturation

##### Impact of Positive Peritoneal Cytology Conversion on Oncological Outcome in Patients with Endometrial Cancer Undergoing Surgery with Intrauterine Manipulator

In this trial 8.1% of endometrial cancer patients undergoing minimally invasive surgery with intrauterine manipulation showed positive peritoneal cytology conversion associated with significantly worse oncological outcome.

[Siegenthaler F. et al. Annals of surgical oncology. 2022, 29\(13\), 8320-8333.](#)



Visual abstract of the study

## Department of Ophthalmology

Inselspital, 3010 Bern  
www.augenheilkunde.insel.ch



Prof. Sebastian Wolf  
Co-Director

Prof. Martin Zinkernagel  
Co-Director  
Head of  
Outpatient  
Department

Prof. Beatrice Früh  
Anterior  
Segment

Prof. Volker Enzmann  
Research  
Laboratories

Prof. Pascal Escher  
Ophthalmogenetics

### Profile

- Teaching students of medicine, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB 6 research groups Investigation of the pathophysiology and treatment of vitreo-retinal diseases, glaucoma, neuro-ophthalmologic disorders and external disease. Clinical research includes phase I-IV studies as well as the development of new imaging modalities for retinal diseases.
- The Bern Photographic Reading Center (BPRC) is an internationally renowned center for coordination and independent evaluation of images obtained in clinical multicenter trials.
- Research projects in cooperation with the Artificial Intelligence in medical Imaging group at the ARTORG-Center explore new deep-learning approaches for image evaluation.
- The research groups involved in basic research use state-of-the-art molecular, cellular and imaging techniques for in vitro, cell culture, ex vivo and in vivo studies. Research projects in Experimental Ophthalmology focus on the potential of stem cells and progenitor cells in restoring visual function, in ocular immunology and the influence of the microbiome on inflammatory eye diseases, as well as on new avenues to treat them.
- The ophthalmogenetics group continuously strives to identify new phenotype-genotype correlations in inherited eye diseases by molecular diagnostic and to understand their impact on eye development.
- External Partners: Dept. of Biology, University of Fribourg; Schepens Eye Research Institute/Massachusetts Eye and Ear, Boston, MA, USA; Department of Ophthalmology, Harvard Medical School, Boston, MA, USA.; Dept. of Ophthalmology and Visual Sciences, University of Louisville, Louisville, KY, USA; Hôpital Ophtalmique Jules-Gonin, Université de Lausanne; Lab for Retinal Cell Biology, Department of Ophthalmology, University of Zurich, Switzerland; Augenklinik, Universitäts-spital Basel; Department of Ophthalmology, University Hospital Regensburg, Germany

### Grants

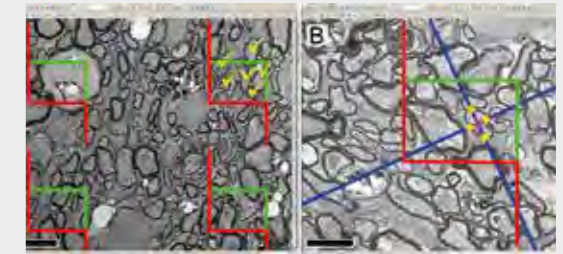
- Foundation Bertarelli: Associations between the ocular microbiome and the mucosal immune system in dry eyes
- Young Talents in Clinical Research: The ocular surface microbiome in health and disease
- Foundation OPOS: Associations between the ocular microbiome and the immune system in dry eye disease
- Structural Imaging Assisted Retinal Fluorescence Lifetime Imager (STARFLI) using a high-speed fluorescence lifetime measurement. scheme / JOINT CALL SK-CH 2019
- Novartis GEMS: Unsolicited research grant for RNA analysis in inherited retinal diseases
- Foundation Haag-Streit: Development of a keratoconus detection algorithm by deep learning analysis and its validation on Eystar images in a clinical trial
- Sutter-Stöttner-Stiftung: Verbindung zwischen Gliose und Fibrose bei der Netzhautdegeneration
- Hans-Goldmann Foundation: Development of human retinal organoids
- Peter Heule Stiftung: Development of human retinal organoids for RP1-associated Retinitis pigmentosa
- Huber-Bieg Stiftung: Genetic analyses by inherited retinal diseases
- Swiss RetinAward: Regulation of photoreceptor fatty acid metabolism by PPARs

### Highlights

#### Impact of Cerebral Hypoperfusion–Reperfusion on Optic Nerve Integrity and Visual Function in the DBA/2J Mouse Model of Glaucoma

Elevated intraocular pressure in the DBA/2J mouse model of glaucoma leads to a much more pronounced optic nerve atrophy compared with transient forebrain hypoperfusion and reperfusion by BCCAO. A supposed worsening effect of an altered perfusion added to the pressure-related damage could not be detected.

<http://dx.doi.org/10.1136/bmjophth-2022-001078>.

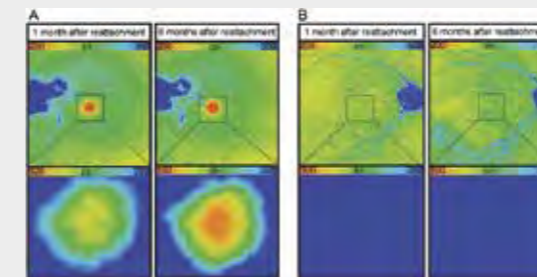


Description of the fractionator tool, applied to imaging (EM cross-section, optic nerve of DBA/2J). For each systematically sampled micrograph four unbiased counting frames are virtually applied with the NewCAST programme

#### Fluorescence Lifetime Imaging Ophthalmoscopy as Predictor of Long-Term Functional Outcome in Macula-Off Rhegmatogenous Retinal Detachment

Fluorescence lifetime imaging ophthalmoscopy might serve as a prediction tool for functional recovery in pseudophakic macula-off rhegmatogenous retinal detachment. Retinal fluorescence lifetimes could give insight in molecular processes after rhegmatogenous retinal detachment.

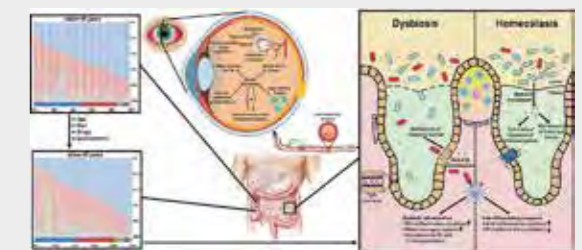
*Retina* 42(12):p 2388-2394, December 2022.



#### The Role of the Gut Microbiome in Eye Diseases

The gut microbiome is a complex ecosystem of microorganisms and their genetic entities colonizing the gastrointestinal tract. When in balanced composition, the gut microbiome is in symbiotic interaction with its host and maintains intestinal homeostasis

Zysset-Burri DC. *The role of the gut microbiome in eye diseases.* *Prog Retin Eye Res.* 2023 Jan;92:101117. doi: 10.1016/j.preteyeres.2022.101117.



Graphical abstract



## Department of Orthopedic Surgery and Traumatology

Inselspital, 3010 Bern  
[www.orthopaedie.insel.ch](http://www.orthopaedie.insel.ch)



Prof. Klaus A. Siebenrock  
Chairman

Prof. Frank M. Klenke, PhD  
Vice-Chairman

PD Dr. Christoph E. Albers

Dr. Marc Attinger

Prof. Johannes D. Bastian

Dr. Moritz C. Deml

Prof. Benjamin Gantenbein



Dr. Barbara Kleer

Prof. Fabian G. Krause

Dr. Michael Schär

PD Dr. Simon D. Steppacher

Dr. Johannes Weihs

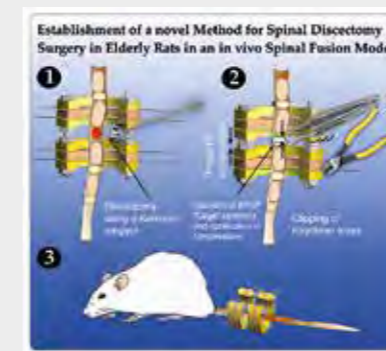
### Profile

- Hip research focuses on pre-arthritis deformities like femoroacetabular impingement or hip dysplasia. The goal is to improve preoperative MR imaging and surgical decision making using artificial intelligence.
- Spine research focuses on disc de- and regeneration, biological approaches for augmentation of spinal fusion, management spinal trauma, spinal infection, spinal tumor/metastatic disease and clinical performance analysis of spinal implants.
- The shoulder and elbow team is working on statistical shape modeling of shoulder morphology, rotator cuff regeneration including stem cells and the investigation of surgical techniques and implants.
- The main focus of the knee research group lies in the establishment of 3-dimensional templating for fracture repair and ligament reconstructions and on-site 3D printing of surgical guides. Further research activities include clinical studies on ligamentous injuries of the knee and complex knee arthroplasty.
- Foot and ankle research mainly focuses on arthrosis of the ankle joint, innovative treatment of ankle fractures and AMIC plastic in osteochondral lesions.
- Orthogeriatrics investigates the impact of orthogeriatric pathways and rehabilitations protocols on the clinical outcome in geriatric patients.
- Translational medicine in all orthopaedic research groups and in collaboration with sitem Center
- Partners: Musculoskeletal Research Unit, sitem Center; personalised medicine group, sitem Center; DBMR University of Bern, Department of Small Animals, Division of Magnetic Resonance Spectroscopy and Methodology (AMSM), AO Research Institute, Davos; CABMM at the university of Zurich, RMS Foundation, Bettlach; SUVA

### Grants

- Albers Ch. E.: "Outcome of Surgical versus Primary Non-Surgical Treatment of Incomplete Burst Fractures of the Thoracolumbar Spine in Patients without Neurological Symptoms: A Randomized Controlled Clinical Trial". SUVA
- Gantenbein B., Wöltje M.: "Fibre-based 3D implants from regenerated silk fibroin for intervertebral disc regeneration". Schweizerischer Nationalfonds SNF
- Schär M., Wangler S.: "Identification of the optimal AC cerclage to restore horizontal stability, an FE-model and cadaveric based study". European Society for Surgery of the Shoulder and the Elbow (SECEC)
- Klenke F. M., Hecker A.: "3D planned surgery of acute injuries performed with 3D guides printed at the point of care". Jubiläumstiftung Swiss Life

## Highlights



A novel orthopedic spinal non-fusion model for the elderly has been established in Wistar rats. Research was performed in close collaboration with the personnel of the centralized animal facilities (CAF).

### Highlight of the Bone & Joint Program of the DBMR

The bone & joint program received 562k € funding in a collaborative training network named "disc4all" to advance integrated computational simulations in translational medicine, applied to intervertebral disc degeneration, named "disc4all" (<https://cordis.europa.eu/project/id/955735>). The project involves artificial intelligence (AI) and agent-based modelling together with ex-vivo bioreactor work to predict metabolic changes and inflammatory pathways of intervertebral disc degeneration. The project also deals with genome-wide single nucleotide polymorphism (SNP) association studies of Finnish/British patient cohorts. The project has successfully started in November 2020 and first publications appeared and runs until October 2024.

A second highlight is the best poster award for the work presented by Katharina Oswald and colleagues at the 16th Conference of the German Spine Society in Münster, Germany entitled: "Verbesserung der spinalen Fusion mittels BMP2 und L51P in einem spinalen Fusionsmodell der Ratte in vivo."

<https://www.dwg.org/gesellschaft/forschung-foerderung/vortrags-und-posterpreise/>  
This research direction is continued based on the first successful in-vivo study on bone morphogenic proteins and their inhibitors.



Prof. Dr. med. Johannes Dominik Bastian

### Promotion of Prof. Dr. med. Johannes Dominik Bastian to "Chefarzt Orthogeriatric"

Orthogeriatrics is a rapidly expanding new subspecialty, which aims to holistically improve the health of the older patient by addressing the complex "personality of the patient". Due to the demographic changes with the ageing population, orthogeriatrics will become increasingly important both in the acute trauma setting, but also for the management of patients requiring elective surgery. Professor Dr. med. Johannes Bastian is a Bern-trained teaching surgeon with a focus on complex hip and pelvic surgery. The approach he uses to improve the outcome of this vulnerable patient population revolves around progress in daily clinical practice, optimizing clinical routines, scientific evaluation of the results and teaching surgical techniques, orthogeriatric co-management and rehabilitation. At the Inselspital, Prof. Dr. Bastian and the team he leads, have established an orthogeriatric service and a fracture liaison service. He is a member of the University of Bern's recently founded committee of experts on "Altersmedizin" and Chief of «Orthogeriatrics» expert group (Swiss Orthopaedics). He founded the interdisciplinary Orthogeriatric Research Center Bern and is main organizer of the Swiss Orthogeriatrics Day. As a reflection of his enduring efforts and achievement, he was "Elected Board Member" of the global Fragility Fracture Network Society.



## Department of Osteoporosis

Inselspital, Imhoof-Pavillon, 3010 Bern  
[www.osteoporose.insel.ch](http://www.osteoporose.insel.ch)



Prof. Kurt Lippuner Director and Head Physician	Prof. Ernst Hunziker Head Translational Research Group	Dr. Daniela Frauchiger Study Coordinator	Dr. Danielle E. Whittier, Ph.D. Research Project Lead	Simone L. Poncioni, Ph.D. Student
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### Profile

- Clinical and epidemiological Research
  - Epidemiology and socioeconomic burden of osteoporotic fractures. Continued development and update of the country-specific fracture risk prediction tool (FRAX).
  - Clinical Trials (Phase II-IV): development of new investigational drugs for the treatment of osteoporosis and the reduction of fracture risk.
- Translational research:
  - Development of improved material parameters and personalized loading towards bone strength prediction by finite element analysis using high resolution peripheral quantitative CT (HR-pQCT) at the forearm and tibia.
  - Targeted stimulation of bone anabolism with in situ bone active agents; osseointegration of bone implants.
- Experimental first in man clinical research: investigation of local bone remodeling and mechanoregulation of bone fracture healing in healthy, aged, and osteoporotic humans.
- Osteoporosis lectures for medical students in the context of Geriatrics (year 4); lectures for Master students in Pharmacy (year 4) in cooperation with BIHAM (Berne Institut für Hausarztmedizin), University of Bern; "Biomechanics Labs" for students of Biomedical Engineering in cooperation with ARTORG Center for biomedical engineering research, Univ. Bern.
- Research Partners: ARTORG Center for Biomedical Engineering Research, 3010 Bern; The Tissue Engineering, Orthopaedics & Mechanobiology (TOM) Group, Department for BioMedical Research (DBMR), Univ. Bern; ETH Zurich, Institute for Biomechanics, Zürich; University Hospitals of Geneva, Service of Bone Diseases. Centre for Metabolic Bone Diseases, University of Sheffield, UK.

### Grants

- AFFIRM-CT SNF sinergia grant no 183584—> 2023 (Partner)
- SNF 320030L\_170205 (D-A-CH): Local remodelling and mechanoregulation of bone fracture healing in healthy, aged, and osteoporotic humans. Collaborative Project with ETH Zurich, Univ. Hospital Innsbruck, Univ. Ulm. —>2022

### Highlights

#### In Vivo Quantification of Local Bone Remodelling During Fracture Healing of the Distal Radius (SNSF DACH Fracture Study)

The study of fracture healing using high-resolution peripheral quantitative computed tomography (HR-pQCT) provides valuable insight into our understanding of bone remodelling during recovery. However, technical hurdles exist for analysis of 3D HR-pQCT images obtained during fracture healing, and patient outcomes are highly variable. In the past year we have developed and validated new techniques for analyzing fracture healing data, and implemented these methods to explore fracture healing in 26 patients using time-lapsed HR-pQCT imaging over the 6-months after fracture.



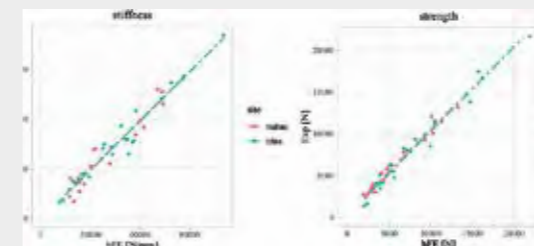
Visualization of bone remodeling during healing in a fractured radius, obtained using high-resolution time-lapse in vivo imaging  
 Image courtesy of Dr. Danielle Whittier

Of note, we have shown that bone formation and resorption rates, measured by HR-pQCT, are highest shortly after the fracture (between 3- and 5-weeks) and decline during "long-term" recovery (3- and 6-months). Additionally, the rate of net bone remodelling during early healing (3-weeks) is correlated with 6-month patient outcomes of bone mineral density in the fractured region, while remodelling rates at all later timepoints had no association with patient outcomes. These findings suggest that the early stages of recovery after fracture play a critical role in patient-specific bone mass achieved post-recovery.

Whittier et al. ECTS 2023, Apr 15-18 (submitted)  
 Walle et al. ECTS 2023, Apr 15-18 (submitted)

#### Validation of an HR-pQCT-Based Homogenised Finite Element Method for Prediction of Distal Radius and Tibia Strength

HR-pQCT-based micro-Finite Element ( $\mu$ FE) analyses are considered the gold standard for virtual biomechanical analyses of peripheral bone sites such as the distal segment of radius and tibia. Homogenized finite element methods (hFE) are an attractive alternative for clinical use thanks to shorter evaluation times and moderate computational requirements. Such hFE models were experimentally validated for distal segments of the radius but neither for distal segments of the tibia nor for both measurement sites combined. Accordingly, the focus of this year was to refine and experimentally validate an hFE processing pipeline for in vivo prediction of bone strength and stiffness at the distal segments of the radius and the tibia, using only one unified set of material properties.

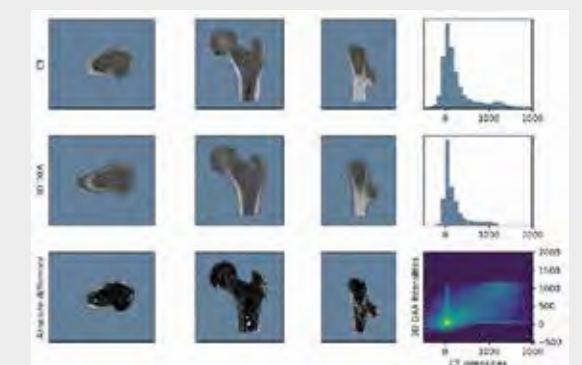


Experimental validation of stiffness (left) and strength (right) of the homogenized finite element (hFE) methodology for both distal radius (orange) and tibia (cyan).

#### 2D-3D Reconstruction of the Proximal Femur from DXA Scans

Osteoporosis is currently diagnosed based on areal bone mineral density (aBMD) from 2D DXA scans, but 3D QCT scans combined with finite element (FE) analysis can predict femoral strength. However, non-negligible radiation dose and high costs prevent a systematic usage of this technique for screening purposes. As an alternative, the 3D-Shaper software (3D-Shaper Medical, Spain) reconstructs the 3D shape and density distribution of the femur from 2D DXA scans. Accordingly, we conducted the first independent evaluation of the software, using a dataset of 77 ex vivo femora. This evaluation includes the density distribution differences, the spatial correlation of voxel intensities and an FE analysis.

We concluded that 3D-Shaper generates an altered BMD distribution compared to QCT but, after careful density calibration, shows an interesting potential for deriving a standardized femoral strength from a DXA scan.



Registration of a 3D DXA reconstruction (middle row) with the 3D QCT (top row) reconstruction and their differences (bottom row). On the right, the respective joint histograms.

## Department of Pediatrics

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[www.kinderkliniken.insel.ch/de/kinderkliniken/kinderheilkunde](http://www.kinderkliniken.insel.ch/de/kinderkliniken/kinderheilkunde)



Prof. Matthias Kopp, Director  
 Prof. Philipp Latzin  
 Prof. Christa Flück  
 Prof. Andrea Klein  
 Prof. Christoph Aebi  
 Prof. Jochen Rössler  
 Prof. Regula Everts

### Profile

- “Early life matters”: A comprehensive interdisciplinary research strategy for the prevention of obesity and episodes of wheeze in children using E-health (Early Life Intervention in Pediatrics Supported by E-health - ELIPSE) was selected as field of competence for funding by the Strategic Funding (SF) Board of the UNIBE Medical Faculty this year (Kopp/Kaess, UPD).
- Research groups involved in basic & clinical as well as translational research projects
- 10 leading research groups in the field of Pediatric Pneumology (Latzin), Pediatric Allergology (Kopp), Neuropediatrics (Klein), Hematology/Oncology (Rössler), Endocrinology/Diabetology and Metabolism (Flück), Infectious Diseases (Aebi), Pediatric Emergency Medicine and Education (Keitel/Steiner), Neonatology (Kidszun), Pediatric Intensive Care Medicine (Riedel)
- Research characterized by collaboration and evaluation of data from multiple existing birth cohorts and clinical registers (e.g. BILD ([www.bild-cohort.ch](http://www.bild-cohort.ch)), the SCILD ([www.scild.ch](http://www.scild.ch)), Swiss Cerebral Palsy Registry (Swiss-CP-Reg; <https://www.swiss-cp-reg.ch/>), Swiss registry for neuromuscular disorders' (Swiss-Reg-NMD; <https://www.swiss-reg-nmd.ch/>), Swiss Pediatric Inflammatory Brain Disease Registry (Swiss-Ped-IBrainD; <https://www.swiss-ped-ibraind.ch/>), Swiss Neonatal Network & Follow-Up Group (SwissNeoNet; <https://www.neonet.ch/swissneonet/aims-and-description>), Swiss Neuropediatric Stroke Registry (SNPSR; <https://snpsr.neuropaediatrie.ch/>), Swiss IBD Cohort Study (<https://www.ibdnet.ch/esibdcs>), Swiss Autoimmune Hepatitis Cohort Study (SASL3), I-DSD registry (<https://home.i-dsd.org/>))
- Training of PhD students in programs of the Graduate Schools, MD students, postgraduate training in pediatrics.
- Clinical research conduct is supported by PedNet Bern, a clinical pediatric hub of the SwissPedNet
- Publications: <https://boris.unibe.ch/view/divisions/DCD5A442BADA517DE0405C82790C4DE2.html>
- External partners: Universities and large hospitals in Switzerland and abroad, national and international research institutions (national: Institute of Social and Preventive Medicine (ISPM), Institute of Primary Health Care (BIHAM), Clinical Trials Unit (CTU), University Psychiatry Department (UPD), University of Bern. International: Airway Research Center North (ARCN), German Center for Lung Research (DZL), Luebeck, Germany)

### Grants

- SNF Projects: 197725, 207893 (Flück), 204518 (Pandey), 212587 (Grunt), 193039 (Steinlin), 182719 (Latzin); SNF Ambizione: 179905 (Yamine), 193342 (Keitel); SNF SINERGIA CRS115\_193694/1 (Rössler)
- EU Horizon2020: DIAMONDS, Partner (2020-2024) (Aebi)
- SPHN & PHRT: NDS SwissPedHealth (Latzin)
- Nachwuchsförderungs-Grants für Patientenorientierte Forschung
- UniBE: Initiator Grant, Talent4Bern, MCID funding
- Grants obtained from foundations: Phospholipid Res. Center, Lungenliga, Swiss Cancer League, SAMW KZS-Fund, Stiftung für Experimentelle Tumorforschung, Krebsforschung Schweiz, Krebsstiftung Schweiz, Stiftung zur Krebsbekämpfung, Fondation Zoé4Life, IFAH-ESPE grants, Anna Müller Grocholski Stiftung, Mach Gaesslen Stiftung, Kinderinsel

### Highlights

#### Personalized Medicine – Functional, Artificial Liver Cells from Skin Tissue

We identified AQP9 expression as a missing factor in urea metabolism in hiPSC-Heps. By addressing this roadblock, we established the efficacy for modeling of OTC of hiPSCs generated from patient-derived fibroblasts,



Patient tissue-based liver cell model for testing OTC defects and other liver diseases.

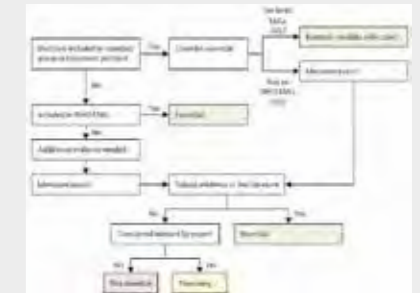
which are routinely banked in the clinical setting. Our results pave the way for studies aiming to tailor disease management to individual patients with OTCD and develop much-needed new drugs.

*Hepatology* 2022. DOI: [doi.org/10.1002/hep.32247](https://doi.org/10.1002/hep.32247).

#### Essential Medicines for Childhood Cancer in Europe: a Pan-European, Systematic Analysis by SIOPE

The aim of the European Society for Paediatric Oncology (SIOPE) Essential Anticancer Medicines Project was to provide a list of anticancer medicines that are considered essential in the treatment of paediatric cancers for patient access across Europe. 73 treatment protocols in Europe were identified and 66 medicines were defined as essential. The WHO EMLc 2021 included two new medicines (everolimus and vinorelbine) following applications we made as a result of this project.

*Lancet Oncol.* 2022, doi: [10.1016/S1470-2045\(22\)00623-4](https://doi.org/10.1016/S1470-2045(22)00623-4).

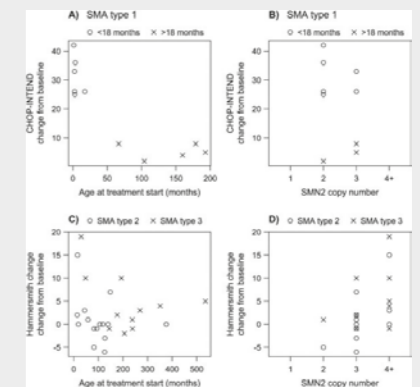


Methodology of the SIOPE Essential Anticancer Medicines Project

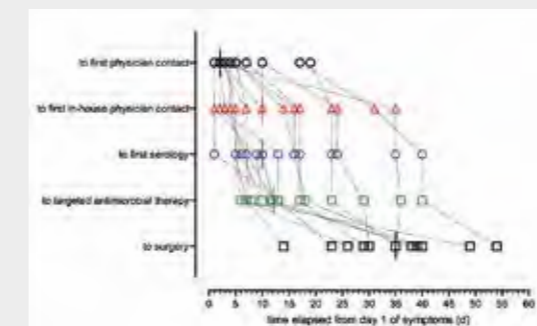
#### Patients with Spinal Muscular Atrophy Treated with Nusinersen in Switzerland

Nusinersen, a novel gene therapy for spinal muscular atrophy showed a clear effect in children and patients with SMA 1 and 2 in the trials leading to approval. Data prospectively collected in the Swiss registry for neuromuscular disorders showed that the 49 treated patients with a large range of age and severity benefit from the treatment; with gains in motor function occurring particularly in young children and SMA type 1, but also in type 2 and 3, adolescents and adults.

Swiss-Reg-NMD group. *Neuromuscul Disord.* 2022; DOI: [10.1016/j.nmd.2022.02.001](https://doi.org/10.1016/j.nmd.2022.02.001).



Change in CHOP-INTEND in SMA type 1 patients and change of HFMSE for SMA type 2 and type 3 patients from treatment start to last assessment by age at treatment start (A and C) and SMN2 copy number (B and D).



Management delays in a series of 20 pediatric patients with tularemia.

#### Tularemia – an Emerging Pediatric Zoonosis

Reports of tick-borne tularemia caused by Francisella tularensis rapidly increase in Switzerland. We study pediatric cases and find that clinical recognition is often delayed, resulting in many days lost before correct antimicrobial therapy is instituted. The goals of future efforts consist of increasing awareness among primary care physicians and devising algorithms allowing timely treatment with the aim of preventing lymph node surgery, which is frequently needed for disease control.

*Open Forum Infect Dis* 2022, <https://doi.org/10.1093/ofid/ofac292>.

## Department of Pediatric Surgery

Inselhospital, 3010 Bern  
<http://www.kinderkliniken.insel.ch/de/kinderkliniken/kikli-chirurgie/>



Prof. Steffen Berger PD Dr. Elizaveta Fasler-Kan PD Dr. Kai Ziebarth PD Dr. Thoralf Liebs PD Dr. Ulf Kessler

### Profile

#### Teaching profile

- The Department for Pediatric Surgery participates in University teaching programs for students of medicine (PBL-teaching, bedside teaching, practical year, clinical skills training, surgical rotation for students)

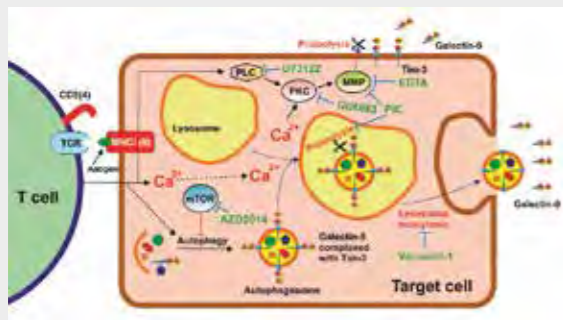
#### Research profile

- Oncobiology (laboratory research in childhood malignancies): PD Dr. E. Fasler-Kan.
- Necrotizing enterocolitis of the newborn (Hosting of the Swiss national NEC registry): Prof. S. Berger, PD Dr. U. Kessler, Dr. V. Schmitz, Dr. R. Saadeh
- Pathophysiology of necrotizing enterocolitis and appendicitis: PD Dr. U. Kessler
- Health related quality of life after pediatric extremity fractures (clinical research and follow up studies): PD Dr. T. Liebs, Dr. N. Kaiser
- Development of new operative strategies in pediatric hip surgery and clinical outcome research after surgical treatment of paediatric hip and knee diseases, including slipped capital femoral epiphysis and ruptured anterior cruciate ligaments. PD Dr. K. Ziebarth, Dr. N. Kaiser

### Grants

- Batzebär grants: PD Dr. Fasler-Kan, Dr. C. Scherer, PD Dr. U. Kessler
- AO foundation grants PD Dr. Ziebarth, Dr. Slongo

### Highlights



Galectin-9 secretion induced by T cells in MCF-7 human breast cancer cells can occur through 2 mechanisms. Firstly, Ca<sup>2+</sup>/PKC-dependent translocation of galectin-9 onto the cell surface followed by proteolytic shedding by matrix metalloproteinases (MMPs), which can also be activated by PKC. Another mechanism could possibly be associated with galectin-9 in complex with a carrier protein joining autophagosomes, which merge with lysosomes, where galectin-9 is shed and secreted via lysosomal exocytosis

S. Schlichtner, I.M. Yasinska, G. S. Lall, S.M. Berger, S. Rugiero, D. Cholewa, N. Aliu, B.F. Gibbs, E. Fasler-Kan and V.V. Sumbayev, *Journal for ImmunoTherapy of Cancer*.

### T Lymphocytes Induce Human Cancer Cells Derived from Solid Malignant Tumours to Secrete Galectin-9 which Facilitates Immunosuppression in Cooperation with other Immune Checkpoint Proteins

We discovered that T lymphocytes induce galectin-9 secretion in various types of human solid malignant tumours. This was demonstrated to occur via two differential mechanisms: firstly by translocation of galectin-9 onto the cell surface followed by its proteolytic shedding and secondly due to autophagy followed by lysosomal secretion. For both mechanisms a protein carrier/trafficker was required, since galectin-9 lacks a secretion sequence. Secreted galectin-9 pre-opsonised T cells and, following interaction with other immune checkpoint proteins, their activity was completely attenuated. Our results underline a crucial role of galectin-9 in anti-cancer immune evasion. As such, galectin-9 and regulatory pathways controlling its production should be considered as key targets for immunotherapy in a large number of cancers.

Table 2: Significant differences in laboratory parameters between survivors and non-survivors

Variable	N	Survivors	Non-Survivors	p	
Maximum Hgb (g/l) before NEC onset (Q9)	77	122 (92)	142 (57)	144 (62)	0.039
Minimum Hgb (g/l) < 7 days before NEC onset (Q9)	122	144 (59)	151 (57)	127 (29)	0.0029
Hgb at disease presentation (g/l) (Q9)	181	149 (76)	155 (69)	121 (29)	<0.0001
Minimum Hgb during NEC (g/l) (Q9)	159	114 (55)	139 (57)	101 (19)	0.025
Maximum WBC (x10 <sup>9</sup> /l) before NEC onset (Q9)	75	5.4 (5.8)	7.7 (5.4)	9.1 (5.7)	0.004
Maximum WBC (x10 <sup>9</sup> /l) < 7 days before NEC onset (Q9)	120	12.8 (8.8)	13.2 (8.1)	15.6 (10.8)	0.049
Maximum PLT (x10 <sup>9</sup> /l) before NEC onset (Q9)	74	684 (121)	109 (118)	97 (76)	0.023
Minimum PLT (x10 <sup>9</sup> /l) during NEC onset (Q9)	105	218 (111)	222 (98)	189 (126)	0.013
Minimum pHi < 7 days before NEC onset (Q9)	166	6.7 (7.7)	7.5 (9.8)	5.7 (8.1)	0.0029
Minimum pHi < 7 days during NEC onset (Q9)	70	7.26 (8.16)	7.29 (8.15)	7.14 (8.17)	0.016
Maximum CRP (mg/l) before NEC onset (Q9)	60	9 (9)	9 (7)	4 (12)	0.3
Maximum CRP (mg/l) < 7 days before NEC onset (Q9)	99	9 (9)	9 (8)	9 (21)	0.4
CRP at disease presentation (mg/l) (Q9)	170	9 (12)	7 (8)	11 (21)	0.3
Maximum CRP (mg/l) during NEC onset (Q9)	181	36 (14)	19 (18)	40.3 (26.5)	0.02
Maximum percentage of proinflammatory cells at disease onset (Q9)	149	31 (36)	31 (36)	35.3 (36.3)	0.054
Lactate at disease presentation (mmol/l) (Q9)	180	2.2 (2.5)	2.1 (1.8)	3.8 (4.3)	0.0073
Maximum Lactate (mmol/l) during NEC onset (Q9)	141	2.2 (2.5)	2.4 (2.2)	3.25 (3.8)	<0.0001
Base excess at disease presentation (mmol/l) (Q9)	186	-2.4 (5.9)	-2 (5.4)	-3.9 (6.3)	<0.0001
Maximum base excess during NEC onset (Q9)	149	-0.9 (5.2)	-1.1 (5.7)	-1.6 (6.2)	<0.0001
Maximum DBI during NEC onset (Q9)	18	1.34 (0.67)	1.2 (0.6)	1.7 (0.7)	0.024

The following laboratory parameters were associated with an increased mortality rate: -before disease onset: Hgb lower than 141 g/l and pH lower than 7; -at disease onset: Hgb lower than 141 g/l and lactate over 3.8 mmol/l; -during the course of disease: Hgb below 113 g/l and lactate over 3.8 mmol/l.

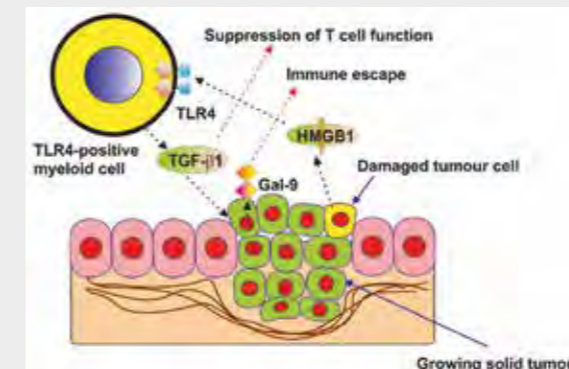
M. Kordasz, M. Racine, P. Szavay, M. Lehner, T. Krebs, C. Luckert, E.M. Hau, S. Berger, U. Kessler, *European Journal of Pediatrics* (2022) 181:933–939.

### Risk Factors for Mortality in Preterm Infants with Necrotizing Enterocolitis: a Retrospective Multicenter Analysis

It is difficult to predict the risk of mortality in necrotizing enterocolitis (NEC). This study aimed at identifying risk factors for severe NEC (Bell stage III) and mortality in preterm children with NEC. In this multicenter retrospective study, we analyzed multiple data from 157 premature children with confirmed NEC in the period from January 2007 to October 2018.

We performed univariate, multivariate, stepwise logistic regression, and receiver operator characteristics (ROC) analyses. We were able to demonstrate that low Apgar scores (notably at 1' and 5'), low hemoglobin concentration (Hgb), and high lactate level at disease onset and during disease correlated with NEC severity and mortality. Severe NEC was related to congenital heart disease (CHD) and patent ductus arteriosus (PDA), whereas death was related to the presence of PDA.

Conclusion: Low Apgar scores, low Hgb, high lactate levels, and the presence of CHD or PDA correlated with severe NEC or mortality in children with NEC.



Proposed mechanism of indirect upregulation of galectin-9 expression by HMGB1 in solid tumour cells lacking TLR4 expression is presented in the scheme.

A.T. Hansen Selnø, S. Schlichtner, I.M. Yasinska, S.S. Sakhn-eych, W. Fiedler, J. Wellbrock, S.M. Berger, Elena Klenova, B.F. Gibbs, E. Fasler-Kan and V.V. Sumbayev, *Front Immunol*. 2021 Jun 21;12:675731. doi: 10.3389/fimmu.2021.675731. eCollection 2021.

### High Mobility Group Box 1 (HMGB1) Induces Toll-Like Receptor 4-Mediated Production of the Immunosuppressive Protein Galectin-9 in Human Cancer Cells

High mobility group box 1 (HMGB1) is a non-histone protein which is predominantly localised in the cell nucleus. However, stressed, injured or dead cells can release this protein into the extracellular matrix passively. In addition, HMGB1 release was observed in cancer and immune cells where this process can be triggered by various endogenous as well as exogenous stimuli. Importantly, released HMGB1 acts as a so-called "danger signal" and could impact on the ability of cancer cells to escape host immune surveillance. However, the molecular mechanisms underlying the functional role of HMGB1 in determining the capability of human cancer cells to evade immune attack remain unclear. Here we report that the involvement of HMGB1 in anti-cancer immune evasion is determined by Toll-like receptor (TLR) 4, which recognises HMGB1 as a ligand. We found that HMGB1 induces TLR4-mediated production of transforming growth factor beta type 1 (TGF-β), displaying autocrine/paracrine activities. TGF-β induces production of the immunosuppressive protein galectin-9 in cancer cells. In TLR4-positive cancer cells, HMGB1 triggers the formation of an autocrine loop which induces galectin-9 expression. In malignant cells lacking TLR4, the same effect could be triggered by HMGB1 indirectly through TLR4-expressing myeloid cells present in the tumour microenvironment (e. g. tumour-associated macrophages).

## Department for Plastic and Hand Surgery

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Prof. Mihai  
Constantinescu  
Co-Director



Prof. Esther  
Vögelin  
Co-Director

### Profile

- Conducting clinical and basic research in the fields of Plastic, Reconstructive and Aesthetic Surgery, under the lead of Prof. Mihai Constantinescu, and Hand Surgery and Surgery of the Peripheral Nerve, under the lead of Prof. Esther Vögelin
- Focus of the Plastic Surgery clinical research: implementation of 3D models of aesthetic tissue reconstruction, innovative strategies for the diagnosis and treatment of critical ischemic tissue and malignant skin tumors, innovations and outcome analysis in free tissue transfer
- Focus of the Hand surgery research: development of mini-invasive treatment modalities using arthroscopy in carpal injuries and evaluation of innovative modalities in repair of peripheral-nerve injuries
- Conducting several basic research projects in the field of vascularized composite allotransplantation (VCA) as well as in ischemia and reperfusion injury
- Investigating the possibility of innovative nanoparticle-based modalities for the treatment of nerve injuries and surgical complications
- Teaching programs for students of Medicine, Biomedical Science and Molecular Life Science, involved in outreach activities for education of young students, such as the Swiss Youth in Science program and the mentoring of Matura Projects of the Swiss Academy of Science
- External Partners: Department of Pharmaceutical Technology, Institute of Pharmacy, University of Jena, Germany; Department of Plastic Surgery and Hand Surgery, University Hospital Zurich, University of Zurich, Switzerland; Institut de Recherche Expérimentale et Clinique (IREC), Université catholique de Louvain, Brussels, Belgium; Institute for Stem Cell Biology and Regenerative Medicine (inStem), Bangalore, India; Institute of Pharmaceutical Sciences, Department of Chemistry and Applied Biosciences, ETH Zurich, Switzerland.; Swiss Federal Laboratories for Materials Science and Technology, St. Gallen, Switzerland

### Highlights



#### Comparing Treatment of Basic Phalangeal Fractures with Intramedullary Cannulated Headless Compression Screws versus Plating

To investigate whether that CCS offers a better outcome in certain types of basic phalangeal fractures as plate fixation. The primary objective is to compare the treatment of basic phalangeal fractures with plate fixation versus CCS.

Primary and secondary endpoints: The primary endpoint is maximal range of motion and strength in both groups after the treatment. The secondary endpoints are postoperative complications after the treatment (multiple operations (tenolysis, plateremoval), duration of hospitalization, duration of operation time, and sick leave.

[Kaspars S et al., Comparing treatment of proximal phalangeal fractures with intramedullary screws versus plating; Arch Orthop Trauma Surg. 2022 Aug 22.](#)

#### Transcutaneous Sentinel Lymph Node Detection in Cutaneous Melanoma with Indocyanine Green and Near-Infrared Fluorescence: A Diagnostic Sensitivity Study

Transcutaneous identification of sentinel lymph nodes in malignant melanoma through ICG and near-infrared fluorescence imaging technology is a feasible technique that could potentially replace in selected patients the radiation-based standard detection methodology.

[Lese I et al., Transcutaneous sentinel lymph node detection in cutaneous melanoma with indocyanine green and near-infrared fluorescence: A diagnostic sensitivity study; Medicine \(Baltimore\). 2022 Sep 9;101\(36\):e30424.](#)



#### A Prospective, Randomized, Single Blinded, Single Centre Study With the Aim to Evaluate Sensory Recovery of Digital Nerves After Primary Repair Performed by Microsurgical Epineural End-to-End Neurorrhaphy alone, or in Combination with an Enwrapping with Fibrin Sealant Tisseel®.

To investigate whether additional wrapping with Tisseel® provides a relevant statistically significant benefit in terms of restoration of sensory function compared to simple end-to-end microsurgical epineural neurorrhaphy, as measured by two-point discrimination.

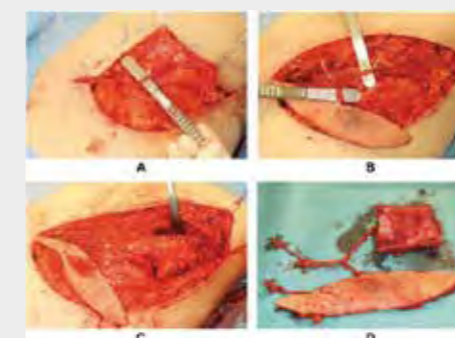
We compare:

- simple microsurgical epineural end-to-end neurorrhaphy alone.
- the simple microsurgical epineural end-to-end neurorrhaphy with Tisseel® sheathing.

#### The Osteocutaneous SCIP Flap: a Detailed Description of the Surgical Technique and Retrospective Cohort Study of Consecutive Cases in a Tertiary European Centre

A single-centre, retrospective study of all cases in which osteocutaneous SCIP flaps were used. Our surgical technique was described and we presented the surgical, functional and aesthetic outcomes of the patients in our cohort. This is the largest series of consecutive osteocutaneous SCIP flaps published outside the Asian continent.

[Zubler C et al., The osteocutaneous SCIP flap: a detailed description of the surgical technique and retrospective cohort study of consecutive cases in a tertiary European centre.](#)



#### Bite Injuries to the Hand and Forearm: Analysis of Hospital Stay, Treatment and Costs

Retrospective analysis to evaluate the delay between bite and surgical treatment, duration of hospitalization, complication due to the bite injury, duration of antibiotic therapy and incapacity of work, overall treatment time for the specific injury and costs for hospital stay of patients sustaining an animal bite from January 2013 to December 2015. In addition the different outcome between early and delayed treatment within the cat bite group was analyzed.

[Schär L et al., Bite injuries to the hand and forearm: analysis of hospital stay, treatment and costs, J Hand Surg Eur Vol. 2022 Oct 7.](#)

Comparison of of cat bite with other bite injuries	Cat bites n=123	Other bites n=85	p-value
Time from bite incident to surgery, days (SD)	2.8 (3.4)	1.3 (1.5)	<b>0.001</b>
Duration of hospital stay (SD)	2.0 (2.2)	1.7 (2.2)	0.215
Antibiotic treatment, days (SD)	11.3 (8.7)	8.7 (4.0)	<b>0.005</b>
Complications (%)	14.6	9.4	0.263
Inability to work, days (SD)	29.4 (67.6)	24.1 (24.0)	0.276
Total costs (SD)	CHF 6607 (7943) € 6681 ((032)	CHF 4922 (5036) € 5007 (123)	<b>0.033</b>

## Department for Pulmonary Medicine and Allergology

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Prof. Thomas Geiser   Prof. Manuela Funke-Chambour   PD Dr. Gunar Günther   PD Dr. Anne-Kathrin Brill   PD Dr. Lukas Jörg   PD Dr. Sabina Guler   PD Dr. Amiq Gazdhar



PD Dr. Fabian Blank   Dr. Tiziana Cremona   Dr. Sudip Das   Prof. Olivier Guenat

### Profile

- Pathophysiology of lung inflammation and fibrosis
- Novel treatments of lung cancer
- Tuberculosis research in global health
- Validation of 3D lung tissue models for inhalation of environmental particles
- Investigating the human lung bacterial microbiome and its impact on the lung immune system
- Exacerbations of fibrotic lung diseases
- Biomarkers for lung fibrosis
- Long-term Effects of COVID on the lung
- Clinical signs and mechanisms in drug hypersensitivity: humoral and cellular immune response to drugs
- Investigation of the transient nature of chronic spontaneous urticarial

### Grants

- Lungenliga Bern (Fabian Blank, PI); NRP79 (Fabian Blank; Co-PI)
- In collaboration with CHUV, Lausanne, a pilot project granted by the Swiss Lung League, Vaud chapter (Ligue Pulmonaire Vaudois) for studying the metagenome-metabolome axis in lung transplant health (SD)
- Lungenliga (Bern) to Amiq Gazdhar
- Lungenliga (Switzerland) to Tiziana Cremona
- BAG support COVID Lung Study
- Bangarter Stiftung (continuing)
- In addition of the two grants indicates last year (3RCC and SNSF), a new one was accepted: Swiss National Science Foundation (Weave) Investigating the pathophysiology of pulmonary arterial hypertension with organ-on-chip technology
- Christine Kühne Center for Allergy Research and Education Research-Grant 2019-2022 (DRESS study)

### Highlights

#### International Bernese Lung Fibrosis Retreat

Prof. Dr. med. Manuela Funke-Chambour organized the first Bernese Lung Fibrosis Retreat on September 16th, 2022. Pros and cons concerning "Experimental models in chronic lung fibrosis and exacerbation", "Treatment approaches for lung fibrosis" and "Disease progression, biomarkers and contributing factors" were vividly discussed.



### Awards and Prizes

Dr. Tiziana P. Cremona (picture) won the Alpha-1 Antitrypsin Laurell's Training (ALTA) Award for Basic Research at ERS 2022 in Barcelona. ALTA is one of the most significant awards in the field of respiratory research.

Dr. Vedat Burak Ozan of the laboratory team by PD Dr. Amiq Gazdhar was awarded a prize for the best poster presentation during the SSP/SSTS poster Walk: Infections, interstitial and obstructive lung diseases at the SSP/SSTS – SSSSC Joint Annual Meeting 2022 in Lucerne on March 31st, 2022.

The «Ewald-Weibel-Lungenforschungspreis 2022» was awarded to Prof. Dr. med. Manuela Funke-Chambour, physician-in-chief at the department of Pneumology, Inselspital. She researched on changes of the lung tissue and was awarded on October 12th, 2022, due to her extraordinary work in the field of fibrotic lung diseases with the title «Pulmonary Fibrosis – an old problem with new relevance».

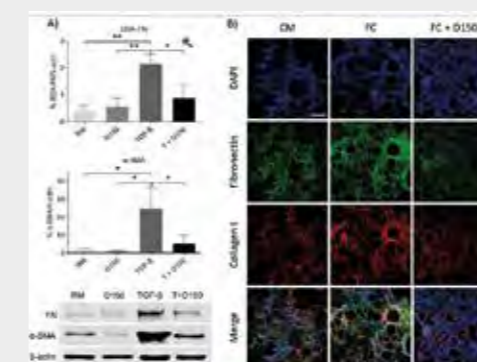
The Swiss Medtech Award 2022 to AlveoliX (Prof. Olivier Guenat, Prof. Thomas Geiser, Dr. Janick Stucki, Dr. Nina Hobi)



### DHEA in Lung Fibrosis

Dehydroepiandrosterone (DHEA) is a precursor sex hormone with antifibrotic properties. We investigated antifibrotic mechanisms of DHEA, and determined the relationship between DHEA-sulfate (DHEAS) plasma levels, disease severity and survival in patients with fibrotic interstitial lung diseases (ILDs). DHEA reduced lung fibrosis and cell proliferation in vitro and ex vivo by inducing cell cycle arrest and inhibition of G6PD activity. The association between low DHEAS levels and disease severity suggests a potential prognostic and therapeutic role of DHEAS in fibrotic ILD.

[Guler SA, Machahua C, Geiser TK, Kocher G, Marti TM, Tan B, Trappetti V, Ryerson CJ, Funke-Chambour M. Dehydroepiandrosterone in fibrotic interstitial lung disease: a translational study. Respir Res. 2022 Jun 8;23\(1\):149.](#)



### A Challenge in the Fight Against Tuberculosis in Europe

A study, performed in 43 European countries, demonstrated major shortcomings in the supply of drugs to treat drug-resistant tuberculosis and drug resistance testing in the WHO European region. Barely more than 50% of countries could test for resistance against Bedaquiline and 70% against Linezolid. Both drugs are new first line drugs for the treatment of drug-resistant tuberculosis and resistance highly important during the roll out of new tuberculosis regimens, to prevent spread of drug resistance. Eastern Europe has the highest proportion of drug-resistant cases of all WHO regions. The study was published in the Clinical Microbiology and Infection and commented on in the Neue Zürcher Zeitung. The project was coordinated by PD G. Günther from Inselspital Bern, in collaboration with his colleagues from TBNET.



## Department of Radiation Oncology

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 Dr. Hossein Hemmatzad  
 Dr. Mohamed Shelan  
 Dr. Emanuel Stutz  
 Dr. Nikola Cihoric  
 Dr. Ekin Ermis



Prof. Steffen Eychmüller  
 Prof. Peter Manser  
 Prof. Michael K. Fix  
 Prof. Yitzhak Zimmer  
 PD Dr. Michaela Medova  
 PD Dr. Matúš Medo

### Profile

- Teaching: Undergraduate lectures are provided for students in medicine, physics, biomedical engineering, molecular and biomedical sciences as well as in dental medicine at the University of Bern; undergraduate teaching does also include practical training for medical students; lectures are given within the master in "Artificial Intelligence in Medicine" at University of Bern; postgraduate lectures in medical physics are given at the Department of Physics at the Swiss Federal Institute of Technology in Zurich; a CAS program for palliative care is run in cooperation with various faculties of the University of Bern and the Bern University of Applied Sciences; various PhD and MD-PhD positions are provided in radiation biology, medical physics and palliative care
- Clinical Research: Clinical Research: (a) Prostate cancer: salvage radiotherapy, metabolomic signatures; (b) head neck cancer: Upfront neck dissection in the context of primary radiotherapy; single vocal cord irradiation; POLARES (Personalized discovery and validation multi-Omics pLATFORM for Recurrent hEad and Neck Squamous Cell Carcinoma) (c) brain tumor: Automatic segmentation of brain tumors, postoperative radiosurgery; (d) palliative care: advance care planning, early integration of palliative care; best care for the dying patient; community palliative care, regional networks
- Medical physics research: (a) Dynamic Trajectory Radiotherapy (DTRT) and Dynamic Mixed Beam Radiotherapy (DYMBER); (b) Standard Electron Beam Application using a Photon Multi Leaf Collimator; (c) Independent Dose Calculation and Dosimetric Impact of Implants in the Context of Robotic Stereotactic Radiotherapy; (d) Efficient Quality Assurance for External Beam Radiotherapy and Accurate Dose Calculation for Brachytherapy; (e) Medical Imaging Related Research Topics
- Radiation biology research: (a) Genomic landscapes of metastatic head and neck squamous cell carcinoma (HNSCC) tumors; SPRR2A in invasiveness and therapeutic resistance in HNSCC; (b) Immune signatures to predict chemoradiation-induced toxicities in HNSCC patients; (c) A MET CAR T-cell immunotherapy combined with radiation therapy in glioblastoma multiforme; (d) Identification of synthetic lethal interactions for CHK2-deficient cancers; (e) Functional characterizations of a newly identified MET receptor tyrosine kinase phosphorylation site in cancer and in context of autism-spectrum disorders; (f) The effect of small cohort sizes and population heterogeneity on differential expression analysis
- Collaborations: Multidisciplinary and multi-institutional national and international collaboration within the SAKK & EORTC networks; Institute for Biomedical Engineering, Swiss Federal Institute of Technology (ETH), Zürich, Switzerland; Princess Margaret Cancer Center, Toronto, Canada; ACRF Image X Institute, University of Sidney, Australia; Department of Clinical Medicine, Aarhus University, Denmark; Carleton Laboratory for Radiotherapy Physics, Carleton University, Ottawa, Canada; Oncogenomics Group, Department for BioMedical Research, Bern, Switzerland; Scailyte AG, Basel, Switzerland; Merck KGaA, Darmstadt, Germany

### Grants

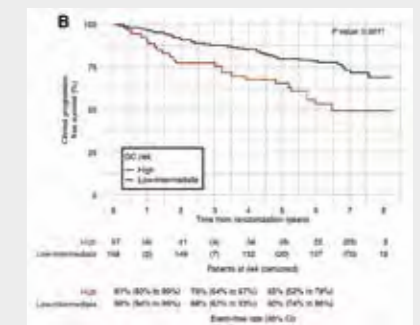
SNF; EU; Innosuisse; Krebsliga; SAKK; Werner und Hedy Berger-Janser – Stiftung; Ruth & Arthur Scherbarth Stiftung; Insel DLF; Insel DLF und Med. Fak.; sitem-Insel Support Funds; Merck; Varian Medical Systems; ENSI

## Highlights

### Clinical Utility of Decipher Genomic Classifier in Treatment of Men Experiencing Prostate Cancer Progression after Radical Prostatectomy

The radiation oncology department at Inselspital in collaboration with the SAKK assessed the clinical outcomes of Decipher genomic classifier (DGC) for 226 prostate cancer patients from the SAKK 09/10 trial. The study involved men experiencing a rise in PSA following RP who received SRT without hormonal treatment with a median follow up of 6.3 years. Findings showed that DGC can identify the patients who are at highest risk of cancer progression and would benefit from earlier treatment. Patients with a high DGC score were more than twice as likely than those with a lower DGC score to experience biochemical and clinical progression, and to receive long-term salvage hormone therapy.

[Dal Pra A et al., Oncol., 2022.](#)

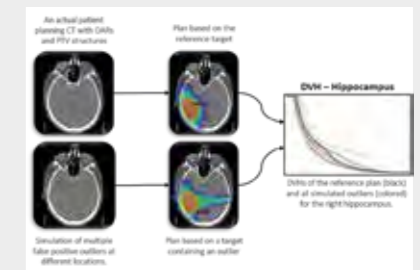


Cumulative incidence estimates of GC low-intermediate ( $\leq 0.60$ ) and high ( $> 0.60$ ) risk for clinical progression

### Impact of Random Outliers in Auto Segmented Targets on Radiotherapy Treatments Plans for Glioblastoma

In order to optimize the workflow in radiotherapy treatments automatic segmentation models are a valuable asset. Deep learning based models show good results in automatically delineating organs at risk in clinically available products. Unfortunately typical errors, as false positives, occur which is especially problematic for automatic target definition. In this study we showed that there is a severe risk of false positive outliers, which can have a detrimental impact on the treatment. The knowledge gained in this study will be used to further improve the robustness of deep learning based auto segmentation models.

[Poel et al., Radiat Oncol., 2022.](#)

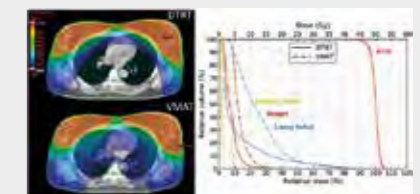


Graphical representation of the dosimetric analysis of a false positive outlier in a simulated scenario

### Non-Isocentric Dynamic Trajectory Radiotherapy (DTRT)

Non-isocentric DTRT extends state-of-the-art volumetric arc radiotherapy (VMAT) through additional dynamic table translations and dynamic table and collimator rotations. For this treatment technique, a treatment planning process (TPP) was developed and experimentally verified. The TPP consists of two steps: first determine the path describing the dynamic of the gantry, collimator and table and second optimize the intensity along the path. Non-isocentric DTRT plans were compared to VMAT plans demonstrating benefits such as reduced delivery time and improved plan quality.

[Guyer et al., Phys. Med. Biol., 2022.](#)



Dose distributions for a VMAT and a DTRT treatment plan with the corresponding dose volume histogram comparisons



Deep hyperthermia device

### Additional Cancer Treatment: Moderate Hyperthermia

The Department of Radiation Oncology, University Hospital Bern Inselspital is the first University hospital in Switzerland offering both superficial and deep hyperthermia with the most advanced technique available. It is applied concurrently with radiotherapy and acts as a radiosensitizer. It is recommended for complex oncological situations particularly in radio-resistant or preirradiated tumors. Our focus is on evidence-based treatment of patients and in clinical studies. In addition, we are collaborating with the industries in implementing and improving hyperthermia treatment planning.

## Department of Rheumatology and Immunology

Inselspital, Sahli Haus 1-2, 3010 Bern; DBMR, Murtenstrasse 24, 3008 Bern  
[www.rheumatologie.insel.ch](http://www.rheumatologie.insel.ch); [www.bachmannlab.ch](http://www.bachmannlab.ch); [www.eggellab.com](http://www.eggellab.com); Maurer Lab: <https://tinyurl.com/2utbpdkh>



Prof. Britta Maurer   Prof. Martin Bachmann   Prof. Monique Vogel   Prof. Alexander Eggel   PD Dr. Kerstin Klein

### Profile

- Participating in University and University Hospital Teaching programs for students of human medicine, biomedicine and biology; master students of biology are also coming from foreign Universities
- 4 basic research groups and 5 clinically and/or translationally oriented research groups
- Clinical research focuses on pregnancy in rheumatic diseases, arthritis, musculoskeletal rheumatology and pain as well as vasculitis, osteoimmunology, Sjögren's syndrome and myositis/systemic sclerosis/ILD
- Basic research focuses on understanding of immune regulation and the development of potential new biomarkers and therapies for infectious and inflammatory diseases
- External Partners Rheumatology: SCQM, EUSTAR, Euromyositis, EULAR, ESR, Swiss Sjögren's Disease Registry; Prof. H. Schiller, Helmholtz Institute, Munich; Prof. M. Kreuter, Universitätsklinik Heidelberg, Prof. I. Lundberg, Karolinska Institute, Dr. A. M. Hoffmann-Vold, University Hospital Oslo, Prof. V. V., ETHZ; PD Dr. M. Behe, PSI, Prof. C. Ospelt, and Prof. O. Distler, University Hospital Zurich; Prof. M. Hoffmann, University of Lübeck
- External Partners Immunology: The Jenner Institute, University of Oxford; Allergy Therapeutics (UK); BRSC (Latvia); Anhui Agricultural University (China); Novartis Pharma AG; Saiba AG; Saiba Animal Health AG; DeepVax AG; Kings College (UK); Prof. Theodore Jardetzky, Stanford University, USA; Prof. Tony Wyss-Coray, Stanford University, USA

### Grants

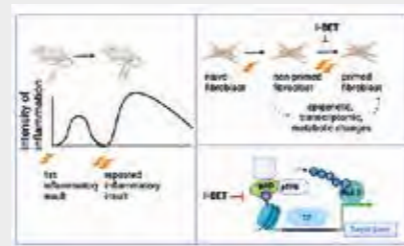
- UniBe ID Grant to PD Dr. Kerstin Klein (CHF 149'114 / 1.5. years)
- UniBE ID Grant to Prof. Dr. med Britta Maurer (CHF 149'594 / 1 year)
- SF Call 2022 to Prof. Dr. med Britta Maurer (CHF 750'000 / 3 years)
- Saiba AG to Prof. Dr. Martin Bachmann (CHF 200'000)

### Highlights

#### Bromodomain Inhibitors Reset the Inflammatory Tissue Priming of Joint Tissue

Priming of synovial fibroblasts drives arthritis flares. We have now shown that inhibitors targeting the bromo- and extra-terminal (BET) protein family prevent inflammatory tissue priming and arthritis flares in preventive and therapeutic settings in a mouse model of repeated injections of inflammatory stimuli into paws. Flare reduction after BET inhibition was mediated, at least in part, by rolling back the primed transcriptional, metabolic and pathogenic phenotype of synovial fibroblasts.

Friščić J et al., *Arthritis Rheumatol.*, 2022. DOI: 10.1002/art.42378.



BET inhibitors reset inflammatory tissue priming

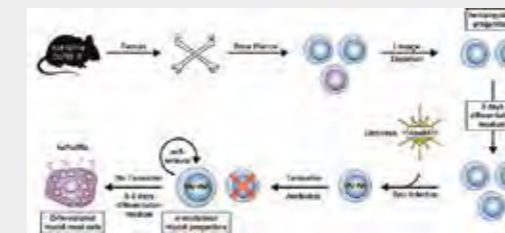
#### Humoral and Cellular Responses to mRNA Vaccines Against SARS-CoV-2 in Patients with a History of CD20 B-Cell-Depleting Therapy (RituxiVac): an Investigator-Initiated, Single-Centre, Open-Label Study

In this study, we showed that patients taking B-cell-depleting therapies were able to mount responses to SARS-CoV-2 vaccination only if certain prerequisites were met. We identified timing of anti-CD20 therapy, immunosuppressive

co-medication, and peripheral B-cell and T-cell status as determining factors. The length of the post-treatment interval and CD19+ and CD4+ cell counts might also have potential as predictive markers as they reliably identified vaccination responders. Additionally, our data support the importance of CD4+ T cells in providing protection against SARS-CoV-2 infection, since both humoral and cellular-mediated immune responses were dependent on CD4+ T-cell numbers.

*Lancet Rheumatol.* 2021 Nov; 3(11): e789–e797.

Anti-SARS-CoV2 immune responses



A novel mast cell activation assay to diagnose allergies.

#### A Novel Functional Mast Cell Assay for the Detection of Allergies

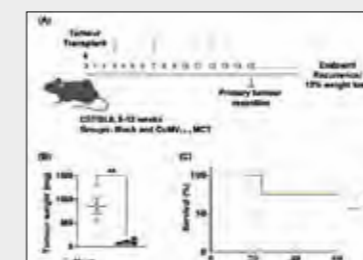
Clinical management of allergic diseases is hampered by the lack of safe and convenient tests to reliably identify culprit allergens and to closely follow changes in disease activity over time. We have genetically engineered a novel mast cell progenitor line, which can be reproducibly differentiated into mature mast cells and used in a diagnostic mast cell activation assay. This novel test might represent a valuable tool to support clinicians in the identification of IgE-mediated allergies and in the quantification of treatment efficacy as well as duration of therapeutic response.

Zbären, N. et al., *JACI* 149, 1018-1030.e11 (2022).

#### In Situ Delivery of Nanoparticles Formulated with Micron-Sized Crystals Protects from Murine Melanoma

Intratumoral injections of novel therapeutics can activate tumor antigen-specific T cells for locoregional tumor control and may even induce durable systemic protection (against distant metastases) via recirculating T cells. In this study we assessed and demonstrate therapeutic efficacy the anti-tumor response induced by intra-tumoral injections of a novel "immune enhancer" consisting of Cucurbit mosaic virus-like particles formulated with microcrystalline tyrosine (MCT) adjuvant.

*J Immunother Cancer.* 2022; 10(9): e004643. doi: 10.1136/jitc-2022-004643.

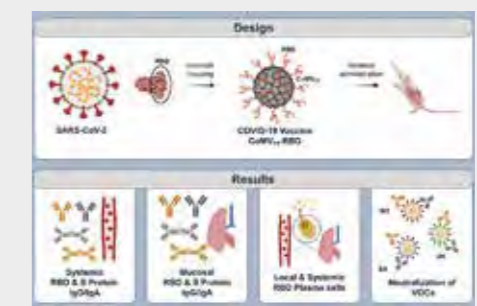


Treatment with the novel immune-enhancer inhibits tumor recurrence

#### Intranasal Administration of a Virus Like Particle-Based Vaccine Induces Neutralizing Antibodies Against SARS-CoV-2 and Variants of Concern

Currently available vaccines are administered intramuscularly and seek to induce a systemic humoral immune response to deliver protection. Since COVID-19 invades the respiratory tract, a mucosal immune reaction would help reduce viral shedding and transmission locally. In this study we presented a vaccine based on virus-like particles (CuMVTT-RBD) which elicited a strong systemic RBD- and spike-IgG and IgA antibodies of high avidity as well as as neutralizing activity for the different variants of concern (VOCs). These data showed the capacity of VLP-based vaccine to induce protective antibodies that can be administered mucosally in a needle free manner.

*Allergy.* 2022. 77(8):2446-2458 doi: 10.1111/all.15311.



Development of a COVID-19 vaccine based on VLPs for intranasal immunization

## Department of Thoracic Surgery

Inselspital, 3010 Bern  
[www.thoraxchirurgie.insel.ch](http://www.thoraxchirurgie.insel.ch)



PD Dr. Patrick Dorn, PD Dr. Oemer Senbaklavaci, Dr. Michail Galanis, Dr. Thanh-Long Nguyen, Dr. Konstantinos Gioutsos, PD Dr. Sergio Bruno Sesia, Prof. Ren-Wang Peng, PD Dr. Thomas M. Marti

### Profile

- Teaching students of medicine as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB)
- Identify the molecular mechanisms conferring resistance to clinical standard therapies, with the goal to unravel druggable vulnerabilities - the 'Achilles' heel' - of therapy-resistant cancer cells for development of innovative strategies to treat lung cancer and MPM
- Investigate how nucleotide/lactate metabolism and the DNA damage response machinery is linked to the tumor initiating capacity and chemotherapy response of NSCLC cancer stem cells
- Evaluation and therapeutic improvements of uniportal minimally-invasive thoracic surgery techniques
- Investigation of different clinical and functional parameters with the aim of achieving better outcome and improvement of patient's comfort
- External Partners: Universities of Basel/Vienna/Essen/Changsha (China)/Shanghai China

### Grants

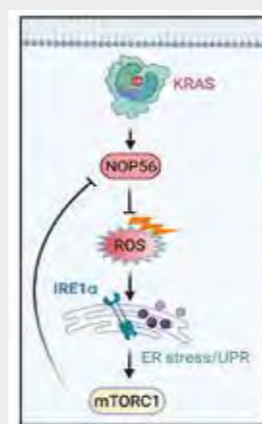
- Swiss National Science Foundation (310030\_192648, IZSEZO\_195105, 310030\_212766-1)
- Swiss Cancer League (KFS-4265-08-2017; KFS-4851-08-2019, KFS-5405-08-2021-R)
- China Scholarship Council (201606230238; 201708530258; 201606740067; 201808170004; 201906240084)
- Stiftung zur Krebsbekämpfung
- Bern Center for Precision Medicine
- Novartis Foundation for Medical-Biological Research

### Highlights

#### Metabolic Synthetic Lethality by Targeting NOP56 and mTOR in KRAS-mutant Lung Cancer

We showed that nucleolar protein 5A (NOP56), a core component of small nucleolar ribonucleoprotein complexes (snRNPs) with an essential role in ribosome biogenesis, confers a metabolic dependency by regulating ROS homeostasis in KRAS-mutant lung cancer cells and that NOP56 depletion causes synthetic lethal susceptibility to inhibition of mTOR. Mechanistically, NOP56 deletion induces ROS and renders cancer cells reliant on mTOR signaling to balance oxidative stress. We further showed that unfolded protein response (UPR) regulates this process by activating mTOR through p38 MAPK. Consequently, co-targeting of NOP56 and mTOR profoundly enhances KRAS-mutant tumor cell death in vitro and in vivo. Our results reveal a previously unrecognized mechanism in which NOP56 and mTOR cooperate in the response to oxidative stress and suggest a new rationale for the treatment of KRAS-mutant cancers.

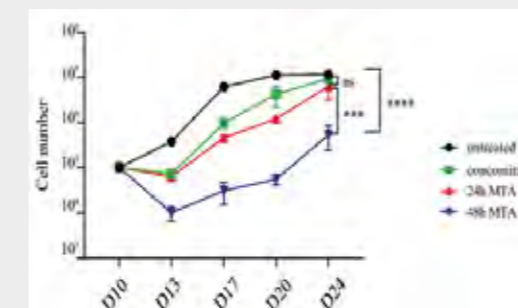
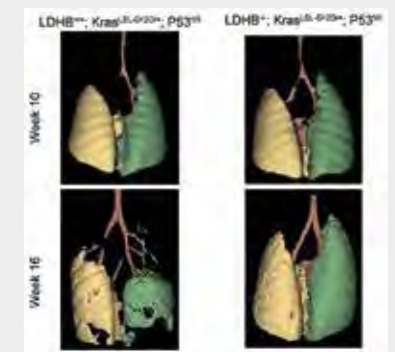
Yang et al. *J Exp Clin Cancer Res.* 2022 Jan 17;41(1):25.  
 doi: 10.1186/s13046-022-02240-5.



#### Targeting Lactate Dehydrogenase B-Dependent Mitochondrial Metabolism Affects Tumor Initiating Cells and Inhibits Tumorigenesis of Non-Small Cell Lung Cancer by Inducing mtDNA Damage

Our study shows for the first time that LDHB is essential for the maintenance of mitochondrial metabolism, especially nucleotide metabolism, demonstrating that LDHB is crucial for the survival and proliferation of NSCLC tumor-initiating cells and tumorigenesis.

Deng et al. *Cellular and Molecular Life Sciences* 2022 Jul 25;79(8):445. doi: 10.1007/s00018-022-04453-5.



#### Schedule-Dependent Treatment Increases Chemotherapy Efficacy in Malignant Pleural Mesothelioma

The present study demonstrates that optimizing the treatment schedule by pretreatment with pemetrexed increases the efficacy of the pemetrexed-cisplatin combination therapy in MPM. We show that the observed benefits are associated with the persistence of treatment-induced DNA damage.

Karatkevich et al. *International Journal of Molecular Sciences* 202, doi: 10.3390/ijms231911949.



#### Blunt Chest Trauma after Mechanical Resuscitation Manoeuvres Appears to Have a Significant Impact on the Often Complicated Course

We investigate the feasibility and immediate outcome of chest wall stabilization for flail chest in this vulnerable patient population. We retrospectively reviewed the medical records of patients after cardiopulmonary resuscitation between January 2014 and December 2018 who were diagnosed with flail chest. We attempted to compare patients after surgery with those after conservative treatment. Surgical stabilization for chest wall instability is well tolerated even by this vulnerable patient population. Our results should be used for further randomized-controlled approaches. It is necessary to evaluate the situation with all parameters in an interdisciplinary manner and to decide on a possible surgical therapy at an early stage if possible.

Dorn et al., *Interact Cardiovasc Thorac Surg.* 2022 May 2;34(5):768-774. doi: 10.1093/icvts/ivac023.



## Department of Urology

Inselspital, Freiburgstrasse 4, 3010 Bern  
www.urologie.insel.ch



Prof. George N. Thalmann   Prof. Fiona Burkard   Prof. Bernhard Kiss   Prof. Marianna Kruihof-de Julio   Prof. Katia Monastyrskaya

### Profile

- Teaching students of medicine, biomedicine and biology as well as graduate students at the Graduate School for Cellular and Biomedical Sciences (GCB) at the University of Bern, CH and Leiden, NL.
- 4 Groups
- Investigation of pathophysiological processes that contribute tumor diseases and bladder dysfunction
- Aim: Understand the molecular processes of urological cancer progression and bladder dysfunction
- External Partners: Marianna Rapsomaniki, IBM Research Zurich, Olivier Guenat, ARTORG Center for Biomedical Engineering Research, Organs-on-Chip Technologies, University of Bern, Bern, Switzerland; Alvaro Aytes Institut d'Investigació Biomèdica de Bellvitge, Program Against Cancer Therapeutic Resistance / Prostate Cancer Lab, Barcelona, Spain; Theodore Alexandrov EMBL-Heidelberg, Structural and Computational Biology / Spatial Metabolomics Lab, Heidelberg, Germany; Sylvia LeDevedec, Leiden Academic Centre for Drug Research, Leiden University, Leiden, The Netherlands; Rosalyn Adam, Urological Diseases Research Center, Boston Children's Hospital, Boston, USA; Todd Purves, Duke University, Durham USA; Swiss Institute for Bioinformatics, TKI Bern, ETH Zürich, Balgrist University Hospital, ZHAW and EPFL

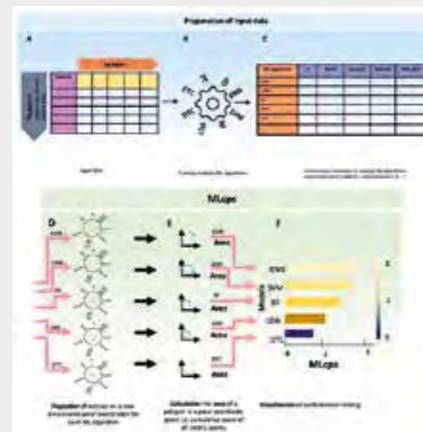
### Grants

- Swiss National Science Foundation (179265, 189149, 184933, 189369, 175773/1, 182966/1, 212298/1)
- Department of Defense Impact Award PC180280 (W81XWH-19-1-0432)
- Swiss Cancer League (KFS 4718-02-2019, KFS-4960-02-2020)
- HORIZON 2020 (Marie Skłodowska-Curie Action (STOPa 748836)
- Bern Center for Precision Medicine
- Wings for life Spinal Cord Research Foundation
- Novartis Foundation for medical-biological Research
- Innosuisse (#41236.1 IP-LS and 101.951 IP-LS)
- 3RCC OC-2019-003
- Initiator Grant (UBERN)
- Tandem

### Highlights

#### MLcps: Machine Learning Cumulative Performance Score for Classification Problems

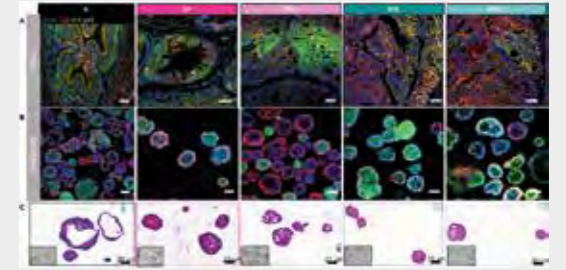
A performance metric is a tool to measure the correctness of a trained Machine Learning (ML) model. Numerous performance metrics have been developed for classification problems, making a choice difficult especially in clinical studies where datasets are frequently imbalanced and number of samples low. We developed a new metric called Machine Learning Cumulative Performance Score (MLcps) as a Python package for classification problems. MLcps combines multiple pre-computed performance metrics into one metric that conserves the essence of all pre-computed metrics for a particular model. We tested MLcps on 4 different publicly available biological datasets and the results reveal that it provides a comprehensive picture of overall model robustness.



MLcps Methodology

#### The Role of CRIPTO Signaling in Lethal Prostate Cancer

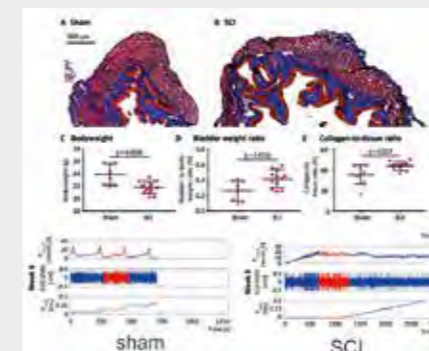
Cripto is an oncofetal protein that regulates stem cell-associated signaling pathways and promotes cellular plasticity, epithelia to mesenchymal transition and maintenance of the stem cell state during normal development, tissue homeostasis and tumorigenesis. Cripto is expressed at high levels in human tumors but not their normal tissue counterparts and has multiple oncogenic effects both in vitro and in mice. Tumor cells with stem cell-like properties have a distinct metabolic profile and perturbation in their metabolomics landscape could result in acquisition of the stem cell phenotype. We demonstrated that CRIPTO signaling sustains stem cell-like PCa cells that initiate the growth of prostate tumors and promote therapy resistance and metastasis.



Novel mouse model of progressive prostate cancer

#### Bladder Morphology and Function Deteriorate after SCI

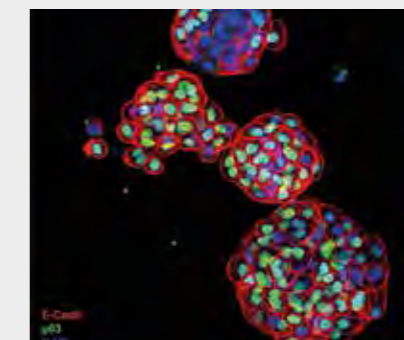
In the pBOO mouse model profound bladder remodelling was necessary to compensate for the outlet obstruction and preserve normal micturition at 7 weeks of pBOO. In contrast, SCI led to persisting and dramatic bladder function deterioration with DSD, loss of spontaneous voiding and urine retention in most animals. At 8 weeks post SCI, significant bladder fibrosis was observed, and the bladder transcriptome was substantially altered, concomitant with the morphological changes. The neurogenic SCI-induced LUTD in the mice bears closer resemblance to the situation in humans, while pBOO induces adaptive gene expression changes resulting in the preservation of the bladder function within the comparable study interval.



Bladder morphology and function deteriorate after SCI

#### Preclinical Models for the Translational Study of Urological Cancers

We have 1. generated patient derived xenografts (PDX) and patient derived organoids (PDO) from biopsies of prostate and bladder cancer (Karkampouna et al. (2021), Minoli et al (2022)). 2. defined a new media composition that allows culture of PDO matrix free and allows medium throughput on the PDOs (collaboration NEXUS, ETH). 3. developed and implemented a clinically relevant culture system for studying tumor tissue ex vivo (patent pending). This technique allows cultivation of tumor slices and needle biopsies without loss of normal architecture, viability, proliferative properties, or expression of specific markers (Karkampouna et al. MTNA (2014); Karkampouna et al. Journal of Pathology (2017)). We have shown that the effects of drug treatment in this system is consistent with that observed on organoids (in vitro) and PDXs (in vivo) (Karkampouna et al.2021). 4. customized the microvasculature-on-chip device to mimic the bone micro-environment. 5. generated a unique PDX BRCA2 mutant and fully characterized it (Karkampouna et al. 2021). 6. Performed a medium throughput screen with NEXUS and identified 16 compounds that are currently being used on PDO (Karkampouna et al. 2021; La Manna 2021 FrOnc). 6. identified CRIPTO, a cell surface protein, as a driver of bone metastatic progression.



Immunofluorescence image of Bladder Cancer Organoids (20x magnification) stained with anti-E-Cadherin (red), anti-p63 (green) and DAPI (blue)

Zoni et al 2020, Rodrigues Sousa et al 2022.

## Department of Vascular Surgery

Freiburgstrasse 18, 3010 Bern  
<http://www.gefaesschirurgie.insel.ch>



Prof. Drosos Kotelis Director from 1.6.2022	Prof. Jürg Schmidli Director until 31.5.2022, Senior Consultant until 30.11.2022	Prof. Vladimir Makaloski Consultant, Vascular Surgery	Dr. Michel Bosier Consultant, Vascular Surgery	Dr. Roman Bühlmann Consultant, Vascular Surgery	Dr. Salome Weiss Research Group Leader	Dr. Corinne Kohler Medical Training (junior physicians)	Dr. Paul Libera Clinic Manager, Medical Education (medical students and interns)
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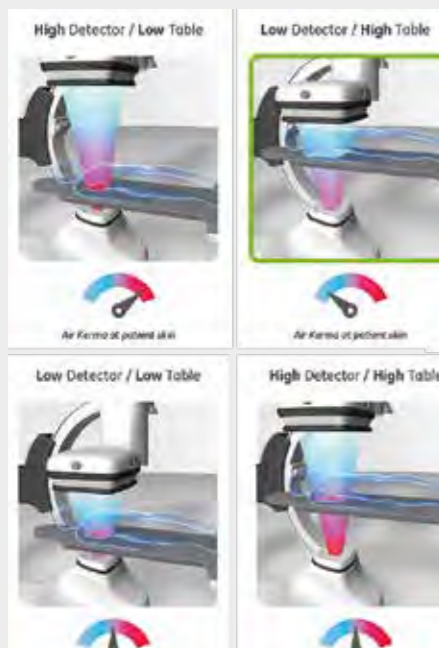
### Profile

- Our department offers the entire spectrum of all modern vascular surgery operative techniques (endovascular and open)
- Largest centre for aortic disorders in Switzerland in cooperation with the Clinic of Cardiac Surgery
- Close cooperation with the vascular centers in Biel (SZB) and Thun (STS)
- Integrated entrustable professional activities for training and further education (1 senior physician currently in the Medical Education master's program; numerous extra-curricular courses for students)

### Grants

- Innosuisse. "Smart digital monitoring of abdominal aortic aneurysms - SmartLyf". 2020-2022. CHF 285'259; Makaloski V. involved vascular surgeon
- SNSF. "Immediate revascularization versus standard of care alone in patients with diabetic foot ulcer and non-critical peripheral artery disease: a randomized controlled trial". 2020-2025. CHF 2'148'880; PI in "Medizinbereich Herz Gefäss": Baumgartner I, Schindewolf M, Makaloski V.
- SNSF. "Multimodal prehabilitation for major surgery in elderly patients to lower complications and to increase cost effectiveness. A randomized, prospective, multicenter, multidisciplinary trial (PREHABIL trial). 2021-2025, CHF 1'058'618; Makaloski V. involved vascular surgeon

### Highlights



### European Society for Vascular Surgery (ESVS) 2023 Clinical Practice Guidelines on Radiation Safety

With an almost exponential rise in fluoroscopy-guided procedures in vascular surgery, the need for guidelines on radiation safety has grown in the past decades. In 2022, the European Society for Vascular Surgery (ESVS) published the ESVS Clinical Practice Guidelines on Radiation Safety as the first of its kind, written under the auspices of a vascular surgery society. The guidelines aim to raise awareness of the risk of ionizing radiation not only among vascular surgeons and trainees, who are exposed to radiation throughout their career on an almost daily basis, but additionally for patients, who are also exposed. Clear recommendations on how to reduce radiation exposure of patients and staff are provided, based on currently available evidence. An entire chapter of the guidelines is dedicated to education and training in radiation safety, which should start as early as possible, and be updated regularly, in the career of a vascular surgeon.

Writing Committee (Modarai B, Haulon S ... Weiss S); ESVS Guidelines Committee; Document Reviewers. European Society for Vascular Surgery (ESVS) 2023 Clinical Practice Guidelines on Radiation Safety. Eur J Vasc Endovasc Surg. 2022 Sep 18;S1078-5884(22)00546-9.



Intraoperative image of the carotid bifurcation after carotid endarterectomy with bovine pericardial patch plasty. Right: Preparation of an endarterectomised carotid plaque.

### Treatment for Patients with Asymptomatic Carotid Artery Stenosis

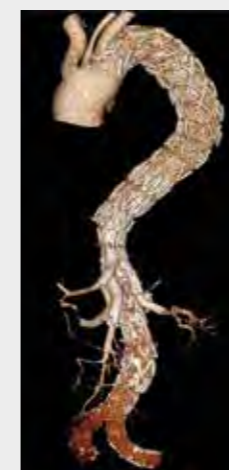
The optimal treatment for patients with asymptomatic carotid artery stenosis remains unclear, with a lack of randomised studies comparing best medical treatment alone to best medical treatment plus carotid revascularisation. Prof. Jürg Schmidli of the Department of Vascular Surgery contributed as an investigator to the international, multicenter, randomized SPACE-2 trial, which allocated 513 patients to carotid endarterectomy and best medical treatment, carotid stenting and best medical treatment, or best medical treatment alone. Superiority of any treatment strategy could not be demonstrated over a 5-year follow-up period. Carotid endarterectomy plus best medical treatment was associated with low postprocedural stroke rates. Of particular importance, this trial highlights a substantial reduction in the risk for stroke with adequate best medical treatment in this patient cohort. However, these results should be interpreted with caution due to the small sample size. Further research is needed to identify patients who may benefit from carotid revascularization in addition to best medical treatment.

Reiff T ... Schmidli J ... SPACE-2 Investigators. Carotid endarterectomy or stenting or best medical treatment alone for moderate-to-severe asymptomatic carotid artery stenosis: 5-year results of a multicentre, randomised controlled trial. Lancet Neurol. 2022 ;21(10):877-888.

### Endovascular Aneurysm Repair with Fenestrated and Branched Prostheses

Treatment of patients with previous (failed) abdominal aortic aneurysm surgery is a complex undertaking. Fenestrated and branched prostheses increasingly appear to be a promising therapeutic option. However, data concerning associated risk factors, treatment indications, and patient outcomes are limited. The results of this study suggest that repair with fenestrated and branched grafts is safe for patients with prior endovascular aneurysm repair or open aneurysm repair, and provide evidence of very good technical success and survival rates.

Budtz-Lilly J ... Kotelis D ... Chaikhouni B ... European Multicentric Experience with Fenestrated-Branched Endovascular Stent-grafting after Previous FAILED Infrarenal Aortic Repair: the EU-FBENDO-FAIL Registry. Ann Surg. 2022 Jul 15.



Branched prosthesis



Fenestrated prosthesis

### Anticoagulant Therapy in Endovascular Aneurysm Repair with Fenestrated and Branched Grafts

This international, expert-based, consensus analysis reports, for the first time, the optimal management of antithrombotic therapy in patients undergoing elective fenestrated branched endovascular aortic repair, and formulates guidelines. The intraoperative guidelines mainly focus on the correct administration of heparin. The pre- and post-operative guidelines address indications for, and management of, dual platelet aggregation inhibition, also taking into account any necessary drainage of cerebrospinal fluid.

D'Oria M, ... PRINCE(2)SS collaborative study group (... Kotelis D ...). Editor's Choice - PRINciples of optimal antithrombotic therapy and coagulation management during elective fenestrated and branched Endovascular aortic repairS (PRINCE2SS): An International Expert Based Delphi Consensus Study. Eur J Vasc Endovasc Surg. 2022 Jun;63(6):838-850.



## Department for Visceral Surgery and Medicine

Inselspital – Bauchzentrum Bern, Freiburgstrasse 18, 3010 Bern  
[www.bauchzentrum-bern.ch](http://www.bauchzentrum-bern.ch)



Prof. Daniel Candinas, Managing Director and Chief of Surgery  
 Prof. Andrew Macpherson, Director and Chief Physician Gastroenterology  
 Prof. Annalisa Berzigotti, Director a.i. and Chief Physician Hepatology

### Staff members

PD Dr. med. et phil. Vanessa Banz, Senior Surgeon Visceral Surgery  
 Prof. Guido Beldi, Chief Surgeon Visceral Surgery  
 Dr. Yves Borbély, Senior Surgeon Visceral Surgery  
 PD Dr. Lukas Brügger, Senior Surgeon Visceral Surgery  
 Prof. Beat Gloor, Chief Surgeon Visceral Surgery  
 PD Dr. Reto Kaderli, Senior Surgeon Visceral Surgery  
 Prof. Deborah Keogh-Stroka, Senior Scientist Visceral Surgery  
 Dr. med. et phil. Corina Kim, Senior Surgeon Visceral Surgery  
 PD Dr. Philipp C. Nett, Senior Surgeon Visceral Surgery  
 Prof. Beat Schnüriger, Senior Surgeon Visceral Surgery  
 Prof. Nasser Semmo, Senior Physician Hepatology  
 Prof. Stephanie Ganal-Vonarburg, Senior Scientist Gastroenterology  
 Prof. Benjamin Misselwitz, Senior Physician Gastroenterology  
 Prof. Reiner Wiest, Chief Physician Gastroenterology

### Profile

- Visceral Surgery – Gastroenterology – Hepatology
- Endoscopy Unit; Transplantation
- External Partners: ETH Zurich, Systems Biology and Laboratory of Biological Engineering; Karolinska Institutet, Department of Surgery, Stockholm; University of Geneva, Molecular Biology; University of Neuchâtel, Department of Psychology; Baveno Cooperation (EASL Research Consortium); University Hospital of Bologna, Department of Internal Medicine; University of Freiburg, Germany; Crick Institute London, UK; Harvard Medical School; Institute of Immunology and Department of Pathology University of Cambridge; Kennedy Institute, University of Oxford; Department of Radiology, Jefferson University, USA; Department of Hepatology and Liver Transplantation, Mayo Clinic Rochester, USA; Liver Unit, Hospital Clinic, Barcelona, Spain; SCCS (Swiss Hepatitis C Cohort Study); STCS (Swiss Transplant Cohort Study); LITMUS Study, DILI Registry Study (Prospective European Drug induced liver injury Registry); ERN Rare-Liver (European Reference Network – Rare liver diseases)

### Grants

- MCID-funded patient-focused project: Early detection for early action: integrating multiple data sources for monitoring the SARS-CoV-2 epidemic in near real-time (Prof. G. Beldi, Co-Lead, total CHF 960'000)
- SF (strategic financial support) medical faculty: Towards reducing infections after healthcare-associated interventions (Prof. G. Beldi, CHF 750'000)
- Aclon Foundation: DNA replication profiles in liver regeneration as a function of age in mice (Prof. D. Stroka and Prof. D. Candinas, CHF 350'000)
- SNF: SINERGIA Dynamic consortium interactions that establish the microbiota during weaning (Prof. A. Macpherson, CHF 3'180'579)
- SNF: Development of functional secretory IgA responses against the intestinal microbiota (Prof. A. Macpherson, CHF 1'100'000)
- SNF: The impact of maternal microbiota and breast milk on host epigenetics and immune repertoire in the offspring (Prof. S. Ganal-Vonarburg, CHF 862'839)
- SNSF SAR (Scholars at Risk) IZSEZO\_211875: Surveillance of primary liver cancer in non-alcoholic fatty liver disease (Dr. A. Cottier, Prof. A. Berzigotti, CHF 110'000)
- Swiss Cancer League: Predictive value of modern magnetic resonance imaging techniques with regard to tumor grading, microvascular infiltration and outcome in patients with newly diagnosed hepatocellular carcinoma, (Prof. M. Maurer, Prof. A. Berzigotti, PD Dr. A. Lachenmayer, M. Montani, CHF 57'300)
- UniBE Doc.Mobility (Dr. Mirjam Kolev, CHF 63'076)



### Development of a Non-Invasive Live Microbial Recording System Using CRISPR Cas

A study published in Science by the research groups of A. Macpherson and R. Platt describes how live intestinal microbes can be harnessed to record segments of DNA through an engineered system of CRISPR Cas that record the gene expression profiles of the test microbes as they pass through the intestinal tract. Because DNA is stable, the 'experience' of the microbes in the small intestine and colon - areas that are normally inaccessible to endoscopes without fasting or purging - can be decoded from the recorded sequences in stool samples. Because the different gene systems of the test microbes are so flexible, this will allow us to detect the nutritional state and health of the intestinal tract in a non-invasive way, replacing hundreds of different current tests with one pass.

### The StOP? Study Has Started

The department for Visceral Surgery and Medicine has initiated a multicentric study aiming to understand if intraoperative briefings within the surgical team reduce postoperative mortality. In this cluster randomized clinical trial 400 surgeons will be recruited from various surgical departments in Switzerland and abroad to be randomized in an intervention and control group. The briefings are designed to improve exchange of critical information among persons working in the operative room and thereby optimize individual task performance.

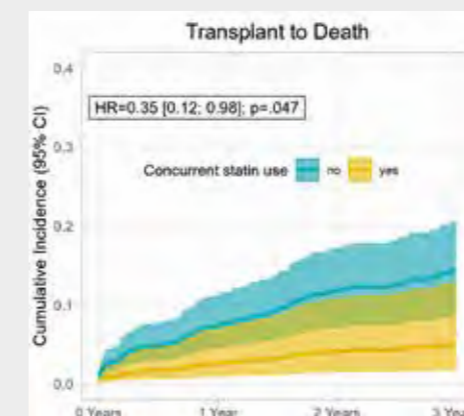


### Stern-Gattiker Prize to Vanessa Banz

The Swiss Academy of Medical Sciences (SAMS) has launched the Stern-Gattiker Prize to make female role models visible and to motivate more young women to pursue an academic career. This year, PD Dr. med. Dr. phil. Vanessa Banz was honoured and awarded. As a senior surgeon for visceral and transplant surgery at the Inselspital, she shows an impressive commitment to promoting younger employees. She received this year's Stern-Gattiker Prize together with Prof. Susanne Wegener (University Hospital Zurich).



PD Dr. med. Dr. phil. Vanessa Banz



### Use of Statins in Liver Transplanted Patients Is Associated with Improved Survival

Statins are inhibitors of 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase widely used in the treatment of dyslipidemia. Part of the benefits of statins in cardiovascular disease and in chronic liver disease are due to their pleiotropic effects on endothelial function. In the experimental liver transplantation (LT) setting, statins protect against ischemia/reperfusion injury, and prolong graft preservation. The study group hypothesized that use of statins in LT recipients may protect from adverse outcomes and conducted a study in all LT adult patients included in 2008-2019 in the Swiss Transplant Cohort Study (n=998) to investigate this. Using a multistate model, the study found that use of statins in LT recipients is associated with improved survival (Figure). Statins were also strongly associated with reduced incidence of recurrent complications and extrahepatic tumors. This data supports the routine use of statins after LT.

## Clinics at the University Hospital, Universitäre Psychiatrische Dienste (UPD)

University Hospital of Old Age Psychiatry and Psychotherapy  
University Hospital of Child and Adolescent Psychiatry and Psychotherapy  
University Hospital of Psychiatry and Psychotherapy



# University Hospital of Old Age Psychiatry and Psychotherapy

Murtenstrasse 21, 3008 Bern  
www.upd.unibe.ch



Prof. Stefan Klöppel, PD Dr. Jessica Peter, Prof. Michael Orth, PD Dr. Anna-Katharine Brem, PD Dr. Jacob Lahr, PD Dr. Severin Pinilla, Dr. Marc Züst

## Profile

- Teaching students studying medicine, pharmacy, psychology, and "Artificial Intelligence in Medicine" as well as PhD students at the Graduate School for Health Science
- 5 research groups
- Investigation of retrospective as well as prospective memory with cognitive assessment, brain imaging, and non-invasive brain stimulation in healthy aging and cognitive impairment
- Application of tablet-based cognitive training in cognitive impairment
- Improvement of sleep to enhance cognition in old age
- Aim: Development and validation of non-pharmacological interventions to counteract cognitive decline
- External partners: Institute of Psychology, University of Bern, Switzerland; Department of Neuroradiology, University of Zurich, Switzerland; SleepLoop Consortium, University of Zurich/ETH Zurich/University of Ulm; Department of Basic Psychological Research and Research Methods, University of Vienna, Austria; Cobtek (Cognition, Behavior, Technology) Research Lab, University Cote d'Azur, France; Neuroscience Center, University of Geneva, Switzerland; German Research Center for Artificial Intelligence (DFKI), Saarbrücken, Germany; Department of Psychiatry, University of Oslo, Norway; Max-Planck Institute of Psychiatry, Munich, Germany; Technical University, Munich, Germany; University of Eastern Finland, Kuopio, Finland; Department of Psychiatry, Monash University, Victoria, Australia; Department of Psychiatry, University of Sao Paulo Medical School, Sao Paulo, Brazil; Lyon Neuroscience Research Center, Lyon, France

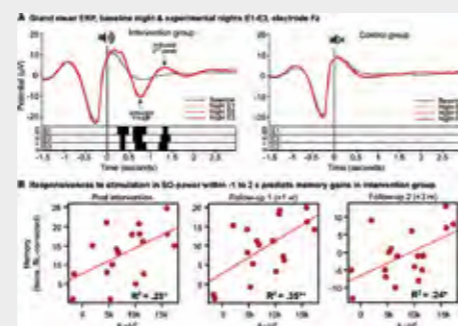
## Grants

- Swiss National Science Foundation (32003B\_189240,100014\_185105,191026)
- Synopsis Foundation
- Velux Foundation
- Bangerter-Rhyner Foundation
- SISF (Sitem Insel Support Funds)
- Age Foundation

## Highlights

### Better Sleep Leads to Better Memory

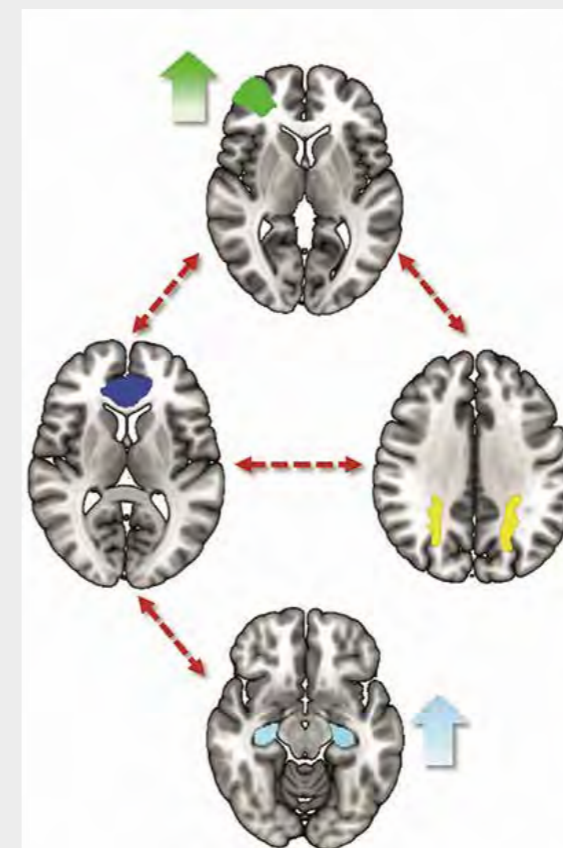
As we age, our sleep quality decreases. This is part of normal aging, but if this decrease becomes severe, it can be a warning-sign of imminent dementia. At the same time, dementia leads to an even more decreased sleep quality, leading to faster progression of dementia. This vicious cycle must be broken, and one way to do it could be by increasing sleep quality. In an ongoing study, we use a technique of presenting sounds to sleeping individuals to boost their sleep quality. First results show that some participants respond well to this treatment, showing stimulation-induced increased slow oscillatory (SO) power was associated with better memory. Other participants, however, do not seem to benefit from this treatment and may even get disturbed by the sounds. In a new study, we want to explore this dynamic further to find the optimal way of using sound treatment during sleep as a tool to delay the onset of dementia.



Physiological response to auditory stimulation during slow wave sleep predicts memory benefits. A Auditory stimulation induced physiological responses in the intervention-, but not the control group. B Magnitude of physiological responsiveness to auditory stimulation predicts memory gains after intervention and at follow up.

### The Left – but not the Right – Prefrontal Cortex Contributes to Episodic Memory Formation

The role hemispheric lateralization in the prefrontal cortex plays for episodic memory formation is debated. In a randomized, double-blind, and sham-controlled design, healthy young participants (n = 254) performed 2 runs of encoding followed by a free recall. To resolve competing hypotheses about the contribution of each hemisphere, we modulated left or right dorsolateral prefrontal cortex (DLPFC) activity using transcranial direct current stimulation during encoding (1 mA for 20 min). With stimulation of the left DLPFC, but not the right DLPFC, encoding and free recall performance improved. The left DLPFC influences how successful new episodic memories are established, possibly by enhancing activity a network containing the left DLPFC (green), the anterior cingulate cortex (dark blue), the parietal cortex (yellow), and the hippocampus (light blue). Increased activity in the left DLPFC will lead to increased activity in the hippocampus, thereby increasing episodic memory formation.



Model of how episodic memories may be established in the brain. Increased activity in the left dorsolateral prefrontal cortex (green) may lead to activity changes in the anterior cingulate cortex (dark blue) and the parietal cortex (yellow), finally leading to increased activity in the hippocampus (light blue).

### Newsletter Research Old Age Psychiatry

To increase outreach, particularly into the lay community, we have started a quarterly newsletter presented in turn by each of our research groups (see example). Please go to [www.memory-clinic-bern.ch/forschung](http://www.memory-clinic-bern.ch/forschung) for archived newsletters and to sign up.



Quarterly newsletter of the Department of Old Age Psychiatry and Psychotherapy (here: April issue)

# University Hospital of Child and Adolescent Psychiatry and Psychotherapy

University Psychiatry Department (UPD), Haus A, Bolligenstrasse 111, 3000 Bern 60  
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Prof. Michael Kaess | Dr. Marialuisa Cavelti | Prof. Jochen Kindler | Dr. Leila Tarokh | PD Dr. Chantal Michel

## Profile

- 5 research groups, 32 staff members
- Investigating mental disorders with an onset during childhood and adolescence up to emerging adulthood
- Focus on: neurobiological mechanisms, early precursors, innovative treatment development, psychotherapy research, E-mental health
- Teaching students of Medicine and Psychology at all educational levels
- External Partners: Institute of Psychology, University of Bern; Department of Child and Adolescent Psychiatry, University of Basel; Department of Economics, University of Zurich; Developmental Clinical Psychology Research Unit, University of Geneva; Department of Child and Adolescent Psychiatry, Heidelberg University, Germany; Centre for Psychotherapy Research, University Hospital Heidelberg, Germany; Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, University of Cologne, Germany; University Hospital of Child and Adolescent Psychiatry, Medical University Vienna, Austria; Orygen, The National Centre of Excellence in Youth Mental Health, University of Melbourne, Australia; School of Psychiatry, University of New South Wales, Australia; Department of Psychiatry and Human Behavior, Brown University, USA; Child Psychiatry Branch, National Institute of Mental Health, USA; Upstate Medical University, USA; Department of Psychology, University of Sussex, UK; Department of Psychology, University of Oregon, USA; School of Psychology, University of Sussex, UK

## Grants

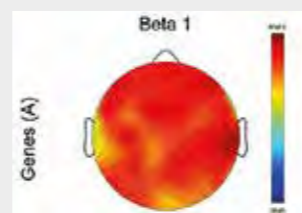
- Interfaculty Research Cooperation Grant - Decoding Sleep: Sleep subtypes in adolescent depression: Sleep physiology and treatment (Ongoing; PI: Dr. Tarokh)
- SNF Project Grant (182639): Neurobiological Mechanisms of Pain Dependent Stress-Regulation in Adolescent Non-Suicidal Self-Injury (Ongoing; PIs: Prof. Kaess & Prof. Koenig)
- SNF Project Grant (184943): Sleep Neurophysiology: A Window onto Adolescent Mental Health (Ongoing; PI: Dr. Tarokh)
- SNF Project Grant (197714): Course and burden of risk symptoms and criteria of psychosis in the community: 5- to 10-year follow-up of the Bern Epidemiological At-Risk (BEAR) and the Bi-national Evaluation of At-Risk Symptoms in children and adolescents (BEARS-Kid) studies (Ongoing; PI: Dr. Michel)
- SNF Project/Flexibility Grant (193279/2): A smartphone-based ecological momentary assessment and intervention for adolescents with auditory verbal hallucinations (Ongoing; PI: Dr. Cavelti)
- SNF Project Grant (192623): Aberrant local brain oscillations and cortical connectivity in the prodromal state and early psychosis – a TMS-EEG study (Ongoing; PI: Prof. Kindler, PD Dr. med. Morishima)
- UniBE Initiator Grant (Ongoing; Dr. Mürner-Lavanchy)
- Ebnet-Stiftung: A smartphone-based ecological momentary assessment and intervention for adolescents with auditory verbal hallucinations (Ongoing; PI: Dr. Cavelti)

## Highlights

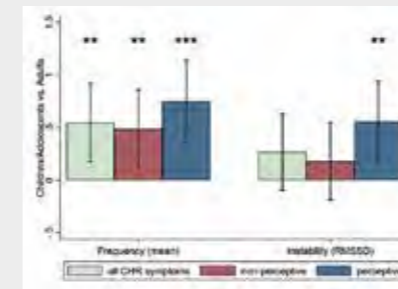
### REM Sleep Highly Heritable in Adolescents

Alterations of rapid eye movement (REM) sleep have long been observed in patients with psychiatric disorders and proposed as a biomarker. Using a twin design, we observe a strong genetic contribution to REM sleep EEG power in early adolescence, establishing REM sleep neurophysiology as a potentially strong endophenotype.

[Markovic, Kaess and Tarokh, Transl Psychiatry, 2022.](#)



Topographic map showing that genes contribute to almost all the variance in REM sleep power in the Beta band (16.2-20 Hz).

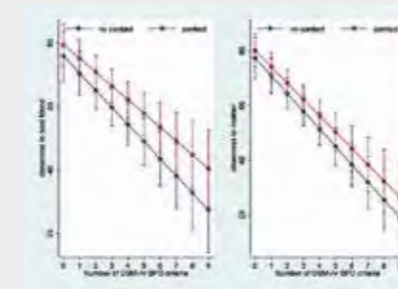


Age effect on frequency (left) and instability (right) of perceptive and non-perceptive CHR symptoms

### An Ecological Momentary Assessment (EMA) Study of Age Effects on Perceptive and Non-Perceptive Clinical High-Risk (CHR) Symptoms of Psychosis

EMA was used in a sample of an early detection for psychosis service in Bern, Switzerland (N = 66; 11-36 years). Analysis on the frequency of CHR symptoms revealed a significant effect of age and the interaction CHR symptoms x age for perceptive/non-perceptive symptoms. The interaction between CHR symptoms x age for stability of perceptive symptoms was also significant. Our finding suggests that with advancing age and more stability of CHR symptoms, clinical relevance increases.

[Michel, ..., Kaess, Kindler, Eur Child Adolesc Psychiatry, 2022.](#)

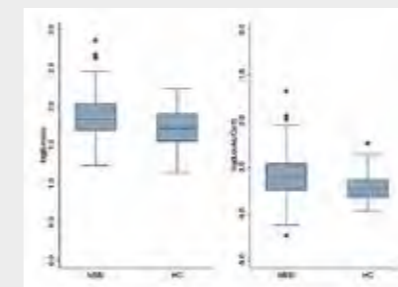


Feelings of closeness in relation to contact (yes/no) and the number of BPD criteria

### Object Constancy in Adolescents With Borderline Personality Disorder (BPD) Pathology

Interpersonal difficulties are a core feature of BPD that may result from an insufficient capacity to maintain feelings of closeness (FC) when a person is absent. This study explored FC toward the mother and the best friend in 52 female adolescents (14 to 18 years). We found a positive association between the number of BPD criteria and the difficulty to maintain FC toward the best friend, but not the mother, in their absence. The results point toward insufficient object constancy in adolescents with BPD pathology that becomes apparent in their peer relationships.

[Seiffert, Cavelti, ..., Kaess, Personal Disord., 2022.](#)

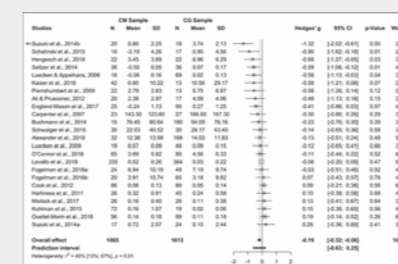


Leukocyte and Leukocyte/cortisol ratio in adolescents with and without (HC) NSSI

### Increased Immunological Markers in Female Adolescents with Non-Suicidal Self-Injury (NSSI)

We investigated immunological markers in a large sample of female adolescents with and without NSSI. We found elevated leukocyte/cortisol ratio in those with NSSI. Childhood maltreatment and depression scores were significantly associated with the leukocyte/cortisol ratio. Our results suggest that immune activation can be detected in females with NSSI and childhood maltreatment and depression may underlie this activation.

[Kindler, ..., Kaess, J Affect Disord, 2022.](#)



Forest plot for delta cortisol assessed in the context of a stressor comparing child maltreatment and control groups

### The Human Stress Response is Affected by Childhood Maltreatment

We conducted a systematic review and meta-analysis on the association between childhood maltreatment and alterations of the hypothalamus-pituitary-adrenal axis. Results revealed that the cortisol response to acute stress is significantly attenuated in those individuals with a history of childhood maltreatment. The meta-analysis confirms theories suggesting a link between maltreatment and maladaptive development of biological stress responses.

[Schär, ..., Kaess, Front Neuroendocrinol, 2022.](#)

# University Hospital of Psychiatry and Psychotherapy

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[www.upd.unibe.ch](http://www.upd.unibe.ch)



Prof. Werner Strik   Prof. Thomas Dierks   Prof. Sebastian Walther   Prof. Katharina Stegmayer   Prof. Franz Moggi   Prof. Daniela Hubl   Prof. Leila Maria Soravia   Prof. Thomas König

## Profile

- Teaching students of medicine, biomedical science, and psychology within the curriculum, supervision of masters and doctoral theses projects, as well as teaching at various graduate schools at the University of Bern
- 17 research groups
- Clinical translational research topics include psychosis pathophysiology and treatment, sleep, addiction, stress, and depression
- Aims: understand the etiology and pathophysiology of psychiatric disorders and develop novel non-pharmacological treatment options
- External partners: Dept. of Psychiatry, Northwestern University, Chicago, USA; Dept. of Psychiatry, Vanderbilt University, Nashville, USA; Dept. of Psychiatry, Philipps-University Marburg, Germany; Dept. of Psychiatry, Karolinska Institute, Stockholm, Sweden; Dept. of Psychiatry, University of Freiburg, Germany; Dept. of Psychiatry, University of Würzburg, Germany; University of Amsterdam, The Netherlands; University of Milano, Italy; Depts. of Psychiatry, University of Basel and University of Zurich; Neurocenter of the University of Lugano

## Grants

- SNF: 184717/182469/184943/189058/192623/180022/179451/159286/207822/200524
- NIH: R01MH118741
- Swiss Health Promotion Foundation (No. 20.189.K50003), Swiss Foundation for Alcohol Research (No. 283, 303 and 328)
- Fondation Adrian et Simone Frutiger, Novartis Foundation for medical-biological research (19A063), Velux-Foundation, Gesundheitsförderung Schweiz, Volkswagen-Foundation, Synapsis Foundation, Swiss Life Jubiläumsstiftung, Robert-Enke Stiftung
- IRC University of Bern

## Highlights

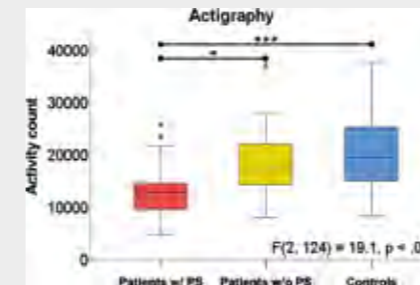
### Brain Activation Predicts Drinking Outcome in Alcohol Use Disorder

In alcohol use disorder, treatment of patients with high craving often fails due to an inability to inhibit drinking behaviour. In an fMRI-study, we investigated whether alcohol-specific inhibition training modulates the neuronal substrates of cognitive control and whether it is predictive for drinking outcome. Higher alcohol-related brain activations in two neighbouring right inferior frontal lobe regions correlated positively with craving and were predictive for a beneficial drinking outcome. The alcohol-specific inhibition activation was not affected by the training, merely inhibition in general.

Grieder et al., doi: 10.3389/fpsy.2022.909992.



Inferior frontal regions are crucial for craving and drinking outcome.



Slowed SCZ patients as defined by expert rating show lower objective activity

### Behavioral Mapping in Psychomotor Slowing in Psychosis Suggest Distinct Psychobiology

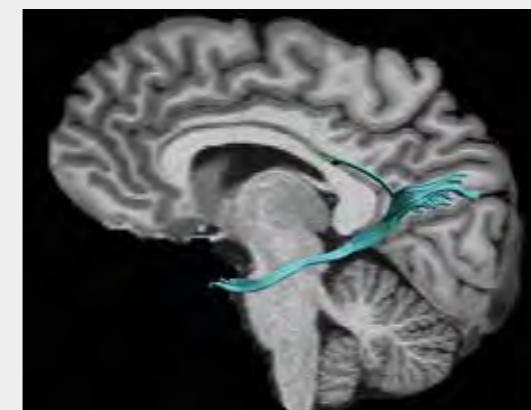
Psychomotor slowing (PS) in psychosis has deleterious effects on patient outcomes. The study tested characteristics across behavioral dimensions utilizing self-report, expert ratings, actigraphy, gait analysis and tests of manual dexterity. Actigraphy and expert ratings distinguished patients with and without psychomotor slowing, indicating distinct pathobiology among patients with psychosis. Slowing seems to characterize a subgroup of psychosis, detectable with objective motor assessments

Nadesalingam et al., doi: 10.1093/schbul/sbac170.

### Hippocampal Network Alterations Are Associated with Avoidant Attachment in Depression

Insecure attachment predisposes to develop depression. The hippocampus forms episodic memory of events with emotional significance, processes that in turn affect attachment behaviour and depression. We investigated the structural correlates of insecure attachment in patients with depression. Insecure attachment was associated with depression severity and high attachment avoidance was associated with smaller hippocampi and with connectivity alterations in the parahippocampal cingulum. Our results suggest a role of the hippocampal network for avoidant attachment in depression.

Bracht et al., <https://doi.org/10.1016/j.jadr.2022.100435>.

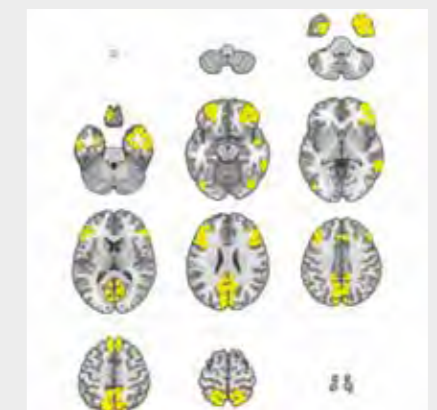


Parahippocampal cingulum fibre tracts (light blue) associated with avoidant attachment

### EEG Microstates During Dream-like Experiences at the Transition to Sleep

The veracity of conscious content is vital for our functioning but lost during decreased wakefulness (e.g., dreaming). By studying spontaneous EEG microstates in hypnagogic states, we found two brain networks that correlated with situational awareness and control (reflective consciousness) vs. mere experiencing something (phenomenal consciousness). This finding may help understand problematic non-veridical contents of consciousness such as hallucinations and delusions.

Diezig et al., doi: 10.1007/s10548-022-00923-y.

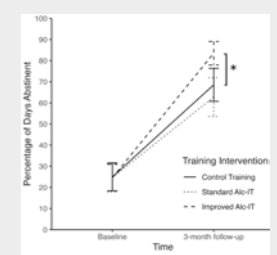


Source localisation of the EEG microstate class accounting for reflective consciousness

### Inhibition Training in Alcohol Use Disorder

Striving to enhance treatment outcome in alcohol-use disorder (AUD), a newly developed alcohol-specific inhibition training was tested in 242 patients with severe AUD in a clinical randomized-controlled trial. The training significantly increased days abstinent at 3 months after treatment discharge. This finding suggests that such a computerized training might be an effective and cost-efficient add-on to treatment as usual.

Stein et al., doi: 10.1111/add.16104.



Change in days abstinent with our novel alcohol-specific inhibition training

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For the annual report 2022 in pdf-format:

