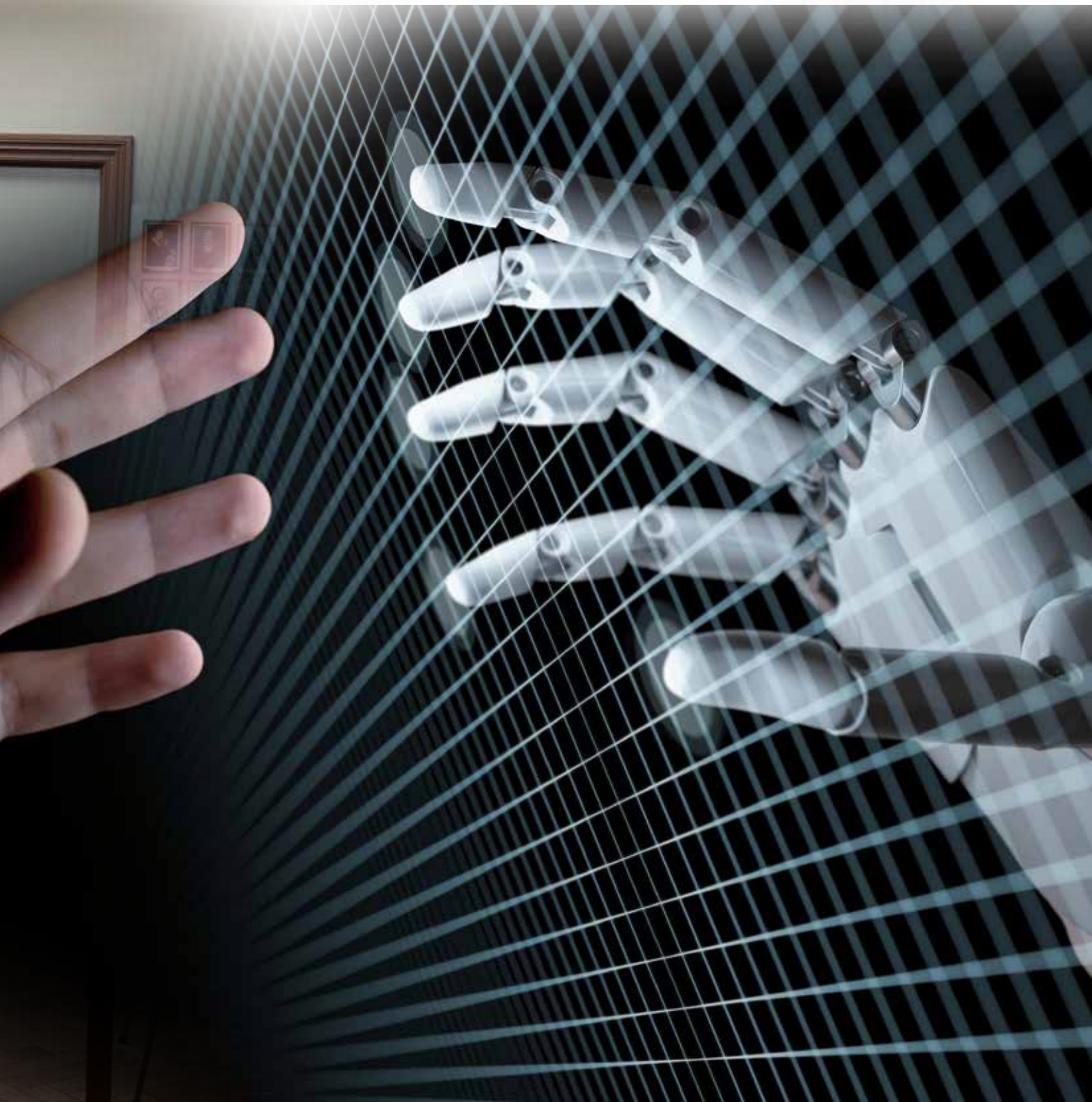


Annual Report 2021



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Foreword

The University of Bern was founded in 1834 including a Medical Faculty from the very beginning. Many personalities of our faculty had an impact on modern medicine including 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 20th century), the neurologist Marco Mumenthaler, and the anatomist Ewald Weibel.

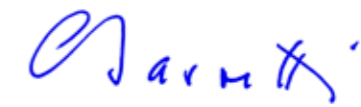
Today, the Medical Faculty offers a full program of study in Human and Dental Medicine, as well as Master studies in Biomedical Sciences, Biomedical Engineering, Pharmacy and Artificial Intelligence in Medicine. With a budget of almost 200 million francs we support the academic activities of 39 clinics and 15 institutes, over 2'200 students (the largest number in Switzerland) and 300 full, associate or assistant professors. The faculty is ranked top 3 in Switzerland, top 35 in Europe and top 76-100 worldwide (Shanghai, THE and QS 2021).

The Medical Faculty looks back on a very successful academic year with the publication of 2'431 original articles, 141'973 hours of teaching and over 84 million francs in extramural funding (33 from the Swiss National Science Foundation).

- The highlights of 2021 include the following:
The publication of a Strategy 2030 (including vision, mission, long-term strategic goals and functional strategies)
- Anne-Françoise Auberson Nordmann, Crésuz, a pioneer in the field of rare diseases in Switzerland, was awarded the honor of Doctor honoris causa
- 13 new professors (six women, seven men) were appointed
- a new strategic and competitive funding for interdisciplinary research cooperations was launched and accorded by the Faculty for three years to the projects on "multi-omics and head and neck squamous cell carcinomas" and "digital neuroscience"
- the large interfaculty research cooperations "Decoding Sleep" and "One Health" were extended by the university for two more years
- six teachers of the year (one for each year of study) and one faculty member in recognition of excellence in teaching were elected for the first time

- the new platforms CAIM (Center of Artificial Intelligence in Medicine) and NeuroTec at sitem-insel were inaugurated to each shape the digital healthcare future and offer novel technologies for tele-neuromedicine.

I hope you enjoy reading this report and I would like to thank all scientists, employees, students and partners of the Medical Faculty of Bern for their outstanding commitment and support.



Claudio Lino Alberto Bassetti
Dean, Medical Faculty, University of Bern

Highlights and Numbers

Highlights 2021

Other Outstanding Publications

Awards and honors

The Medical Faculty in Numbers

SF-Board Projects 2021

Interfaculty Research Cooperation

NeuroTec

SF Board Projects

Highly Cited Researchers 2021

Top 5 Departments of the Inselspital and Institutes of the Medical Faculty 2020

Strategy 2030 of the Faculty

Highlights 2021

January 2021



7.1.2021 - Persistent Lung Damage after Covid-19

The nationwide study was initiated by PD Dr. med. Manuela Funke-Chambour at the Department for Pulmonary Medicine of the Inselspital, in collaboration with the Department for BioMedical Research (DBMR) of the University of Bern and for the first time, there has been discovered that severe Covid-19 can result in prolonged impairment of oxygen uptake in the lungs even after four months. Long-term monitoring and treatment of these patients is urgent and important.

Guler SA et al., Pulmonary function and radiological features four months after COVID-19: first results from the national prospective observational Swiss COVID-19 lung study. Eur Respir J 2021



11.1.2021 - 4D-Simulator Breakthrough in Brain Surgery

Aneurysm operations in the brain rank among the most delicate procedures in neurosurgery. A new training technology codeveloped between the Department of Neurosurgery of the Inselspital and ARTORG Center of the University of Bern, will further improve patient safety during future procedures: A new 4D simulator enables planning, testing and optimization of the procedure on an exact 4D model, which also emulates the blood, blood vessels and pulse.

Fredrick Johnson Joseph (I) ARTORG Center and Dr. med. David Bervini, Department of Neurosurgery

www.venturekick.ch

20.1.2021 - Newly Founded: A Multidisciplinary Center for Research into Infectious Diseases and Immunity

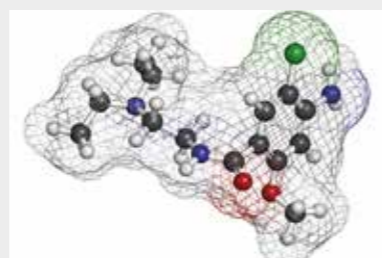
The University of Bern establishes a multidisciplinary center to study the origin and course of infectious diseases and their impact on health, society and economics. The new research center is to receive some 30 million Swiss Francs financial support from the Vinetum Foundation over a period of 10 years.



25.1.2021 - Metoclopramide Treatment Blocks CD93-Signaling-Mediated Self-Renewal of Chronic Myeloid Leukemia Stem Cells

A research team from the Department of Medical Oncology of the Inselspital and the Department for BioMedical Research (DBMR) of the University of Bern has identified and investigated an agent that can effectively inhibit the proliferation of leukemia stem cells. The drug metoclopramide (MPR), used as an antiemetic, specifically interrupts the CD93 signaling pathway, which only leukemia stem cells use to proliferate. This opens up a therapeutic approach using MPR to selectively eliminate leukemia stem cells.

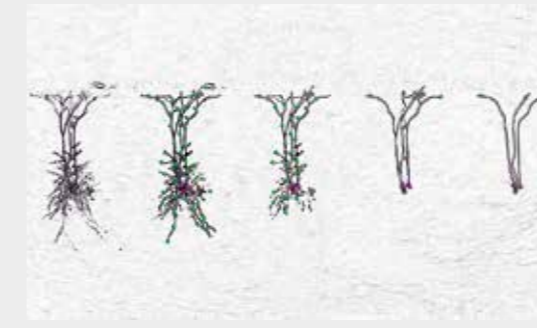
Riether et al., Metoclopramide treatment blocks CD93-signaling-mediated self-renewal of chronic myeloid leukemia stem cells. Cell Reports 34,108663; Jan 26, 2021.



27.1.2021 - A NEAT Reduction of Complex Neuronal Models Accelerates Brain Research

Unlike their simple counterparts in artificial intelligence (AI) applications, neurons in the brain use dendrites – their intricate tree-like branches – to find relevant chunks of information. Now, neuroscientists from the Department of Physiology of the University of Bern have discovered a new computational method to make complex dendrite models much simpler. These faithful reductions may lead AI applications to process information much like the brain does.

Wybo WAM et al., Data-driven reduction of dendritic morphologies with preserved dendro-somatic responses. eLife, Jan 26 2021.



29.1.2021 - Well on the Way to a Permanent Professorship

The funding scheme Eccellenza of the Swiss National Science Foundation SNSF enables highly qualified researchers to implement their projects as an assistant professor at a Swiss university. Here, we present the four award-winning researchers: Maria Balmer, Jessica Bastiaansen and Sofia Zambrano are the researchers from the Medical Faculty who will deepen their research at the University of Bern as part of the SNSF Eccellenza program. Their projects won the competition in a nationwide bidding process. Their scientific disciplines range from medicine to the humanities.



SNSF Eccellenza Professorial Fellowships

February 2021



2.2.2021 - Biomedical Basis of the Barker Hypothesis Revealed

A research group from the Department of Nephrology and Hypertension of the Inselspital and the Department for BioMedical Research (DBMR) of the University of Bern published a comprehensive study on prenatal causes of kidney disease in adults in "Nature Communications". The finding: The serum protein Fetuin-A plays a central role in managing local inflammation and microcalcifications in the fetal kidney, which has implications for kidney function in adulthood. The study results provide evidence for clinical use of Fetuin-A in renal disease.

Rudloff S et al., Fetuin-A is a HIF target that safeguards tissue integrity during hypoxic stress Nat Commun. 2021 Jan 22;12(1):549.

8.2.2021 - Researchers Create Sophisticated Lung-on-Chip

In collaboration with the Department of Pulmonary Medicine and the Department of General Thoracic Surgery of the Inselspital, researchers from the ARTORG Center for Biomedical Research of the University of Bern have developed a second-generation lung-on-chip model with life-size dimension alveoli in a stretchable membrane, made of purely biological material. The new model reproduces key aspects of the lung tissue architecture not found in previous lungs-on-chip. This opens up new possibilities for basic pneumological research, understanding lung pathologies, drug screening and precision medicine.

[Zamprogno P et al., Second-generation lung-on-a-chip with an array of stretchable alveoli made with a biological membrane, Commun Biol. 2021 Feb 5;4\(1\):168.](#)



Pauline Zamprogno in the ARTORG Center's Organs-on-Chip Culture Lab.

4.2.2021 - Only 14% of the Bernese Population have Antibodies against Coronavirus

In the canton of Bern, only 14% of the adult population were infected with the coronavirus and developed antibodies against SARS-Cov-2. These are the preliminary results of a seroprevalence study coordinated by the Swiss School of Public Health and carried out in Bern by the University of Bern in cooperation with the Inselspital.



The Corona bus in Brienzwiler
©Corona Immunitas Bern

March 2021

3.3.2021 - How to track the Variants of the Pandemic faster

A global group of researchers is calling for better integration of viral genetics, bioinformatics, and public health to enable better pandemic response now and better pandemic preparedness in the future. In a comment piece in the journal Nature, an international collaboration of specialists in viral and genetic analysis lay out the 'bioinformatics bottlenecks' that are hindering response to the SARS-CoV-2 pandemic, and propose ways to 'clear the road' for better tools and approaches. The analysis is led by Swiss scientists Dr. Emma Hodcroft at the Institute of Social and Preventive Medicine (ISPM) of the University of Bern and Prof. Christophe Dessimoz at the University of Lausanne, both at the SIB Swiss institute of Bioinformatics, alongside Dr. Nick Goldman at EMBL-EBI in the UK.

[Emma B. Hodcroft et al., Want to track pandemic variants faster? Fix the bioinformatics bottleneck, Nature Comment, 1 March 2021.](#)

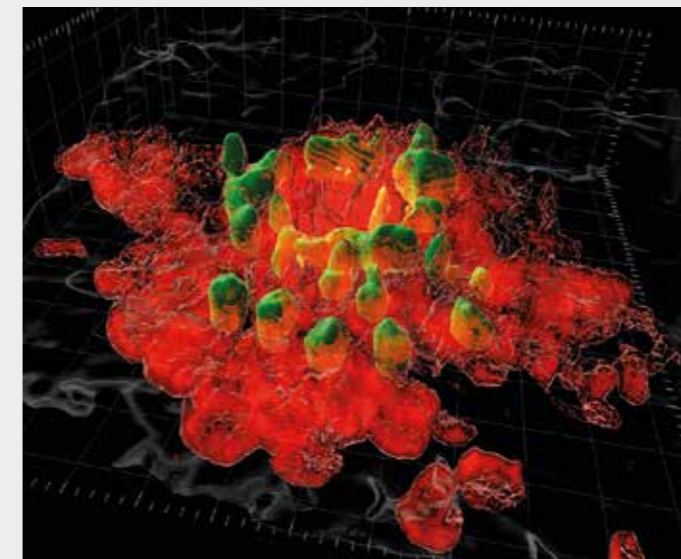


Emma Hodcroft, PhD ©Oliver Hochstrasser

5.3.2021 - Controlling Adhesions in the Abdomen

Adhesions are scars in the abdomen occurring after surgery and often having serious consequences. Now, researchers from the Department for BioMedical Research (DBMR) of the University of Bern and the Department of Visceral Surgery and Medicine of the Inselspital, in collaboration with Canadian researchers, have discovered how such adhesions form. The findings may help to develop a drug to prevent adhesions in the future. The study was published as the cover story of "Science magazine".

[Zindel J et al., Primordial GATA6 macrophages function as extravascular platelets in sterile injury, Science. 2021 Mar 5;371\(6533\):eabe0595.](#)



Prof. Dr. med. Adrian Ochsenbein, Director and Chief Physician of the Department of Medical Oncology and Dr. phil. nat. Sabine Höpner, Department for BioMedical Research (DBMR)

16.2.2021 - Targeted Elimination of Leukemic Stem Cells

Cancer research in Bern has discovered a further mechanism to combat leukemia: a research team at the Department of Medical Oncology of the Inselspital and the University of Bern has succeeded in identifying an important signaling pathway for regulating leukemic stem cells. With this discovery, the researchers are expanding the arsenal of potentially highly effective drugs against leukemias ("blood cancers").

[Höpner S et al., LIGHT/LTBR signaling regulates self-renewal and differentiation of hematopoietic and leukemia stem cells, Nat Commun. 2021 Feb 16;12\(1\):1065.](#)

6.3.2021 - Graduation Ceremony of the Medical Faculty



Also this year, the Medical Faculty had to cancel the event due to Corona. Nevertheless, following grants have been awarded:

Faculty awards for the three best dissertations of the year 2020

1st price - Mr. Dr. Josef PRAZAK for the Dissertation „Bacteriophages Improve Outcome in Experimental Staphylococcus Aureus Ventilator Associated Pneumonia“ under the direction of Mr. Prof. Dr. Yok-Ai Que, Department of Intensive Care Medicine, Inselspital

2nd price - Mrs. Dr. Maria Karolina DE MONTMOLLIN for the Dissertation „L-thyroxine therapy in older adults with subclinical hypothyroidism and hypothyroid symptoms: secondary analysis of a randomized trial“ under the direction of Mr. PD Dr. Martin Feller and Prof. Dr. Nicolas Rodondi, Institute of Primary Healthcare, University of Bern

3rd price - Mr. Dr. Jon BRUGGER for the Dissertation „Transmission of and susceptibility to seasonal influenza in Switzerland from 2003 to 2015“ under the direction of Mr. PD Dr. Christian L. Althaus, Institute of Social and Preventive Medicine (ISPM), University of Bern

Recognition Prize of the Dental Society SSO

For outstanding achievements in the study of dentistry
No award in 2020, planned again in 2021

Prize of the Medical Society of the Canton of Bern

For the best Federal examinations in human medicine 2020
Best Candidate for CS Examination: due to COVID restrictions there was no CS-Examination
Best candidate for the MC-exam: Mr. Nicolas Christoph BURGHERR

CSL Behring Award

For excellence in the Master program Biomedical Sciences
Mrs. Laura Patricia LEUENBERGER & Mrs. Sofie Amanda VON KÄNEL & Mrs. Jasmin Melanie MEIER

Alumni Biomedical Sciences Award

For the best Master's thesis in the Master program Biomedical Sciences
Mrs. Karin Farah RECHBERGER

The RMS Foundation Award

For the best graduate in the Biomedical Engineering Master program
Mr. Adrian RUCKLI

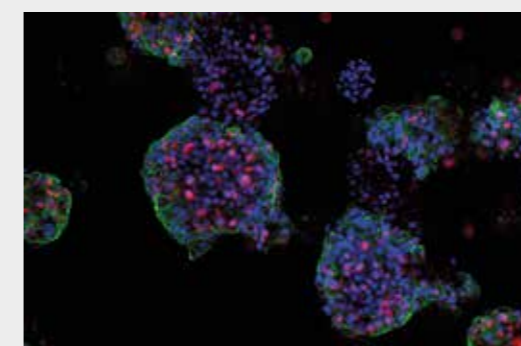
Teachers of the Year 2020

PD Dr. med. Stefan Tschanz, PD Dr. med. Gudrun Herrmann, PD Dr. phil. nat. Franziska Suter-Riniker, PD Dr. med. Yara Banz, Dr. med. Christoph Bosshard, Prof. Dr. phil. Rouven Porz
(see also „Teachers of the year - 6 Masters of Disaster in Corona year“ on page 98)

8.3.2021 - Predicting Success in Therapy with Individualized Cancer Models

Scientists at Urology Research Laboratory of the Department for BioMedical Research (DBMR) of the University of Bern and Urology Department of the Inselspital have established organoid culture models from prostate tumor biopsies. These are small clusters of cells which can be used to test the efficacy of various drugs. In this way, it is possible to test which treatment will most likely benefit individual patients.

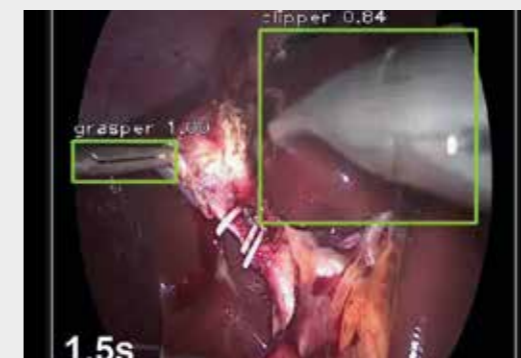
[Karkampouna S, et al. Patient-derived xenografts and organoids model therapy response in prostate cancer. Nat Commun 12, 1117 \(2021\).](#)



12.3.2021 - Artificial Intelligence Assesses Surgical Performance

A research team from various Departments of the Inselspital, the Department for BioMedical Research (DBMR) and the Bern Center for Precision Medicine (BCPM) of the University of Bern and the company caresyntax has succeeded in proving that artificial intelligence (AI) can reliably assess the skills of surgeons. With a three-stage procedure, a method has been presented that correctly assigns good and moderate performance with a high hit rate. This paves the way for further steps towards AI-based expert systems.

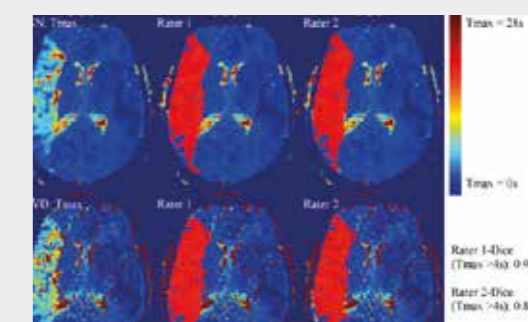
[Lavanchy J et al., Automation of surgical skill assessment using a three-stage machine learning algorithm. Nature Sci Rep. 2021 Mar 4;11\(1\):5197.](#)



Screenshots of the instrument detection algorithm. Green frame with the detection (Clipper and Grasper) and the detection reliability.

9.3.2021 - Treating Brain Stroke more Effectively with Artificial Intelligence

A research team from the Department of Diagnostic and Interventional Neuroradiology of the Inselspital, the Bern Center for Artificial Intelligence in Medicine (CAIM) of the University of Bern and the Centre hospitalier universitaire vaudois (CHUV) uses artificial intelligence to enable faster targeted action after a brain stroke. The project "Advanced Stroke Analysis Platform" (ASAP) works with federated learning, i.e. the databases of both hospital centers are connected "federatively". The project is funded by Innosuisse. AI research will be strengthened by the newly founded Center for Artificial Intelligence in Medicine (CAIM).



AI-powered systems to help save valuable time in acute brain attack

15.3.2021 - Two New Chief Physicians in the Emergency Center for Children and Adolescents

With Dr. med. Keitel and Dr. med. Steiner, two highly qualified and dedicated emergency medicine specialists are taking over as chief physicians in charge of the emergency center for children and adolescents. PD Dr. Keitel and Dr. Steiner complement each other perfectly, both medically and with regard to management and further development of the clinic. The dual leadership model not only promises positive impulses for the entire medical field, it also shows that innovative leadership models have a place in top university medicine.



16.3.2021 - HIV: Increased Weight Gain with TAF Medication

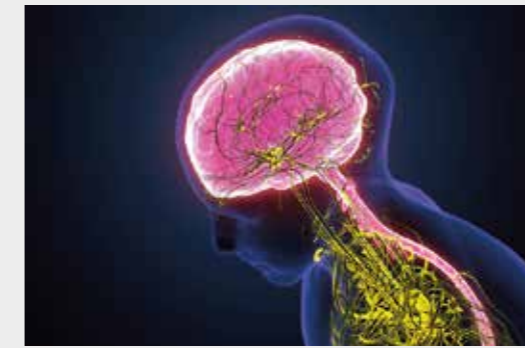
A research team from the Department of Infectious Diseases of the Inselspital has investigated side effects of a standard HIV therapy in the Swiss HIV Cohort Study. Tenofovir alafenamide (TAF) is the most widely used HIV drug today thanks to its good efficacy and tolerability. The study presented has now demonstrated disproportionate weight gain associated with increased blood lipid levels after switching to TAF. With targeted counseling and an individual risk assessment, the possible therapy variants are to be weighed against each other and the patient-specific best solution is to be elicited.

Surial B et al., Weight and Metabolic Changes After Switching From Tenofovir Disoproxil Fumarate to Tenofovir Alafenamide in People Living With HIV: A Cohort Study, Ann Intern Med. 2021 Jun;174(6):758-767.



27.3.2021 - Bernese Neurology in EU-wide Network

International research collaboration: A team of researchers of the Department of Neurology of the Inselspital and the company CSL-Behring in sitem-insel are participating in Bio2Brain, a European network of cutting-edge research. This tackles training, research and translation in the field of safe application of drugs in the central nervous system.



The brain is very well shielded against all kinds of disturbances. Most pathogens, toxins and environmental influences are systematically stopped before they can do any damage. If drugs are now to be introduced into the central nervous system in a targeted manner, new approaches are needed in research and development.

31.3.2021 - Gynecology: Gentle Surgical Interventions without Disadvantages

In a recent study, researchers of the Department of Obstetrics and Gynecology of the Inselspital demonstrate that certain gynecological treatments using minimally invasive surgery do not have any disadvantages in terms of survival. At the same time, it was shown that the minimally invasive methods are significantly less stressful for patients.

Papadia A et al., Minimally invasive surgery does not impair overall survival in stage IIIc endometrial cancer patients, Arch Gynecol Obstet. 2020 Feb;301(2):585-590.

Bogani G et al., Sentinel node mapping vs. sentinel node mapping plus back-up lymphadenectomy in high-risk endometrial cancer patients: Results from a multi-institutional study, Gynecol Oncol. 2021 Apr;161(1):122-129.



19.3.2021 - Center for Artificial Intelligence in Medicine (CAIM) Opens

The Center for Artificial Intelligence in Medicine (CAIM) of the University of Bern and the Insel Gruppe with the partners sitem-insel and the University of Bern Psychiatry Services UPD has been officially inaugurated on March 9, 2021. The virtual opening event offers insights into controversial topics and current research projects on Artificial Intelligence in Medicine. 500 participants connected online.



When Sparks and Grit Bring AI to the Patient

Raphael Sznitman, Director of the Center for Artificial Intelligence in Medicine (CAIM), is a leading expert at the interface between medicine, artificial intelligence (AI), and engineering. On the eve of the CAIM Opening, he talked about his motivation to research AI: "I look for the 'aha' moment in all projects".

<https://www.caim.unibe.ch/>

24.3.2021 - Aspirin not as Effective as Blood Thinner

In a multicenter study led by the University Hospital Basel and the University Geriatric Medicine FELIX PLATTER Basel, a research group with the participation of the University of Basel, the Department of Neurology and the Institute of Diagnostic and Interventional Neuroradiology of the Inselspital, the Institute for Infectious Diseases (IFIK) of the University of Bern and other centers investigated the equivalence of aspirin to blood thinning (anticoagulation). The study shows that aspirin is not equally effective as blood thinning in the case of carotid artery rupture.



Engelter S et al., Aspirin versus anticoagulation in cervical artery dissection (TREAT-CAD): an open-label, randomised, non-inferiority trial, Lancet Neurol. 2021 May;20(5):341-350.



First authors Silvio Steiner (bottom left), Jenna Kelly (top left), Mitra Gultom (top center), Philip V'kovski (top right), and last author Ronald Dijkman (bottom right), Institute of Infectious Diseases (IFIK), University of Bern. © UniBE

31.3.2021 - Why SARS-CoV-2 Replicates Better in the Upper Respiratory Tract

A team of researchers from the Institute for Infectious Diseases (IFIK) of the University of Bern and the Federal Institute of Virology and Immunology (IVI) have assessed virus growth and activation of the cellular defense mechanisms in the respiratory tract. They have shown that natural temperature differences existing in the upper and lower respiratory tract have a profound influence on SARS-CoV-2 replication and subsequent innate immune activation in human cells. The findings can help to develop antiviral drugs and preventive measures.

V'kovski P et al., Disparate temperature-dependent virus-host dynamics for SARS-CoV-2 and SARS-CoV in the human respiratory epithelium, PLoS Biol. 2021 Mar 29;19(3):e3001158.

8.4.2021 - Every Fourth Child Wants Better Pain Treatment

In a large study, the Department of Anaesthesiology and Pain Medicine of the Inselspital conducted research on pain management during surgery in children in twelve centers and four European countries. Analysis of the data revealed a need for optimization in nearly one in four children. The research team discovered ways to reduce the use of opioid painkillers after surgery as a precautionary measure.

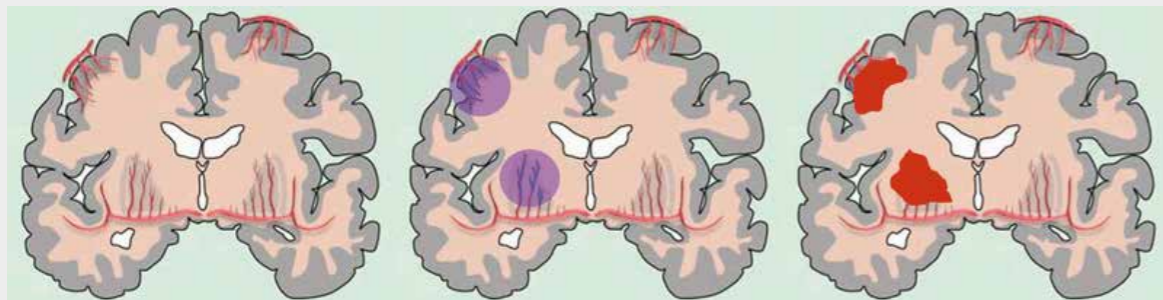


[Stamer U et al., 'Desire for more analgesic treatment': pain and patient-reported outcome after paediatric tonsillectomy and appendectomy Br J Anaesth. 2021 Jun;126\(6\):1182-1191.](#)

8.4.2021 - Blood Thinning is only Secondary Cause of Cerebral Hemorrhage

In collaboration with the University College London, the Department of Neurology and Stroke Center of the Inselspital has clarified the role of blood thinning in cerebral hemorrhage in two coupled studies. The team succeeded in establishing cerebral microangiopathy, a disease of the small blood vessels in the brain, as the primary cause. Thus, the prevention of cerebral hemorrhage must focus on the localization and treatment of microangiopathies. Blood thinning to protect against cerebral stroke is therefore basically an option again in the future.

[Seiffge D et al., Small vessel disease burden and intracerebral haemorrhage in patients taking oral anticoagulants, J Neurol Neurosurg Psychiatry. 2021 Mar 19;jnnp-2020-325299.](#)



Sketch of a normal brain (left) and the two diseases that are the subject of the publication: Microangiopathies (center) and cerebral hemorrhages (right).

22.4.2021 - Preclinical Cancer Research: Electro spray Successfully Tested

A research team from the Department of Pulmonary Medicine and the Department of Medical Oncology of the Inselspital, the Department of Biomedical Research and the Institute of Pathology of the University of Bern and the University of Applied Sciences and Arts Northwestern Switzerland FHNW has succeeded in the local application of cancer drugs directly to tumors. Using a jointly developed, special electro spray device, a massive reduction in the size of aggressive lung cancer tumors was achieved in the preclinical laboratory.

[Ruzgys P et al., Electro spray Mediated Localized and Targeted Chemotherapy in a Mouse Model of Lung Cancer, Front Pharmacol. 2021 Apr 20;12:643492.](#)



5.5.2021 - Sitem-insel School is Reshaping Blended Learning

The Swiss Academy of Engineering Sciences SATW presents in its blog the sitem-insel School. It points out that the sitem-insel School is rapidly expanding its blended learning portfolio and evolving according to the needs of its students. It clearly lives up to its mission – to convert scientific findings into clinical applications. It also reports how the School coped with the challenges COVID-19 poured into the education system, how they develop blended learning programs, their research and start-up activities.



<https://tinyurl.com/mrxxa99j>

6.5.2021 - The University of Bern Welcomes Seven Marie Skłodowska-Curie Fellows

This year, seven researchers are visiting the University of Bern as Marie Skłodowska-Curie Fellows. The "Marie Skłodowska-Curie Individual Fellowships" are an opportunity for experienced researchers to advance their career with a stay in a foreign country. Two of the seven fellows will implement their own research project at the Faculty of Medicine: Dr. Therina du Toit at the Department of BioMedical Research under the supervision of Prof. Michael Grössl with the project "Tracing novel androgen pathways: deciphering the role of 16 α -hydroxylation in human fetal biology (SHOXY)" and Dr. María Constanza Maldifassi at the Institute of Biochemistry and Molecular Medicine (IBMM) under the supervision of Prof. Christine Peinelt with her project "Nicotinic Acetylcholine Receptors nAChRs in Prostate and Colon Cell Cancer: pharmacology, mechanism, cellular (mal)function (AChRs-CRC-PCa)".



Dr. Therina du Toit

Dr. María Constanza Maldifassi

<https://ec.europa.eu/research/mariecurieactions/>

11.5.21 - Hyperoxaluria: Therapy against Rare Metabolic Disease

In an international study with the participation of the Department of Nephrology and Hypertension of the Inselspital, researchers demonstrated the efficacy and tolerability of lumasiran for the treatment of primary hyperoxaluria type 1. This means that for the first time a causal therapy is available for this very rare disease.

[Garrelfs S F et al., Lumasiran, an RNAi Therapeutic for Primary Hyperoxaluria Type 1, N Engl J Med. 2021 Apr 1;384\(13\):1216-1226.](#)



12.5.21 - New Approach to Prevent Brain Damage in Premature Babies

A research group from the Department of Obstetrics and Feto-maternal Medicine of the Inselspital and the Department of BioMedical Research of the University of Bern succeeded in demonstrating that small extracellular vesicles (sEV) from the umbilical cord can prevent damage to brain cells in premature babies. The sEV contents inhibit two signalling pathways preventing myelination. This study shows a new approach to effective prevention of brain damage in premature births.

[Joerger-Messerli M S et al., Human Wharton's Jelly Mesenchymal Stromal Cell-Derived Small Extracellular Vesicles Drive Oligodendroglial Maturation by Restraining MAPK/ERK and Notch Signaling Pathways, Front Cell Dev Biol. 2021 Mar 23;9:622539.](#)



12.5.21 - Space Technology in the Operating Theater

The instruments were developed to search for signs of life on other planets. But now they will also be used to distinguish healthy nerve cells from brain tumor cells. Astrophysicist Brice-Olivier Demory and Raphael Sznitman, an expert in machine learning and artificial intelligence, realized they could start a promising project by combining their expertise. This is how BrainPol came into being, an interdisciplinary research project largely funded by the National Center of Competence in Research PlanetS. The project aims to master a medical challenge that has so far remained unsolved: Gliomas are malignant brain tumors.

<https://tinyurl.com/3ka7zzhh>



18.5.21 - Emergency Medicine: Reliably Determine Cerebral Stroke in Acute Dizziness

The rapid and correct diagnosis of a cerebral stroke as the cause of acute dizziness in the emergency room is of the highest priority. A research team from the Department of Otorhinolaryngology, Head and Neck Surgery, University Institute of Diagnostic and Interventional Neuroradiology, Department of Emergency Medicine (T.C.S.), and Department of Neurology of the Inselspital has succeeded in identifying and testing a reliable indicator related to spontaneously occurring eye movements (nystagmus). After a stroke, the incomplete suppression of nystagmus can be detected in light using video glasses.

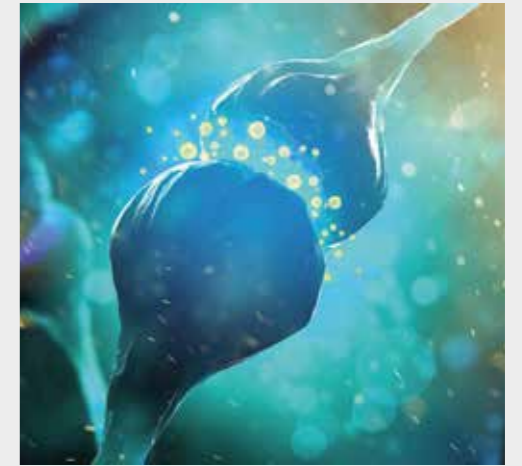
[Mantokoudis G et al., Stroke Prediction Based on the Spontaneous Nystagmus Suppression Test in Dizzy Patients: A Diagnostic Accuracy Study, Neurology. 2021 Jul 6;97\(1\):e42-e51.](#)



9.6.21 - Endometriosis: Pain Regulation through the Body's own Cannabinoids

In a study published in the journal "PAIN", researchers from the Department of BioMedical Research (DBMR), Institute of Biochemistry and Molecular Medicine (IBMM), NCCR TransCure of the University of Bern and the Department of Obstetrics and Gynecology of the Inselspital report new findings on the development of pain in endometriosis. For the first time, the role of the body's own pain-controlling endocannabinoids (EC) was investigated more closely in groups of patients with precisely described pain complaints. It was shown that the pain results from a complex interaction of pain and inflammation control.

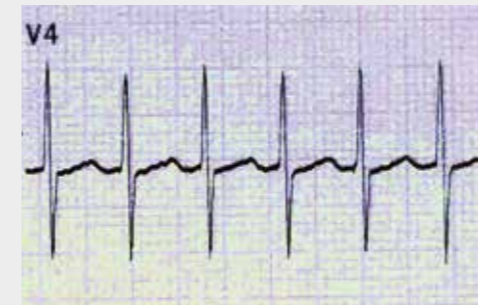
[Andrieu T et al., Association of endocannabinoids with pain in endometriosis, Pain. 2021 Jul 27.](#)



16.6.21 - Treating Cardiac Arrhythmias with Radiation

The Inselspital and the University of Bern are involved in the STOPSTORM project to establish a comprehensive database to validate radiation treatment of ventricular tachycardia. The European consortium is coordinated by the University Hospital Utrecht and includes 31 partner centres from 8 countries. STOPSTORM is supported by the EU research funding programme "Horizon 2020" with 7.1 million Euros.

www.stopstorm.eu



16.6.2021 - Testicular Cancer: Improved Treatment and Prognosis

An international research consortium with the participation of the Department of Medical Oncology of the Inselspital has reviewed and adapted the previous classification of metastatic testicular cancer in a comprehensive study. New indicators and a much broader database allowed a more precise classification and more targeted treatments of testicular cancer patients. In addition, the new data shows that the prognosis for patients with metastatic testicular cancer has improved significantly over the last twenty years.

[Beyer J et al., Survival and New Prognosticators in Metastatic Seminoma: Results From the GCGG-Update Consortium, J Clin Oncol. 2021 May 10;39\(14\):1553-1562.](#)



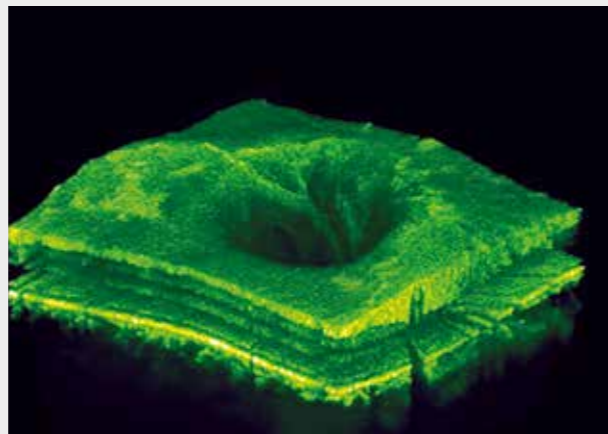
June 2021

8.6.21 - AI Could soon Help Determine your Eye Doctor Appointments

Three of the most common chronic eye diseases require regular check-ups and injections into the eye to avert the threat of blindness. A study by the AIMI, ARTORG Center of the University of Bern and the Department for Ophthalmology of the Inselspital in collaboration with RetinAI Medical AG Bern, a start-up for artificial intelligence (AI) applications in ophthalmology now shows that the ideal individual examination frequency of patients can be predicted quite accurately by machine learning - with a triple benefit.

[Gallardo M et al., Machine Learning Can Predict Anti-VEGF Treatment Demand in a Treat-and-Extend Regimen for Patients with Neovascular AMD, DME, and RVO Associated Macular Edema, Ophthalmol Retina. 2021 Jul;5\(7\):604-624.](#)

[Munk M R et al., Assessment of patient specific information in the wild on fundus photography and optical coherence tomography, Sci Rep. 2021 Apr 21;11\(1\):8621.](#)



[Kurmann T et al., Expert-level Automated Biomarker Identification in Optical Coherence Tomography Scans, Sci Rep. 2019 Sep 19;9\(1\):13605.](#)

[Mantel I et al., Automated Quantification of Pathological Fluids in Neovascular Age-Related Macular Degeneration, and Its Repeatability Using Deep Learning, Transl Vis Sci Technol. 2021 Apr 1;10\(4\):17.](#)

22.6.21 - Prostate cancer: Higher Radiation Dose: no Advantage

An international research team led by the Department of Radiation Oncology and Urology of the Inselspital has compared radiation doses after prostate removal as part of the SAKK 09/10 study. The study concludes that increased doses do not bring any advantages in terms of preventing cancer from spreading again. On the other hand, they are associated with significant additional burdens for patients.

[Ghadjar P et al., Dose-intensified Versus Conventional-dose Salvage Radiotherapy for Biochemically Recurrent Prostate Cancer After Prostatectomy: The SAKK 09/10 Randomized Phase 3 Trial, Eur Urol. 2021 Sep;80\(3\):306-315.](#)



23.6.2021 - Cardiac Arrest: Cooling alone Brings no Advantage

The international research consortium TTM2 along with the Departments of Intensive Care Medicine and Anesthesiology and Pain Medicine of the Inselspital recently published a study in the "New England Journal of Medicine" on managing the temperature of comatose patients admitted to the emergency unit after cardiac arrest. The Cardiac Arrest Center Bern, the first certified center for cardiac arrest in Switzerland, played a major role in the development of the study by proving that targeted hypothermia does not increase the probability of survival relative to targeted normothermia.

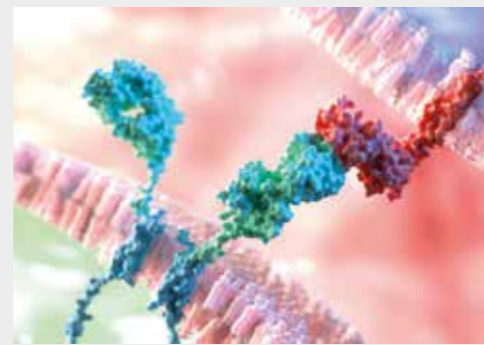
[Dankiewicz J et al., Hypothermia versus Normothermia after Out-of-Hospital Cardiac Arrest, N Engl J Med. 2021 Jun 17;384\(24\):2283-2294.](#)



28.6.2021 - CAR-T Cell Therapy First Application in CH for Myeloma Successful

At the Department of Medical Oncology of the Inselspital the procedure of CAR-T cell therapy has been carried out for the first time in Switzerland in a patient with recurrent multiple myeloma. The patient responded very well. No serious side effects occurred.

<https://tinyurl.com/2p85bx9v>



9.7.2021 - New Robotic Systems in Test Phase at the Inselspital

The further development of new robotic applications in surgery is part of a university hospital's core mission. The Inselspital together with the University of Bern, namely the ARTORG Center for Biomedical Research, are involved in numerous projects. At the beginning of July 2021, two new systems with very different approaches were used for the first time. In the coming months, they will be tested extensively in clinical practice and research.

9.7.2021 - OPERAM Study: Omitting Medication without Disadvantage

The European research consortium OPERAM today publishes in the British Medical Journal a large study funded by the European research programme "Horizon 2020" and the State Secretariat for Education, Research and Innovation (SERI). The study was led by a research team from the University Clinic for General Internal Medicine of the Inselspital and the Institute of Primary Health Care (BIHAM) of the University of Bern. The topic is the reduction of the number of medications in older people with multiple illnesses. For the first time, it was possible to prove for this group of patients that omitting superfluous, possibly even harmful medication has no negative effect on the state of health.

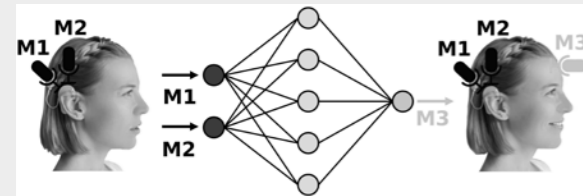
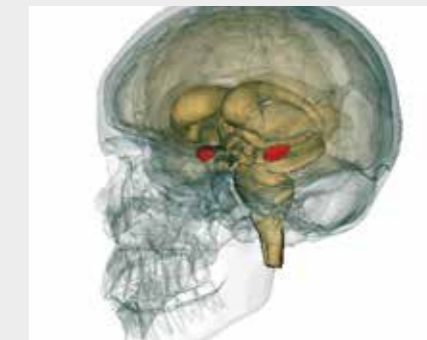
www.operam-2020.eu



16.7.21 - How Micro-Dircuits in the Brain Regulate Fear

The brain mechanisms underlying the suppression of fear responses have attracted a lot of attention as they are relevant for therapy of human anxiety disorders. Despite our broad understanding of the different brain regions activated during the experience of fear, how fear responses can be suppressed remains largely elusive. Researchers at the Laboratory of Systems Neuroscience, Department of Physiology of the University of Bern and the Friedrich Miescher Institute in Basel have now discovered that the activation of identified central amygdala neurons can suppress fear responses.

[Whittle N. et al., Central amygdala micro-circuits mediate fear extinction, Nat Commun. 2021 Jul 6;12\(1\):4156.](#)



30.6.21 - AI from Hearing Research Improves Speech Understanding for Hearing Aid Users

In noisy environments, it is difficult for hearing aid or hearing implant users to understand their conversation partner because current audio processors still have difficulty focusing on specific sound sources. In a feasibility study, researchers from the Hearing Research Laboratory of the University of Bern and the Inselspital now suggest that artificial intelligence could solve this problem.

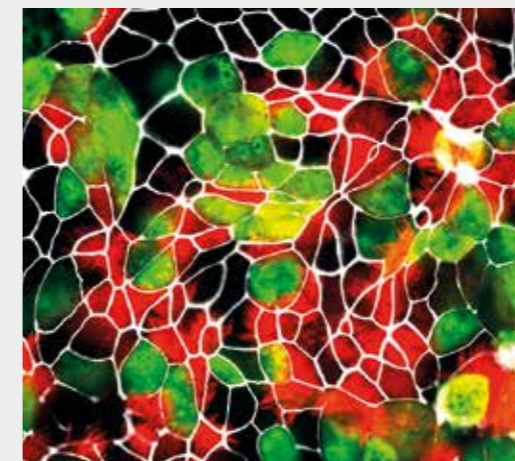
[Fischer T et al., Speech signal enhancement in cocktail party scenarios by deep learning based virtual sensing of head-mounted microphones, Hear Res. 2021 Sep 1;408:108294.](#)

July 2021



5.7.2021 - Opening of Radio-Oncology in the Theodor Kocher House

In the future, even more cancer patients can be treated with personalised and highly precise radiotherapy in the new premises of the University Hospital for Radio-Oncology in the Theodor Kocher House.



19.7.2021 - In Vitro Zoo Helps in Understanding SARS-CoV-2

A team of researchers from the Institute for Infectious Diseases (IFI) of the University of Bern and the Institute of Virology and Immunology (IVI) have used a unique collection of advanced cell culture models of cells lining the airways from various domesticated and wildlife animals to determine which animals are susceptible to SARS-CoV-2 infection. The team found that SARS-CoV-2 efficiently infected respiratory cells from monkey and cats, and proposes that SARS-CoV-2 surveillance in these animals and its close relatives is necessary.

[Gultom, M., et al., Susceptibility of Well-Differentiated Airway Epithelial Cell Cultures from Domestic and Wild Animals to Severe Acute Respiratory Syndrome Coronavirus 2. Emerging Infectious Diseases, Juli 2021.](#)

4.8.2021 - Diabetes: Automatic Regulation of Blood Sugar after Kidney Failure

Regulating blood sugar levels is very challenging when diabetes is coupled with kidney failure. Research groups at the Departments of Diabetes, Endocrinology, Nutritional Medicine and Metabolism as well as Nephrology and Hypertension of the Inselspital together with the partner center of Addenbrooke's Hospital in Cambridge UK published a study today in the Nature Medicine journal. Closed-loop systems that provide fully automated blood sugar regulation were analyzed. The study revealed that closed-loop systems significantly reduce blood sugar levels that fall outside the target range.



[Boughton CD et al., Fully automated closed-loop glucose control compared with standard insulin therapy in adults with type 2 diabetes requiring dialysis: an open-label, randomized crossover trial. Nat Med. 2021 Aug;27\(8\):1471-1476.](#)

25.8.2021 - Covid-19: Rapid Antigen Tests Detect only 2 out of 3 Infections

A research team from the Inselspital and the University of Bern has made a direct comparison of rapid antigen tests with PCR tests under real conditions. The rapid antigen tests showed a total of only two out of three infections, and in people without symptoms not even half. The study shows that rapid antigen tests are only suitable to a limited extent for reliably ruling out SARS-CoV-2 infection.

[Jegerlehner S et al., Diagnostic accuracy of a SARS-CoV-2 rapid antigen test in real-life clinical settings. Int J Infect Dis. 2021 Aug;109:118-122.](#)



27.8.2021 - Caesarean Birth: No Increased Risk of Respiratory Problems

An extensive long-term study led by researchers from the Departments of Pediatrics and Obstetrics and Gynaecology of the Inselspital could not identify any increased risk of respiratory problems after caesarean birth. The publication in the "American Journal of Obstetrics and Gynecology" does not show an increased risk of respiratory diseases for C-section babies after one year or after six years.

[Salem Y et al., Are children born by cesarean delivery at higher risk for respiratory sequelae? Am J Obstet Gynecol. 2021 Aug 5;S0002-9378\(21\)00866-8.](#)



31.8.2021 - A "Quantum Leap" to Murtenstrasse

On August 31st, the innovative research and laboratory building at Murtenstrasse 24-28 was inaugurated. The newly built complex is a milestone in the space strategy of the University of Bern. It combines research and central services of the Department of Biomedical Research as well as the Institute of Forensic Medicine at one location.



10.9.2021 - For the First Time, Solid Data on the Shortage of Doctors in Primary Care in the Canton of Bern

In which regions will there be a shortage of family doctors and paediatricians in the coming years? How many doctors are currently working in primary care in the canton of Bern, and with what workloads? The Workforce Study 2020-2025 of the Institute of Primary Health Care (BIHAM) of the University of Bern provides solid data on questions like these for the first time. The studies show which measures could be taken to counter the shortage of doctors.

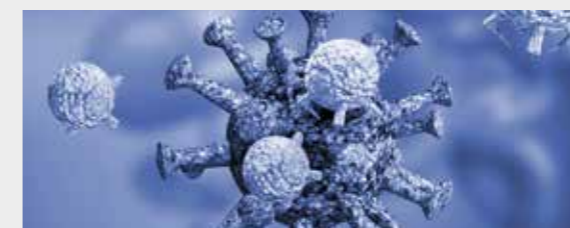
[Workforce Study 2020-2025 of the Institute of Primary Health Care \(BIHAM\)](#)



16.9.2021 - Covid-19: Limited Vaccination Success after Antibody Therapy

In a groundbreaking study, researchers from the Departments of Nephrology and Hypertension, Clinical Chemistry, Rheumatology and Immunology, Haematology and Central Haematology Laboratory, Dermatology, Neurology and Infectious Diseases of the Inselspital and the Department of Biomedical Research (DBMR) and the Institute for Infectious Diseases of the University of Bern investigated the effect of mRNA vaccines in patients following antibody therapy. In this exceptionally vulnerable patient group, the immune system's vaccine response is significantly reduced after anti-CD20 treatment. At the same time, however, the researchers have demonstrated ways to optimize the vaccine protection, at least in parts of this particularly at-risk group.

[Moor MB et al., 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. Lancet Rheumatol. 2021 Sep 7.](#)



15.9.2021- Bern Medical Hub Opening of NeuroTec Research Platform

The Insel Gruppe opened the NeuroTec research facility, together with the University of Bern and sitem-insel, on the Insel Campus in Bern on Tuesday, September 14. NeuroTec pools the clinical knowledge of the Inselspital and the expertise in medical technology of the University of Bern, while further expanding Bern's leading position in neurology pioneered by Prof. Claudio Bassetti and his team.

[NeuroTec-Loft: First "research flat" for identifying, monitoring and improving therapy for neurodegenerative diseases such as Parkinson's disease or dementia](#)



23.9.2021 - Pulmonary Fibrosis: Longer Survival after Successful Rehabilitation

In a large, multicentre study, an international research team from Switzerland, Germany, Canada, the USA and Australia found strong evidence that successful rehabilitation of pulmonary fibrosis is associated with a significantly greater likelihood of survival. The study, published in the British Medical Journal "Thorax", with PD Dr. Sabina Guler from the Department of Pulmonary Medicine of the Inselspital as first author, was led by the University of British Columbia in Vancouver. In Switzerland, the Bern Rehab Centre in Heiligenschwendli and the Inselspital worked closely together.

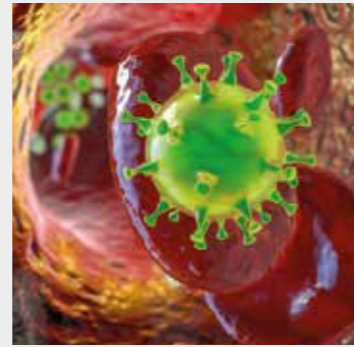
[Guler SA et al., Survival after inpatient or outpatient pulmonary rehabilitation in patients with fibrotic interstitial lung disease: a multicentre retrospective cohort study. Thorax. 2021 Aug 30;thoraxjnl-2021-217361.](#)



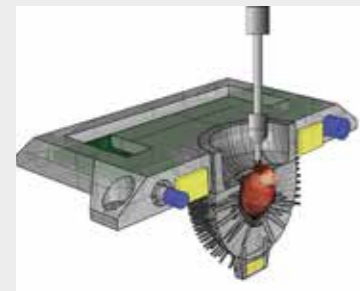
28.9.2021 - Covid-19 Vaccination: Mortality Decreases after Very Rare Side Effect

A large-scale international study co-led by the Departments of Neurology and Hematology of the Inselspital investigated the very rare blockage of cerebral veins (sinus vein thrombosis) after administration of the Oxford-AstraZeneca and Janssen/Johnson&Johnson vaccines. Neither vaccine has been used in Switzerland to date. The mortality rate due to this complication fell from 61% to 42% after the mechanism of its development was clarified in spring 2021.

[vKammen M S et al., Characteristics and Outcomes of Patients With Cerebral Venous Sinus Thrombosis in SARS-CoV-2 Vaccine-Induced Immune Thrombotic Thrombocytopenia; JAMA Neurol. 2021 Nov 1;78\(11\):1314-1323.](#)



October 2021



5.10.2021 - Simultaneous Optical and Electrical Tracking of Heart Activity

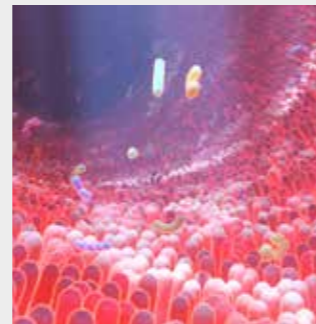
It is still elusive to what extent interactions between different cell types of the heart influence the normal heart rhythm and possibly trigger life-threatening arrhythmias. A new measurement method developed at the Department of Physiology of the University of Bern combines for the first time optical and electrical recording of cardiac ventricular activation which, in conjunction with optogenetics, will permit finding comprehensive answers to these questions.

[Rieger M et al., Enabling comprehensive optogenetic studies of mouse hearts by simultaneous opto-electrical panoramic mapping and stimulation, Nat Commun. 2021 Oct 4;12\(1\):5804.](#)

13.10.2021 - Immune System Keeps Intestinal Flora in Balance

Trillions of bacteria live in the intestine. They are kept in a permanent balance by the immune system and are therefore harmless to humans. Researchers from the Department of BioMedical Research (DBMR), the Institute of Pharmacology of the University of Bern, the Department for Visceral Surgery and Medicine at the Inselspital and the German Cancer Research Center have now been able to show how antibodies in the gut keep these bacteria in check. This finding could make an important contribution to the development of better vaccines.

[Rollenske T et al., Parallelism of intestinal secretory IgA shapes functional microbial fitness, Nature. 2021 Oct;598\(7882\):657-661.](#)



Prof. Mauricio Reyes, ARTORG, in conversation with Prof. Daniel Aebersold, Department of Radiation Oncology

13.10.2021 - Cancer Research: AI Image Interpretation for Clinical Use

Artificial intelligence (AI) is being used more and more intensively in image interpretation for diagnosis and therapy planning. In a study, a broad-based research team from the Department of Radiation Oncology of the Inselspital and the University of Bern was able to demonstrate that the common assessment basis of an AI-based image segmentation for brain tumours can still be optimised. The deviations, as measured on the basis of parameters commonly used today, do not correlate with a clinically relevant change in the radiation dose. AI-based software needs to be further aligned with a clinically relevant outcome before large-scale deployment in order to deliver real added value in terms of treatment quality.

[Poel R et al., The predictive value of segmentation metrics on dosimetry in organs at risk of the brain; Med Image Anal. 2021 Oct;73:102161.](#)

14.10.2021 - Radiomics / Pulmonary Fibrosis: Reliable Prognosis Thanks to AI

In October 2021, a research team from the universities and university hospitals of Zurich, Oslo and Bern published results on AI-driven image analysis of pulmonary fibrosis, which occurs in the rare systemic sclerosis. The researchers, led by Prof. Britta Maurer of the Department of Rheumatology and Immunology of the Inselspital and researchers from the University Institute of Clinical Chemistry of the Inselspital and the Department for BioMedical Research (DBMR) of the University of Bern, applied methods of radiomics analysis and created surprisingly clear risk profiles that offer a promising basis for future individualised patient management.

[Schniering J et al., Computed tomography-based radiomics decodes prognostic and molecular differences in interstitial lung disease related to systemic sclerosis; Eur Respir J. 2021 Oct 14;2004503.](#)



21.10.2021 - Paediatric Pneumology: Reliable Prognosis for Cystic Fibrosis

A research team from the Paediatric Pneumology, Children's Hospital of the Inselspital and the ISPM of the University of Bern has been able to provide important evidence in research into cystic fibrosis (CF): The measurement of the Lung Clearance Index allows a reliable prognosis of the course of cystic fibrosis. The comprehensive study with data from 1980 to 2006 was published in the European Respiratory Journal and is considered a milestone in the development of biomarkers for predicting the course of cystic fibrosis.

[Kurz J M et al., Association of lung clearance index with survival in individuals with cystic fibrosis; Eur Respir J. 2021 Jul 21;2100432.](#)



50 Years Institute of Social and Preventive Medicine (ISPM)

The Institute of Social and Preventive Medicine (ISPM) of the University of Bern commemorates 50 Years with a symposium on 26 October. The symposium features past and the present ISPM Directors, as well as internationally recognized public health experts who will discuss ISPM's history and public health yesterday, today, and tomorrow.



28.10.2021 - The Medical Collection Launches its Digital Museum

After decades of collecting, the Medical Collection was presented to a wider public for the first time. The Inselspital and the University of Bern welcomed 100 invited guests to the opening ceremony.

The collection managed by the Institute for the History of Medicine comprises over 10,000 objects. It mainly documents the history of the last 150 years and contains smaller instruments such as forceps or ophthalmoscopes, medium-sized objects such as moulages or electrocardiographs and large devices such as iron lungs or operating tables. The collection represents medical research and inventions as well as the treatments and everyday occurrences of hospital life. Its display depot will soon be open to visitors on guided tours.



Launch ceremony of the Digital Museum



Website of the Digital Museum: <https://medizinsammlung.ch/en/>

Making Medicine

The Digital Museum's motto is "Making Medicine". It shows that medicine does not simply exist but that it comes into existence through the action of physicians, ambulance drivers and scientists but also patients and ultimately all of us. It uses ten practices and activities like cutting, lying, preventing, making visible, doing research or deciding to illuminate the history and present of medicine. It wants to stimulate a process of reflection on the relationship between society, health and illness.



View of the display depot

November 2021

5.11.2021 - Coma Patients: Favourable Prognosis when Brain Cells Are in Sync

A research team from the NeuroTec, Department of Neurology of the Inselspital, the Institute of Computer Science of the University of Bern and the Centre Hospitalier Universitaire Vaudois (CHUV) Lausanne studied the processing of sound signals in the brains of patients on their first day in a coma. In a recently published paper, the researchers identified neuronal synchrony, the temporally coordinated working of neurons, as a crucial factor in predicting successful recovery after coma.

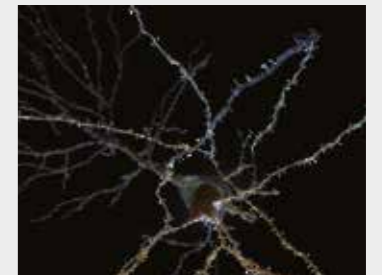
[Alnes S L et al., Complementary roles of neural synchrony and complexity for indexing consciousness and chances of surviving in acute coma; Neuroimage. 2021 Oct 6;245:118638.](#)



10.11.2021 - When Algorithms Get Creative

Uncovering the mechanisms of learning via synaptic plasticity is a critical step towards understanding how our brains function and building truly intelligent, adaptive machines. Researchers from the Institute of Physiology of the University of Bern propose a new approach in which algorithms mimic biological evolution and learn efficiently through creative evolution.

[Jordan J et al., Evolving interpretable plasticity for spiking networks; Elife. 2021 Oct 28;10:e66273.](#)



11.11.21 - Covid-19: Preventive Measures for Healthcare Workers

A research team at the Department of Visceral Surgery and Medicine of the Inselspital, the Department of Biomedical Research, Bern Center for Precision Medicine of the University of Bern and the University of Trieste (It) investigated the effectiveness and economic efficiency of in-hospital preventive measures to protect healthcare workers. For this purpose, a mathematical model of SARS-CoV-2 transmission was developed, incorporating factors both inside and outside the hospital. Regular, broad-based, real-time PCR testing was found to be the most economical and effective method for screening and thereby maintaining hospital infrastructure.

[Sanchez-Taltavull D et al., Regular testing of asymptomatic healthcare workers identifies cost-efficient SARS-CoV-2 preventive measures; PLoS One. 2021 Nov 5;16\(11\):e0258700.](#)



Prof. Dr. med. Guido Beldi Prof. Dr. Michael Gerfin

12.11.2021 - Psoriasis Research: Decisive Contribution from Bern

Researchers from the University of Zurich, the University of Sao Paulo and the Department of Dermatology of the Inselspital were recently able to report important progress in psoriasis research in Science Immunology. The basic work of the two universities in Zurich and Sao Paulo could be confirmed thanks to a clinical review by the Bernese team. The project exemplifies the importance of international, interdisciplinary cooperation in today's research projects.

[Zwicky P et al., IL-12 regulates type 3 immunity through interfollicular keratinocytes in psoriasisform inflammation; Sci Immunol. 2021 Oct 22;6\(64\):eabg9012.](#)



18.11.2021 - Dangers of Silent Atrial Fibrillation in Diabetes

In a major study, a research group at the Departments of Cardiology Department and General Internal Medicine Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism of the Inselspital and the Institutes of Social and Preventive Medicine (ISPM) and the Institute of Primary Health Care (BIHAM) of the University of Bern found that patients with diabetes were found to have significantly more frequent, silent atrial fibrillation. Because of the more frequent, asymptomatic atrial fibrillation and more severe concomitant diseases, the researchers raise the question of whether patients with diabetes should be systematically screened for atrial fibrillation.

Bano A et al., Association of Diabetes With Atrial Fibrillation Phenotype and Cardiac and Neurological Comorbidities: Insights From the Swiss-AF Study, J Am Heart Assoc. 2021 Nov 16;10(22):e021800.



22.11.2021 - Second and Third Wave of COVID-19 Hit Nursing Staff much Harder

Compared to the first wave, nursing staff in Swiss hospitals were exposed to a significantly higher workload and greater time pressure during the second and third COVID 19 waves. As a result, nursing staff were less satisfied with their work and less likely to want to continue working in the nursing profession. This is shown by a survey conducted by the Institute of Management Accounting and Controlling of the University of Bern.

Hospital nursing report: <https://tinyurl.com/yc49r47d>



16.12.2021 - Gut Bacteria Aggravate Adhesions after Abdominal Surgery

A multidisciplinary international research team led by Prof. Daniel Candinas and Prof. Deborah Stroka at the Department for Visceral Surgery and Medicine of the Inselspital and the University of Bern has succeeded in providing important evidence: The researchers were able to identify the initial cells and primary trigger leading to the formation of adhesions in the abdomen after operations contaminated by intestinal bacteria. This provides the first promising starting points for a possible therapy.

Zindel J et al., Intraperitoneal microbial contamination drives post-surgical peritoneal adhesions by mesothelial EGFR-signaling, Nat Commun. 2021 Dec 16;12(1):7316.



Prof. Daniel Candinas and team during an operation: Important, life saving abdominal surgery can lead to adhesions ©Janosch Abel, Insel Gruppe

17.12.2021 - New Vice-Rector for Research Elected

The Cantonal Government has elected a new Vice-Rector to the Executive Board of the University. As of 1st January 2022, Prof. Hugues Abriel will take over the Vice-Rectorate Research.

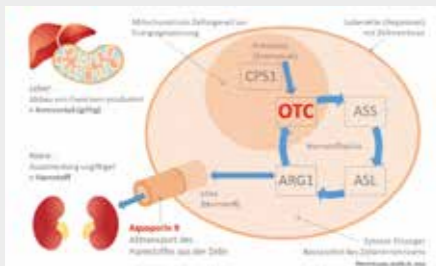


December 2021

2.12.2021 - Personalized Medicine - Artificial Liver Cells from Skin Tissue

A research group from the University Department of Pediatrics, the University Institute of Clinical Chemistry of the Inselspital and the University of Bern, the University Children's Hospital Zurich - Eleonorenstiftung and the University of California San Francisco (UCSF) has succeeded in taking an important step towards the construction of personalized artificial liver cells. For the first time, engineered stem cells from skin tissue could be made to behave like normal liver cells by adding a transport protein. These cells can now be used to test drugs, among other things.

Laemmle A et al., Aquaporin 9 induction in human iPSC-derived hepatocytes facilitates modeling of ornithine transcarbamylase deficiency, Hepatology, 2021 Nov 16.



10.12.2021 - Fast Information Processing with Slow Neurons

Bernese researchers at the Institute of Physiology of the University of Bern have developed a theory that shows how the brain can efficiently learn extremely fast sequences of sensory stimuli. This can happen much quicker than previously thought if neurons (nerve cells) have a mechanism that allows them to "predict" the future. The Bernese work was selected for presentation from among nearly ten thousand submitted papers at the world's most important conference on artificial intelligence.

Haider P et al., Latent Equilibrium: A unified learning theory for arbitrarily fast computation with arbitrarily slow neurons



Other Outstanding Publications

Institute of Social and Preventive Medicine (ISPM)

Hodcroft E et al., Spread of a SARS-CoV-2 variant through Europe in the summer of 2020, *Nature*. 2021 Jul;595(7869):707-712.

Skrivankova V W et al., Strengthening the Reporting of Observational Studies in Epidemiology Using Mendelian Randomization: The STROBE-MR Statement, *JAMA*. 2021 Oct 26;326(16):1614-1621.

Low N et al., The changing landscape of chlamydia control strategies, *Lancet*. 2021 Oct 16;398(10309):1386-1388.

Institute for Infectious Diseases (IFIK)

V'kovski P et al., Disparate temperature-dependent virus-host dynamics for SARS-CoV-2 and SARS-CoV in the human respiratory epithelium, *PLoS Biol*. 2021 Mar 29;19(3):e3001158.

Department of Cardiology

Valgimigli M et al., P2Y12 inhibitor monotherapy or dual antiplatelet therapy after coronary revascularisation: individual patient level meta-analysis of randomised controlled trials, *BMJ*. 2021 Jun 16;373:n1332.

Institute of Primary Health Care (BIHAM)

Aubert C E et al., Adding a New Medication Versus Maximizing Dose to Intensify Hypertension Treatment in Older Adults: A Retrospective Observational Study, *Ann Intern Med*. 2021 Dec;174(12):1666-1673.

Da Costa B R et al., Effectiveness and safety of non-steroidal anti-inflammatory drugs and opioid treatment for knee and hip osteoarthritis: network meta-analysis, *BMJ*. 2021 Oct 12;375:n2321.

Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UEM)

Schuetz P et al., Management of disease-related malnutrition for patients being treated in hospital, *Lancet*. 2021 Nov 20;398(10314):1927-1938.

Institute of Physiology

Whittle N et al., Central amygdala micro-circuits mediate fear extinction, *Nat Commun*. 2021 Jul 6;12(1):4156.

Theodor Kocher Institute (TKI)

Engelhardt B, Private immune protection at the border of the central nervous system, *Nature*. 2021 Aug;596(7870):38-40.



Awards and Honors

December 2020 - March 2021

Ulm Dermatology Prize 2020

The Ulm Dermatology Prize of the year 2020 was awarded to Prof. Dr. Tosso Leeb from the Institute of Genetics of the Vetsuisse Faculty. The prize is awarded for outstanding scientific achievements in the field of genetic skin diseases.

PHOENIX Pharmacy Science Award

Prof. Dr. Hans-Uwe Simon from the Institute of Pharmacology received a PHOENIX Pharmacy Science Award in the field of Pharmacology and Clinical Pharmacy. His excellent work elucidates a molecular mechanism of network formation and thus, sheds light on an important mechanism of immune function.

Epidemiology Academic of the Year (Europe)

Prof. Oscar H. Franco, M.D., of the Institute of Social and Preventive Medicine (ISPM), has received the "Epidemiology Academic of the Year (Europe)" award from Global Health and Pharma Magazine.

SAKK/Astellas GU-Oncology Award 2020

Dr. Anke Augspach of the Department for BioMedical Research (DBMR), Precision Oncology Research Group, received the SAKK/Astellas GU-Oncology Award 2020, honoring her research on new treatment approaches for prostate cancer.

Prix Retina Award 2020

Dr. Anke Augspach of the Department for BioMedical Research (DBMR) has been awarded the Young Investigator Grant 2021 by the Fond'action Foundation for her research on prostate cancer. The grant is endowed with 100,000 Swiss francs.

3Rs Award 2020

The 3Rs Award 2020 was presented to Prof. Dr. Ronald Dijkman, Institute for Infectious Diseases (IFIK). The award recognizes outstanding contributions to the advancement of the 3Rs principle, which aims to replace, reduce and refine animal testing. Ronald Dijkman and his team collect human cells from inside the airways and culture them in a Petri dish. They conduct studies on these invitro cell cultures. This makes it possible to replace certain experiments that previously required animals.

PCF Young Investigator Award

Antonio Rodriguez Calero, M.D., of the Department for BioMedical Research (DBMR), received the 2020 Jeff & Loyd Zisk-PCF Young Investigator Award from the Prostate Cancer Foundation (PCF). The award was given for his research on prostate cancer.

April - July 2021

Ypsomed Innovation Award and Venture Kick for "SurgeonsLab"

PD Dr. med. David Bervini, University Hospital for Neurosurgery, and Fredrick Johnson Joseph, ARTORG Center for Biomedical Engineering Research, received a Venture Kick in the amount of 150'000 Swiss francs. They were also awarded the Ypsomed Innovation Prize. In their start-up "SurgeonsLab", they developed a 4D simulator that facilitates the surgical treatment of brain aneurysms.

Four Pfizer Research Awards

Prof. Dr. Carsten Riether (Department of BioMedical Research (DBMR) and University Hospital for Medical Oncology, Inselspital), PD Dr. Jin Li (Institute of Biochemistry and Molecular Medicine (IBMM)), PD Dr. Ange Maguy (Institute of Physiology) and Dr. med. Christa König (University Hospital for Pediatrics) each received a Pfizer Research Award. The award-winning work deals with leukemia, cardiac arrhythmias and the fever threshold in children and adolescents with cancer.

Young Investigator Grant 2021

Dr. Anke Augspach of the Department for BioMedical Research (DBMR) has been awarded the Young Investigator Grant 2021 by the Fond'action Foundation for her research on prostate cancer. The grant is endowed with 100,000 Swiss francs.

SNSF Competition for Scientific Images

The first prize in the category “The men and women of science” of the SNSF competition for scientific images went to Lukas Munz, Oeschger Centre for Climate Change Research (OCCR) (see p. 16). PD Lukas Anschütz, MD, University Department of Otolaryngology, Head and Neck Surgery (HNOK) of the Inselspital Bern, was honored with an award in the category “The Places and Tools”.

Ten SNF Ambizione Grants

Ten researchers from the University of Bern each received an Ambizione Grant from the Swiss National Science Foundation (SNSF): Dr. phil. Marialuisa Cavelti, Dr. Fabio Ferrari, Dr. Andreas Haas, Dr. med. Kristina Keitel, Dr. Andrew Lawrence, Dr. Graham Lee, Dr. Niels Ligterink, Dr. Milan Malinsky, Dr. Stefan Schlegel and Dr. Moritz von Brescius.

New SATW Individual Member from the Medical Faculty

Prof. Dr. Jürgen Burger is appointed as an individual member of SATW due to his outstanding achievements in medical technology, especially in device development, as well as his commitment to education and the translation of scientific knowledge into economically valuable contributions.

Young Talents in Clinical Research

Five researchers from Inselspital have won a coveted “Beginners Prize” in the 2020 call for proposals. One grant went to a researcher from the Bern Institute of Family Medicine BIHAM at the University of Bern. Thus, 6 of the total 14 grants of the “Young Talents in Clinical Research” funding program went to Bern. Congratulations to the winners!

SNF Sinergia Grants for three University of Bern Researchers

PD Dr. med. David Bervini, University Hospital for Neurosurgery, and Fredrick Johnson Joseph, ARTORG Center for Biomedical Engineering Research, received a Venture Kick in the amount of 150'000 Swiss francs. They were also awarded the Ypsomed Innovation Prize. In their start-up “SurgeonsLab”, they developed a 4D simulator that facilitates the surgical treatment of brain aneurysms.

Doctor Honoris Causa

Prof. Dr. Hans-Uwe Simon received Doctor Honoris Causa for his outstanding achievements in the fields of Pharmacology and Immunology and establishing successful scientific collaboration all over the world, South Ural State Medical University, Chelyabinsk, Russian Federation.

August - November 2021

Romanian Order of Merit

Prof. Dr. Dr. A. Sculean was awarded with the Romanian Order of Merit.

Eccellenza Fellowship at the Medical Faculty

A total of four grant recipients are from the University of Bern, one is Maxime Baud of the Department of Neurology of the Inselspital.

Presidency of the European Hip Society (EHS)

Prof. Dr. Klaus Siebenrock has taken up the presidency of the European Hip Society (EHS) for the next two years (2021-2023) at this year’s EHS Congress in Lille.

Vidi Grant

Prof. Dr. Laura Marchal-Crespo of the ARTORG Center for Biomedical Engineering Research received a Vidi Grant from the Netherlands Research Council. She is working on the improvement of rehabilitation robots and the further development of virtual training environments for relearning movements after a brain stroke.

Swiss Academy of Medical Sciences

Prof. Dr. Nadia Mercader from the Institute of Anatomy was elected as a new member of the Senate of the Swiss Academy of Medical Sciences. In addition, Prof. Dr. George Thalmann from the Department for BioMedical Research and the University Hospital for Urology replaces Prof. Dr. Claudio Bassetti after eight years on the board.

Vontobel Prize for Age(ing) Research

Dr. phil. nat. Daniel Brigger and PD Dr. Alexander Eggel from the Department for BioMedical Research (DBMR) and the University Hospital for Rheumatology, Immunology and Allergology, as well as Dr. Mario Noti, formerly of the Institute of Pathology, have been awarded the Vontobel Prize for Age(n)s Research. In an animal model, they succeeded in decelerating two age-related impairments with a novel cell therapy.

Sinergia Grants

For their research projects, Prof. Dr. Eliane Jasmin Müller from the Department for BioMedical Research, Dermatology Research Group, Prof. Dr. Marianna Kruithof-de Julio from the Department for BioMedical Research and the University Hospital of Urology, and Prof. Dr. Isabelle Stadelmann-Steffen from the Institute of Political Science received Sinergia grants from the Swiss National Science Foundation (SNSF). Over three to four years, the projects will be supported with funds totaling around 7.3 million Swiss francs.

Ten SNF Ambizione Grants

Ten researchers from the University of Bern each received an Ambizione Grant from the Swiss National Science Foundation (SNSF) of which 2 of the Medical Faculty: Dr. Carole Elodie Aubert from the Department of General Internal Medicine and Franca Schmid from the ARTORG Center for Biomedical Engineering Research.

Two InnoSuisse Grants

Prof. Dr. Inti Zlobec from the Institute of Pathology received an InnoSuisse Grant. Together with the industrial partner Lunaphore, new treatment options for colorectal cancer will be developed. Another InnoSuisse Grant was awarded to Prof. Dr. Marianna Kruithof-de Julio from the Department for BioMedical Research and the University Hospital of Urology, PD Dr. Ronald Dijkman from the Institute for Infectious Diseases (IFIK) and Nina Hobi from AlveoliX for the development of a kit to test drugs against Covid-19 and other respiratory diseases.

WHO expert

Dr. Kathrin Summermatter of the Institute of Infectious Diseases was selected as an expert on a World Health Organization (WHO) panel on the origin of novel pathogens.

President of “Smarter Medicine - Choosing Wisely” Switzerland

Prof. Dr. Nicolas Rodondi, MD, of the Bern Institute of Family Medicine (BIHAM) and the University Department of General Internal Medicine, has been elected as the new president of the “smarter medicine - Choosing Wisely Switzerland” association.

CSL Research Acceleration Grants

As part of the CSL Research Acceleration Initiative, Prof. Dr. Britta Engelhardt (Theodor Kocher Institute) and Dr. Nicoletta Sorvillo (DBMR), as well as Prof. Dr. Uyen Huynh-Do of Inselspital Bern, were awarded grants to accelerate the discovery of innovative biotherapies that address unmet patient needs.

Theodor Kocher Prize

The Theodor Kocher Prize, endowed with CHF 50,000.00, was presented at the Dies academicus in equal parts to PD Dr. Alexander Eggel of the Department of Rheumatology, Immunology and Allergology (RIA) and Dr. Nadine Amsler of the Institute of History.

The Medical Faculty in Numbers

2'208
students in
2 Bachelor programs
6 Master programs

203
students
in 40 CAS/DAS/MAS programs

351
Final Master Degrees
237 Medicine
42 Dental Medicine
20 MSc in Biomedical Sciences
38 MSc in Biomedical Engineering
5 Masters of Medical Education

1 Faculty
3 Organisations
15 **39** Clinics
Institutes

110 Full Professors
19 Assistant Professors
171 Associate Professors
485 Lecturers

444
Doctorate Degrees
321 Dr. med. 34 Dr. med. dent.
74 from the Graduate School for Cellular and Biomedical Sciences
15 from the Graduate School of Health Sciences

199'520'035
Budget
32'730'509 from the Swiss National Science Fondation
52'070'447 third party funds for research

2431
Original Articles published
141'973 hours of teaching



NeuroTec - Closing the Last Mile in Neurology

With the inauguration of NeuroTec on 14 September 2021, the last mile in neurology is about to be closed at the medical location in Bern. As part of the Insel Gruppe AG and located at sitem-insel, the Swiss Institute for Translational and Entrepreneurial Medicine in Bern (sitem), NeuroTec is dedicated to the expansion of the Neurology Department's research program. The new Bernese research hub sets itself the goal to identify and validate new digital biomarkers in order to enable the translation of personalized diagnostics and therapeutic interventions from the clinic to the patient's home.

Most neurological and neuro-psychiatric disorders are not transient but chronic, such as epilepsy, depression, Alzheimer's and many more, typically not showing linear time courses, but rather individual dynamics. In today's health care system based on repeated clinical visits, these individual dynamics of neurology patients' diseases are under-sampled. Therefore, technology allowing longitudinal monitoring of neurological disorders in real-world environments is an urgent need, which is now being addressed by NeuroTec. The hub develops novel technologies to improve diagnostics, monitoring and therapies of neurological disorders and enables the translation of personalized diagnostics and therapeutic interventions from the clinic to the patient's home. Apart from sleep, EEG and circadian labs, the research hub houses the NeuroTec loft as its core infrastructure. The instrumented apartment has been developed to monitor human behavior and how neurological disorders influence daily life. The loft is equipped with state of the art virtual reality technology, such as computer-generated three-dimensional animations of real world settings. NeuroTec is run by the Department of Neurology of the Inselspital, in close collaboration with the ARTORG Center for Biomedical Engineering of the University of Bern. It is namely directed by Prof. Kaspar Schindler and vice-directed by Prof. Tobias Nef, while Prof.

Claudio L. A. Bassetti holds the chair of the Strategic Board. NeuroTecs research involves project-specific partners from academia, non-profit research institutions and industrial partners in public-private partnerships. The first generation of projects (e.g. Closed-loop NeuroStimulation, Brain-inspired Computing for EEG analysis or Ultra Long-Term EEG (subscalp electrodes): EpiOs and others) span both recording and stimulation, invasive and non-invasive methods, and thus, provide a firm yet innovative platform to transform neurology through synergy and collaboration. The main goal of NeuroTec is to develop, test and deliver such technologies and to pave the way for patient-centered neurology that aims to diagnose and treat patients in their homes. Schindler, K.A.; Nef, T.; Baud, M.O.; Tzovara, A.; Yilmaz, G.; Tinkhauser, G.; Gerber, S.M.; Gnarr, O.; Warncke, J.D.; Schuetz, N.; et al. NeuroTec Sitem-Insel Bern: Closing the Last Mile in Neurology. Clin. Transl. Neurosci. 2021, 5, 13. <https://doi.org/10.3390/ctn5020013>



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Highly Cited Researchers

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 published multiple papers frequently cited by their peers that rank in the top 1% of citations for field and year in the Web of Science.



Top 5 Departments of the Inselspital and Institutes of the Medical Faculty 2020

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 relations to resources and third party funding.

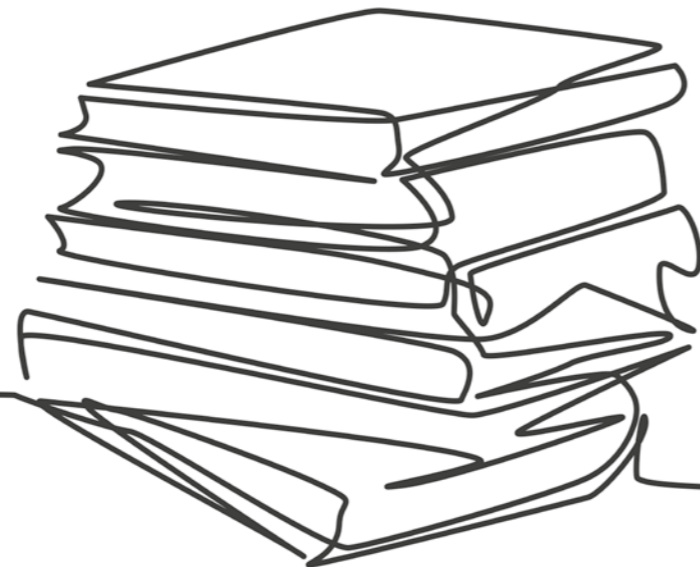
The indicators are applicable to all institutes and clinics and provide incentives in line with the research strategy. The research evaluation aims to assure quality, create a base for the performance-oriented allocation of funds and serves as a means of control to the respective clinics and institutes.

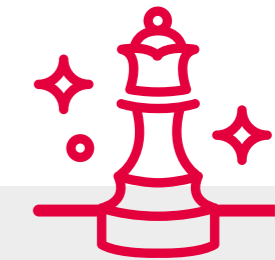
Departments of the Inselspital

- Department of Neurology
- Department of Ophthalmology
- Department of Medical Oncology
- Department of Clinical Chemistry
- Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)

Institutes of the Medical Faculty

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



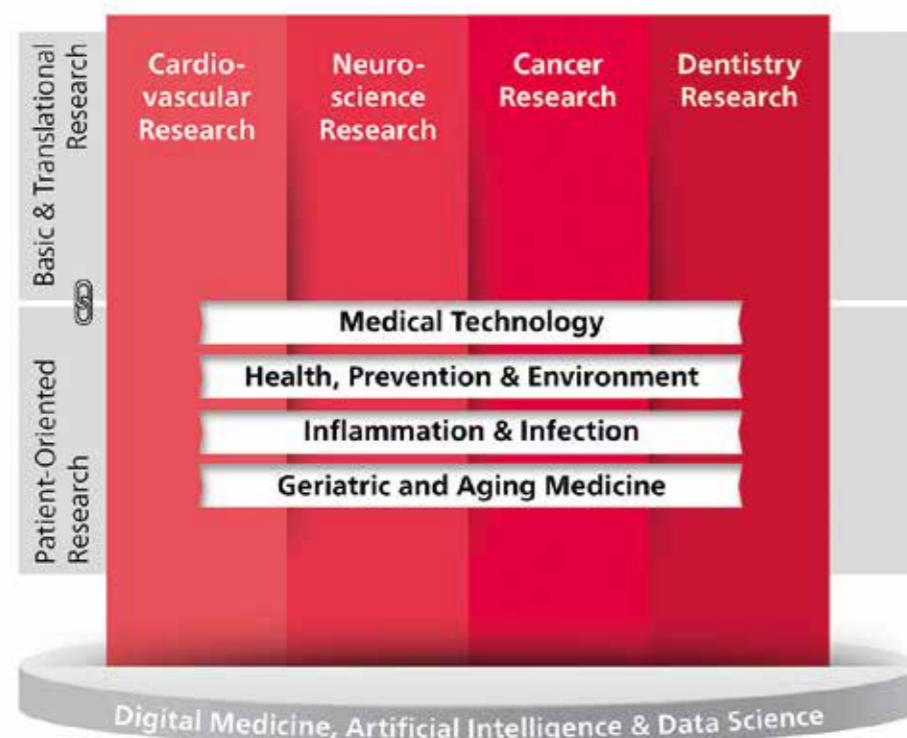


Strategy 2030: Excellence in Teaching, Research and Top-Medicine

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 location representing 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.



6 Longterm Strategic Goals

1. Excellence in Teaching

The Medical Faculty aims to continuously improve the research-based and practice-relevant quality in its teaching as well as further develop strategic fields such as “teaching culture” and recognition, funding (including “protected teaching time” and allocation of funds based on performance), digitalization and vertical integration.

2. Excellence in Research

Expanding its leading position in the area of basic, translational and patient-oriented research. Central to this aim is the promotion of “research culture”, cluster formation within the Bernese Medical Campus, interdisciplinary, interprofessional research as well as promoting junior researchers.

3. Existing and New Areas of Focus

Through strategic funding, the Medical Faculty intends to strengthen existing (neurological, oncological, cardiological, dental sciences) as well as partly new cross-sectoral focuses (medical technology, health, prevention and environment, inflammation and infection, geriatrics and geriatric medicine, digitalization, artificial intelligence, data science).

4. Priorities in Organizational Development

The Medical Faculty wants to professionalize the Dean’s Office as well as some processes (e.g. successions, appointments) and organizational structures (e.g. core facilities).

5. National and International Networking and Positioning

As the capital city’s Medical Faculty, it institutionally positions itself as a highly attractive location through its national and international networking.

6. Digital Medicine

The Medical Faculty aims to further develop digitalization in medicine (clinic, teaching and research) in particular strategic fields by establishing a “digital hub” among the different stakeholders of the University of Bern and the university hospitals. Providing infrastructure- and data-related interoperability, academization of digital medicine and developing specific teaching curricula are essential advances to achieve within this framework.



6 Functional Strategies to the Long-Term Strategic Goals

1. Promotion of Young Academics

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

2. Scientific Integrity

The Medical Faculty ensures scientific integrity in all areas of research with a quality assurance system.

3. Communication

The Medical Faculty increases its national and international perception as an institution with excellent research, teaching and top-medicine.

4. Sustainability

The Medical Faculty meets the requirements of sustainable development in all areas and actively contributes to a climate-neutral university.

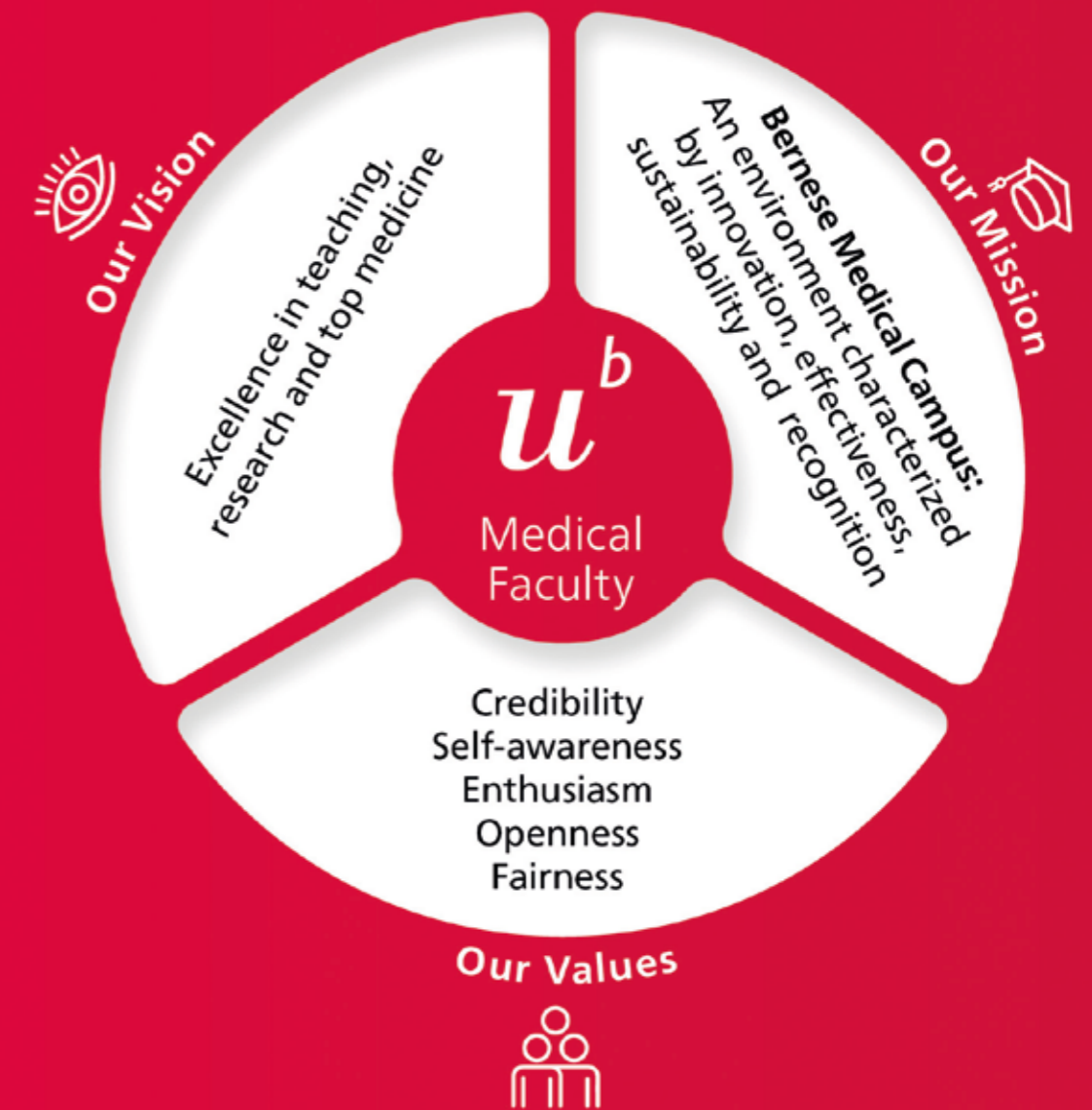
5. Equality & Diversity

Equal opportunities, equality and inclusion are implemented in a sustainable manner.

6. Quality Assurance

The Medical Faculty continues to ensure efficient and effective quality assurance for teaching and research.

These functional strategies not only contributively support its implementation at university level, but also define further faculty-specific objectives.



Historical

"Return to Drugs": Alexander Tschirch and the Heyday of Pharmacognosy
Deans of the Medical Faculty





The pharmacognostic collection with drug packages in the foreground and jars in the background, c. 1908

Glimpses of the History of the Faculty "Return to Drugs": Alexander Tschirch and the Heyday of Pharmacognosy

"A mighty storm has swept over the old, venerable edifice of scientific pharmacy, and, though it could not sweep it away completely, it has left only debris." With these words Alexander Tschirch (1856-1939) described the state of his academic subject area when he was appointed professor in Bern in 1890. Indeed, in the middle of the nineteenth century, the new subject of pharmacology had emerged, dealing with the experimental testing of drug effects on the animal and human body. Chemistry, in turn, had long been established as an independent subject. What role was left for traditional pharmacy as the scientific study of remedies? According to Tschirch, it was in danger of degenerating into a purely educational subject for pharmacists, and the pharmacist was being transformed from a scholar into a mere salesperson. His goal was to put pharmacy back on a secure scientific foundation.

Scientific Pharmacy

Pharmacist training at that time was strongly focused on practical matters and, with only four university semesters (in Germany, moreover, only three), it was relatively undemanding academically. For Tschirch, however, the practical orientation was not an argument against academia. "With equal justification," he opined, "one could also deny scientificity to medicine." The practical orientation, however, was the reason

for him to locate the newly founded institute and the chair of pharmacy at the Faculty of Medicine. Since the founding of the University in 1834, the teaching of pharmacy had already switched four times between the Faculties of Medicine and Science. According to Tschirch, furthermore, the scientists lacked an understanding of the task of pharmacy, even though, simply put, it was the same as that of medicine: the safe and successful treatment of patients.

Tschirch combined the incorporation into the Medical Faculty with a clear structuring of the Institute into a chemical, microscopic and pharmacognostic department. The task was to study drugs in each of these areas through research and teaching. Pharmacognosy was at the centre of the Institute and of Tschirch's interest. Its task was "to become scientifically acquainted with the drugs of plant and animal origin in all directions – with the exception of their physiological effects – to describe them correctly and to link them together from a general point of view." Pharmacognosy was thus the continuation of the old doctrine of remedies (materia medica) under new scientific aspects. In addition to their botanical description, the plants (drugs of animal origin were very much in the background) were to be analysed primarily in terms of their historical dimension, geographical distribution, organic structure, and morphology, as well as their chemical constituents. In view of the increasing access to all far-flung regions of the world with their diverse flora, an almost unlimited field of research opened up here.

"We first have to get sick to our stomachs with tablet and ampoule medicine before we find the right way again"

In Search of Effective Medicinal Plants

Tschirch travelled to Ceylon, Sumatra and Java and received drug shipments from all over the world. The Bernese pharmacognostic collection, founded by Friedrich August Flückiger in the 1860s, grew continuously and eventually comprised some 60,000 drug samples, mostly preserved in jars (2,500 of which have survived to the present day). With his Handbook of Pharmacognosy (3 vols.), Tschirch established the foundation for the subject and offered a classification of drugs from a chemical point of view (carbohydrates, polysaccharides, resins, etc.). Over the course of his supervision of more than 150 dissertations, he forged a great number of individual analytical paths into this boundless new field for research. Due to the scale of the project, the vast majority of drugs collected in Bern had to remain uninvestigated for the time being. But Tschirch had shown the way and established Bern as the undisputed centre of pharmacognosy. Its task was the differentiated investigation of the individual plants according to their origin and specific efficacy depending on where they were grown. For example, even before Tschirch, it had been discovered on the basis of poppy plants cultivated in Bern that European opium contained more morphine than could be obtained from Oriental plants. Such investigations were to be the basis for cultivating medicinal plants that could yield medicines of the highest possible efficacy.

The collection was not only an instrument of research, but also of education. Future pharmacists had to know the drugs from their own experience. Only on this basis were they able to recognize the accuracy and quality of the goods delivered to the pharmacy and to learn the appropriate testing procedures. It was also important to know all aspects of production, packaging, storage and shipment of the plants from which the drugs were derived, as these had a significant impact on the active ingredient content. Accordingly, various kinds of drug packaging were also well represented in the collection.

Return to Drugs

Pharmacotherapy, however, did not develop in the direction intended by Tschirch. It was increasingly shaped by the development of synthetic drugs. Tschirch said, "We first have to get sick to our stomachs with tablet and ampoule medicine before we find the right way again". He called for a "return to drugs". By "drug" he meant the plant with all its active ingredients, as in newly emerging complex preparations such as Pantopon. Pantopon had been suggested by his Bern colleague Hermann Sahli in 1909 and was produced by Hoffmann-La Roche from the same year onwards. As a purified opium extract, it was supposed to work better and more gently than morphine. While for Tschirch, this marked the beginning of a new period in applied pharmacognosy, the "period of gentle methods", the passage of time has shown that this was wishful thinking; the "return to drugs" did not materialize. With Tschirch's retirement in 1931, pharmacognosy lost its most important representative and thus rapidly lost also its significance.



Tschirch with palm frond in Indonesia, 1889

From today's perspective, the question arises as to whether Tschirch had overreached, with his combined goals of establishing pharmacognosy as a subject as independent as possible, and of systematically investigating the world's flora. Had pharmacognosy focused more on a few promising plants and sought collaboration with pharmacology, it might have been

more successful. That being said, despite the many earlier and recent studies in phytopharmacy, the majority of the world's flora still awaits pharmacognostic and pharmacological research. With the advances made in analytic effectiveness and capacity, we can envisage a future in which Tschirch's goals might yet be realized.



Opium bernense (Institute for the History of Medicine)



Pantopon "Roche"

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 Egli
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		

T. Kocher, Dean 1898 - 1900 and Nobel Prize Winner 1909

From today's perspective, the question arises as to whether Tschirch had overreached, with his combined goals of establishing pharmacognosy as a subject as independent as possible, and of systematically investigating the world's flora. Had pharmacognosy focused more on a few promising plants and sought collaboration with pharmacology, it might have been

more successful. That being said, despite the many earlier and recent studies in phytopharmacy, the majority of the world's flora still awaits pharmacognostic and pharmacological research. With the advances made in analytic effectiveness and capacity, we can envisage a future in which Tschirch's goals might yet be realized.



Opium bernense (Institute for the History of Medicine)



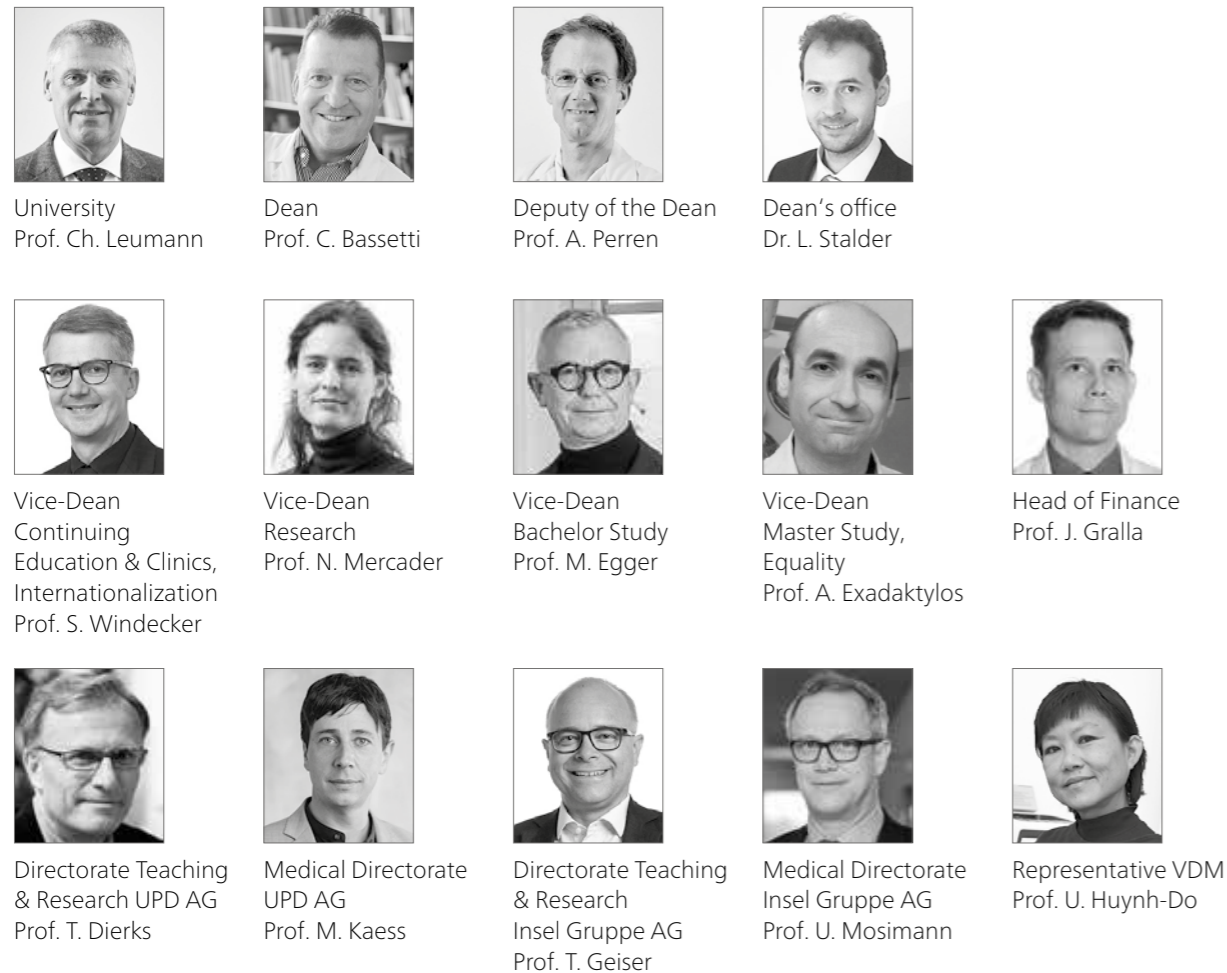
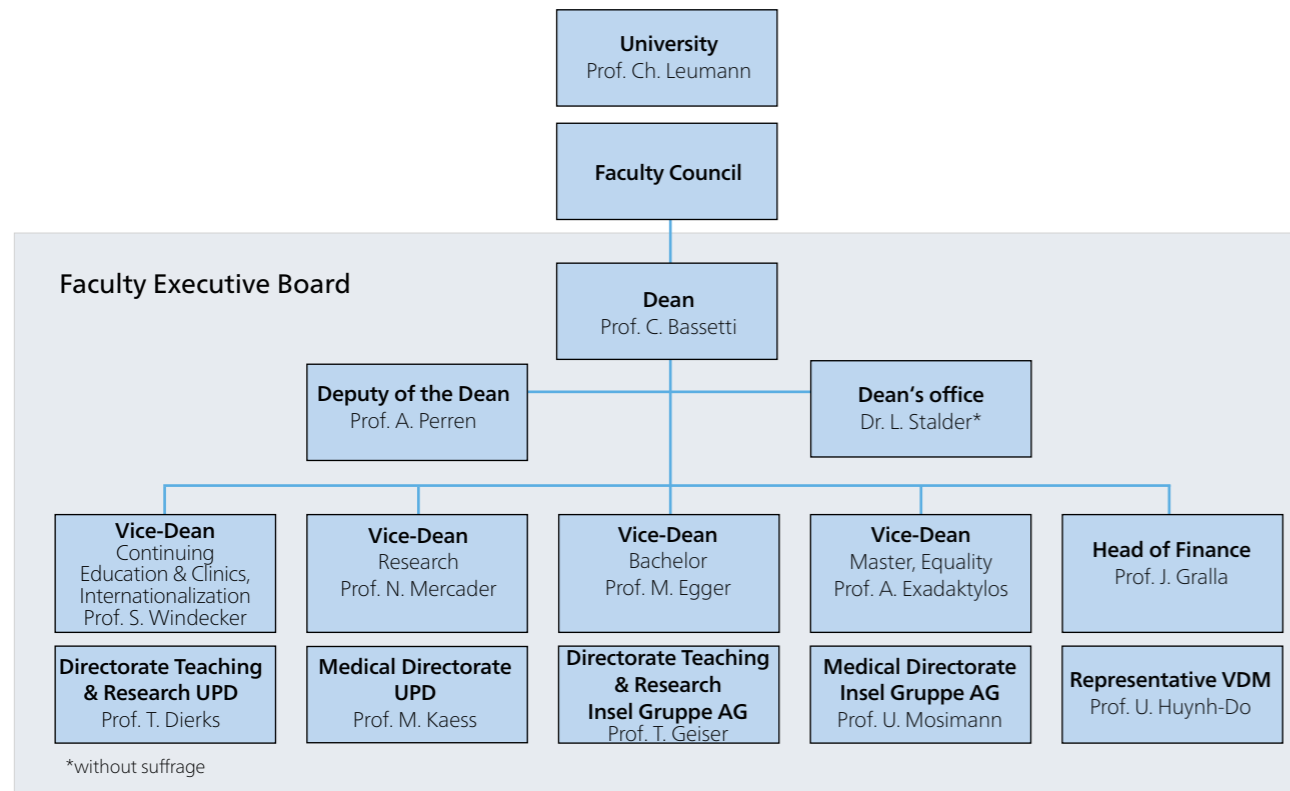
Pantopon "Roche"

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		

T. Kocher, Dean 1898 - 1900 and Nobel Prize Winner 1909

Organigram



Dean and Vice-Deans



Departments of the Vice Deans



Prof. Marcel Egger

Bachelor and Master Studies Equality

Like all university teaching, the medical curriculum is a very dynamic process that has to constantly remodeled and aligned with the socio-economic framework as well as with new requirements for the next generation of young medical doctors.

The training of young doctors is one of the central tasks and requests of the Medical Faculty. However, society's demands on medical graduates are high, but students also have high expectations on their education and training in medicine at the Medical Faculty. As a logical consequence, excellence in teaching is one of the strategic goals of the Medical Faculty Strategy 2030. The Medical Faculty aims to continuously improve the research-based and practice-relevant quality in teaching in the problem-based learning (PBL) hybrid curriculum environment. In particular, we would like to develop and improve the "teaching culture" especially in the clinics. This means that teaching and training of students should receive greater attention and recognition, e.g. by means of "protected teaching time". In this context, we would like to tune the vertical integration, i.e. between preclinical and medical training contents, as well as strengthen the interprofessional and inter-faculty learning opportunities. At present, a task force is working on the implementation of these goals.

Not surprisingly, digitalization and Digital Medicine will affect the professional profile of a medical doctor in a profound and unprecedented way. For example, what should medical students know about machine learning at the end of their studies? Future medical professionals should be able to validate AI systems and its application in the respective clinical situation on the basis of solid criteria and apply them in a clinical context. In addition, AI raises new ethical and legal questions. Students must be aware of these socio-political aspects and must be able to take a position on these issues that are essential for their medical profession. These are just examples of new contents that we would like to integrate into the curriculum.

In a broader context, the Medical Faculty also aims to further develop digitalization in medicine (clinic, teaching and research) in particular strategic fields by establishing a "digital hub" among the different stakeholders of the University of Bern and the university hospitals. A task-force is working to establish a close partnership between different stakeholders in order to solve the urgent problem of data interoperability between research institutes of the UniBE including the Medical Faculty and the university hospitals.

The fact that we also train practical and committed future doctors is shown by initiatives like these: Since mid-December, more than 70 of our medical students have been supporting the intensive care unit and the emergency department at Inselspital on the basis of a student initiative. Such initiatives are fueled by many factors.

Diversity, for example, contributes significantly to the excellence of teaching and research in Bern. The consideration and promotion of equal opportunities and diversity in all its dimensions is therefore a crosscutting issue that affects Bachelor's and Master's programs equally. We are therefore committed to ensuring equal opportunities in studies, teaching, research and administration. With various programs and investments, we aim to increase the promotion of diversity at our faculty and affiliated institutes.

Equality is not an empty word but a common thread that runs through all vice-deaneries.



Prof. Nadia Isabel Mercader Huber

Research and Young Academics

The focus of activity in this period was the preparation of the Research Strategy 2030. This was carried out in close cooperation with the Committee for Research. In addition, concrete implementation options have also been prepared since fall 2021.

Excellence in research is to be strengthened by increasing collaborations between the various clinics and departments. Vertical integration is to be achieved by expanding the networking of basic, translational and patient-oriented research. Furthermore, it is our goal to promote existing and new bridge-building research topics. Thus, interdisciplinary and interprofessional collaborations shall be established in different research areas. This should enable breakthroughs in research at the interfaces of different disciplines. In this context, the first Strategic Board (SF-Board) call was launched in 2021 with a total budget of 1.6 million CHF. In the coming years, this vessel is expected to foster further research consortia of the Medical Faculty.

The opening of the new building of the Department of Biomedical Research DBMRs in October 2021, with the restructuring into thematic research programs, and the establishment of the Center for Artificial Intelligence (CAIM) in January 2021 are very good examples of how networking and collaborations within the faculty are strengthened and future-oriented.

Another key focus is the promotion of young researchers. We note that the research culture in our clinical environment needs to be strengthened. It is imperative to facilitate research opportunities for junior clinicians and to support MD-PhD students. We are also committed to sparking interest in research early, during undergraduate studies.

Also this year, a call for Protected Research Time was made, which was met with very great interest. The information event in the 2nd year of studies in human and dental medicine also met with great interest. This makes it clear that we must continue to work in 2022 to support the next generation of researchers.



Prof. Stephan Windecker

Education & Clinics and Internationalization

Continuing education in 2021 was affected in general and also at the Medical Faculty by the ongoing disruptions of the COVID-19 pandemic. Fortunately, as of the fall semester of 2021, the first +100 students were able to start the master's program in Bern due to the establishment of a sufficient number of block practicals and the willingness of additional tutors. Furthermore, the course regulations for the MAS course in Stroke Medicine of the University Department of Neurology of the Inselspital were approved and will take place for the first time in April 2022. The Master of Science in Artificial Intelligence in Medicine was also established as a mono-subject, which was developed jointly with CAIM and will start for the first time in the fall semester of 2021.

In 2021, a commission was established within the Medical Faculty for the purpose of developing a national and international networking strategy. In addition to consolidating existing national collaborations in French-speaking Switzerland (Fribourg and Neuchâtel), an official agreement with the Faculty of Biomedical Sciences of the Università Svizzera italiana will be sought. The framework for the intensification of strategic international partnerships as well as the promotion of the exchange of researchers will be elaborated.

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

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
 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
 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
 School of Dental Medicine zmk, Freiburgstrasse 7
 Swiss Institute for Translational and Entrepreneurial Medicine (sitem), Freiburgstrasse 18
 University Cancer Center, Freiburgstrasse 10
 University Neurocenter, Freiburgstrasse 16
 PBL-Tutorial Rooms, Effingerhaus 55

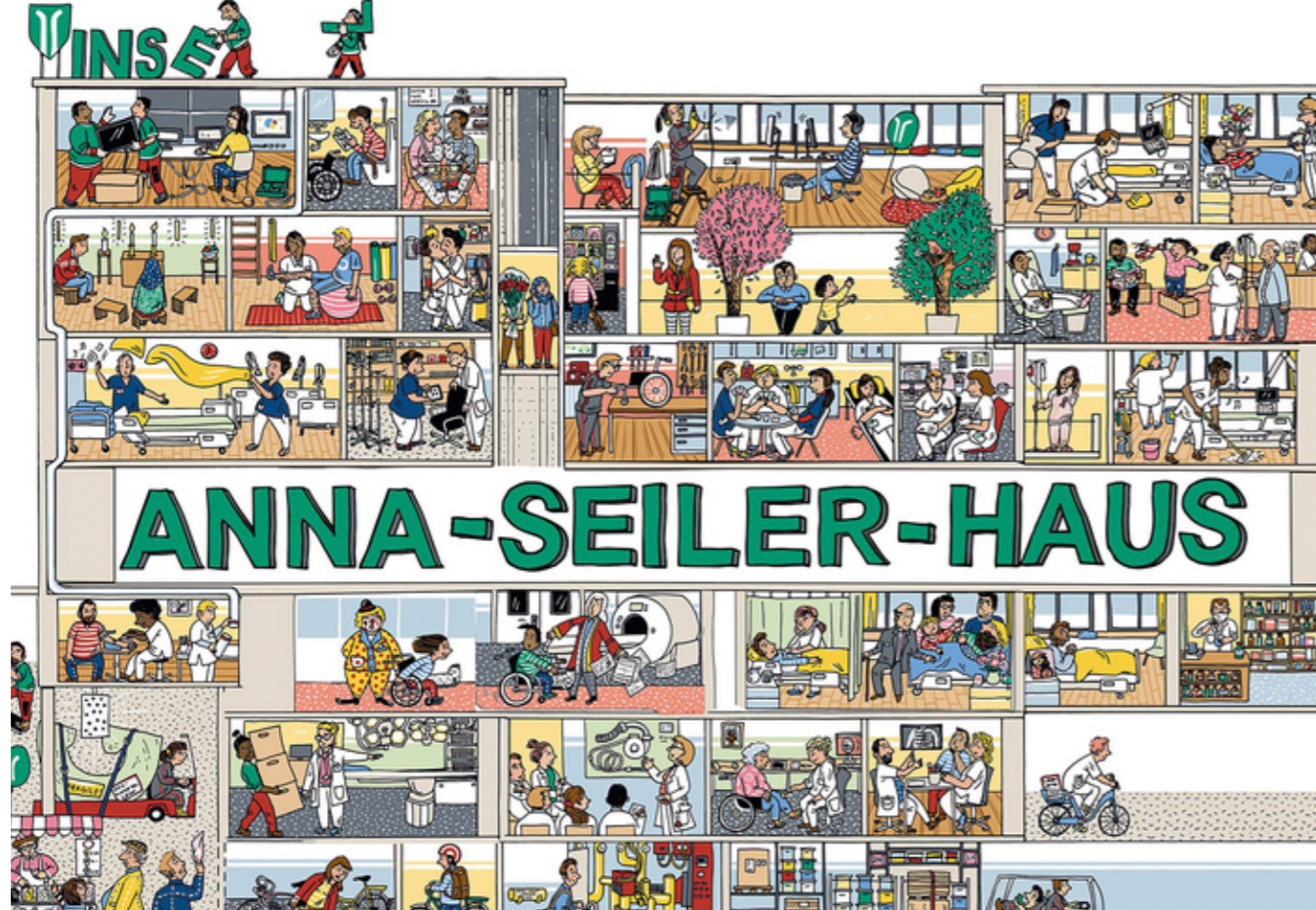
Teaching facilities

UniAlhambra
 UniZiegler

UPD

Universitäre Psychiatrische Dienste, Bolligenstrasse 111





Panel 12: The new main building is named after Anna Seiler, the founder of the Inselspital

Structural Development of the Inselspital Area

The structural development for the expansion and modernization of the spatial infrastructure on the Insel campus (Bernese Medical Campus) advances. The year 2021 brought the name of the new main building on panel 12, the opening of new facilities at Murtenstrasse 24-28 and panel 6.1 as well as time horizons with regard to new constructions plans.

Panel 12: The New Main Building is Named Anna-Seiler-Haus

About two years after its start and two years before its completion, the new main building of the Inselspital is given its name: The future core of the Insel campus will be named after Anna Seiler, the founder of the Inselspital. The previous Anna-Seiler-Haus will be given a new name. The construction of the main building is on schedule. In August 2021, the connection to the Intensive Care, Emergency and Surgery Center (INO) was completed and with this step, the new building has taken another important step forward. Interior construction also progressed through the end of 2021. The construction of the first floors will be finalized in the first quarter of 2022, after which the complex technical commissioning of the building starts. The new building is scheduled to be ready for occupation in the third quarter of 2023. The Anna-Seiler-Haus will be a center point on 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.



Future front of the new Anna-Seiler-Haus



The new main building rises into the sky next to the old one

„Anna Seiler represents the Inselspital and its long history like no other historical figure. That is why it was important to us to name the new main building - the centerpiece of the new Insel campus - after her. With a female name, we also wish to send a signal about the importance of women in medicine. With a share of 73 percent, the majority of our workforce is female and contributes accordingly to the outstanding medicine, care and research at the Insel Gruppe.“

Dr. h.c. Uwe E. Jocham
President of the Directorate at Insel Gruppe AG

Panel 6.1: New Radiation Oncology Building

The new radiation oncology building was put into operation in July 2021. After two years of construction, the new facilities of the Department of Radiation Oncology in the basement of the Theodor-Kocher-Haus are ready. The building reaches 20 meters into the depth and complements the new building of the treatment rooms in the OP East. It is part of the Tumor Center, which will be located in the raised Theodor-Kocher-Haus. At the core of the new building are four rooms for radiation therapy protected against radiation by a total of 1400 cubic meters of extremely dense baryte concrete. The gate to the treatment room weighs 38 tons. The building is underground and cannot be recognized from the outside. This construction is another example of how infrastructure and medicine complement each other on the Insel campus.



Murtenstrasse 24-28:
The inauguration of the new medical research and service building took place in August 2021

Murtenstrasse 24-28: New Laboratories and Medical Research and Service Building for the Department for Biomedical Research (DBMR) and Institute of Legal Medicine (IRM)

The new laboratory building at Murtenstrasse 24 - 28 was inaugurated in August 2021. The new building on the edge of the Insel campus houses the Institute of Forensic Medicine (IMR) and the Department of for Biomedical Research (DBMR). Previously, the two institutes were spread across 18 locations in the city of Bern. The high-tech building is constructed in a sustainable manner: It uses little energy and offers an agreeable indoor climate. The building is designed to be easily adjustable to future research standards and needs. The new laboratory building is important for strengthening Bern as a medical location, creates synergies in the use of shared research infrastructures and provides on almost 11,000 square meters enough space for 400 employees.



Offices at Murtenstrasse 24-28

Panel 3: The New Base Camp for Bernese Medical Students

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 panel 3, which will serve as a the base camp for Bernese medical students. The feasibility study for panel 3 was completed at the end of 2019 and the architectural competition is expected to be announced within the next two years until 2023. The commissioning of the new medical training building is planned to be around 2030.

Panel 7: Medical Research and Training Center

The last year's winner further developed the project "JANUS", which went into construction project phase. The construction period is estimated to start in the middle of this decade, with an estimated completion of the building by the end of the decade. The new center will host various institutes of the Medical Faculty. It 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.



Panel 7: The front of project "JANUS", the future building of the medical research and training center (©ARGE BB07)



Working space in the future medical research and training center (©ARGE BB07)



Dean's Office



Dr. Lukas Stalder
Head of the Dean's Office



Dierk Matthäus *)
IT Project Manager



Gabriela Schaller
Assistant to the Dean and to the Head of the Dean's Office, Communication



Romano Hoenger
Assistant to the Dean



Doris Häfelin
Assistant to the Head of the Dean's Office



Pia Jäggi
Finances



Rita Meyer
Appointments, Habilitations



Isabelle Salzmänn
Dissertations, Confirmations



Franziska Studer
Diploms, Exam fees, Graduation Ceremony



José Schranz
Annual Report, Teaching Capacities



Nicole Peter
Quality Manager



Dr. Marcel Wullschleger
Course Evaluation



Svea Lehmann
Gender Equality Coordinator



Sanche Schwab
Successions, IT support



Pham Lan
Finances / Human Resources Coordinator

*) Our long-time, highly valued and dedicated colleague in the Dean's Office of the Medical Faculty, Dierk Matthäus, passed away on 27 March 2022.



Debora Scherrer
Successions and Promotion of young Academics



Tina Schubert
Successions and Internationalization

Dean's Office of Student's Affairs



Dr. Peter Frey
Head of Unit of Student's Affairs
Study Coordinator 3rd Year



Sarah Habegger
Student's Office



Beatrice Ducret
Administration 1st Year



Dr. Helena Röss
Study Coordinator 1st Year



Franziska Schmidhauser
Administration PBL, Tutors



Dr. Sandra Trachsel
Study Coordinator 2nd Year



Sara Vaz
Administration Clerkships



Barbara Rechsteiner
Administration Master in Pharmacy, Lectures and Electives Master in Medicine



Regula Walther
Clinical Skills Training Courses 3rd Year



Isabel Fahrni
Lectures and Seminars 3rd Year



Karin Erb
Administration Masterthesis, Courses EKP 4th Year



Franziska Kolb
Administration 2nd Year Courses SK1 5th Year



Interview with Dr. h.c. Anne-Françoise Auberson Nordmann

Mrs. Auberson Nordmann is an Honorary Doctor of the Medical Faculty, University of Bern and a founding member and President of ProRaris, the alliance of Swiss organizations of people with rare diseases. She is committed to the implementation of the National Concept for Rare Diseases.

You are personally committed in various ways. What led you on the path you have taken?

Actually, I wanted to become a doctor. I suffer from a rare disease myself, the essential tremor. It is not painful, but quite limiting on a social level, as the symptoms do have negative connotations. Due to the trembling I decided against medicine being the ideal choice for me, so I choose law studies. I was interested in people and I wanted to help them. Through law, I recognized a way to pursue this wish too. Then, life had other plans: After the legal internship, I lost my father, whereupon I had to integrate into the management board of our family business. It required a different education and I dropped out of my law studies.

What I have always done since very early and continued until the present day is volunteering. During my studies, I started volunteering in a psychiatric ward in Geneva, where I helped patients eating their meals. Now imagine, someone with an essential tremor trying to spoon soup to someone. That specific time had a great impact on me. I learned a lot, because the patients laughed with me until I managed to put some liquid in their mouth with a spoon! This situation sums it up quite well: It took a lot of self-irony and humor for me to face my disease. This is a lesson I have carried with me ever since.

You started volunteering very early in the seventies and you founded ProRaris in 2010. What have you done in the almost 40 years between?

I was active in the family business and president for some time there. Besides that, I have always been involved in volunteer work. For example in the field of AIDS in Geneva, where I worked with the pioneers of AIDS research. This specific experience personally strengthened me in my fight against unequal treatment, as the inequality in the field of AIDS was particularly obvious: Back then, I saw people dying all alone because their families did not care. In stark contrast, there were people dying of cancer in a palliative situation surrounded by family and friends. In relation to rare diseases, it is also a very similar kind of loneliness and ignorance which leaves many patients without support.

How did you initially get involved in rare diseases on an institutional level with ProRaris?

Out of my own experience. Nothing existed with regard to the essential tremor in Switzerland. So I came up with the idea to found an association for those affected. Searching for information, I contacted Orphanet Suisse, whereupon I was offered to join a group of rare disease patient organizations looking to found a rare disease alliance in Switzerland. A condition of being integrated into the group of founders was being affected by a rare disease oneself – thanks to essential tremor I could join.

“I was interested in people, and I wanted to help them.”

How is Switzerland positioning itself in relation to rare diseases?

Switzerland owns all the good preconditions; however, it is really behind schedule in relation to rare diseases. Most European countries already have national plans for rare diseases. When we had only started talking about it in Switzerland, France had already edited the 3rd version of the national concept. The problem in Switzerland is that the issue of rare diseases is neither public nor politicized, nor is institutionalized. Today, the BAG reports 600'000 people affected, but still, the country's response is to rely first on volunteers, not to offer equal access to health services. In addition, the topic of rare diseases is difficult to manage. It can only be explored with the support of the patients, an interest which is often nonexistent in the medical domain. This leads back to the unequal treatment: Many people affected live without a solution – all their lives! I have met many patients lifelong treated only by their family doctor in the village. They could not advocate for themselves and fight for further examinations.

How can this be changed?

Personally, I must admit that I am very frustrated. We have indeed achieved results: In 2014, the Federal Council established a national concept for rare diseases, with the implementation plan following the year after. It is a huge task; all the measures to improve the situation of the people concerned must be defined and the deadlines are postponed from year to year. I am extremely grateful to all the doctors and researchers who are involved in this work and who are collaborating with ProRaris, which has been recognized as one of the key partners for this very implementation. Yet the legal basis for its maintenance and continuation is still lacking. This is frustrating. The recognition is visible on paper and the needs and expectations are written down – but no action follows. We need a political movement to create a legal basis for the funding of the measures identified as necessary. Moreover, the mindset must change. For example, in France, the concept of rare disease has in general a better response, as it is part of basic knowledge. In Switzerland, this is not yet the case. I always notice this on the annual day of rare diseases: Every year again and again, it all has to be explained and defined to the press, as if nothing was known about it.

The Medical Faculty of the University of Bern awarded you an honorary doctorate. What can an academic institution do in this difficult situation?

The honorary doctorate represents a very important thing. It shows the fact that the Medical Faculty recognizes the advances made in relation to rare disease as well as the effect of a mandatory, indispensable collaboration between patients and the medical domain. Therefore, I see this honorary doctorate not only as a personal honor, but as a recognition of collaboration and appreciation for all the people and patients involved. This means, you are already doing a lot. For now, it is really up to the politics to push something forward.

There are various initiatives around many different rare diseases. Each rare disease has its own reality and specificity. How do you manage to group these different initiatives together?

We work together because the difficulties are the same, not the diseases. I believe and have many times witnessed that a person affected by a rare disease has indeed a great sense of solidarity with those similarly concerned, regardless of their pathology: There is a possible benefit from such shared adversity. Only from working together, we could define the difficulties and only together we can achieve a movement that addresses issues specific to rare diseases. This unites us.

Describe yourself in 3 words

I speak a lot, but I am a very reserved person. And I am determined and loyal.



“Only from working together we could define the difficulties and only together we can achieve a movement that addresses issues specific to rare diseases.”

Who or what has inspired you in your commitment?

I had role models in my family. An uncle of mine founded the “Swiss Solidarity”. But for me it was always a matter of course, if you have certain qualities and opportunities, investing your time and resources for others.

Who would you like to thank in this context?

Not any specific person, but the entire ProRaris committee. I have received an extraordinary opportunity at ProRaris. They are all professionals with an enormous commitment. I have a great friendship and respect for all of them. My successor is a politician. After her arrival she said to me: “Mrs. Auberson, you are a pioneer, now it is the right moment to professionalize ProRaris.” I answered: “If by professionalize you mean a solid base, whereby the foundation is financed, I agree. But for the rest, I have a professional committee.”

Looking back at your entire impressive career, what was a failure in your eyes?

What bothers me is the failure regarding UniRares. I would have liked this to have gone much differently.

When I founded UniRares, it was very welcomed everywhere, as there was finally something for the many people affected by rare diseases and left alone without any association. But it needed a lot of support. There were some competences in the committee, but not enough. I am honest, this was a personal failure, but now it is no longer up to me to lead this.

What keeps you busy apart from all your professional commitment?

I love music; my husband is a classical musician! I also enjoy my role as a grandmother.

Can you say something about your relationship with sleep?

It does not get any better with age. But since I have fewer commitments, I no longer get up at 6 o'clock.

What is ahead of you in the next years?

The future is tomorrow, not years ahead. My future is the older age – this is when you do not talk about the future anymore. My wish is to stay interested and active every day and for as long as possible. And I always want to keep the self-irony and humor!



Interview with Prof. Dr. med. Dr. h.c. Albert Hofman

Prof. Albert Hofman is an Honorary Doctor of the Medical Faculty, University of Bern and is the Chair of the Department of Epidemiology and the Stephen B. Kay Family Professor of Public Health and Clinical Epidemiology at Harvard T.H. Chan School of Public Health in Boston, Massachusetts (USA). He is the initiator and principal investigator of two major population based, prospective cohort studies.

Could you tell something about your decision to become a medical doctor?

I remember when I had to take the decision back in gymnasium. At that time, I was reading Paul de Kruif's “Microbe Hunters”, an American bestseller, and Charles-Edward Amory Winslow's classic “The Conquest of Epidemic Disease” – I am sure those literary pieces made an impression on me. I was also talking to a friend of my father who was a general surgeon. He always spoke very passionately about medicine, which had an impact too.

If you did not enter this career, what other field or profession would you have considered?

My alternative was mathematics, as I was very good at it in gymnasium. Now, I am glad I did not choose this path, because I do not think I would have succeeded in this field as I have in medicine. An alternative I still find very attractive is demography, especially coming from a medical and epidemiological background.

When did your specific interest in public health and social and preventive medicine evolve?

The interest was sparked arose through epidemiology. While doing internal medicine, I developed an interest in epidemiology; not so much because of infectious disease or Microbe Hunters, but rather because of the quantitative approach to medical problems – which are in the end clinical epidemiological problems. I came into epidemiology from a clinical background and I think this is in itself very interesting, as epidemiology is one of the very few fields that can be an integrating force of clinical medicine on the one hand and public health on the other.

Where should the fields of public health and epidemiology be in the context of medical studies?

This is a very important question and I have a very clear answer: Ideally, public health, epidemiology, and clinical medicine ought to be integrated under the roof of one organization, namely a medical school. Just as in Europe, where you have the integrating force between clinical medicine and public health with epidemiology playing a role in both. In the US, public health is strongly separated from clinical medicine, which means you miss connections – this became clear at the beginning of the Covid-19 pandemic in the US.

“Epidemiology is one of the very few fields that can be an integrating force of clinical medicine on the one hand and public health on the other.”

Your biography offers two major cohort studies: The Rotterdam Study and the Generation R Study. What were the motifs to initiate these two studies?

The two studies have slightly different motifs, yet both are about causation. The Rotterdam Study looks at where the diseases are: In the elderly. We focused on people aged 55 and older. While one can study diseases isolated at a younger age, those diseases and their causes can be studied in their interactions and in a total population at a later stage. At a certain age point, various diseases come in, such as epilepsy, just to mention one neurological example. I am particularly proud that we did not only study one group of diseases, so we had a relatively broad range of outcomes. This meant we could also study comorbidities and factors related to those.

The Generation R Study is slightly different. It is also about causation, but focused on people earlier in life using the so called life course approach. Many of the end results in diseases in the middle-aged and elderly start earlier – and the best way to study these diseases is over a long period of time is a cohort study. We also

set the goal to start as early in study subject’s lives as possible: Generation R starts at the fetal stage. Now, there is a follow-up to Generation R even starting before conception, which we initially also wanted to do. Many of the harmful influences that we have in the environment have an impact as early as on conception.

What was the most difficult part about launching a large cohort study like the Rotterdam Study?

I think the most difficult part is the beginning. You need to arouse interest and acquire funding. Luckily, we had help from a very foreseeing and progressive Dean in the medical school back in those days. After some time, we were able to acquire funding from not only one source, but from several sources. The government was not particularly interested at the initial stage, only later. The beginning is also a period where you must gain the trust of the PhD students involved in the project, which is difficult, but at the same time also very gratifying once the project is running with people trusting in it. Therefore, the start was difficult – But if something is easy, everybody can do it!



“I simply keep doing what I am doing now: Help to develop further the department and the strong scientific but also educational environment.”

Much of today’s attention lies on precision medicine. What is the role of precision medicine in such studies?

Precision medicine has an important role. In the Rotterdam Study, we did big genomic studies, full MRI scan studies, and in fact one of the first whole genome screens in a population. It is so to speak “risk profiling”. You must find those who are at risk and those you have to treat specifically. Nowadays, we have over 50 years of experience since the first risk function of cardiovascular diseases was published. There is much emphasis on “risk profiling” in epidemiology with nature, genetic, major genomic, pharmacological and lifestyle factors, which will all become major elements for epidemiologists who study the efficacy of drugs.

Brain health is a relatively new concept. How do you approach brain health?

In this relation, I would like to refer to the historical German concept of the “Nervenarzt”, for example represented by Prof. Kraepelin at the beginning of the 20th century. Back in that time, the concept integrated neuroscience and psychiatry, in other words mental and brain health – and for the first time looked at it not in isolation. In terms of my work, I am more focused on the neuroscientific side, I want to find causes and mechanisms in order to treat and prevent. Let me give you an example. At the moment, we work on the link between stroke and dementia. We know that small vessel disease does play a key role in that, and only recently we have found out that blood pressure, in particular the variability of blood pressure, is strongly related to small vessel disease. If you then have some antihypertensive calcium channel blockers, who can reduce the variability of blood pressure, and if you can link this to small vessel disease, this may lower the risk of dementia.

Could you summarize your personality in three words?

I am a supporter, a driver and a leader, but I do believe in a kind of shy and humble way.

Who inspired you the most?

I encountered many inspiring personalities in medical school, but two people particularly inspired me during my epidemiological and medical development: Geoffrey Rose, the towering epidemiologist and cardiologist who went into cardiovascular epidemiology.

My all-time favorite book is his piece Strategy of Preventive Medicine. It beautifully describes our task in medicine. My other major inspiration is Olli Miettinen, who sadly passed away in November last year at the age of 85. Most concepts we now know referring to as modern epidemiology come from him. I was fortunate to work directly with him for three years in Boston, after which a lifelong of joint work followed. I learned so much from him.

Looking back at your impressive career, what are you particularly proud of and what is a failure in your eyes?

I am proud of the cohort studies. I am also particularly proud of creating a thriving and active intellectual environment, through which we were able to attract the best students. What still haunts me is that I did not sufficiently succeed in linking epidemiology to basic science or the other way around. I am still not sure, why it is so difficult, maybe it is due to the fact of people still working and thinking in silos.

What keeps you busy when you are not working?

My pleasure is classical music. Several times a week I am at a concert and I am playing chamber music myself. It is a source of inspiration; when sitting there and listening, it is as if all troubles peel off and quietly melt away – and suddenly there is room for new ideas!

Can you say something about your relationship with sleep?

I sleep 7 hours a night, but it is getting a bit less with age.

What is ahead of you in the next years?

I simply keep doing what I am doing now: Help to develop further the department and the strong scientific but also educational environment. My great predecessor, Professor Brian MacMahon, who had the chair for nearly 30 years, has always seen the established educational environment for our students and the enthusiasm for epidemiology as his major achievement – this is what I wish to keep.



Dr. h. c. Anne-Françoise Auberson Nordmann, Honorary Doctor of the Medical Faculty

Honorary Doctorate of the Medical Faculty

The Medical Faculty awards the honor of Doctor *medicinae honoris causa* to Mrs. Anne-Françoise Auberson Nordmann, Crésuz.

Laudatio

- Anne-Françoise Auberson Nordmann,
- the pioneer in the field of rare diseases in Switzerland;
 - the advocate for people living with a rare disease;
 - the co-founder of the ProRaris Alliance Rare Diseases Switzerland, which unites those affected and gives them a strong voice;
 - for her essential contribution to the National Concept Rare Diseases;
 - for her tireless and selfless commitment to those affected, especially to their empowerment and to a new understanding of the role of patients as competent, full interlocutors;
 - for her numerous contributions to the dissemination of knowledge about rare diseases to the general public.

Curriculum Vitae

- Born 1948
- 1970 Law studies, University of Geneva
- 1970-1972 Legal internship
- 1972 Bank apprenticeship
- from 1972 Managing Director of a family holding company
- 2009-2017 President of the holding company
- Since 1973 numerous engagements in the field of medicine
- 2010 Vice-President and since 2011 President of ProRaris-Alliance Rare Diseases Switzerland
- 2018 Initiator and supporter of the patient organization UniRares

New Professors at the Medical Faculty



Thomas Sauter

Since 1 December 2020 Endowed Professor in Emergency Telemedicine at the Department of Emergency Medicine

Thomas Sauter joined the University Emergency Center of the Inselspital in 2012 as a senior physician at the Inselspital. He earned a master's degree in medical education from the University of Bern and the University of Illinois, Chicago, and in 2017 he received the SIWF award for special commitment to continuing medical education. In 2018, he was appointed Head of Education, eHealth, and Emergency Telemedicine, and in 2019 he habilitated in emergency medicine at the University of Bern. Thomas Sauter is involved in innovative teaching for medical students in emergency medicine, including virtual reality simulation training, and drove the topic of digitalization in emergency medicine in various national and international committees. For example, he is the founder and chairman of the working groups on digitization of the European Society of Emergency Medicine (EUSEM) and Swiss Society of Emergency and Rescue Medicine (SGNOR), as well as founder and congress president of the Swiss Congress on Emergency Telehealth. His main research interests in the still young field of Emergency Telehealth are digital triage and decision making, virtual reality in clinic and education, wearables and personalized medicine as well as application research on chances and risks of digitalization in acute care.



Britta Maurer

Since 1 January 2021 Full Professor in Rheumatology, Director and Chief Physician of the University Department of Rheumatology and Immunology at Inselspital

After completing her medical studies in 2004 and her PhD at the University of Heidelberg in 2005, Britta Maurer worked at the Department of Rheumatology, Hematology and Oncology at the Medical University Hospital in Heidelberg. For a research stay at the Center for Experimental Rheumatology, EULAR Center of Excellence (Prof. S. Gay) she moved to Zurich in 2007. Three years later, she resumed her residency at the Department of Rheumatology, University Hospital Zurich, where she habilitated in rheumatology in 2015. Since 2016, she has been a senior physician with a focus on systemic autoimmune diseases at the USZ.

Britta Maurer's research interest is the development of new tools for approaches to personalized medicine. To this end, she combines molecular biological analyses, innovative imaging methods and the use of artificial intelligence.



Martin Schimmel

Since 1 February 2021 Full Professor and Chairman of the Department for Reconstructive Dentistry and Gerodontology, Head of Undergraduate Dental Education, Vice Managing Director of ZMK Bern and Head of the Dental Technology Laboratory

Martin Schimmel completed his dental studies in Mainz, where he also received his doctorate. After working at the University of Leipzig and in private practices in Germany and England, he joined the University of Geneva as a senior lecturer in 2006. There, he obtained the federal specialist dental degree, the MAS Oral Biol and habilitated. In 2014, he was appointed Associate Professor of Gerodontology at the University of Bern. Since then, he has also been the representative of the ZMK Bern in the Faculty Commission for Equality. Martin Schimmel founded the department's satellite clinics in the Siloah Foundation and the two Burgerspittels Bern. Since 2019, he has been president of the Swiss Society for Geriatric and Special Care Dentistry. He was elected „Teacher of the Year“ by the dental students of the ZMK Bern in 2020. Martin Schimmel's research focuses on implant-prosthetic treatment concepts and their influence on patient-reported outcomes in the old and very old. In international networks he investigates the concept of „orofacial hypofunction“. For this purpose, he developed a chewing function test, which is currently used by about 30 research groups worldwide. He also conducts research on digital dentures with and without implants.



Katharina Stegmayer

Since 1 April 2021 Assistant Professor in Biological Psychopathology at the Universitäre Psychiatrische Dienste (UPD)

Katharina Stegmayer grew up in Germany and graduated from medical school at the University of Saarland in 2008. She worked as research associate at the Georg August University Göttingen, and completed her clinical training at the University Hospitals for Psychiatry and Neurology in Bern. In 2019, she habilitated in psychiatry and psychotherapy at the University of Bern. Since 2018 she has been working as a senior physician and in 2021 has been appointed as head physician at the University Clinic for Psychiatry and Psychotherapy in Bern.

Katharina Stegmayer's research interest is on the identification of multilevel markers for the prediction, indicated prevention and personalized treatment of mental disorders. She combines basic and translational research applying comprehensive behavioural test, blood and saliva analyses, multimodal imaging, EEG, and virtual reality approaches.



Annika Frahsa

Since 1 May 2021 Endowed Assistant Professor with Tenure Track of Community Health at the Institute of Social and Preventive Medicine (ISPM)

Annika Frahsa studied political science, North America studies and anthropology at FAU Erlangen-Nuremberg and at McGill University Montréal. Her doctorate in 2013 (Dr. phil. in sports science from FAU) focussed on the impact of participation on diverse stakeholder groups in physical activity promotion. With a habilitation on the capability approach as a paradigm for physical activity-related health promotion, she received her Venia Legendi in sport science at the University of Tübingen in 2021. She already collaborated with the University of Bern from 2017 to 2020 within a SNF NRP74 funded project on migrant women's health care needs for chronic illness services in Switzerland. In May 2021, Annika Frahsa has become the head of the new research group on community health and health care systems research at ISPM, with an endowment by the Lindenhof Foundation Bern. She currently is the principal investigator of the research component in the WHO special initiative on urban governance for health, equity, and wellbeing and she co-leads a study by the German Ministry of Health on physical activity promotion in nursing homes. Her research addresses social-structural determinants of health, the enhancement of participatory approaches in health research, and interventions to promote community health and healthy environments.



Steffen Eychmüller

Since 1 May 2021 Professor of Palliative Medicine, Chief Physician at the University Center for Palliative Care

Steffen Eychmüller completed his medical studies from 1981 to 1987 at Saarland University in Homburg. He received his medical license in 1988 and his doctorate in colorectal cancer at the same university. Steffen Eychmüller focused on internal medicine, psychosomatics and finally palliative care. He completed several fellowships in Australia and the USA. In 1997, Steffen Eychmüller obtained the title of specialist in internal medicine, in 2001 the FMH qualification in psychosomatic medicine and in 2003 the Master in Medical Education. From 2006 onwards, Steffen Eychmüller was head physician at the Palliative Care Center of the Cantonal Hospital of St. Gallen and was involved in various national committees for a future-oriented approach to palliative care. Steffen Eychmüller has been working at Inselspital, University Hospital Bern, since February 2012. Thanks to his commitment, palliative care is now successfully established at the Insel Gruppe. In 2016, Eychmüller became an endowed professor for palliative care. The focus of his research is on anticipatory care planning, care of the dying and end of life in the community.



Michael Liebrez

Since 1 May 2021 Professor of Forensic Psychiatry at the Institute of Forensic Medicine (IMG)

Michael Liebrez succeeds Professor Annelise Ermer as Associate Professor for Forensic Psychiatry and Psychotherapy. Additionally, he will serve as Head of the Department of Forensic Psychiatry. He is certified for psychiatry and psychotherapy (FMH) as well as forensic psychiatry (FMH) by the Swiss Medical Association. Prior joining the University of Bern, he established and headed the Assessment Clinic for Issues of Civil and Public Law of the Psychiatric University Hospital Zurich and was a Visiting Research Fellow for Forensic Psychiatry, Division of Law, Ethics, and Psychiatry, Columbia University, New York. He has long-standing experience in the treatment of patients with substance use disorders (SUD), implemented an outpatient service for offenders with a SUD in case of court-mandated therapy and served as an expert to the Council of Europe's Pempidou Group. His previous work on mental disorders has been published in medical and in academic publications on law. He is a member of various national and international professional societies and serves as Editor in Chief of the medico-legal journal Forensic Science International Mind and Law.



Lia Bally

Since 1 August 2021 Professor for Clinical Nutrition and Metabolism at the University Department of Diabetology, Endocrinology, Nutritional Medicine and Metabolism (UDEM)

The University of Bern appoints Lia Bally to a newly created professorship in nutrition and metabolism. Professor Bally works as an endocrinologist and physician scientist at the University Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM) of the Inselspital Bern. Within the department, she is heading the Nutrition, Metabolism and Obesity Services. Lia Bally completed her medical studies at the University of Bern in 2013. Directly afterwards, she completed the MD PhD program at the Graduate School for Cellular and Biomedical Sciences in Bern and graduated Summa Cum Laude in 2017. Supported by the Swiss National Science Foundation, she intensified her research activities at the Institute of Metabolic Science at the University of Cambridge (UK). In parallel, she completed her clinical training in internal medicine and endocrinology. Supported by competitive funding grants (e.g. SNF Eccellenza), Lia Bally combines approaches in metabolic science with technological innovation (artificial pancreas, digital nutrition, etc.), with a strong focus on patient-centered care.



Ralf Schulze

Since 15 September 2021 Professor for Oral Diagnostic Science, he will also become Head of Oral Diagnostic Science at the Department of Oral Surgery and Stomatology and a member of the Management Committee of the Dental Clinics.

Ralf Schulze was born in Munich, Germany, where he completed his studies in dentistry at the Ludwig Maximilian University in 1993 and received his doctorate in 1995. After working in a private practice he began his further training in oral surgery at the Clinic for Oral and Maxillofacial Surgery at Otto von Guericke University Magdeburg in 1994. In 1998, he moved to the Polyclinic for Dental Surgery at the Johannes Gutenberg University in Mainz, where he worked as senior physician and head of the oral and maxillofacial radiology department since 2000. He habilitated there in 2006 in dental radiology and was appointed associate professor in 2013. Ralf Schulze researches methods and techniques for the optimization and new development of various dental X-ray procedures. Among other things, he has developed methods for obtaining three-dimensional information from a small number of two-dimensional X-ray images. In particular, the improvement of clinical radiology through optimized information retrieval is at the center of his interests with a strongly interdisciplinary approach. Several patents and patent applications characterize this long-standing interdisciplinary research activity. In addition, Ralf Schulze has been actively involved in international radiation protection committees for many years.



Benoît Schaller

Since 1 October 2021 Full Professor of Cranio-Maxillofacial Surgery, Successor of Prof. Iizuka at the Department of Cranio-Maxillofacial Surgery

Benoît Schaller grew up in Fribourg, graduated in human medicine from the University of Bern in 2000 and received his doctorate from the same university in 2004. He then completed his dental studies at the University of Zurich in 2007 and obtained his doctorate in dentistry from the University of Bern in 2009. In 2010, he obtained the specialist title in oral and maxillofacial surgery (FMH) and the specialist title in oral surgery (SSO). Benoît Schaller conducted research in Singapore (SingHealth/Duke-NUS) in 2015 and received the Venia Docendi of the University of Bern in 2016. In 2019, he was awarded the title of Associate Professor of the University of Bern. Benoît Schaller's scientific priorities aim to improve the treatment of traumatic injuries of the skull and craniofacial region. His research interests also focus on the analysis of bone regeneration, different bone substitutes and growth factors in bone healing and new bone formation. Together with the ETH Zurich and University of Zurich he received a Swiss National Foundation grant (Sinergia) for the development of new resorbable osteosynthesis systems to treat maxillofacial fractures.



Lilian Witthauer

Since 1 September 2021 Assistant Professor with Tenure Track at the Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM)

Lilian Witthauer studied physics at the University of Basel and graduated with a PhD in Experimental Physics in 2015 from the same university. In addition, she holds a Master of Advanced Studies in Medical Physics from ETH Zurich. During her postdoctoral studies at the Department of Biomedical Engineering at the University of Basel she worked on virtual reality surgery planning and performed research on optical navigation sensors. In 2018 she moved to Boston, where she worked as a research fellow at the Wellman Center for Photomedicine at Massachusetts General Hospital and Harvard Medical School. There, she developed intramuscular oxygen sensors for improved diagnosis of compartment syndrome. Her current research focus at the Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM) is the development of new realtime blood glucose sensors. Lilian Witthauer's research interests also include the advancement of tools to measure and analyze additional physiological parameters to facilitate the diagnosis and treatment of diabetes patients.



Carla Meyer-Masseti

Since 1 October 2021 Endowed Assistant Professor for Clinical Pharmacy at the Department of General Internal Medicine

Carla Meyer-Masseti studied pharmacy in Basel and obtained her specialization in hospital pharmacy (FPH) in 2006. In 2011, she completed a joint PhD thesis in medication safety at the University of California San Francisco, Department of Clinical Pharmacy (Prof. B. Joseph Guglielmo) in connection with a fellowship in medication safety and the University of Basel, Department of Clinical Pharmacy & Epidemiology (Prof. Dr. Christoph Meier). In 2010, she joined the Swiss Patient Safety Foundation as a medication safety specialist. From 2012 to 2016, she worked as a medication safety pharmacist at the Cantonal Hospital of Lucerne. Between 2016 and 2020, she completed her postdoctoral studies in Basel focusing on medication safety at the interface of care to home care organizations. At the same time, she was a project manager and clinical risk manager at the Center for Quality Management and Patient Safety at University Hospital of Zürich. From 2020 to 2021, Carla Meyer was a senior lecturer and researcher at the Institute of Primary Healthcare at the University of Bern. The Kollegium für Hausarztmedizin KHM has awarded her the Fond interprofessionalité in 2020. Her research focus is on medication safety and interprofessional collaboration during transition of care.

SNF Professors at the Medical Faculty



Christian Soeller

Since 1 October 2021 Professor for Cardiac Physiology and Co-Director of the University Institute of Physiology

Christian Soeller grew up in Dinslaken, Germany and graduated in physics from the University of Göttingen in 1991. During his PhD at the Max Planck Institute for Flow Research (Göttingen, Germany), he developed a research interest in optical imaging techniques. After completing his PhD in 1994, he moved to biophysics at the Medical School of St George's University of London, where he applied multiphoton microscopy to the study of calcium dynamics in the heart as a postdoctoral fellow. In 1998, he began his faculty career as a lecturer in the Department of Physiology at the University of Auckland, New Zealand before moving to the University of Exeter (UK) in 2012 to join the newly established Living Systems Institute there. There, he served as Professor of Physical Cell Biology and as one of the institute's assistant directors before moving to Bern. Christian Soeller researches the calcium dynamics and pathophysiology of the cells of the heart muscle, applying modern imaging techniques. For this reason, in addition to the physiology and biophysics of the heart, an additional focus of his research is the further development and application of super-resolution microscopy techniques.



Stéphane Ciochi

Institute of Physiology
1 March 2018 - 28 February 2024

Project: Neuronal circuits of the ventral hippocampus and context-specific emotional memories

Coming face to face with a venomous snake in a forest will trigger a fearful reaction, whereas observing the same snake behind the glass of a terrarium will rather evoke curiosity. Thus, the context in which life situations are experienced plays an important role in gating emotional responses. The ventral hippocampus is a key brain region of the cerebral cortex involved in context-specific emotional memories. The objective of this research program is to understand the mechanisms and neuronal circuits involved in the formation of emotional memories using a cross-level approaches combining recordings/imaging of identified ventral hippocampal circuits, selective optogenetic strategies and disease models in behaving mice. Selective modulation of specific neuronal mechanisms in the ventral hippocampus could foster the development of more potent and selective therapeutics for human patients as altered emotional regulation is a hallmark of pathological anxiety and post-traumatic stress disorders.



Laura Marchal-Crespo

ARTORG Center for Biomedical Engineering Research
1 September 2017 - 31 December 2021

Project: Optimize Motor Learning to Improve Neurorehabilitation

Patients with neurological disorders engage in an intensive and extensive neurorehabilitation process to regain part of their lost cognitive and motor functions. Important success factors are the intensity and duration of therapy and the optimal adaptation of the degree of difficulty to the patient's abilities. Robot-assisted rehabilitation and virtual reality (VR) is a promising technology combination to improve neurorehabilitation, as robot-aided training allows for high-intensity training in a highly motivating virtual environment. However, current VR-based rehabilitation robots seem to be working with suboptimal training strategies – only using a fraction of the rehabilitation potential – by not optimally considering the subjects' individual needs. This project aims to improve neurorehabilitation by performing a systematic analysis of the relative benefits of novel robotic training strategies that modify the training difficulty and immersive virtual environments on motor (re)learning based on the participant's specific needs, age, and characteristics of the task to be performed.



Gilles Olivier Wandeler

Department of Infectious Diseases, Inselspital,
University Hospital Bern

1 September 2018 - 31 August 2022

Project: Towards the functional cure of hepatitis B virus infection: longitudinal studies to assess long-term outcomes in Switzerland and sub-Saharan Africa

HBV infection is a major global public health problem, and the first cause of liver cancer in Africa. In view of the recent improvement in access to antiviral treatment, it is important to better understand the clinical evolution of treated persons. The overall objective of this work is to evaluate the clinical course and determinants of HBV functional cure in HBV-infected patients. Cohorts of HBV-infected patients have been established in Zambia, Senegal, and Switzerland, and allow their close follow-up over several years. The specific objectives are to evaluate the criteria for indication of antiviral treatment, the frequency of occurrence of functional cure, and the incidence of liver cancer. The analysis of liver biopsies will help us to better understand the evolution of the main molecular markers of HBV infection. This project will promote advances in research on the cure of HBV by improving our knowledge of its molecular determinants in populations that have been little studied until now. The results of the project will help in the development of specific guidelines for the treatment of HBV-infected patients in Africa.



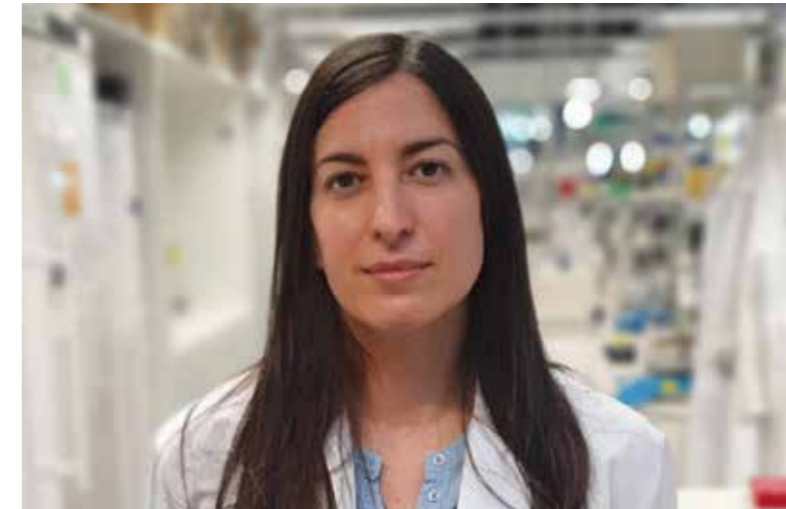
Selma Aybek Rusca

Department of Neurology, Inselspital,
University Hospital Bern

1 November 2018 - 31 October 2022

Project: Sense of Agency and Stress in Functional Neurological Disorders

This project aims to better understand the mechanisms responsible for a neurological disorder that is very common but poorly known to the general public and neglected by scientific research: functional neurological disorder (FND). FNDs manifest themselves by various very disabling symptoms such as paralysis, walking disorders, tremors or loss of consciousness. FNDs affect young patients with a peak between 20 and 40 years of age. A dysfunction of certain neural networks has been demonstrated, in particular the network of the sense of agency which allows us to recognize whether we are the agents of our own movements. This project will study whether it is possible to restore a normal functioning of this network of agency by 1) a non-invasive neurostimulation technique (application of an electric field on the skull) and/or 2) a mindfulness meditation therapy (standard 8-week program).



Georgia Konstantinidou

Institute of Pharmacology
1 August 2016 - 31 July 2022

Project: Exploring requirements for the maintenance of oncogenic KRAS-induced lung and pancreatic tumors

Lung and pancreatic cancers are the leading causes of cancer-related deaths worldwide. Therefore, more effective therapeutic strategies are urgently needed to combat these devastating diseases. Tumor-associated KRAS mutations occur in about 31% of non-small cell lung cancers (NSCLC) and about 97% of pancreatic ductal adenocarcinomas (PDAC), the most common forms of lung and pancreatic cancers, respectively. These tumors are critically dependent on KRAS oncogenic activity, a phenomenon called oncogene addiction. To date, attempts to develop direct inhibitors of mutant KRAS have been unsuccessful and only recent advances have shown promising results, which still need to be validated in the clinic. In parallel, the identification of molecular targets necessary for the maintenance of mutant KRAS-dependent tumors is of enormous interest. Our research objective is the identification and targeting of signaling pathways maintaining addiction to oncogenic KRAS in NSCLC and PDAC. We will employ a multifaceted experimental strategy that takes advantage of unique in vivo mouse models and in vitro reagents to address the above questions and provide a framework for the development of therapeutic regimens against NSCLC and PDAC.

Eccellenza Professors at the Medical Faculty



Lia Bally

Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM), Inselspital
1 January 2020 - 31 December 2024

Project: DEciphering the Enigma of Postprandial Hyperinsulinaemic Hypoglycaemia after Bariatric Surgery (The DEEP Project)

Bariatric (weight-loss) surgery is an increasingly common anti-obesity treatment. In addition to its potent weight-reducing effects, bariatric surgery dramatically alters glucose metabolism. While beneficial for diabetes remission, these alterations can predispose susceptible individuals to a late complication known as postprandial hyperinsulinemic hypoglycaemia. The condition often occurs years after surgery, and can result in alterations or even loss of consciousness, with debilitating consequences. In spite of its frequency (e.g. up to 30% of operated individuals), the underlying pathophysiology remains incompletely understood. The DEEP project i) explores various candidate mechanism using dynamic metabolic profiling of the entero-pancreatic axis, ii) investigates manifestations of different phenotypes in clinical practice, iii) assesses the feasibility, efficacy and utility of novel therapeutic/preventive interventions. Insights from this project will not only improve our understanding of this increasingly recognized and potentially debilitating condition, but also broaden the knowledge of the effects of bariatric surgery on various aspects of glucose regulation, in particular the remission of diabetes.



Marco Osterwalder

Department for Biomedical Research (DBMR)
1 Mai 2020 - 30 April 2025

Project: Regulatory dynamics of heart formation and in vivo cardiac reprogramming

Heart abnormalities represent the most frequent birth defect in humans and are a leading cause of adult death worldwide. Despite the availability of the human genomic sequence, the genetic causes responsible for congenital heart disease (CHD) remain insufficiently understood and point to a significant contribution of alterations in developmental gene networks. These networks are controlled by gene regulatory enhancers, genomic elements which can be located far upstream or downstream of their target gene(s). However, despite their critical function, the position or identity of most heart enhancers remains unknown. Our research combines molecular biology, mouse genetics, single-cell sequencing and CRISPR genome editing in cells to identify the relevant enhancer landscapes of genes regulating heart development and known to be affected in CHD. We are also investigating how these regulatory elements can be harnessed to promote cardiac reprogramming for cardiac regeneration following the loss of cardiomyocytes in heart disease. This project aims to advance our understanding of heart development and disease and will be critical for the interpretation of cardiac disease-associated variants in patients.



Sofia Carolina Zambrano Ramos

Institute of Social and Preventive Medicine (ISPM)
1 November 2021 - 31 October 2026

Project: The risks and benefits of integrating emotions in end of life communication

Despite initiatives to teach communication skills to physicians, patients and their families remain inadequately informed about the severity of their illness. Although emotions and the inner life of the physician can significantly influence this communication, their impact remains largely unexplored. The main goal of the proposed projects is to explore the role of emotions in the practice of medicine, particularly when dealing with patients with advanced diseases. This includes understanding how physicians' emotions are present in everyday practice, what is their impact on physician's wellbeing and on patient care, and whether emotions and communication can be influenced by self-reflection. The main significance of this study lies in its timeliness and in its comprehensive approach to a complex subject in medicine. It responds to current and future challenges of caring for an ageing population at a time when new technologies place greater challenges on decision making and on the physician's ability to communicate with their patients.



Jessica Bastiaansen

Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)
1 November 2021 - 31 October 2026

Project: Quantitative magnetic resonance biopsies: Exploiting signal asymmetries for next-generation noninvasive biomarker mapping

The quantification of fat in living tissues can provide information on the prognosis of heart failure and liver disease. MRI is a powerful technique to identify disease biomarkers noninvasively, but it is complex and the measurement times are long. The limitation of current MRI techniques is that quantitative information about fat is confounded by the presence of water and by magnetic field inhomogeneities that induce signal asymmetries. We aim to develop a novel imaging paradigm that uses signal asymmetries to encode tissue components carrying specific frequency signatures, such as fat, at high spatial resolution. The MRI technique will enable artifact-free imaging and tissue property characterization with minimal confounding effects, and it will advance our understanding on using signal asymmetries as a means to encode multiple tissue properties noninvasively. This knowledge will enhance the capability of MRI to extract quantitative information on tissue function and anatomy, with solid prospect for the future replacement of invasive biopsies.



Maria Luisa Balmer

Department of Diabetes, Endocrinology, Nutritional
Medicine and Metabolism (UDEM), Inselspital
1 November 2021 - 31 October 2026

Project: Immunometabolic sensing of bacterial metabolites driving diet-induced obesity

Obesity and diabetes are on the rise worldwide. The causes for the development of these diseases are diverse and include intrinsic (e.g. genetics) as well as extrinsic (e.g. diet) factors. The gut microbiota also appears to play an important role; however, it is often difficult to answer the „chicken-and-egg“ question, i.e., to prove causal involvement of the microbiota in the development process of obesity and diabetes. The microbiota is metabolically active and thus also influences metabolic processes in humans. In this project, we will investigate to what extent the gut microbiota and its metabolites play a causal role in the development of obesity under high-fat diet in mice. Furthermore, we will investigate how metabolites of the gut microbiota influence metabolism and thus immune system function and whether this interaction is involved in the development process of obesity and its complications. The project thus aims to identify metabolic targets for the prevention and therapy of obesity and diabetes.



Prof. Sören Huwendiek, member of the faculty due to academic excellence

Faculty Membership for Academic Excellence

The faculty membership for academic excellence is a new opportunity for excellent researchers and teachers of the Medical Faculty to become a full member of the faculty, independent of a university position and to get financial and staff support for at least four years.

The Medical Faculty has decided to launch an annual call for faculty membership for academic excellence in research and teaching.

For the year 2021, the faculty approved the election of Sören Huwendiek at its July meeting.

Professor Sören Huwendiek, MD, PhD, MME, Head of Department of Assessment and Evaluation, Institute of Medical Education, and Associate Professor of the Medical Faculty has been granted a faculty membership based on academic excellence in teaching and research in the field of medical education. Among his main topics are innovative ways of formative assessment (Virtual Patients, workplace-based assessments), summative assessment (including licensing exams), communication and practical skills, and blended-learning. He is one of the nationally and internationally most renowned experts in the field of medical education and will strengthen the voice of academic teaching in our faculty.

The next call is planned for April 2022.

Teaching

School of Human Medicine
School of Dental Medicine
Local Student Committee of Bernese Medical Students
Teachers of the Year 2021
Bachelor and Master Program in Pharmacy
Master of Science in Artificial Intelligence in Medicine
Master of Science in Biomedical Sciences
Master of Science in Biomedical Engineering





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
- 2nd largest institution of 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

Bachelor of Medicine

Study places HUM and DENT 2021	360
Starters HUM bachelor program 2018	328
Ending with bachelor degree 2021	282
Drop out 2018-2021	14%

Master of Medicine

Study places 2021	340
Starters master program 2018	240
Ending with master degree 2021	240
Drop out in the master program	0%

Federal Exam Human Medicine 2021

Multiple choice exam:	Clinical skills exam:
239 candidates	239 candidates
239 passed	236 passed
0% missing	1.3% missing

Covid Again

In spring 2021, teaching activities had to be switched almost completely to online teaching again. In the fall, we were finally able to start with face-to-face classes again. The students were looking forward to the real lectures and the contact with their fellow students. Except for the practical courses in geriatrics, the classes could be conducted with presence under Covid-19 Omikron.

New courses in ultrasound and emergency medicine have been established. In addition, the wave of plus 100 students is now rolling through the master's program. The 4th/5th year of study will be completely redesigned in the process because of the block practicals.

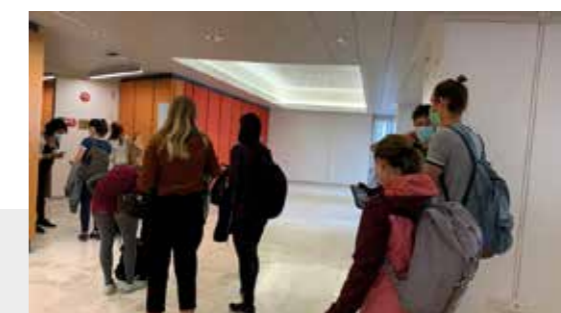
New PBL-Tutorial Rooms in the Effingerhaus 55

From beginning of the term in September, the problem based learning tutorials in the 3rd year of the bachelor's program could be held in 11 new rooms at the Effingerstrasse 55 near the Inselspital. It is the first time all tutors and students of the 3rd year are in the same building. The rooms are provided by the Inselspital.



New Course in Emergency Medicine for Students

Driven by the EPA6-learning objective of the federal catalogue PROFILES an interdisciplinary team (Simon Jung, Thomas Sauter) build up a new course for the 6th year students. The two day course was held online with a mixture of presentations, chats and questions for voting.



Covid-19

The Medical Faculty and the Inselspital relied on a Covid certificate check at the beginning of each semester. In the preclinical years, 84% of the students were fully vaccinated and in the clinical years 94%. Unvaccinated students were eligible for free testing at the university for hands-on courses, particularly with patients. Image: Dean's Office of Student's Affairs randomly checked students in the lecture rooms of the Inselspital.

School of Human Medicine

Murtenstrasse 11, 3007 Bern
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 and the Master 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.

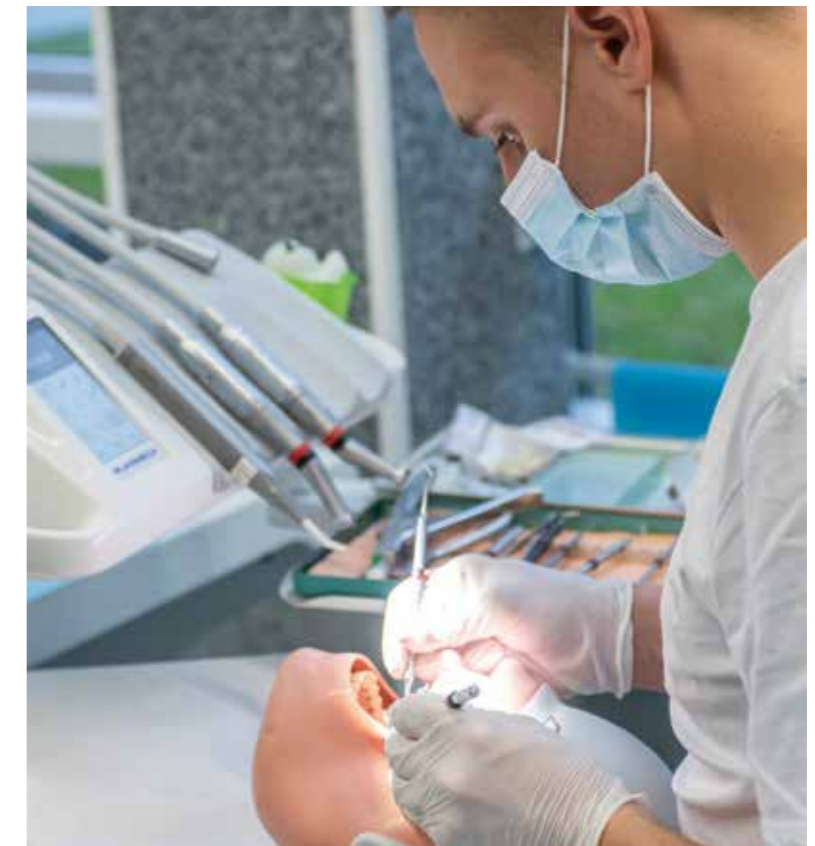
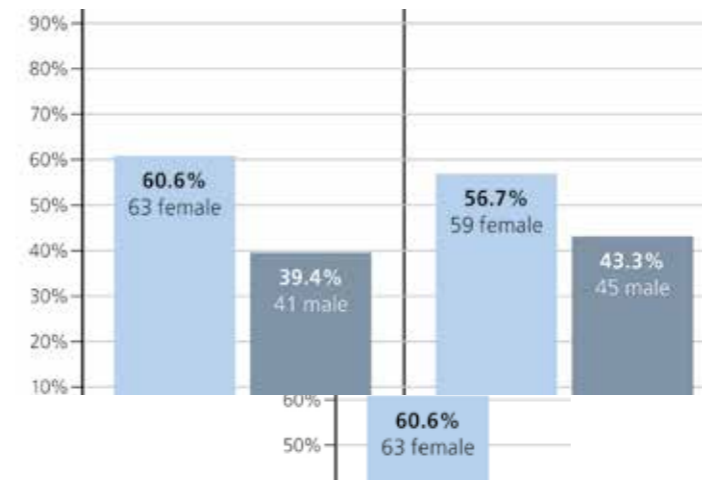
Swiss National Examination in Dental Medicine

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 2021 42 candidates 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 studies) as well as the gender ratios are listed in the figure:



School of Dental Medicine
 Freiburgstrasse 7, 3010 Bern
www.zmk.unibe.ch, www.facebook.com/zmkbern



General Assembly in December 2021

Local Student Committee of Bernese Medical Students

The fsmb (Fachschaft Medizin der Universität Bern)

- is created by students for students
- is the official representative of Bern's medical students
- has seats in various committees
- aims to facilitate and optimize studies and to represent the interests of medical students
- offers several services for the students and organizes many events

Education Commission since 2019

Since the end of 2019, the Fachschaft executive board has established the Education Commission (Bildungskommission, BK). This separation is to serve a clearer division of tasks. As an organ of fsmb, the BK deals with all issues and topics related to education and studies. We meet at least twice a semester to discuss current issues in medical education from a student perspective. Permanent members are our delegates in the various committees and commissions of the medical faculty of the University of Bern, the swimsa delegates and representatives and speakers of each academic year.

Yearly representatives

With the introduction of the Education Commission, representatives and speakers in each academic year (Jahressprecher*innen) were also introduced. The yearly representatives are members of the fsmb executive board, who form the link between the board and the students of years 1 to 6. They are the first point of contact for problems, questions and concerns of the students, and pass all the upcoming on to the fsmb executive board, the Dean's Office, the Faculty or other contact points.



A Warm Welcome to our New First-semester

2021 started challenging. With the pandemic still ongoing, particularly the spring semester was demanding for all of us. Restrictions not only affected the academic life, but the social and interpersonal exchange, with many events already cancelled or postponed during the spring semester. On late March, news reached the fsmb that the sponsor of the Freshmen Bags was no longer able to continue to support the project. For several years, first-year students at the University of Bern have been welcomed with a Freshmen Bag, which was organized in cooperation with other students' associations. Unfortunately, due to the pandemic and the short timeframe, our collaborators were not able to acquire a new sponsor for this project. So, at the end of march, it seemed like the first-semester students had to start without a welcoming gift.

Disappointed but not discouraged, the fsmb not only set out to redesign the Freshmen Bags, but to take this opportunity to rethink the entire Freshmen Event for the medical students at the University of Bern. During the last weeks of the spring semester, despite the ever-closer exams, the executive board of the fsmb started with the planning and designing of the new event. Creative members of the fsmb worked throughout their summer holidays to contribute to the success of this unprecedented multi-project, which in the end consisted of three parts.

The giveaway of the newly designed Welcoming Bags marked the starting point of the new Freshmen Event. Thanks to the partly support of the swimsa fund, the fsmb was able to distribute an ecologically sustainable, locally printed Bag with illustrations designed by a member of the executive board to each of the almost 400 newcomers. On top of that they received an entirely new "Survival Booklet" flyer, designed by the executive board, containing information about upcoming events of the fsmb, organizations one can engage in, and a map of Bern showing all sites of university buildings, delicious places to eat and the best locations to spend your leisure time at.

And thirdly, but most importantly, the freshers were encouraged to engage with their peers and meet new fellow students through a series of called to life events. Within the first two weeks, the freshmen were invited to accompany other members of the fsmb on an early Gurtenwalk to enjoy the sunrise from the top of the Gurten, exercise together on the Bären Parcours, take part in a city tour of Bern, and join the fsmb at the Marzili to an evening beer. The welcoming events ended with a beach volleyball tournament as a finale grande.

This large-scale Newcomers Welcoming Project was brought to life only by the relentless commitment of many motivated students. We are happy to have received overwhelmingly positive feedback and are already gathering ideas for next year. Thank you all who have put their energy into this multi-project!





Teachers of the year - 6 Masters of Disaster in Corona Year

The Local Student Committee of Bernese Medical Students was challenged again this year to choose the Teacher of the Year.

A special year deserves a special Teacher of the Year

For a long time they thought about how they could organize this year's election, because the past year has changed so much in the students' everyday life due to Corona and you could only see your lecturers virtually, many internships had to be cancelled or strongly modified and the "just ask the prof about the lecture" had to be packed into an email. Certainly it was a very special time not only for the students, but also for the lecturers, when the contact to the students suddenly changed so drastically. They therefore decided that a special year deserved a special Teacher of the Year.

Feedback and thanks to the lecturers

In order to give feedback and thanks to the lecturers for this time, the students were asked who stood out to them this year, be it through special implementation of the lectures or new and different ideas for this "new" everyday study life, who mastered this year best and should become the Master of Disaster of the Corona year.

Master of Disaster for each academic year

Of course, since each academic year experienced very different changes, we also wanted to give each academic year the opportunity to have its personal Master of Disaster and also specifically award this lecturer for the performance in the corresponding academic year. For this purpose, we also removed the otherwise common rule that already elected teachers are not eligible for re-election, in order to give every lecturer the same chance to be elected.



1st year of study

PD Dr. med. Stefan Tschanz
Institute of Anatomy



2nd year of study

PD Dr. med. Gudrun Herrmann
Institute of Anatomy



3rd year of study

PD Dr. phil. nat. Franziska Suter-Riniker
Institute of Infectious Diseases IFIK



4th year of study

PD Dr. med. et phil.nat. Yara Banz
Institute of Pathology



5th year of study

Dr. Christoph Bosshard
Institute of Social and Preventive Medicine
Insurance Medicine Suva



6th year of study

Prof. Dr. phil. Rouven Porz
Insel Gruppe, Medical Directorate, Ethics



Photo: pharmaSuisse

Bachelor and Master 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 (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 (started in September 2020): Diseases and pharmacotherapy, health promotion and disease prevention, the Swiss health system, pharmacoconomics, scientific methodology; Master's thesis (6 months)
- Master year 2 / year 5 (started in September 2021): Clinical pharmacy and pharmaceutical care, clinical skills, triage and red flags, vaccination, prescription validation, communication, 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 with 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.
- We focus on interprofessional collaborations in teaching and research.

Successful completion of the first round of Master's theses in Pharmacy

The fourth year pharmacy students performed their Master's theses during six months between January and August 2021. The Swiss Society of Industrial Pharmacists (GSIA) sponsored a prize for an outstanding Master's thesis. The prize was presented by Dr. h.c. Uwe E. Jocham, President of the GSIA Foundation, to Arlene Günter for her thesis „Machine Learning for the Prediction of Drug induced Liver Injury Patterns“ carried out at the Clinical Pharmacology, Inselspital, supervised by PD Dr. Felix Hammann and Dr. Verena Schöning.



Pharmacy students have started their practical training in public pharmacies

With the beginning of the autumn semester in September, our first cohort of students have started their fifth and last year. In year 5, teaching is very practical and patient-oriented. Courses such as communication, clinical skills, prescription validation, or manufacturing of medicines were attended as preparation for the 30 weeks practical training in a public pharmacy that has begun on the 1st November. The practical training is a crucial part of the Master's course in Pharmacy and gives the students the important opportunity to put their knowledge into practice and learn and train on the job under close supervision.



Photo: pharmaSuisse

Appointment of a new Professor in Clinical Pharmacy

Prof. Dr. Carla Meyer-Masseti has been appointed as new Professor in Clinical Pharmacy. This new assistant professorship is sponsored by pharmaSuisse over five years and is based at the Clinical Pharmacology and Toxicology, Department of General Internal Medicine, Inselspital. Clinical Pharmacy comprises activities and services of the clinical pharmacist to develop and promote the rational and appropriate use of medicines and medical devices with the aim to improve the therapy outcome, health and quality of life of the patient. It includes all the services performed by pharmacists practising in hospitals, community pharmacies, nursing homes, homebased care services, clinics and any other setting where medicines are prescribed and used. (European Society of Clinical Pharmacy) Prof. Meyer-Masseti will set up a patient-oriented and interprofessional teaching programme in clinical pharmacy. Research projects will focus on medication safety and interprofessional collaboration during transition of care. Another aim is the further development of closer collaborations between Clinical Pharmacology and the Institute of Hospital Pharmacy.



Administration Office Bachelor, Freiestrasse 3, 3012 Bern
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



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
- Minimum GPA 5.0
- Compatible with up to 40 % part-time work
- Rotations in university hospital departments to be instructed in medical specialties
- Fundamental and applied courses in AI
- Master's thesis project (one semester)
- Strong ties to industry and hospitals

Start of the New Program

Despite the difficult pandemic circumstances, the ARTORG Center and CAIM have successfully launched the new interdisciplinary program Master of Science Artificial Intelligence in Medicine (MSc AIM). 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.

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

MSc AIM Study Structure

Introduction of New Courses that Cultivate the Bridge between AI and Medicine

Unique Approach: Course "Introduction to Clinics"

During the 1st semester, this innovative course introduces students to core medical specialties and allows them to gain a better understanding of the workflow in clinical routine settings in a variety of medical departments and institutes. Students explore the services, the structure, as well as the role of currently twelve core fields of medicine within the Bern University Hospital (Inselspital) environment.



Clinical Implementations of AI

Technology Focus: Course "Introduction to Artificial Intelligence in Medicine"

AI has become a fundamental topic in many areas of technology and society. With a rich development history, the domain has undergone radical shifts in thinking. As such, this course of the 1st semester provides a broad overview of the topic of AI. As an introduction course, a historical overview is given on the topic and a number of technical frameworks and concepts are introduced.



Research and Development

Participation in Networking Events

Our program successfully participated in two virtual networking events: the local, highly frequented BME Day in Bern and the online AI Expo Africa with several thousand registered participants. Both events offered great opportunities to e-meet interested future students and extend our national and international networks with academic and industrial partners. Graduates from this program will take advantage of the strong Swiss, European, and international network of the involved institutions both in academia and health industry.



Virtual Networking Events

Master of Science in Artificial Intelligence in Medicine
Murtenstrasse 50, 3008 Bern
www.caim.unibe.ch/msc_aim



Master of Science in Biomedical Sciences

Swiss Academic Institutions and Biomedical Research Companies trying to recruit 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 Studies 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 Studies and the 1st year of the Master studies, 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
- 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: 210
- Presently enrolled students: 32
- Gender (f/m): 1/31
- 11 biomedical sciences graduated in 2020

CSL Behring Prize 2021

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

1. Rank: Laura P. Leuenberger *5.82*
2. Rank: Sofie A. von Känel *5.65*
3. Rank: Jasmin M. Meier *5.43*



Laura P. Leuenberger



Sofie A. von Känel



Jasmin M. Meier



Left to right: Andrea Karolin, Chantal Bachmann, Selianne Graf, Karin Rechberger, Christoph Schneider

Alumni Biomedical Science Prize 2021

The prize for the best Master Thesis 2021 sponsored by the Alumni Organization went to Karin F. Rechberger for her study on "Influence of molecular properties on interstitial tissue levels of therapeutic antibodies". The work was conducted in the pharmacy Roche in Basel.

Master Program in Biomedical Sciences

Bühlplatz 5, 3012 Bern
www.medin.unibe.ch/studium/studienprogramme/master_in_biomedical_sciences/index_ger.html



The Biomedical Engineering class of 2021

Master of Science in Biomedical Engineering

The master's 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.

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
- Attractive, central location
- Excellent career perspectives

Figures

- 171 students were enrolled in the fall semester
- 67 regular and 3 exchange or guest students joined in 2021
- 21% of new students are female
- 38 biomedical engineers graduated over the year 2021

Restructuring of the curriculum

After intensive preparation, the curriculum was restructured as of fall semester 2021. The focus is now on a more practice-oriented education, which is achieved primarily through the newly created „BME Laboratories“. These will be conducted in the second semester in the research groups of the University of Bern and the Bern University of Applied Sciences (BFH). In addition, thanks to the great commitment of the Institute of Biochemistry and Molecular Medicine, practical laboratories were now included in the course „Biological Principles of Human Medicine“, which illustrate and complement the theoretical lectures.

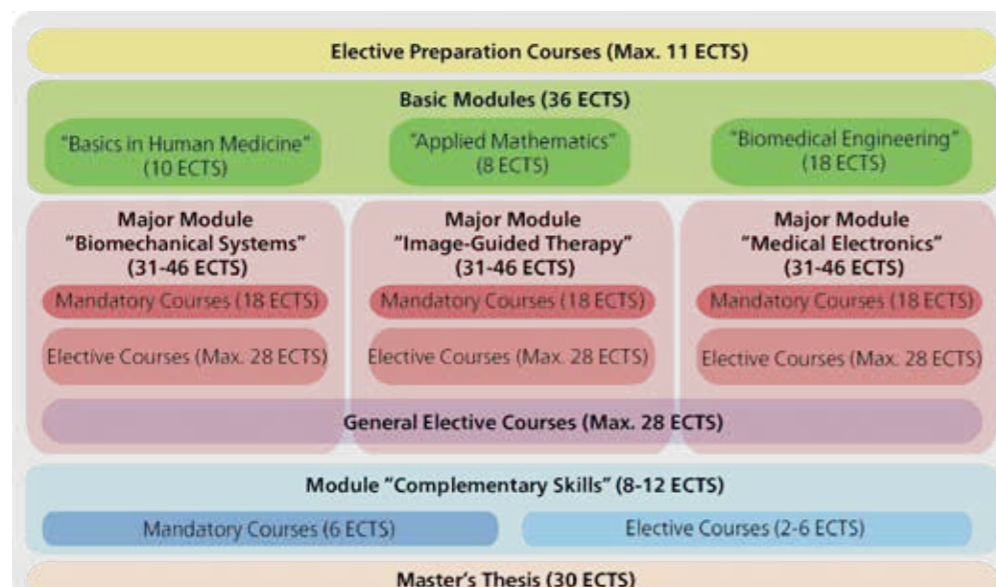


Diagram of the new curriculum structure

The first virtual BME Day was a great success

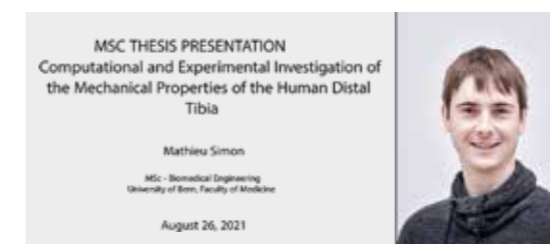
The Biomedical Engineering Day is our annual BME career day and networking event. Due to the pandemic, the BME Day was held online for the first time. Medtech companies presented their activities and their requirements for young professionals in a zoom webinar. During the "coffee break", more than 200 visitors had the chance to walk from booth to booth in a virtual environment, chat with the representatives of Medtech companies or research groups and meet other visitors. A highlight was the live surgery, which was broadcast in a direct transmission from an operating room at the Department of Thoracic Surgery, Inselspital. Many thanks especially to Gregor Kocher and Patrick Dorn for making this possible. Last but not least, we would like to thank the Musculoskeletal Biomechanics Group at ARTORG center for their technical support.



A picture taken during the live surgery (lung resection due to cancer)

SSBE Student Award

At the annual meeting of the Swiss Society for Biomedical Engineering (SSBE), BME graduate Mathieu Simon received the student award for his work on "Computational and experimental investigation of the mechanical properties of the human distal tibia". Mathieu is now a PhD student in the Musculoskeletal Biomechanics group at ARTORG center.



Mathieu Simon received the SSBE student award

Master's Thesis Awards by Swiss Engineering

Every year, Swiss Innovation awards two prizes for the best master's theses in the fields of innovation and basic science, respectively. Maxime Chiarelli received the award for his thesis entitled "Estimation of the energy loss through turbulence in an aortic stenosis model using backlight Particle Tracking Velocimetry in a silicone ascending aorta phantom". Giuditta Thoma was honored for her work on the topic "Lung-alveoli-on-chip: mechanical characterization of a new biological membrane"



Maxime Chiarelli (top) receives the award from Philippe Buechler (ARTORG center) during a video conference

RMS Award 2021

In 2021, the RMS Award went to Adrian Ruckli for his outstanding grade point average (GPA) of 5.77/6.0. Each year, the Robert Mathys Stiftung (RMS), an independent service laboratory and research institute located in Bettlach, offers it to the BME student with the highest GPA. This year, the prize was awarded during the zoom webinar at the virtual Biomedical Engineering Day.



Adrian Ruckli (bottom) receives the RMS award

Master of Science in Biomedical Engineering
 Freiburgstrasse 3, 3010 Bern
www.bme.master.unibe.ch

Promotion of Young Academics

sitem-insel School for Translation and
Entrepreneurship in Medicine
CAS, DAS and MAS Degree Programs
PhD Education
Commission for Equality
Grants





sitem-insel School for Translation and Entrepreneurship in Medicine

sitem-insel School aims to promote researchers and train specialists in the fields of translational medicine and biomedical entrepreneurship. Lecturers and supervisors of the school are representatives from research and development-oriented private companies, scientists from universities, clinicians, collaborators from regulatory agencies, and financial experts.

Profile

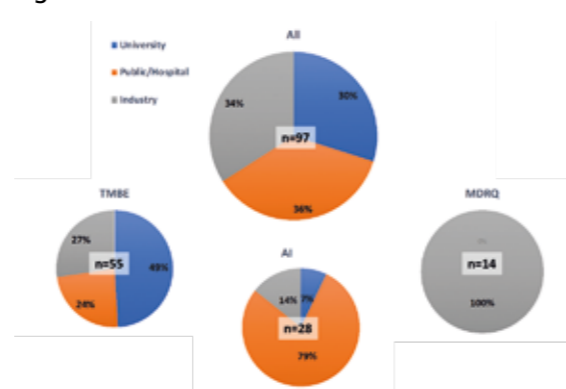
sitem-insel School

- aims to promote researchers and train executives in the fields of translational medicine and biomedical entrepreneurship
- aims to teach students practice-oriented high-quality knowledge
- aims to facilitate a strong network between people involved in the translational process
- offers training recognized by the University of Bern

Vision and aims

- Strengthen the School's national and international reputation and visibility in the field of translational medicine, biomedical entrepreneurship, AI in healthcare
- Increase number of national and international students

Figures



Number of students enrolled in study programs of the sitem-insel School

- TMBE: Translational Medicine and Biomedical Entrepreneurship
- AI in MI: Artificial Intelligence in Medical Imaging
- MDRQ: Medical Device Regulatory Affairs and Quality Assurance

MAS/DAS/CAS «Translational Medicine and Biomedical Entrepreneurship»

Despite the Covid-19 situation, the study program started with the largest cohort in September 2021 since the start of the program in 2017. The 17 participants come from a.o. the University of Bern, Inselspital, ETHZ, University Hospital Zurich, University of Zurich, Terapet, ILAH, AO foundation, Incotec AG, University Hospital Heidelberg, Germany, Medical University of Silesia, Poland, Horacehealth, Neuroconsan, Slovakia



Scholarship program for the MAS in Translational Medicine and Biomedical Entrepreneurship

Symposium 2021 «Artificial Intelligence in Diagnostic Medical Systems»

As part of the new MAS/DAS/CAS «Artificial Intelligence in Diagnostic Medical Systems», the sitem-insel School organised for the third time an international symposium in September 2021. This year's focus was on aspects related to the translational process of AI in medicine. Speakers featured top international experts and leaders in the field of AI in medicine such as Shibeshih Belachew, Biogen; Cristina Granziera, University of Basel; Mauricio Reyes, University of Bern; Jana Semrau-Brandt, Dentons; Charles E Kahn, University of Pennsylvania; Daniel Pinto dos Santos, Uniklinik Köln; Jürgen Burger and Roland Wiest from the University of Bern and University Hospital Bern; Marta Gehring, Swiss Biotech; Robert Baldwin from Imageens; Peter Wehrheim, Abbott; Prisca Quadroni, AI Legal & Strategy Consulting, and Jeremy de Sy, Aidoc Medical.

Symposium «MDR: from Innovation to Application»

75 participants joined our very first MDR Symposium in May. International speakers addressed the challenges related to the implementation of the new Medical Device Regulation (MDR). Beni Hirt from Decomplix presented strategies how SME and start-ups can deal with increasing regulation and new technologies; Mike Wallenstein presented "lessons learnt" from Novartis as the first company to achieve a certification of their QMS system and product against the EU MDR; insightful statistics were presented by Elena Kyria from Eledem on the current state of the MedTech job market (some interesting statistics on the Swiss market indeed!); Tobias Kober from Siemens Healthineers explained practical aspects of FDA approval processes from an R&D point of view. A very interesting round table discussion was led by Daniel Delfosse from Swiss Medtech and breakout sessions were held with Susanne Wyss-Lanz (Axxos), Juergen Berndt (former JnJ), Danielle Giroud (MD-CLINICALS) and Mathias T. Eng (Quaregia).

On 30.08.2021 the second cohort started with the MAS/DAS in "Medical Device Regulatory Affairs and Quality Assurance". Again students around the world participated either coming to Bern or connecting via video conference.



Symposium as part of the kick off of the MAS/CAS/DAS «AI in Diagnostic Medical Systems»

sitem-insel School
Freiburgstrasse 3
<https://sitem-insel.ch/en/minds>



© University of Bern

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. They are addressed to professionals with a tertiary education.

Advanced study programs of the Medical Faculty

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

All study programs can be found on our website:
www.medizin.unibe.ch/weiterbildung/cas_das_mas/index_ger.html

„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 programs

- CAS/DAS/MAS in Artificial Intelligence Diagnostic Medical Systems consisting of
 - CAS in Artificial Intelligence Technologies in Healthcare
 - DAS in Artificial Intelligence in Diagnostic Medical Systems
 - DAS in Artificial Intelligence in Techniques for Diagnostic Medical Systems
 - DAS in Artificial Intelligence in Translational Diagnostic Medical Systems
 - MAS in Artificial Intelligence in Diagnostic Medical Systems
 - MAS in Artificial Intelligence in Techniques for Diagnostic Medical Systems
 - MAS in Artificial Intelligence in Translational Diagnostic Medical Systems
- MAS in Stroke Medicine (starting in April 2022)
- DAS in Leading Learning Health Care Organisations



Key Visual MAS in Stroke Medicine



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, Rehabilitation and Patient: Related Studies
- 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 there is also a co-thesis advisor), co-referee and a member of an expert committee as mentor (only in FKIII).

Graduates receive one of the following titles:

- PhD in Health Sciences (specialist area e.g. Clinical Sciences).

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 four areas of specialization:

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

The requirement for the program is 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:

- MD,PhD (Doctor of Medicine and Philosophy), University of Bern,
- DVM,PhD (Doctor of Veterinary Medicine and Philosophy), University of Bern, or
- DDS,PhD (Doctor of Dentistry and Philosophy), University of Bern.

As in 2020, the graduate schools were fully functional throughout 2021 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

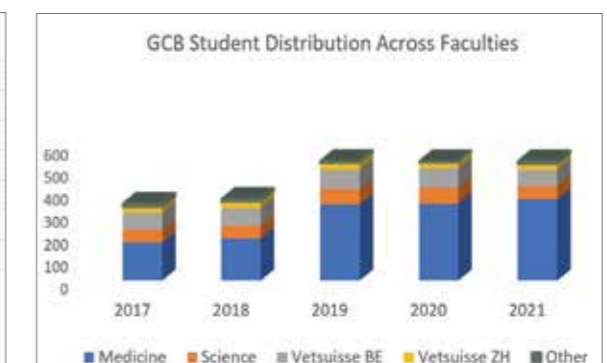
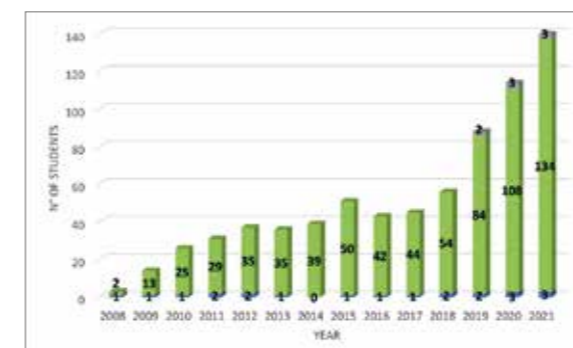
- Increased number of students from 114 to 140
- Two-days GHS Symposium at Schloss Münchenwiler, was very successful with a record number of student's participation (78 presentations of posters and talks)
- Changes in the Steering Board Committee: Prof. René Mürli (chair FKII) retired, and Prof. Urs Fischer (chair FKIII) moved away from the University of Bern. Their successors were nominated, respectively Prof. Tobias Nef and Prof. Lorenz Räber
- Welcomed seven new incoming medical faculty expert committee members and thanked two outgoing
- An internal evaluation revealed high satisfaction with the GHS: 90% of students, 95% of alumni and 100% of supervisors and committee members, who took part in the survey, would recommend the GHS to others.
- Despite the pandemic we had a high number of graduations: 16 in 2021 in comparison to 10 in 2020
- Publication of the second GHS Annual Report

Highlights, important events at GCB

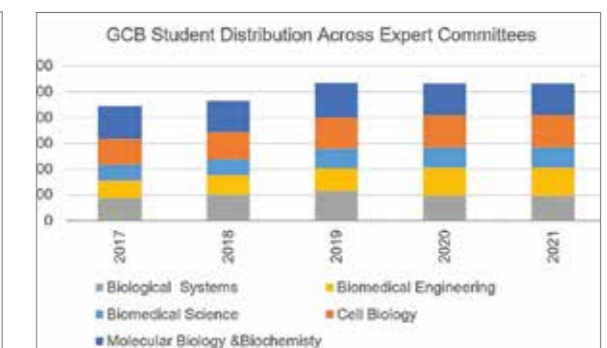
- Admission Applications – there were 127 in 2021 equal to the number in 2020.
- Welcomed three incoming medical faculty Mentors
- Very proud to announce that the Swiss Academy of Medical Sciences (SAMS/SAMW) granted two fellowships to: Decollogny Morgane and Manuel Egle
- Successful first ever fully virtual GCB Symposium 2021 supported by ATORG's Prof. Dr. Tobias Nef and Dr. Stephen Gerber – 40 Talks, 100 Poster Flashes, 239 Posters
- Currently there are 44 MD, PhD & 1 DDS, PhD students enrolled



GHS total number of students in 2021: 140 Students (which includes 16 theses defended, 4 resignations and 38 new applications in 2021). 95% of GHS Students are pursuing PhD degrees within the Medical Faculty



GCB total number of students in 2021: 534 registered, (which excludes 117 theses defended, and includes the 127 new applications in 2021).



Graduate Schools GCB & GHS
Mittelstrasse 43, 3012 Bern
www.gcb.unibe.ch & www.ghs.unibe.ch



UNCOVER THE FACTS

Commission for Equality

The Medical Faculty Commission for Equality (Innerfakultäre Kommission für die Gleichstellung, IFKG) supports the Medical Faculty in realizing measures ensuring effective equality and diversity throughout the whole medical 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.

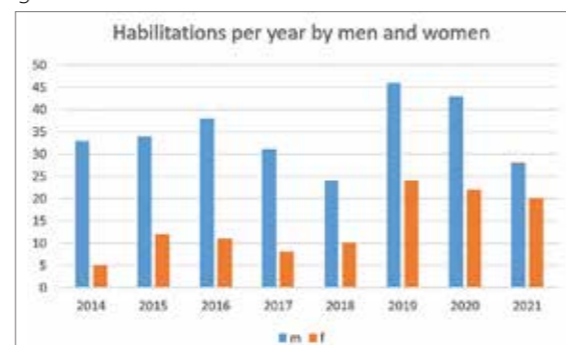
The immediate aim of the Commission for Equality is to increase the number of women in leadership positions in the Medical Faculty and to increase diversity. Among other measures, the IFKG aims to illustrate career options that improve working conditions such that they allow both women and men to combine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

Profile

- Mentoring4Women program
- Ensuring implementation of equal opportunities in search committees and in the work environment of 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 Bern

Figures

The proportion of women in the Swiss medical profession continues to rise. The proportion of women amongst our medical students has reached almost 70% eventually leading to more women than men to graduate in human medicine.



However this development is not reflected in the subsequent career steps. The bar graph shows that the percentage of women finalizing the habilitation has reached about 30%. In addition, while after the habilitation 65% of men reach the next career step only 18% women are promoted to this level. Finally, the Medical Faculty stills shows only about 10% women in leadership positions of Ordinara or Extraordinaria. This is far below the goal of the University of Bern aiming for 40% of leadership positions to be held by women.

The few women in these leadership positions were made VISIBLE on our Faculty Homepage by the IFKG. The women introduce themselves on our new website, please have a look: https://www.medizin.unibe.ch/ueber_uns/professorinnen/index_ger.html

Excellence in research and teaching will depend upon our ability to keep the many excellent and talented women in the career track. It is time to accept that women still do not have the same opportunities as men do. The IFKG is dedicated to actively patching up the "leaky pipeline"!

„It is time for everyone to face up to the issue and actively work“

Prof. Brigitta Engelhardt



Workshop Appenberg – FELS Network

Female Empowerment in Life Sciences (FELS)

The Female Empowerment in Life Sciences (FELS) is a new interdisciplinary association of female researchers and academics with medical or life science background, which emerged in September 2021 supported by the Commission for Equality of the Medical Faculty and the Teaching and Research Directorate of the Inselspital. The goal of the association is to serve as a functional network supporting gender-neutral academic career development, implementation of equality and female leadership.

Origin of FELS

FELS network was founded during the Workshop for academic female researchers of the institutes and clinics of the Medical Faculty.

Goals of FELS Network

- To actively promote networking and exchange among female medical and life science researchers
- To support female researchers in their academic career development by exchanging helpful information regarding grants, courses and other career promoting opportunities
- To provide coaching to the network participants

Organization

FELS is open to any female researcher with medical or life science background interested in joining the group. Currently a core working group (Kerngruppe), constituted by 13 participants, is taking care of the administrative work.

Workshops and Meetings

FELS is organizing half-day workshops every 3 to 4 months. The workshops focus on a pre-defined topic related to academic career development and gender-equality, and include presentations from internal and/or invited speakers. Additionally, a yearly retreat is planned. The core working group meetings are currently taking place virtually monthly.

FELS also offers less formal networking meetings which are usually scheduled on the first Tuesday of every month in form of regulars' tables. The goal of these meetings is to promote networking and exchange in the group, as well as to welcome new interested participants.

You want to join? Please find more information under https://www.medizin.unibe.ch/ueber_uns/gleichstellung/fels_netzwerk/index_ger.html
e-mail to: fels.meddek@unibe.ch



Commission for Equality

Murtenstrasse 11, 3008 Bern
www.medizin.unibe.ch/ueber_uns/gleichstellung/index_ger.html

Grants

Graduate School in Health Science (GHS)

3 options: Health Sciences; Cognitive Neurosciences and Clinical Sciences
Career stage: young MD's (open to other health professionals, psychologist, biologists, engineers)
Duration: 3 – 5 years
Number of calls/year: for Clinical Sciences: 1x per year, otherwise continuously
Funding source: Medical Faculty, University of Bern

Graduate School for Cellular and Biomedical Sciences (GCB)

Career stage: biologists, engineers, MedVet, MD's
Duration: 3 – 4 years
Number of calls/year: continuously
Funding source: Medical Faculty, University of Bern

CTU Grants

Career stage: MD's before Habilitation
Duration: max. 2 years
Number of calls/year: 2x per year
Funding source: University Hospital of Bern

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: Deans 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, >40 years old and not habilitated.
Women are explicitly encouraged to apply.

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 (SNF mobility fellowships, Ambizione, SNSF-professorship; EU Marie-Curie-S. fellowships, ERC grants, etc)

Numerous Foundations

Career stage: during BSc or MSc
Duration: 1 – 5 years
Number of calls/year: 1x per year
Funding source: Foundations
Additional information: open for students registered at University of Bern in academic years 2 - 6

Travel Grants

Career stage: during BSc or MSc
Duration: 1 – 6 years
Number of calls/year: continuously
Funding source: Deans Office of the Medical Faculty, University of Bern
Additional information: open for students registered at University of Bern in academic years 1 - 6

Young Investigator Call for Scientific Projects in Cancer

Career stage: young researchers, from postdocs to private lecturers at the Medical Faculty of Bern
Duration: 2 years
Number of calls/year: 1x per year
Funding source: Béatrice Ederer-Weber foundation
Additional information: the call is aimed at promoting outstanding young researchers and shall provide them an opportunity to generate preliminary data that enhance their chances to succeed in further third party funding schemes such as those from SNF.

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

FILMED (Promotion of Innovative Teaching in Medicine)

Career stage: Students of the Faculty of Medicine
Duration: 1 year
Number of calls/year: 2x per year
Funding source: Innovation Fund from the Dean's office of the Medical Faculty, University of Bern
Additional information: Funding for the development of innovative teaching projects to participating institutes and clinics.

Röthlisberger Stipendium

Career stage: Medical Students from the 2nd year of study upwards
Duration: 1x per year
Number of calls/year: 1x per year (September)
Funding source: Röthlisberger foundation

Centers and Platforms

ARTORG Center for Biomedical Engineering Research
Bern Center for Artificial Intelligence (CAIM)
Bern Center for Precision Medicine (BCPM)
Department for BioMedical Research (DBMR)
Department of Clinical Research (DCR)
Diabetes Center Bern (DCB)
Microscopy Imaging Center (MIC)
Swiss Institute für Translational and Entrepreneurial Medicine (sitem-inse)
University Cancer Center (UCI)
University Neurocenter



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

Profile

- Interdisciplinary Center of Excellence for medical technology between the University of Bern, Inselspital, Bern University Hospital, and industry at the interface between technical and medical disciplines
- With its clinical partners ARTORG tackles unmet healthcare needs in diagnosis, monitoring and treatment
- Longstanding experience in translation, clinical validation and commercialisation of MedTech research in Bern and beyond, including various start-ups
- 12 independent research groups, 5 of them at sitem-insel covering AI, biomechanics, organs-on-chip, rehabilitation, robotics, surgical technologies, virtual and augmented reality
- Services for projects at the intersection between medicine, engineering and microbiology: Biomechanical Testing, Clinical Research Databases, Medical Rapid Prototyping Core Facility, Organs-on-Chip Facility (biomicrofabrication), Scientific Computing, ARTORG workshop Mechanical Design and Production
- 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

- Swiss National Science Foundation (incl. SNSF Bridge + SNSF Sinergia)
- Innosuisse & Industry funding
- Horizon 2020: AIM4DoC / EUROoC / Eye-Robot / GlimS / HiPerNav / IMAGE-R / Oberon / RCI
- JDRF / Stiftelsen Promobilia / NCCR Robotics / 3RCC / SPHN / PASC HPC-PREDICT – MitrAccel / Schweiz. Herzstiftung / Krebsforschung Schweiz / ERC Starting Grant/ UniBE ID Grants

Highlights

Towards Closed-loop DBS in Parkinson's @NeuroTec

With the Neurology (P. Krack) and Neurosurgery (C. Pollo) Departments of the Inselspital, the ARTORG Gerontechnology and Rehabilitation group (T. Nef) aims to develop and evaluate the feasibility of a closed-loop Deep Brain Stimulation (DBS) control system that uses electrophysiological recordings in the brain, together with behavioral and physiological signal recordings, to minimize Parkinson's Disease

Research of neurological disorders at the NeuroTec Loft (Photo: Adrian Moser ©University of Bern)



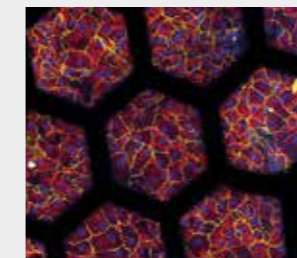
symptoms and maximize patients' quality of life. The clinical research for the study, which will use multimodal sensors and machine learning algorithms to recognize motor and non-motor symptoms, will be partly carried out at the 2021 opened NeuroTec center. SNSF Bridge Discovery project 194794.



Spinebot Intraoperatively Quantifies Spinal Stiffness

The ARTORG Computational Bioengineering lab has developed a robotic device to measure the biomechanics of deformed and degenerated spinal segments during surgery, in collaboration with the Orthopedic Department of the Children's Hospital, University of Basel. SpineBot has been designed to quantify spinal stiffness of patients suffering from specific pathologies – such as scoliosis or low back pain – that are not available for ex-vivo measurements. This is expected to allow a better biomechanical characterization of the human spine to improve patients' treatment. Philippe Büchler et al., J Med Devices. 2021 vol. 15.

SpineBot is a parallel kinematic robot (Photo: Adrian Moser ©University of Bern)



Patient cells on a 2nd gen lung-on-chip (Pauline Zamprogno © ARTORG Center)

A Sophisticated Lung-on-Chip Made in Bern

In collaboration with clinical partners from the Inselspital Thoracic Surgery and Pneumology Departments, the Organs-on-Chip Technologies lab has developed a second generation lung-on-chip model with life-size dimension alveoli in a stretchable membrane, made of purely biological material. The new in vitro model reproduces key aspects of the lung tissue architecture not found in previous lungs-on-chip. This powerful alternative to animal models opens new possibilities for basic pneumological research, understanding of lung pathologies, drug screening and precision medicine.

Pauline Zamprogno et al., Commun Biol 4, 168 (2021).

Immersive VR Enhances Motor Training Usability

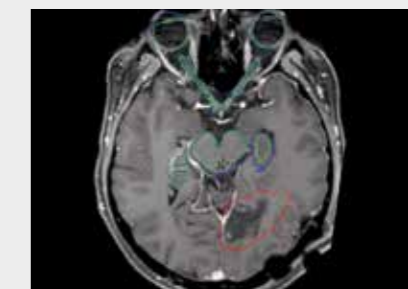
Together with the Inselspital Neurology Department Department of the Inselspital, the ARTORG Motor Learning and Neurorehabilitation lab (MLN) has studied the effects of immersive virtual reality (VR) technology on cognitive load, motivation, and usability while performing a three-dimensional reaching task. The team was able to show that VR using head-mounted displays is more usable than a standard computer screen to visualize training experience in three dimensions and helped participants to increase their embodiment and training motivation. Nicolas Wenk et al., Virtual Reality (2021).



Immersive VR setup at the MLN lab (Photo: Adrian Moser ©University of Bern)

Advancing AI for Clinical Use in Radiotherapy

Artificial Intelligence is increasingly used in image interpretation for diagnosis and treatment planning. A research team from Inselspital and the ARTORG Medical Image Analysis group demonstrated in a study that the current methods of qualifying AI for brain segmentation could be enhanced. Deviations of presently used parameters do not correlate with clinically relevant changes of the radiation dose distribution. For wide implementation of AI based software with real added value in treatment quality a stronger focus on clinically relevant outcomes is needed. Robert Poel et al., Med Image Anal, Vol. 73, Oct 2021, 102161.



MRI taken from a glioblastoma patient (Robert Poel © ARTORG Center)

Center for Artificial Intelligence in Medicine (CAIM)

Murtenstrasse 50, 3008 Bern
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 Inselspital 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

Official CAIM Opening

On 19 March 2021, CAIM was officially opened with a public mini conference and a scientific symposium. The virtual opening event with 500 registered participants offered insights into pivotal topics and current research on AI in medicine. The first, German-language part included speeches by University Rector Christian Leumann, Insel Gruppe President Uwe E. Jocham, Regierungsrätin Christine Häsler as well as Claudio Bassetti and Raphael Sznitman. Bernhard Pulver, Guido Beldi, Susanne Gedamke, Nikola Biller-Andorno and Stefan Weber discussed opportunities and challenges of AI in healthcare in a round-table talk with SRF moderator Sonja Hasler. The subsequent scientific symposium offered a glimpse into health AI research in Bern as well as a keynote by Gregory D. Hager from Johns Hopkins University.

[Opening Program & Recordings](#)
[Media Release](#)
[CAIM video](#)



CAIM Launches Embedded Ethics Lab

To support the activities of its four pillars "Digitalization & AI Education", "Network & Dissemination", "Computational Infrastructure" and "Research Project Fund", the Embedded Ethics Lab was formed as an integral part of CAIM. It unites experts in ethics, policy, and law to provide guidance on ethical questions surrounding AI applications in medicine. As part of its activities, a series of midday Ethics Talks for researchers was launched in the fall semester 2021/22.

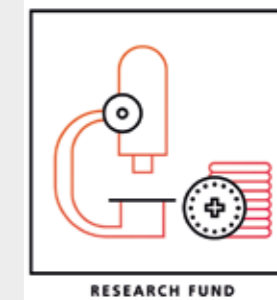
[CAIM Embedded Ethics Lab / Ethics Talks](#)



First Call: CAIM Research Project Fund

The CAIM research fund closed its first call with 20 project applications covering very diverse medical disciplines of the Inselspital and a wealth of University of Bern research areas. The fund aims to support researchers in AI for healthcare with innovative project ideas that demonstrate a clear patient benefit and high potential for disrupting current medical procedures. Upon review, funding decisions for a duration of two years will be made in early 2022.

caim.unibe.ch/research_fund



New Master's Program AI in Medicine Started

To educate the next generation of AI task force, CAIM has launched a MSc program targeted at students in engineering, informatics, mathematics, and physics. The 2-year program introduces principles of artificial intelligence and enables students to apply this knowledge to design, develop and evaluate intelligent systems across the medical and clinical lifecycle. Rotations in several Inselspital departments offer first-hand insights into different medical specialties.

caim.unibe.ch/msc_aim

Research

A selection of AI in medical technology research at the Bern Medical Hub in the past year:

- Audiology: [AI improves speech quality for hearing aid users](#)
[Bayesian brain for tinnitus](#)
- Neuroradiology: [Efficient treatment of stroke with AI and federated learning](#)
- Neurosurgery: [Space technology in the operating theater](#)
- Nutrition: [Smartphone verifies compliance with Mediterranean diet](#)
[User preferences of nutrition apps](#)
- Ophthalmology: [AI could soon tell you, how often to see the eye doctor](#)
- Radiotherapy: [Advancing AI image interpretation for clinical use](#)
- Pathology: [Deep Learning predicts subtypes in colorectal cancer](#)
- Pneumology: [AI x-ray analysis detects Covid-19 more reliably](#)
[Reliably predicting progression of Covid-19](#)
[Pulmonary fibrosis: Reliable prognosis thanks to AI](#)
- Physiology: [Neuromorphic deep learning with first spike times](#)
[When algorithms get creative](#)
- Visceral Surgery: [Using AI to assess surgical performance](#)

Bern Center for Precision Medicine (BCPM)

Murtenstrasse 40, 3008 Bern
www.bcpm.unibe.ch



Structure

The Bern Center for Precision Medicine (BCPM) is an interdisciplinary center in support of precision medicine. It is composed of the management board, a scientific review committee, and the operational office. The center offers a platform for researchers and educators of the University and Inselspital, with the goal to promote and establish precision medicine. Headed by Prof. Mark Rubin, the center currently has 26 ongoing research projects and 78 members.

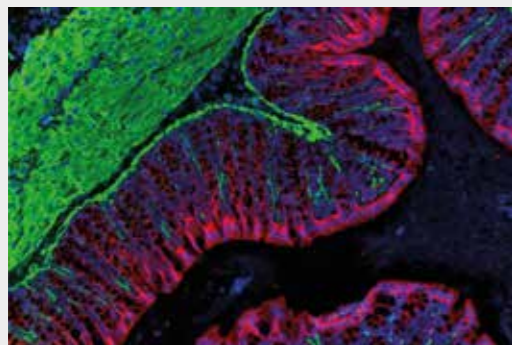
Profile

- The BCPM strengthens the national and international position of the University of Bern and the Inselspital in the area of precision medicine.
- It aims to develop new medications and methods, increase the quality of treatment for patients, and relieve the health care system with more efficient therapies.
- The BCPM is active in research, education, networking, and outreach. External partners include other 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 Kruihof-de Julio: PROMETEX, Metabolically-instructed personalized therapy selection for prostate cancer

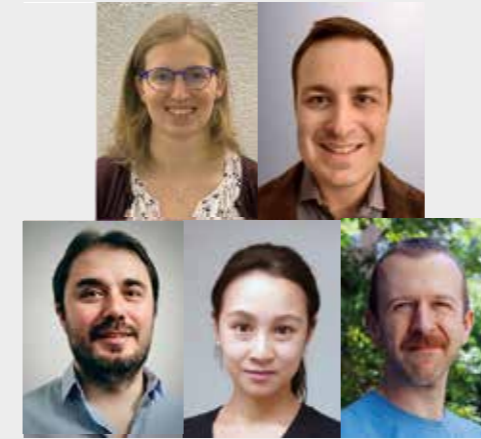
Highlights



IMC Platform image of a mouse colon with alpha-SMA in red, E-cadherin in green and DNA in blue

Imaging Mass Cytometry (IMC) Platform

The Bern Center for Precision Medicine, in collaboration with the Departments of the University of Bern and Inselspital, installed the Hyperion Tissue Imager in 2020. It generates tissue images with single cell resolution for detection of up to 40 different metal-tagged proteins with its unique fusion of microscopy with mass spectroscopy. This aids research related to the characterization of immune functions, infectious diseases, immunophenotyping, cancers and response to therapies. As with the genome sequencing infrastructure, the IMC Platform is being used by researchers coming from both the University and the University Hospital.



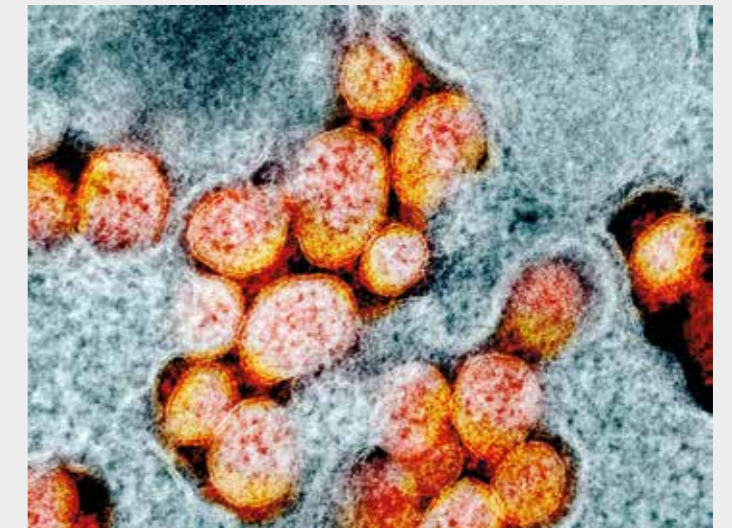
The winners of the young investigator project call

Call for young investigators

In autumn 2021, the BCPM organized a special call for young researchers. The goal was to give them the opportunity to lead their own independent pilot project and gather pilot data for pursuing another grant such as SNF Ambizione or PRIMA. 44 applications were handed in, out of which five projects were chosen for financing. The winners were Anne Gregor, Pierluigi Casolaro, Bahtiyar Yilmaz, Charlotte Ng and Jakob Zimmermann, with subjects such as neurology, gastroenterology, oncology, organoids and radiotherapy with optical fibers.

Genome Sequencing Infrastructure

The NovaSeq 6000 device financed by the BCPM is still at the heart of the sequencing activities of both the University and the University Hospital. The annual throughput has more than doubled since the purchase. The device is being used in everyday clinical practice, such as diagnosing hereditary diseases and molecular tumor profiling. Innovative methods such as High Quality Microbiomic Amplicon Sequencing, Metatranscriptomics and Metagenomics are practiced, and the device is used continuously and with different methods in the context of SARS-Cov-2 projects.



Novaseq 6000 sequencing was used in research of SARS-Cov-2-infections



Biobank

At the Liquid Biobank Bern (LBB), blood and urine samples are processed, frozen and stored for research purposes. In 2021, the processing of primary samples increased by 42% to a total of 29,639, the storage of cryo-tubes by 37% to a total of 134,864. Thanks to the expansion of the automation and the consistent digitization of the biobank processes, this increase could be achieved without additional jobs. With the COVID-19 cohort, jointly initiated by the Biobank and the BCPM, samples were taken from 1,347 patients, which covered the pandemic over the entire period.

Department for BioMedical Research (DBMR)

University of Bern, Murtenstrasse 24-28, 3008 Bern
www.dbmr.unibe.ch



Prof. Mark A. Rubin
DBMR Director

Prof. Anne Angellillo-Scherrer
Deputy Director DBMR

Prof. Marianna Kruihof-de Julio
DBMR Board of Directors

Ass. Prof. Carsten Riether
DBMR Board of Directors

Ass. Prof. Volker Enzmann
DBMR Board of Directors

Structure

With about 100 participating individual labs, the Department for BioMedical Research (DBMR) promotes an integrative perspective to clinical research with a strong emphasis in the development of translational approaches. The groups of the department are organized in 13 Research Programs and 10 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 and Animal Core Facilities that also 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
- Place where the researchers of the Inselspital research
- Aim: to bridge laboratory-based and biomedical patient-oriented clinical research
- Organizing networking platforms as progress reports, seminars and research conferences
- 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, Lausanne (CH), ETH Zurich (CH), Geneva University Hospital (CH), Novartis (CH), Roche (CH), RMS Foundation (CH), University of Basel, 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, Paris (FR), Stanford Burnham Prebys Medical Discovery Institute (USA), Weil Cornell Medicine (USA), Ulsan National Institute of Science and Technology (Korea)

Grants

- SNF Sinergia: PROMETEX: Metabolically-instructed personalized therapy selection for prostate cancer, PIs: Prof. Dr. Eliane Jasmin Müller and Prof. Dr. Marianna Kruihof-de Julio
- Fond' action contre le cancer Young Investigator Grant 2021: Towards understanding the role of the minor spliceosome in advanced cancer. PI: Dr. Anke Augspach
- Helmut Horten Foundation: How child intestinal microbiota influence lifelong immunity. PI: Ziad Al Nabhani
- H2020 MSCA IF: Tracing novel androgen pathways: deciphering the role of 16 α -hydroxylation in human fetal biology. Dr. Therina du Toit
- Werner und Hedy Berger-Janser Foundation: Molecular characterization, in vitro modelling and therapeutic targeting of prostate cancer liver metastases. PI: Mark Rubin
- InnoSuisse: AlvireX: A game-changing translational drug screening platform to revolutionize drug development against respiratory viral infections, PIs: Prof. Dr. Marianna Kruihof-de Julio, PD Dr. Ronald Dijkman (Institute for Infectious Diseases (IFIK)) and Nina Hobi (AlveoliX)
- CSL Research Acceleration Initiative: Prof. Dr. Britta Engelhardt, Dr. Nicoletta Sorvillo, and Prof. Dr. Uyen Huynh-Do

Highlights

Opening Murtenstrasse 24-28

The opening of the new building at Murtenstrasse 24 allows to foster synergies and a creative collaborative environment. Out of the 13 Research Programs of the DBMR, Cancer Therapy Resistance (CTR), Oncology-Thoracic Malignancies (OTM), Cardiovascular Diseases (CVD), Lung Precision Medicine (LPM) have relocated to Mu24.

The state-of-the-art Technology Core Facilities that DBMR manages and operate have also been relocated to Mu24. To ensure a better user experience and workflow, the Mass Spectrometry and Proteomics (PMS), Live Cell Imaging (LCI) and Flow Cytometry and Cell Sorting (FCCS) are all located on the 4th floor.



Highly Cited Researchers 2021



Five DBMR Researchers - Prof. Mark A. Rubin, MD, Prof. Andrew J. Macpherson, Prof. Dr. med. Mattias Egger, Prof. Dr. med. Stephan Windecker, Prof. Georgia Salanti – are among the most highly cited researchers 2021.

Best Poster – Award 2nd AACR-KCA Joint Conference

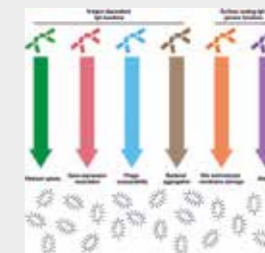
The Best Poster Award at the 2nd AACR-KCA Joint Conference on Precision Medicine in Solid Tumors, which was held on November 12, 2021, was awarded to Liana Hayrapetyan, Program Translational Cancer Research, Medova Lab.



Best Poster Award Liana Hayrapetyan

Immunoglobulin A antibodies control intestinal bacteria

An international team led by researchers from the DBMR and Inselspital show how the intestinal immune system specifically recognizes our commensal bacteria and how IgA constrains microbial fitness in the intestine. The findings, published in Nature, October 13, 2021, expand our fundamental understanding of mucosal antibody responses and how we keep homeostasis between the host and its microbiota.



Immunoglobulin A

Vontobel Prize for Age Research

Dr. phil. nat. Daniel Brigger, PD Dr. Alexander Eggel and Dr. phil. nat. Mario Noti (former UniBe) from the DBMR and University Clinic for Rheumatology, Immunology and Allergy succeeded in decelerating two age related impairments with a new type of cell therapy. They were awarded Fr. 5000.- for their work on: Eosinophils Regulate Adipose Tissue Inflammation and Sustain Physical and Immunological Fitness in Old Age.



Daniel Brigger, Mario Noti, Alexander Eggel

Department of Clinical Research

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



PD Dr. Sven Trelle
 Director ad interim DCR and Director CTU

Christina Huf
 Head Quality Management

Carmen Jörg
 Head Clinical Research Coordinators

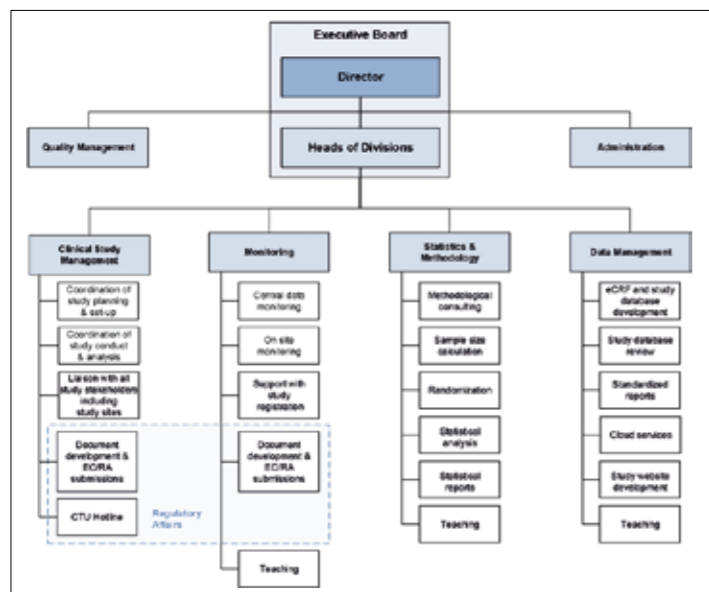
Dr. Martin Jünger
 Head Monitoring

Dr. Andreas Limacher
 Head Statistics and Methodology

Dr. Felix Rintelen
 Head Clinical Study Management

Miriam Wegmann,
 Head Data Management

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 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 eventually. The search procedure is currently on-going.

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 2021 we conducted more than 300 consultings and supported more than 400 research projects
- Facilities of Clinical Investigation (CI) 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 2021, 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



Two large trials published with support of CTU Bern

With more than 5,000 and 2,000 patients respectively, MASTER DAPT and OPERAM have been one of the largest and most complex trials supported by CTU Bern so far. MASTER DAPT was conducted in 140 sites in 30 countries and showed that an abbreviated dual antiplatelet therapy regimen is safe and able to reduce bleeding events in patients who underwent percutaneous coronary intervention and are at high bleeding risk. CTU Bern provided extensive data management and statistics support. OPERAM was a pragmatic cluster-randomized trial which enrolled multimorbid elderly with polypharmacy in four European countries and evaluated a complex intervention aimed at optimizing drug therapy. Although inappropriate prescribing was common in this trial population, the intervention was not able to reduce drug-related hospitalizations.



Supporting WHO in its Solidarity trial program

The World Health Organization has started two platform trials to help overcoming the COVID-19 pandemic. In 2021, the second phase of a randomized trial evaluating different pharmaceutical treatments against COVID-19 has started. In addition, a multi-arm vaccine trial has started in autumn. Both trials are conducted globally in multiple sites. CTU Bern supports the treatment trial with central data monitoring. For the vaccine trial, we are responsible for central data monitoring, regular reporting, and statistical analysis.



Multiple large projects completed and started

Multiple large projects completed enrolment and follow-up in 2021 and results with direct impact on patient care are expected for 2022. Among those, NOSTONE, a trial funded by the IICT program of the Swiss National Science Foundation (SNSF), is noteworthy because it is the largest ever conducted trial in patients suffering from recurrent kidney stones. Important other trials are ESTxENDS and SWIFT DIRECT. Other large scale projects started in 2021 such as the STREAM trial, a trial evaluating the safety of stopping statins in 1,800 patients 70 years or older without cardiovascular disease. Also, PASTA started enrolment. A European trial evaluating steroid treatment in a rare disease: pediatric stroke. Further information on these projects can be found on the CTU website.

Swiss Health Study Pilot successfully completed

The Swiss Health Study is planned as a large-scale, population-based longitudinal cohort to study the health of the Swiss population and influencing factors. For preparation, a pilot study was completed at two sites, Bern and Lausanne. This pilot was successfully completed in December 2021 after enrollment of 789 participants of which, 360 were enrolled in Bern at our Clinical Investigation facility. Experiences and results of this pilot will now be used to finalize the protocol and set-up for the real study which we hope will start in 2023.



Diabetes Center Berne (DCB), Innovation in Diabetes Technology

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



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

Structure



DCB is a private, independent Swiss foundation (established in 2017), that fosters innovation in diabetes technology. It helps research projects and entrepreneurial ideas grow. It identifies unmet needs and provides projects around the world with expertise and access to clinical research facilities and workspaces, as well as access to its own laboratories. DCB also provides financial resources and runs its own clinical trials as well as 3rd party clinical trials. DCB works in close scientific partnership with the Department of Diabetes, Endocrinology, Clinical Nutrition and Metabolism of Bern University Hospital (UDEM).

Profile

- Artificial pancreas & biological feedback
- Sensing & smart monitoring
- Application systems, insulin delivery
- Nutrition & metabolism
- Innovation management
- Clinical trial management
- Booster program for start-ups
- A hub of translational development for the diabetes research community
- Partners: UDEM (Inselspital, Bern), Institute for Diabetes Technology (Ulm)

Grants

- NTN Innovation Booster, provided by Innosuisse (Topic: "Digital Health Nation")
- Consortium partner with DayOne Basel, CSEM, Novartis, FHNW, Hôpitaux Universitaires de Genève, University Hospital Basel et al.

Highlights



Qarbs: The first start-up founded out of a DCB project

CarbVis AG is currently developing a user-friendly, automated carbohydrate assessment system for better diabetes management.



Diabetes Center Berne is expanding its network by partnering with the Diabetes-Technologie Forschungs- und Entwicklungsgesellschaft mbH at the University of Ulm (Institute for Diabetes Technology, IfDT)

Ulm and Bern are joining forces

The IfDT is a centre of excellence that enjoys international renown for its work in the field of diabetes technology. It has over 20 years of experience in the areas of glucose measurement systems, continuous glucose monitoring, insulin pumps and closed-loop applications.

Launch of the first venture fund dedicated to diabetes technology, through a collaboration between the Swiss Start-Up Group (SSUG), Diabetes Center Berne and Simon Michel

The Swiss Diabetes Venture Fund (SDVF) will invest up to CHF 50 million over the next 5 years, with a target portfolio size of 20–30 investments in Switzerland, Europe and the USA. General Partners: Simon Michel who will bring his experience as CEO of the Ypsomed Group, Derek Brandt as CEO of DCB with his global reach in the diabetes ecosystem, and Mike Baur, CEO of SSUG, drawing upon the resources and experience gained from SSUG's 6-year track record in building up the largest Swiss venture platform.

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



Prof. Lilian Witthauer took up her position as Professor of Diabetes Technology with a focus on the development of Sensors

This newly created assistant professorship with tenure track is one of a total of four new professorships that the University of Bern and DCB have jointly established in the field of "Diabetes Technology and Artificial Pancreas". The positions are assigned to the Chair of Diabetology and Endocrinology at the University of Bern, Prof. Christoph Stettler.



Prof. Dr. phil. Lilian Witthauer

The DCB Open Innovation Challenge - one of the largest venture awards in Europe - successfully completed

The challenge: finding new approaches to further improve glucose measurement. > 350 innovators representing 40 countries on the DCB Innovation Platform. 72 projects submitted. > 100 coaching sessions provided. > 30 dedicated experts and coaches involved. There was also a one-week Bootcamp, with the top teams from Brasil, India, USA, UK, Germany and Norway coming together at DCB. The top teams can count on DCB's ongoing support, including access to its expertise and its network.



Final Pitches and Award Ceremony at sitem-insel and on live stream. The winner: Team Glucoset, Norway (on the screen). Photo Credit: Sandra Blaser

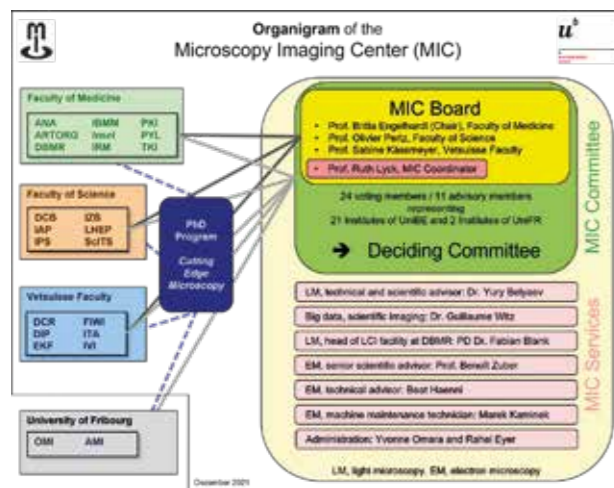
Microscopy Imaging Center (MIC)

c/o Theodor Kocher Institute, Freiestrasse 1, 3012 Bern
www.mic.unibe.ch



Prof. Britta Engelhardt Chair, Representative of the Medical Faculty	Prof. Sabine Käsmeyer Representative of the Vetsuisse Faculty	Prof. Olivier Pertz Representative of the Faculty of Science	Prof. Ruth Lyck MIC coordinator	Dr. Guillaume Witz scientific assistance BiImaging and BigData	Dr. Yury Belyaev scientific assistance Light Microscopy
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Structure



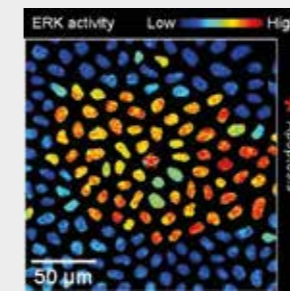
The MIC is the center of excellence for high-end microscopy in the life sciences at the University of Bern. A tight collaboration with the Science IT support (SciITS) unit of the University of Bern ensures high quality support in data handling and image analysis. Currently, 71 instruments are registered at the MIC. Amongst these are 21 confocal light microscopes, 10 electron microscopes, two atomic force microscopy systems, one imaging mass cytometer and one micro-computed tomography (micro-CT) instrument. In 2021, this equipment was used by 445 researchers.

The MIC committee consists of 35 microscopy experts from the Medical, Science and Vetsuisse Faculties. The MIC instrument portfolio is provided by 20 institutes of the three participating faculties.

Profile

- Mission: Disseminate expert knowledge and provide technical support in high-end microscopy. Implementation of new technologies. Administer MIC instrument portfolio and ensure central access to equipment.
- Teaching and events: Lecture series on Advanced Microscopy. MIC workshops, MIC trainings, Instrument demos, MIC research day, MIC symposium. PhD program Cutting Edge Microscopy (CEM). In 2021, the MIC organized a 2-day summer school for the CEM students and a virtual visit to the Paul Scherrer Institute (PSI).
- Portfolio: Multidimensional imaging of living and fixed samples from the organelle to the organism level; light, electron and atomic force microscopy; micro-computed tomography.
- Services: 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).
- Internal activities: The MIC Committee meets four times per year to take decisions.
- External partners: Swiss Society for Optics and Microscopy (SSOM); Life Sciences Switzerland (LS2), Intersection Microscopy; Swisshotronics; Scientific Volume Imaging b.v. (SVI); Swiss Microscopy and Imaging Core Facility Network; Science IT Support Unit of the University of Bern.

Highlights



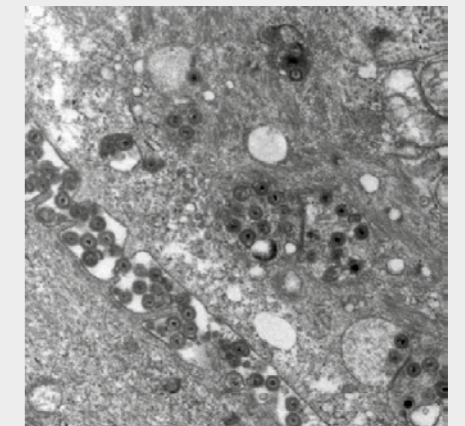
Visualization of ERK activity

Highlight from the Faculty of Science

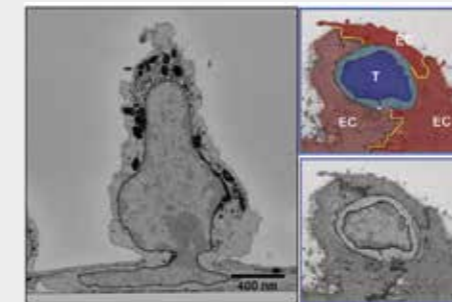
Using time-lapse microscopy, fluorescent biosensors and optogenetics, the Pertz lab has discovered that apoptotic events trigger multicellular waves of ERK and Akt activity, which are two important signaling kinases. These waves are important to maintain epithelial homeostasis. Each wave generates a local survival effect where apoptosis is suppressed for 3-4 hours. This survival effect regulates the spatio-temporal occurrence of apoptotic events, ultimately controlling epithelial homeostasis and epithelial barrier function. Paolo Armando Gagliardi et al. 2021, *Developmental Cell*, 10.1016/j.devcel.2021.05.007.

Highlight from the Faculty of Veterinary Medicine

Amphibians are undergoing an unprecedented mass extinction around the globe with a dramatic loss in biodiversity. It is becoming increasingly clear that infectious diseases are critical factors in this complex process. Starting from two recently discovered herpes viruses, similarities and differences between the infected hosts and viruses were studied. Findings indicate that the skin lesions observed in infected frogs and toads result from a virus-associated dermatitis. This study provides a basis to address the clinical relevance of these viruses regarding their potential impact on amphibian biodiversity and conservation. Francesco C. Oraggi et al. 2021, *Veterinary Pathology*; 10.1177/03009858211006385.



Virus particles within and between cells



Highlight from the Faculty of Medicine

Combining the expertise of Britta Engelhardt and Benoit Zuber in live-cell imaging and serial block face scanning electron microscopy (SBF-SEM) allowed to track transendothelial migration of T cells across the blood-brain barrier under flow at the structural level. This study has identified the tricellular junctions as novel sites of T-cell diapedesis across the blood brain barrier (BBB). Mariana Castro Dias et al. 2021, *J Cell Sci*; 10.1242/jcs.253880.

SBF-SEM of a T cell crossing a tricellular junction in frontal and transversal view.



Michael Stoffel was ceremoniously bid farewell at the MIC symposium. He was one of the early MIC committee members and represented the Vetsuisse faculty on the MIC board for many years.

MIC Symposium 2021

The MIC Symposium 2021 on "3D electron microscopy" was held on-site in the UniS on November 19, 2021 and was attended by 110 participants. Wanda Kukulski, Michael Stoffel, Benoit Zuber and Dimitri Vanhecke formed the scientific committee. During the day, six scientific speakers from Germany, the Netherlands, and Switzerland covered most recent achievements in electron microscopy of molecular structures, virus-cell interactions, ciliary morphology and contact sites between intracellular lipid droplets. The representatives from industry discussed with the audience latest equipment for protein purification and automatic sample preparation for cryo imaging.

Swiss Institute for Translational and Entrepreneurial Medicine (sitem-insel)

Freiburgstrasse 3, 3010 Bern
www.sitem-insel.ch



Dr. Simon Rothen
CEO

Dr. Julie Risse
CBO

Dr. Christian Rosser
COO

Prof. Juergen Burger
Director sitem-insel School

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 (Inselspital) as well as to the Medical Faculty in Switzerland (University of Bern). Next to its own units, the sitem-insel community includes a wide variety of about 30 units from clinics, industry, research and education to service-providers. All are joined together under one roof and drive innovation for the benefit of the patient.



Profile

- National Center of Excellence for Translational Medicine that professionalizes translation research for the benefit of patients, society, and science
- Research and development infrastructure in a state-of-the-art building catalyzes a multidisciplinary collaborative approach to unlocking 'bench to bedside' innovation
- Reducing silos by bringing together clinic and industry, research and education since together, we are sitem-insel
- Non-profit public-private partnership in close cooperation with the University of Bern, the Inselspital, industry and start-ups
- More than 100 partners in the sitem-insel network
- 95% occupancy in platform facilities. 60% Medical devices, 30% medicinal and biotech products, 10% diagnostics
- Continuing Education in
 - Translational Medicine and Biomedical Entrepreneurship
 - Medical Device Regulatory Affairs & Quality Assurance
 - Artificial Intelligence in Medical Imaging
 - Artificial Intelligence in Diagnostic Medical Systems – under development
- 26 modules taught by more than 100 lecturers from industry, academia and authorities
- More than 32 start-ups and companies in incubator phase
- International students from 11 countries

Grants, received as center/platform

- Screen4Care – Shortening the path to rare disease diagnosis by using newborn genetic screening and digital technologies. Project funded by the Innovative Medicines Initiative, a joint undertaking of the European Union and the European Federation of Pharmaceutical Industries and Associations (EFPIA). For more information visit: www.screen4care.eu
- «Modular and interactive continuing education programs in the field of artificial intelligence: a collaboration between sitem School and the mathematical institute at the University of Bern»
Zentrum für universitäre Weiterbildung, ZUW, Universität Bern
- «Digitalisation of medical diagnostic systems: Continuing education modules for medical doctors interested in Artificial Intelligence for medical diagnostic systems»
Zentrum für universitäre Weiterbildung, ZUW, Universität Bern

Highlights



Training in sitem-insel's CATR. © Gianni Pauciello, Inselspital Bern

Education at the CATR

Cutting-edge education is an important part of the translational process. The Clinical Anatomy Training and Research Unit (CATR) at sitem-insel has taken up speed again and has been hosting international and national surgical training courses this year in its state-of-the-art infrastructure.

30.09-2.10: First GESEA course and certification in Switzerland
23-25.09: European Endometriosis League Masterclass
30.08-03.09: 5th Swiss Endoscopic Ear Surgery Course SEES and the 17th Endoscopic Paranasal Sinus & Skull Base Hands-on Course PSSB
25-26.06: AO Spine Master Level Specimen Course—Improving Technical and Non-Technical Skills for Complication Prevention in Complex Situations

New Unit

In October we welcomed a new unit into our building: The Bern University of Applied Sciences (Berner Fachhochschule BFH) has signed a lease agreement for 2 offices. We look forward to fruitful collaborations.



NeuroTec Opening

NeuroTec, the newly opened research unit within sitem-insel, accelerates innovation and explores novel medical technology to improve diagnostics and the treatment of neurological diseases. The aim is to shift diagnosis and therapy from the hospital to the patient's home. NeuroTec pools the clinical knowledge of Inselspital, University Hospital Bern, and the expertise in medical technology of the University of Bern and the Medtech Scene in Bern. The facilities at sitem-insel enable an active exchange with researchers in the field. NeuroTec is run by the Department of Neurology of Inselspital, University Hospital Bern in close collaboration with the ARTORG Center for Biomedical Engineering Research of the University of Bern, with project-specific partners from academia, non-profit research institutions and industrial partners in public-private partnerships.



The NeuroTec Loft

New Projects

CoVasc Consortium within sitem-insel's BSL-3 laboratory: Shortly after its opening, one of the rooms of the biosafety level-3 laboratory (BSL-3) within sitem-insel, was rented out to the CoVasc consortium. The CoVasc consortium is a group of 4 research project leaders and 10 project partners, that connects experts in heart research, vascular biology and neuroimmunology as well as in virology. Together they investigate how and if heart and vascular cells are prone to be infected by the SARS-CoV-2 and potential consequences thereafter. The National Research Program 78 initiated by the Swiss National Foundation finances this project.

Screen4Care: An international public-private consortium of 35 partners, including sitem-insel and the University of Bern, launched Screen4Care – a research project that aims to significantly shorten the time required for rare disease diagnosis and efficient intervention by utilizing genetic newborn screening and advanced analysis methods such as machine learning. The project will run for a period of five years with a total budget of EUR 25 million provided by the Innovative Medicines Initiative (IMI 2 JU), a joint undertaking of the European Union and the European Federation of Pharmaceutical Industries and Associations (EFPIA).



The entry to sitem-insel's BSL-3 laboratory

University Cancer Center (UCI)

Inselspital, Bern University Hospital, Freiburgstrasse 10, 3010 Bern
www.tumorzentrum.insel.ch



Prof. Daniel M. Aebersold
Chairman and Board of Directors

Prof. Michael Müller
Vice-Chairman and Board of Directors

Prof. Adrian Ochsenbein
Board of Directors

Prof. Aurel Perren
Board of Directors

Prof. Andreas Raabe
Board of Directors

Prof. Ralf Schmid
Board of Directors

Prof. George Thalmann
Board of Directors



Prof. Jörg Beyer
Managing Director

Christian Ziegler, Head
Coordination and Quality
Management (from October
2021)

Sybille Meyer-Soltys
Head
Coordination and Quality
Management (until May 2021)

Aleksandra Aleksandrowicz,
Quality
Management
Officer

Sonja Läderach,
Assistant

Peter Rüegg,
Content
Manager

Structure

University Cancer Center Inselspital (UCI)

Insel Gruppe AG / University of Bern



The structure of the UCI is outlined in figure 1. 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

In 2021 the UCI supported interdisciplinary, multi-professional expert groups who dealt with specific issues relating to the care and aftercare of children, young adults and geriatric patients:

Expert Group Adolescents and Young Adults

Adolescents and young adults with cancer between the ages of 14 and 20 stand between pediatric and adult oncology. They miss both, the «familial focus» of pediatric oncology and the «disease focus» of adult oncology. The expert group intends to understand better the needs of this group of patients and to make them heard more clearly. The aim is to enable the various specialist disciplines at Inselspital to address this group of patients in a more targeted manner.



Expert Group Cancer Survivors

Fast-evolving treatment options and technologies continue to advance survival in children, adolescents, and young adults diagnosed with cancer. The expert group focuses on latest developments and future directions of care for cancer survivors, in particular late effects, follow-up care and chronic diseases, fatigue, psychosocial aspects and fertility.



Expert Group Geriatric Oncology

Geriatric syndromes in people over 80 years of age influence the treatment of an oncological disease. The special needs and values of people in the last phase of life must be taken into account. These are often vulnerable or frail people, they frequently suffer from several different diseases, which increases the complexity in the course of the disease. The risk of complications in therapy is increased within these patients. The expert group is dedicated to specific questions for an adequate treatment of the very old.



University Neurocenter

Inselhospital, 3010 Bern
www.insel.ch/de/das-inselhospital/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. With 400 beds, >1'400 collaborators, >60'000 out-clinic patients, >8'000 in-hospital patients, and >3'500 operations/interventions each year is the largest of its kind in Switzerland, and leading in Europe.

Profile

Research areas with strong transdisciplinary approaches within the Neurocenter include the following:

- Stroke, including complex neurovascular diseases
- Sleep-wake-epilepsy, including epilepsy surgery
- Advanced neuroimaging (high-field MRI, intraoperative imaging, post-processing and machine learning).
- Movement disorders, including functional neurosurgery for Parkinson's disease, neurological and psychiatric disorders
- Neurorehabilitation including computer-assisted systems and robotics
- Neuroimmunology / multiple sclerosis
- Neurodegeneration/dementia
- Intraoperative surgical technologies: neuromonitoring, robotics, augmented reality navigation associated developments, targeted procedures and 3D printing and simulation techniques
- Systems neuroscience and psychopathology
- External Partners: Universities and large hospitals in Switzerland and abroad, other research institutions, industry

Grants

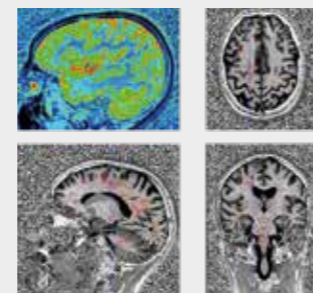
- SNSF: 39 grants in total
- Horizon 2020: 6 grants
- Innosuisse: 3 grants
- NIH: 2 grants
- Others grants funded by Swiss Heart Foundation, Swiss Academy of Medical Sciences, Novartis Foundation for medical-biological research, Velux-Foundation, Synapsis Foundation and others.

Highlights

A Platform for Integrated Neuroscience

The data platform was selected as funded project (800'000 CHF for 3 years) within the call "Strategische Forschungsförderung" of our faculty. 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.

T1-relaxometry for deep disease phenotyping, 7 T MRI

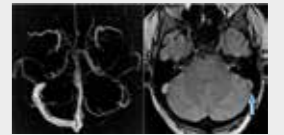


Interdisciplinary Covid-19 Research Projects

Several multidisciplinary Covid-19 projects have been initiated leading to more than 25 publications, e.g. 1) a study on humoral and cellular responses to mRNA vaccines in patients with CD20 B-cell-depleting therapy. (Moor MB, (...) Chan A Hoepner R et al. Lancet Rheumatol. 2021;11:e789-e797); 2) the European Academy of

Neurology-Neuro-covid Registry. (Chou SH, (...)Bassetti C et al. JAMA Netw. Open 2021; 3;4(5):e2112131); 3) international projects on cerebral venous thrombosis after vector vaccines (Sánchez van Kammen M*, Heldner M* (...)Arnold M#...Coutinho JM#, JAMA. 2021;326(4): 332-338).

Cerebral venous thrombosis of the transverse sinus (blue arrow)



Spontaneous Intracranial Hypotension (SIH)

Our neurocenter has proposed a new pathophysiological concept for the subgroup of SIH patients with no evidence of CSF leakage. In these patients, reducing the compliance or the volume of the spinal compartment seems to be the appropriate therapeutic strategy (Goldberg J et al. Front Neurol. 2021 Nov1;12:76008). Our multidisciplinary research has led to an excellent reputation with admission of patients from abroad and was summarized in a review article (Lancet Neurol. 2022, accepted for publication).

Inauguration of NeuroTec Sitem-Insel Bern

NeuroTec aims at accelerating the development of technologies that enable the validation and translation of personalized neurologic diagnostics and therapeutics from the clinic to the patient's home, where the disease dynamics may be assessed more accurately. Schindler K, Nef T, Baud M, Tzovara A ..., Krack, P Fröhlich F, Sznitman R, Rothen R, Bassetti CL. Clin. Transl. Neurosci. 2021,5(2),13; 1-16. The inauguration ceremony in 2021 was attended by members of the government of the cantons Bern, Ticino and Geneva, the ETH Zurich and the Wyss Center



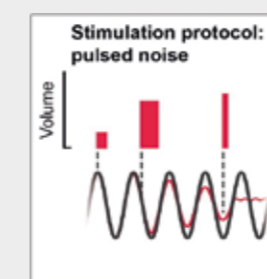
NeuroTec Loft at sitem-insel

Master of Advanced Studies in Stroke Medicine

The Neurocenter of the University of Bern was selected to establish the Master of Advanced Studies in Stroke Medicine (MAS) of the European Stroke Organisation to train clinicians and researchers in stroke care throughout Europe and the world. This is the second prestigious international MAS of the Neurocenter after successful implementation of the MAS in Sleep, Consciousness and Related Disorders.



Simulation Training for Acute Stroke Care



Auditory closed-loop modulation of slow wave sleep (SWS) to treat major depression (MD)

The first evidence for the feasibility and efficacy of automated detection and suppression of SWS in humans based on auditory closed-loop stimulation was provided by one of the PIs (C. Nissen) of the ERC "Decoding Sleep". Future studies will investigate the hypothesis that selective suppression of SWS can mimic the rapid antidepressant effect of therapeutic sleep deprivation in MD, potentially driven by sleep-related modifications of altered neuroplasticity in MD. EU patent application (Nr. 21202960.7)

Randomized intermittent tones were used to suppress slow waves sleep

HORAO

A major challenge in neurosurgery is the intraoperative identification of fiber tracts and the differentiation between tumorous and healthy tissue. To overcome this problem. Prof. P. Schucht, Dpt. of Neurosurgery et al launched the HORAO project, which after initial crowd funding has now been supported by a SNSF-Sinergia grant.



Fibre tracking on a human brain

Institutes at the University of Bern

Institute of Anatomy
Institute of Biochemistry and Molecular Medicine (IBMM)
Institute for the History of Medicine (IMG)
Institute of Pharmacology (PKI)
Institute of Physiology
Institute of Social and Preventive Medicine (ISPM)
Theodor Kocher Institute (TKI)
Institute for Infectious Diseases (IFIK)
Institute of Pathology
Institute of Forensic Medicine (IRM)
Institute of Primary Health Care (BIHAM)
Institute of Complementary and Integrative Medicine (IKIM)
Institute for Medical Education (IML)
Institute of Dental Medicine (ZMK)



Institute of Anatomy

Baltzerstrasse 2, 3012 Bern
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 Babychuk Group Leader
PD Dr. Elisabeth Eppler
PD Dr. Gudrun Herrmann Group Leader



PD Dr. Ruslan Hlushchuk Group Leader
PD Dr. Asparouh Iliev Group Leader
PD Dr. Rene Köffel Group leader
PD Dr. Stefan Tschanz Central Services Leader

Profile

- Teaching. The Institute of Anatomy is responsible for the comprehensive teaching of preclinical medical students (Human and Veterinary Medicine, Dentistry) and students of related paramedical fields (Biomedical Sciences, Pharmacy, Biomedical Engineering, Physiotherapy, Osteopathy) in subjects such as Gross Anatomy, Histology, Embryology and Cell Biology. In addition, postgraduate education and advanced surgical training is provided for medical graduates specializing in a large variety of surgical fields. We also educate postgraduate medical students (Master/MD) as well as PhD students at the Graduate School for Cellular and Biomedical Sciences (GCB), including the Interfaculty Cutting Edge Microscopy PhD Specialization Course (responsible: Prof. Benoît Zuber). PD Dr. Gudrun Herrmann and PD Dr. Stefan Tschanz were elected "Teachers of the year 2021".
- Research. Ten groups with various research topics: novel radiotherapy approaches (e.g., microbeam radiation therapy); cellular damage control and liposomal nanotraps against bacterial toxins; cardiac development and regeneration; ultrastructure and function of synapses, protein structure; pulmonary development and pulmonary particle deposition; structure and function of cilia; neuroinflammation and brain infections; microCT-based imaging; immunobiology.
- Selected external partners. Australia: Australian Synchrotron, University of Melbourne, Monash University, University of Sydney. Denmark: University of Copenhagen. Finland: Biomedicum Center Helsinki. France: French National Centre for Scientific Research, European Synchrotron Radiation Facility, University Hospital Henri Mondor, Institut du Fer à Moulin. Germany: University Clinic Lübeck, University of Erlangen-Nürnberg, Max Planck Institute for Heart and Lung Research, University of Giessen, University of Göttingen, German Center for Neurodegenerative Diseases (DZNE), University of Münster, University of Halle-Wittenberg, University of Magdeburg, Helmholtz-Zentrum München. Kenya: University of Nairobi. Israel: Hebrew University. Italy: University of Bari, University Milano Bicocca. Latvia: University of Latvia. Slovenia: University of Ljubljana. Spain: Centro Nacional de Investigaciones Cardiovasculares CNIC. Sweden: Lund University. Switzerland: Idiap Research Institute, Anapath Services AG, University of Basel, Institut Straumann AG, Fumedica AG, Kantonsspital St. Gallen, University of Zurich, Paul Scherrer Institute, Lascco SA, ETH Zürich, Lausanne University Hospital, University of Fribourg. UK: University of Birmingham, Diamond Light Source. USA: University of California in Davis.

Grants

- 8 SNF grants, 5 EU grants, 44 international/3rd party grants

Highlights

Primordial GATA6 Macrophages Function as Extravascular Platelets in Sterile Injury

Beat Haenni & Prof. Benoît Zuber have contributed to a publication in Science demonstrating the mechanism by which macrophages form scars in the abdomen, known as adhesions, which is a serious complication of abdominal surgery. The paper made the cover of the issue (DOI: 10.1126/science.abe0595).



Two Teachers of the Year 2021

COVID-19 represented a very special challenge for every student newly joining the university. Special challenges ask for special help and efforts, which our students got from PD Dr. Gudrun Herman (GH) and PD Dr. Stefan Tschanz (ST). As a thank you from the students of the 1st (ST) and 2nd year (GH) of our medical school, they were elected as Teachers of the Year 2021.



Two PhD Thesis Awards

Dr. Andrés Sanz-Morejón received the Dr. Lutz-Zwillenberg Prize of the University of Bern for his excellent work about "Role of macrophages and epigenetic inheritance during cardiac regeneration in the zebrafish". The Swiss Society of Anatomy, Histology and Embryology (SGAHE/SSAHE) honored Dr. Alexander Ernst for his thesis "New insights into epicardium formation through in vivo imaging in the zebrafish". Both did their PhD in the group of Prof. Nadia Mercader (DOI: 10.1007/978-1-0716-0668-1_5; 10.1242/dev.174961).



A PhD Thesis with 15 Publications

As a member of the group of Prof. Djonov Dr. Verdiana Trappetti is investigating a novel, anti-cancer treatment strategy called Synchrotron Microbeam Radiation Therapy (S-MRT). Based on synchrotron radiation based X-rays, several parallel microbeams with a width of 50 µm were used for a high dose irradiation of the tumors. This unique beam geometry resulted in an outstanding tumor control and significantly reduced the tissue complications commonly associated with conventional radiotherapy. In her thesis, Dr. Trappetti focused on the treatment of lung cancer and melanoma and contributed to uncover the biological mechanisms behind the differential response of tumor and normal tissues to S-MRT (DOI: 10.1016/j.ijrobp.2021.07.1717; 10.3390/ijms22147755).



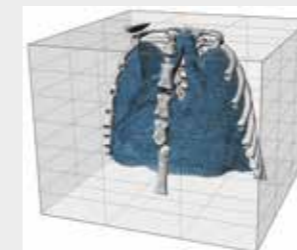
More VEGF, More Life — and Health Span

To live to high ages is appreciated, but preferably without aging. PD Dr. Ruslan Hlushchuk, Oleksiy Khoma and Prof. Valentin Djonov have contributed to a publication in SCIENCE demonstrating that increasing VEGF-signaling may remarkably prolong mammalian life span and improve overall health. They showed that a modest compensatory increase in circulatory VEGF was sufficient to preserve a young-like vascular homeostasis, alleviate multiple adverse age-related processes, and ameliorate a host of age-associated pathologies in mice (DOI: 10.1126/science.abc8479).



Most Natural High-resolution Imaging of Lungs

The Anatomy of the University of Bern has a long tradition of quantitative characterizations of the lung. Together with the team of the TOMCAT beamline (Swiss Light Source, PSI; Villigen) Dr. Elena Borisova of Prof. Schittny's group developed a protocol to image lungs in situ directly after the heartbeat stopped. In the resulting 3-dimensional-dataset, she estimated the individual diameter of all airspaces at micrometer-resolution. This novel protocol will be used for a quantitative analysis of structural lung diseases like cystic fibrosis and emphysema (DOI: 10.1007/s00418-020-01868-8).



Institute of Biochemistry and Molecular Medicine (IBMM)

Bühlstrasse 28, 3012 Bern
www.ibmm.unibe.ch



Prof. Christiane Albrecht Prof. Wanda Kukulski PD Dr. Jin Li Ambizione Group Leader Prof. Christine Peinelt Co-Director Prof. Hugues Abriel Co-Director Head NCCR TransCure PD Dr. Martin Lochner Lecturer Prof. Dimitrios Fotiadis Managing Director



Prof. Jürg Gertsch Deputy Director Prof. Peter Bütikofer

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)
- Nine 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 selected membrane proteins, discover new therapeutic targets
- Leading House of NCCR TransCure - Excellence in Membrane Transport Research
- Collaborations: D-BSSE & D-CHAB, ETH Zürich, Switzerland, Swiss Institute of Bioinformatics, University of Geneva, School of Medicine, University of Nottingham, UK, Department of Pharmacology, University of Cambridge, UK, MRC LMB Cambridge, UK, School of Life Sciences, University of Warwick, UK, Novartis Institutes of Biomedical Research, Basel, Switzerland, Max-Planck-Institute, Munich, Germany, Laboratory of Molecular Electron Microscopy, The Rockefeller University, New York, USA, PeterMac Institute, Melbourne, Australia, NIH, NIAAA, Rockville, USA, Institute for Research in Biomedicine (IRB Barcelona), University of Barcelona, Spain

Grants

- Swiss National Science Foundation NCCR TransCure (leading house), NCCR Molecular Systems Engineering
- SNSF project grants No. 31003A_173155, 310030_184783, 31003A_162581, 31003A_163359, 310030_184980, 310030_189220, 310030_204972, 310030_197408
- SNSF R'Equip grant No. 316030_198524
- SNSF Sinergia grants No. CRSII5_183481, CRSII5_180326/1, CRSII5_170923
- National Research Program Covid-19 (NRP 78) from the SNSF, grant No. 198314
- Lindenhof Foundation Bern, Swiss Cancer League, Gebert Rüt Foundation, Scherbarth Foundation, InnoSuisse grant 47109, 3RCC grant OC-2019-019, Swiss Heart Foundation FF20124, Bangerter-Rhyner Stiftung, Novartis Stiftung #20C196
- Ambizione Fellowship PZ00P3_173961, SNSF Spark CRSK-3_190182, MD-PhD 01/20 SNSF 323530_199381

Highlights



Pfizer Prize for PD Dr. Jin Li

Patients with congenital long QT syndrome have defective ion channels that are proteins on the surface of heart cells coordinating the electrical activity. The time for the heart to recharge between each heartbeat (the so-called QT interval) is abnormally prolonged and puts patients at risk of life-threatening arrhythmias and sudden cardiac arrest. Currently available treatment options are nonspecific and fail to correct the underlying physiology. Jin Li identified an antibody targeting a specific ion channel that can restore the electrical stability in heart cells of a patient with long QT syndrome.

Cryo-electron microscopy structure of the light-driven proton pump proteorhodopsin

Proteorhodopsin (PR) is a light-driven proton pump used by bacteria to harness solar energy and power important cellular processes, similar to photosynthesis in plants. By solving its atomic structure, we have provided molecular insight into the working mechanism of this globally prevalent phototrophic process. In addition, these findings are of great value since light-driven proton pumps are used as energy sources in bionanotechnological applications and as optogenetic tools. Hirschi S. et al., Nature Commun 12, 4107 (2021).

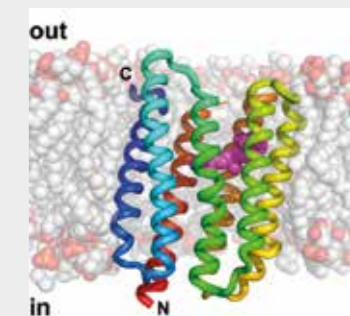


Figure: Structure of PR in the lipid bilayer. Transmembrane helices are rainbow-colored and retinal cofactor pink

Synthesis of fluorescent bile salt derivatives to study hepatic uptake and efflux transporters

In vivo studies of hepatic transporter function by means of tracer compounds have emerged as important diagnostic tool to monitor the progression or improvement of liver diseases. To expand the arsenal of tracer compounds and to avoid radioactive compounds, we have synthesised several fluorescent bile salt derivatives by attaching small, bright fluorescent dyes to the bile acid side chain. Using cellular transport assays, we were able to show that they interact with organic anion, bile salt uptake, and bile salt efflux transporters. Thus, these new fluorescent bile salt derivatives have potential as imaging agents to follow substrate uptake into hepatocytes. Leuenberger M. et al., J Pharmacol Exp Ther 377, 346 (2021).

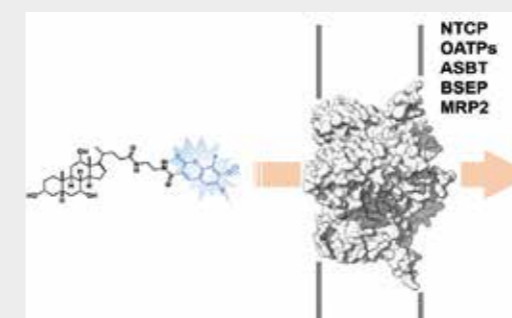


Figure: Chemical structure of one synthetic fluorescent cholic acid derivative (left) used to study organic anion (OATPs), bile salt uptake (NTCP, ASBT) and bile salt efflux (BSEP, MRP2) transporters

Podcast "Sabbatical in French-speaking Africa"

Prof. Hugues Abriel took a 10-month long sabbatical and was a visiting professor at the Universities of Kinshasa (RD Congo) and Fès (Morocco). He tested the implementation of nanopore DNA sequencing technologies in medical genetics laboratories. Beside this, he recorded and published a podcast where he interviewed many of the colleagues he worked with during his sabbatical.

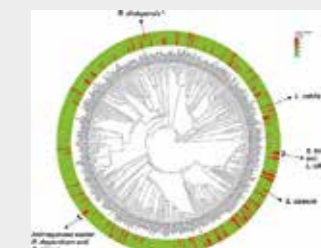
<https://africarxiv.pubpub.org/sabbatique-en-afrique-francophone>



Figure: Dr. Gerye Mubungu (Uni. Kinshasa) with Hugues Abriel

A phylogenetic approach for anti-Chagas disease drug discovery

Globally, more than six million people are infected with *Trypanosoma cruzi*, the causative protozoan parasite of the vector-borne Chagas disease (CD). We conducted a cross-sectional ethnopharmacological field study in Bolivia among different ethnic groups where CD is hyperendemic. A total of 775 extracts of botanical drugs used in Bolivia in the context of CD and botanical drugs from unrelated indications from the Mediterranean De Materia Medica compiled by Dioscorides two thousand years ago were profiled in a multidimensional assay uncovering different antichagasic natural product classes. Salm A. et al., iScience 24(4):102310 (2021).



Institute for the History of Medicine (IMG)

Bühlstrasse 26, 3012 Bern
www.img.unibe.ch



Prof. Hubert Steinke Director
 Dr. Pascal Germann
 Stefan Hächler Head of Archive
 Manuel Kaiser Head of Collection
 Bruno Müller Head of Library

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
- 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 for the History of Medicine and Health, University of Lausanne; 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

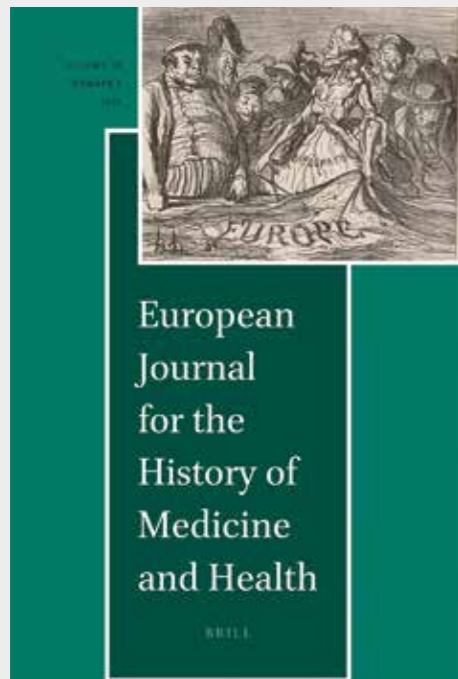
- 2 major Swiss National Science Foundation grants (No. 100011_184880; 10FE15-198247)

Highlights

A new history of medicine journal

The Swiss Society of the History of Medicine and Sciences and the European Association for the History of Medicine and Health in 2021 have launched the new European Journal for the History of Medicine and Health. It acts as a continuation of the Swiss Journal Gesnerus, published since 1943. The IMG serves as an important basis for the new journal with Hubert Steinke as one of the editors and Pascal Germann as book review editor.

<https://brill.com/view/journals/ehmh/ehmh-overview.xml>



An oral history of total hip replacement

Maurice E. Müller and our University played a pioneering role in the early development of hip prosthesis. The history of this important scientific and clinical achievement has, however, still to be written. It's particularly important to gather evidence from former key figures. The IMG has organized single interviews and a witness seminar with surgeons, engineers and manufacturers who were instrumental in the complex process of research and production. The interviews are the basis for a written documentation and will be stored in our Archives.



Witness seminar with some of the participants

Origins of peer review

The SNFS has granted the second and last part of the digital edition project on Albrecht von Haller's correspondence and reviews. In this 2021-2023 period we are editing all of Haller's more than 9,000 book reviews, published 1745-1777 in the Göttingischen Gelehrten Anzeigen. Haller and the journal were instrumental in the development of a new form of critical peer review and thus for the establishment of professional research communities. The process of this differentiation of the branches of science is, however, still poorly understood. The study of Haller's reviews will shed light on the early period of this story.

www.hallernet.org



A new Digital Museum

The Institute manages the medical collections of the University and of the Inselspital. In October, it launched a digital museum presenting ten practices and activities like cutting, lying, preventing, making visible, doing research or deciding to illuminate the history and present of medicine. It shows that medicine does not simply exist but that it comes into existence through the action of physicians, ambulance drivers and scientists but also patients and ultimately all of us. It wants to stimulate a process of reflection on the relationship between society, health and illness.

www.medizinsammlung.ch



Institute of Pharmacology (PKI)

Inselspital, INO-F, 3010 Bern
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Prof. Andrea Huwiler
Director a.i.

Prof. Hans-Uwe Simon
Director until 30.9.2021,
Deputy Director

Prof. Thomas Kaufmann

SNF Prof. Georgia Konstantinidou

Prof. Stephan von Gunten

Prof. Shida Yousefi

Prof. Uwe Zangemeister-Wittke

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)
- 7 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.

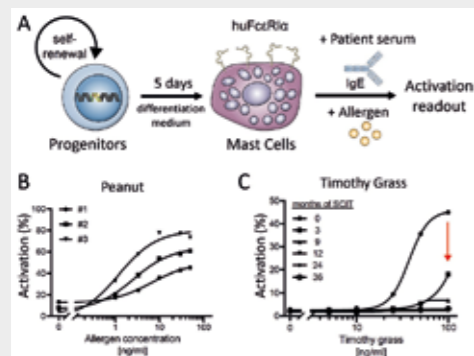
Grants

- Swiss National Science Foundation (grant No. 310030-166473; 310030_184816; 310030-175561; 31003A_173215; 31003A_149387; 310030-146215; 310030E-132762; 310030A-138201; 31003A_170134; 310030_184757; 31003A_173006; 310030-201199); Swiss Cancer League (KFS-3941-08-2016; KFS-4958-02-2020); HORIZON 2020 (Marie Skłodowska-Curie Action): MEL-PLEX; Novartis Foundation for Biological-Medical Research; SNF Professorship (PPO0P3_194810/1); Bern Center for Precision Medicine (BCPM) Grant; Innosuisse-Swiss Innovation Agency #40922.1 IP-LS; #52202.1 IP-LS (co-applicant); Helmut Horten Stiftung; Russian Government Program (075-15.2021-600)

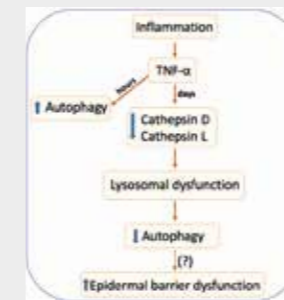
Highlights

A novel functional assay to diagnose allergies

Allergies are on a global rise, calling for improvements of current allergy diagnostics. In a fruitful collaboration, the labs of Dr. Thomas Kaufmann (PKI) and Dr. Alexander Eggel (RIA) have developed a novel test to detect allergies and to monitor treatment responses. The test is based on a unique standardized cell model, from which large numbers of functional allergic effector cells (mast cells) can be derived on demand (A). Combined with a high-throughput approach this paves the way for a rapid, sensitive and reproducible functional allergy test using patient serum (B, C).
Zbären N et al, Journal of Allergy and Clinical Immunology 2021, online, ahead of print, doi: 10.1016/j.jaci.2021.08.006.



(A) Principle of the mast cell allergy assay
(B) Assay results from 3 patients allergic to peanut
(C) Patient showing reduced reactivity to timothy grass after 3 months of immunotherapy (SCIT)



Evidence for lysosomal dysfunction within the epidermis in psoriasis and atopic dermatitis

We show that TNF- α facilitated the induction of autophagy in an initial phase, but reduced the levels and enzymatic activities of lysosomal cathepsins in later time periods, resulting in autophagy inhibition. Therefore, TNF- α appears to play a dual role in the regulation of autophagy. The relevance of these in vitro findings was supported by the observation that the protein levels of cathepsins D and L are decreased in both psoriasis and atopic dermatitis skin specimens. Taken together, this study suggests that TNF- α blocks autophagy in keratinocytes after long-term exposure, a mechanism that may contribute to the chronicity of inflammatory skin diseases. Klapan et al., J Invest Dermatol 2021, doi: 10.1016/j.jid.2021.05.016.

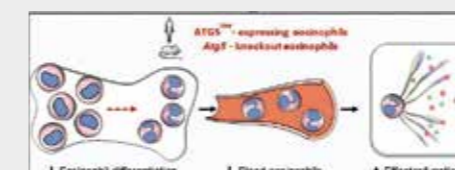
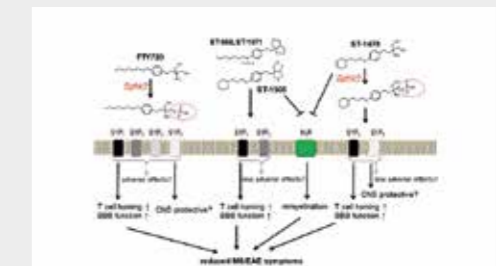
Loss of Sphk2 enhances WT1 and nephrin expression in podocytes and protects from diabetic nephropathy

We here investigated the role of Sphk2 in diabetic nephropathy and show that STZ-induced proteinuria and nephropathy is prevented in Sphk2^{-/-} mice. This coincides with increased nephrin and WT1 protein staining in renal sections of Sphk2^{-/-} mice. Nephrin and WT1 were also upregulated in cultures of podocytes with stable knockdown of Sphk2 or in cells treated with a Sphk2 inhibitor. This involves mechanistically sphingosine accumulation and inhibition of PKC. Our data suggest that Sphk2 is a possible new pharmacological target to stabilize the glomerular filtration barrier and reduce proteinuria in chronic kidney disease. Imeri et al., Matrix Biol. 2021, doi: 10.1016/j.matbio.2021.05.003.



Novel compounds with dual S1P receptor agonist and histamine H3 receptor antagonist activities act protective in a mouse model of multiple sclerosis

We have synthesized two novel piperidine derivatives of fingolimod, denoted ST-1505 and ST-1478, which show structural similarity to pitolisant, a H3R antagonist approved for the treatment of narcolepsy. Both compounds exerted H3R affinities, and in addition, ST-1505 was a dual S1P1+3 agonist, whereas ST-1478 was a dual S1P1+5 agonist. In mice, they induced lymphopenia and diminished disease symptoms in a model of MS. Therefore, these compounds hold promise as novel drugs for the treatment of MS and other autoimmune diseases, and by their H3R antagonist potency, they might additionally improve cognitive impairment during disease. Imeri et al., Neuropharmacol 2021, doi:10.1016/j.neuropharm.2021.108464.



ATG5 promotes eosinopoiesis but inhibits eosinophil effector functions

In this report, we demonstrated that eosinophil differentiation is delayed and reduced in the absence of ATG5 under both physiological and leukemic conditions. Moreover, the effector functions of ATG5-deficient mouse and human eosinophils are enhanced under in vivo conditions. Based on the data obtained from this study, we propose that mouse and human eosinophil hematopoiesis and effector functions are regulated by ATG5, which, consequently, controls the amplitude of overall antibacterial eosinophil immune responses. Germic et al., Blood 2021, 137, 2958-69.

Institute of Physiology

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Prof. Marcel Egger
Managing Director

Prof. Thomas Nevia
Codirector

Prof. Walter Senn
Codirector

Prof. Stephan Rohr
Codirector

Prof. Katja Odening
Codirector

Prof. Christian Soeller
Codirector

Prof. Jan Kucera

Ass. Prof. Sonja Kleinlogel



Ass. Prof. Stéphane Ciochi

Ass. Prof. Jean-Pascal Pfister

PD Dr. Shankar Sachidhanandam

Dr. Mihai Petrovici

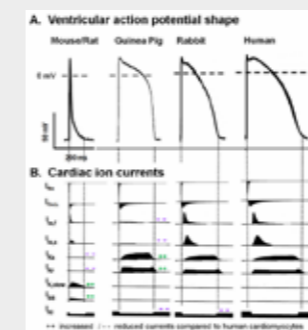
Profile

- 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 cure retinal degeneration, 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)
- EJLB Grant "Silence LQTS" (Odening)
- ERC Consolidator Grant (Nevian)
- ERC Starting Grant (Ciochi)
- SNF Professorship Grant (Ciochi, Pfister)
- Bertarelli Foundation Catalyst (Kleinlogel)
- Human Brain Project (Petrovici, Senn)
- SNF Synergia Grant (Senn)
- IFK Decoding Sleep (Nevian, Senn)

Highlights



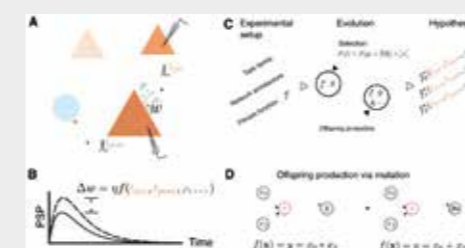
Species differences in cardiac ion currents

Experimental models for cardiac electrophysiology research

This position paper from the ESC Working Group on Cardiac Cellular Electrophysiology provides an overview of currently available electrophysiological research methodologies, the most commonly used experimental (cellular and animal) models for cardiac arrhythmias including relevant species differences, the use of human cardiac tissue and in silico models to study cardiac arrhythmias, and the relevance, limitations, and opportunities of these models to recapitulate specific arrhythmia disorders; with the ultimate goal to facilitate the clinical translation of basic electrophysiological research findings on arrhythmia mechanisms and therapies. Odening KE, et al. Europace. 2021 Nov 8;23(11):1795-1814.

Synapses learn to learn

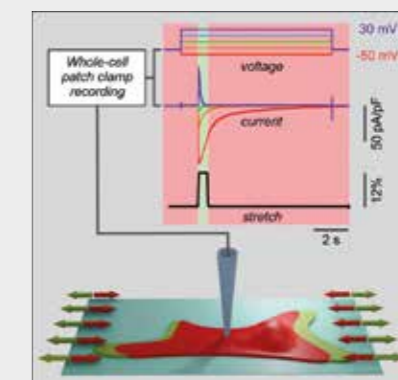
We form memories every day, acquire new knowledge or refine existing skills. This stands in stark contrast to our current computers, which are typically used to perform pre-programmed actions. Our ability to adapt is heavily dependent on synaptic plasticity, changes in the coupling strength between neurons in the central nervous system. We developed a new approach based on "evolutionary algorithms" that searches for solutions to problems by mimicking the process of biological evolution. In particular, we applied these algorithms to discover new phenomenological models of synaptic plasticity in typical learning scenarios. We discovered previously unknown mechanisms for learning efficiently from rewards, recovered efficient gradient-descent methods for learning from errors, and uncovered various functionally equivalent spike-timing-dependent-plasticity rules with tuned homeostatic mechanisms. Our evolving-to-learn (E2L) approach promises to gain new insights into biological learning principles and accelerate progress towards powerful artificial learning machines. Jakob Jordan, Maximilian Schmidt, Walter Senn und Mihai A. Petrovici: Evolving interpretable plasticity for spiking networks, eLife, 28 October 2021.



Artificial evolution of synaptic plasticity for cortical microcircuits

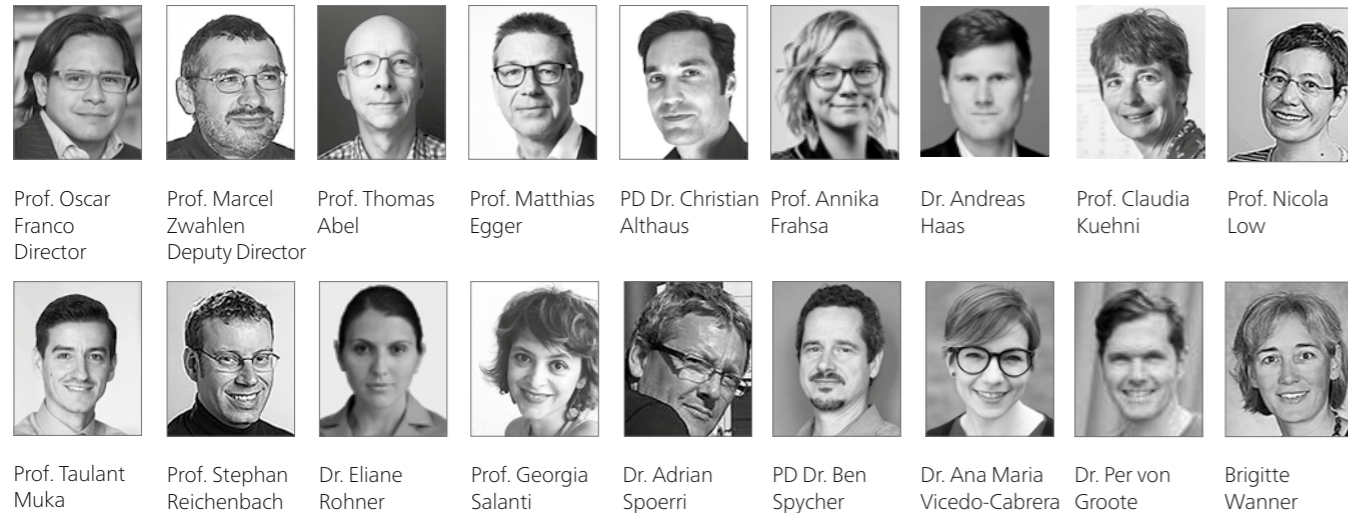
Advancing mechanobiology by performing whole-cell patch clamp recording on mechanosensitive cells subjected simultaneously to dynamic stretch events

The normal function of the human body critically depends on cells that sense mechanical events and translate these events into electrical signals. This so-called 'mechano-electrical transduction' process is central to hearing and sensing and contributes importantly to body movement and the normal function of the lung, the circulatory system, the digestive tract and other organs. For understanding mechano-electrical transduction at the single cell level, researchers generally contact cells under investigation with a measurement electrode and induce mechanical events by gently indenting the cell with a second pipette ('poking'). Because this type of mechanical stimulus is highly unphysiological, we developed a novel experimental method where the entire cell is subjected to realistic linear strain events while keeping the delicate electrode-cell contact intact. This is achieved by realtime 3-D stabilization of the cell-electrode interface during strain events using video-feedback and piezo actuators. Proof-of-concept measurements with this 'Linear Single Cell Strain' (LSSE) system using NIH3T3 cells not only demonstrated the feasibility of subjecting individual cells to repeated mechanical strains with altered dynamics and amplitudes but revealed mechanosensitive currents with hitherto unknown properties. iScience (2021), 24:102041. Etienne de Coulon, Christian Dellenbach and Stephan Rohr.



Institute of Social and Preventive Medicine (ISPM)

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Prof. Claudia Kuehni
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Prof. Taulant Muka
Prof. Stephan Reichenbach
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Prof. Georgia Salanti
Dr. Adrian Spoerri
PD Dr. Ben Spycher
Dr. Ana Maria Vicedo-Cabrera
Dr. Per von Groote
Brigitte Wanner

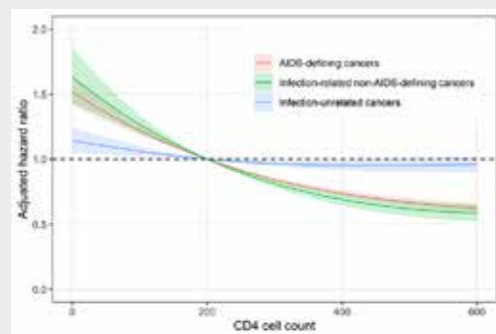
Profile

- 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.
- 15 research groups and 2 research platforms
- 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

- 2 Swiss National Science Foundation, SNSF; 1 SNSF Ambizione Fellowship
- 2 National Institute of Health (5 year extension of IDEA collaboration, 1 RO1 grant)
- WHO
- UZH; KK, MS-Gesellschaft; Foundation Johanna Dürmüller-Bol; KFS / UKBB; KK
- Lindenhof Stiftungsprofessur

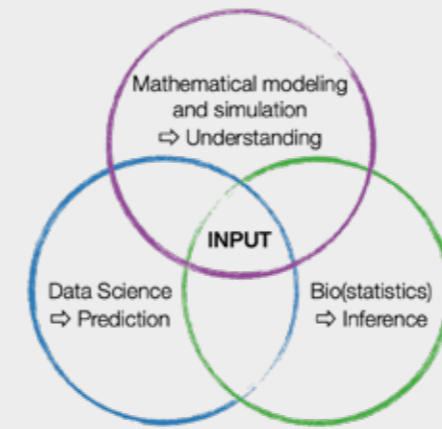
Highlights



Association of CD4 cell counts with cancer incidence

South African HIV Cancer Match (SAM) study

Together with collaborators at the National Cancer Registry (NCR) in South Africa and the Swiss Tropical and Public Health Institute, ISPM researchers established the SAM study. The SAM study is based on record linkages between HIV-related laboratory tests from the National Health Laboratory Service and cancer diagnoses from the NCR. It currently includes data on 5.2 million people living with HIV in South Africa. Several papers using SAM data have been published in peer-reviewed journals and the cohort profile is available as a preprint: [10.31219/osf.io/w52sb](https://doi.org/10.31219/osf.io/w52sb).



Epidemiological research at the interface of modeling, (bio)statistics, and data science

INPUT - Interfaculty Platform for Data and Computational Science

In collaboration with the Center for Space and Habitability (CSH), ISPM established a platform for the development and application of computational methods in epidemiology, medicine, and the natural sciences. A major aim of INPUT – led by PD Dr. Christian Althaus – is to foster interdisciplinary collaborations across institutes and faculties at the University of Bern. Newly developed methods have helped to better understand the course of the SARS-CoV-2 pandemic and the spread of new viral variants, supporting the mission of the Multidisciplinary Center for Infectious Diseases (MCID). In the future, a major focus of INPUT will be on the analysis of electronic health records for surveillance purposes of communicable and non-communicable diseases using various tools from machine learning.

Mental health care for people living with HIV

Mental health problems are common among people living with HIV in Zimbabwe, yet few specialists provide mental health care. In collaboration with the [Friendship Bench Project](#) and [SolidarMed](#), ISPM's [Mental Health](#) and [HIV Research Groups](#) conducted a clinical trial to evaluate the effectiveness of a psychological intervention for persons living with HIV and mental health problems in Zimbabwe. The intervention, termed Friendship Bench, trains laypersons to deliver evidence-based cognitive behavioural therapy on park benches. The intervention was feasible, acceptable, and reduced symptoms of common mental disorders.



Trained layperson conducting a therapy session with a young woman

Research on urban governance for health, equity, and wellbeing

The research group on community health acts as lead global academic partner and develops a protocol for operational research and evaluation of multisectoral action and community engagement in five participating cities: Bogota, Doula, Khulna, Mexico City, and Tunis in close collaboration with national academic partner institutions and WHO regional and country offices.



New research group on community health and health(care)systems research

Supported by an endowment of the Lindenhof foundation, a new research group was established in 2021, led by TT Assistant Professor Dr. Annika Frahsa. The research group applies social science methodology to understand and explain socio-structural determinants of health, particularly among vulnerable communities. The research group on community health also supports the emerging ISPM tier on policy and practice that aims to further strengthen the local impact of ISPM.



Theodor Kocher Institute (TKI)

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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. Giuseppe Locatelli Research Group Leader	Dr. Steven Proulx Research Group Leader
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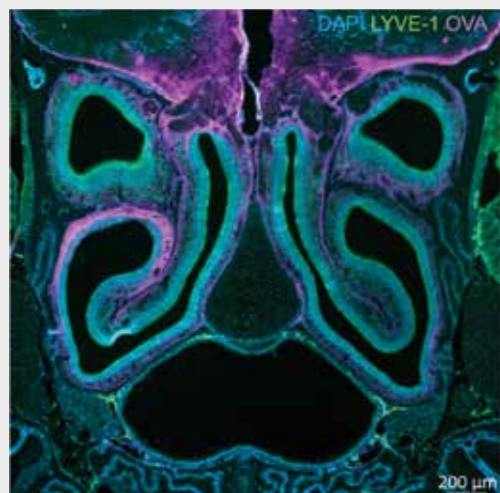
Profile

- The TKI hosts 5 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.
- We are teaching bachelor and master students of the Medical, Science and Vetsuisse faculties in lectures and practical classes in immunology, vascular and cell biology. We are educating graduate students of the Graduate School for Cellular and Biomedical Sciences (GCB). We are coordinating national PhD programs "Cell Migration" and "Cutting Edge Microscopy".
- External partners: Renaud Du Pasquier, CHUV, Lausanne; Harm-Anton Klok, EPFL, Lausanne; Michael Detmar, ETH Zurich; Thorsten Buch, University Zurich; Tobias Dick, Heidelberg, Germany; Martin Kerschensteiner, LMU Munich, Germany; Gianluca Matteoli, KU Leuven, Belgium; Marco Prinz, University Hospital Freiburg, Germany; Nicholas King, University Sydney, Australia; Yann Decker, University of the Saarland; Eric Shusta, University of Madison Wisconsin, Madison, USA; James McGrath, University of Rochester, NY, USA

Grants

- SNSF (310030E_189312; 310030_189080; 310030_189226; 4078PO_198297)
- NIH R61/R33, Fidelity Bermuda Foundation, EU Horizon 2020 ITN ENTRAIN, Swiss MS Society, Bern Center for Precision Medicine, CSL Behring
- UniBE ID grant (with Prof. Paola Luciani, DCB), Swiss Heart Foundation, Synapsis Foundation
- Scherbarth Foundation, Italian Multiple Sclerosis Foundation

Highlights



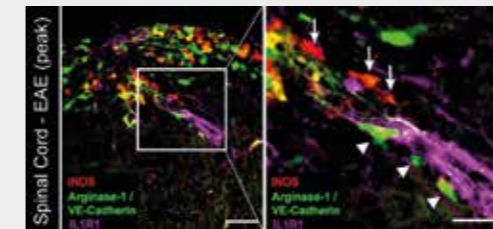
Decalcified mouse skull section showing outflow of fluorescent ovalbumin (OVA) into the nasal tissue lymphatics (LYVE-1+)

Drainage of cerebrospinal fluid (CSF) through the cribriform plate to nasopharyngeal lymphatics

In a collaborative project with researchers at the University of the Saarland, we have established an MRI assay to measure the dynamics of CSF flow after a low-rate infusion of contrast agent into the lateral ventricle of mice. This study demonstrated a rapid outflow of CSF along cranial nerves, especially along olfactory nerves to the nasal mucosa to reach lymphatic vessels draining this tissue. We validated this finding on decalcified sections after CSF injection of a fluorescent tracer Decker et al, 2021 <https://insight.jci.org/articles/view/150881>.

Cells of the blood brain barrier prime invading monocytes toward distinct inflammatory functions

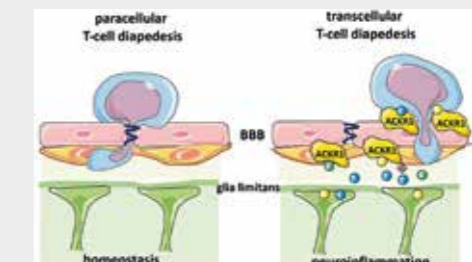
Our group has shown that monocytes trafficking to the central nervous system during autoimmune inflammation acquire distinct inflammatory features following interaction with endothelial cells of the blood brain barrier. In particular, we described an indirect role of the cytokine IL1 β in shaping anti-inflammatory functions of invading myeloid cells. Ivan et al., 2021, <https://doi.org/10.3389/fimmu.2021.666961>.



Differential polarization of macrophages in the mouse spinal cord during neuroinflammation

ACKR1 promotes transcellular T-cell diapedesis across the inflamed blood-brain barrier

Microvascular endothelial cells of the central nervous system (CNS) form the blood-brain barrier (BBB), which tightly regulates the migration of immune cells from the blood into the immune privileged CNS. Accounting for its barrier properties, multi-step T-cell migration across the BBB is characterized by unique adaptations. One of those is that T cell cross the inflamed BBB transcellular, through pores of BBB endothelial cells, rather than through the endothelial junctions. We could identify the atypical chemokine receptor 1 (ACKR1), expression of which is induced at the inflamed BBB, to mediate transcellular T-cell diapedesis across the inflamed BBB by shuttling inflammatory chemokines from the abluminal to the luminal side of the BBB. Marchetti et al., EJI, 2021, <https://doi.org/10.1002/eji.202149238>



ACKR1 is upregulated at the inflamed BBB and shuttles inflammatory chemokines from the abluminal to luminal BBB which increases transcellular T-cell diapedesis

3 PhD students could finalize their PhD thesis in 2021 at the TKI

Dr. Sidar Aydin, thesis title: "Cellular and molecular mechanisms involved in CD8+ T-cell migration across the blood-brain barrier during immunosurveillance and neuroinflammation", February 5th, 2021

Dr. Daniela Condeescu-Ivan, thesis title: "Myeloid cell recruitment to the CNS during neuroinflammation – migration pathways and functional polarizations", August 4th, 2021

Dr. Federico Saltarin, thesis title: "Investigations on the extravasation of melanoma cells across the blood brain barrier", December 10th, 2021



Dr. Sidar Aydin



Dr. Daniela Ivan



Dr. Federico Saltarin

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 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 Hiilty
 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.
- Twelve 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.
- National Partners: Insel Gruppe AG, Swisstransplant, sitem-insel AG, Regionalspital Emmental, Langenthal; Swiss Agency for Development and Cooperation, EPFL, ETH, University of Lausanne, Swiss Tropical and Public Health Institute, Basel, Spiez Laboratory, Swiss Federal Office for Civil Protection, Institute of Virology and Immunology (IVI), University Hospital Basel, University of Geneva
- International Partners: Department of Neurology and Neonatal Brain Disorder Center, University of California, San Francisco, USA; Centre for Respiratory Diseases and Meningitis, National Institute for Communicable Diseases, South Africa; Department of Genetics, University of Leicester, UK; School of Life Sciences, University of Nottingham, UK

Grants

- Swiss National Science Foundation: 196062, 196644, 197083; 192067; 189136; 179260; 169791; 170063; NRP 72 grants 177452; 177378; 177386; 167066, 167133, 192514, Sinergia grant 180317; Bilateral programme South Africa grant 170844, 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



High throughput diagnostics

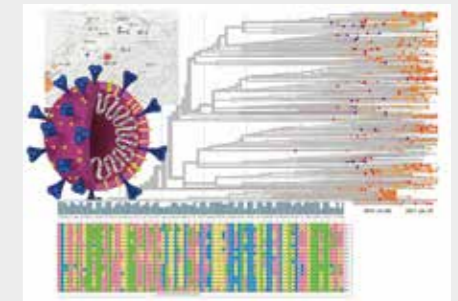
New automated high-throughput laboratory

In September 2021, a new 82 m² laboratory was inaugurated. It combines three rooms in one large laboratory. It is dedicated to automated high-throughput molecular and serological diagnostics. Currently, it mainly serves COVID-19 PCR analytics. This innovation will further streamline IFIK's analytics. IFIK is grateful to all involved parties for the rapid and professional construction work.

National Genomic Surveillance of SARS-CoV-2 variants

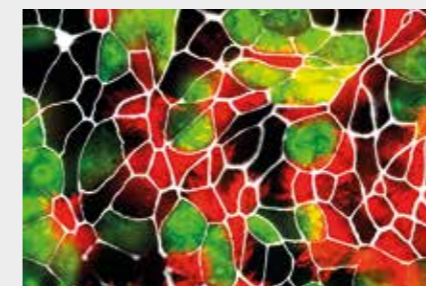
The objective is to rapidly identify variants of concern, their source and their distribution throughout the country. IFIK uses the latest long-read, real-time nanopore sequencing to provide fast and accurate results to the surveillance national program. The strategy is based on the recommendations of the World Health Organization and the project is supported by the FOPH.

National Genomic Surveillance of SARS-CoV-2 variants



COVID-19 research: Temperature is key

To better understand why infections with SARS-CoV and SARS-CoV-2 result in such different clinical outcomes, biologically relevant in vitro cultures representing the human airway were used to investigate the impact of respiratory tract temperatures on SARS-CoV and SARS-CoV-2 replication. The analysis of replication and the temperature-induced changes in the host innate immune defense mechanisms help explain why SARS-CoV-2 replicates so well in the upper respiratory tract and why SARS-CoV-2 exhibits higher human-to-human transmissibility than SARS-CoV. This study was recognized with the prestigious 3Rs award 2020 from the Swiss 3R Competence Center (3RCC).



Close up of AEC cultures of Rhesus macaque showing the presence of SARS-CoV-2 infected cells (green).

Biosafety Center

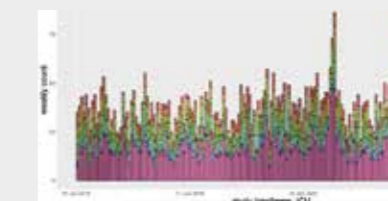
The Biosafety Center was awarded a mandate to establish a multi-disciplinary lecture series on biosafety and biosecurity. This lecture series is the first of its kind at the University of Bern. After intensive biosafety training, the first research groups started their COVID-19 related projects in the two BSL-3 laboratories of sitem-insel, under the supervision of the Biosafety Center.



Biosafety Center at sitem-insel

Near real-time monitoring with ANRESIS

The Swiss Antibiotic Resistance Centre ANRESIS systematically and continuously collects representative, anonymized Swiss data on antibiotic resistance, bacteremias and antibiotic consumption. This allowed us to describe in detail increasing numbers of bacteremia episodes in Swiss intensive care units during the COVID-19-pandemic waves in a timely manner.



Blood stream infections in Swiss ICUs 01/2018 – 05/2021

Institute of Dental Medicine (ZMK)

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|--|---|--|--|--|---|---|
| <p>Prof. Urs Brägger
Director of the Clinic of Reconstructive Dentistry and Gerodontology (Jan 21)</p> | <p>Prof. Vivianne Chappuis
Director of the Clinic of Oral Surgery and Stomatology</p> | <p>Prof. Christos Katsaros
Director of the Clinic of Orthodontics and Dentofacial Orthopaedics</p> | <p>Prof. Hendrik Meyer-Lückel
Executive Director (from Feb 21)
Director of the Clinic of Restorative, Preventive and Pediatric Dentistry</p> | <p>Prof. Martin Schimmel
Head of the Department of Gerodontology (Jan 21)
Director of the Clinic of Reconstructive Dentistry and Gerodontology (from Feb 21)</p> | <p>Prof. Anton Sculean
Executive Director (Jan 21)
Director of the Clinic of Periodontology</p> | <p>Prof. Ralf Schulze
Head of Division of Oral Diagnostic Science</p> |
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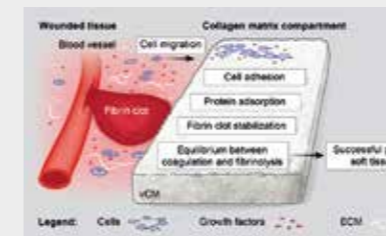
Profile

- 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, Salhgrenska 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; Department of Periodontology, University of Malmö, Sweden; Department of Periodontology, Semmelweis University, Budapest
- Interdisciplinary diagnosis and rehabilitation of oral diseases and defects

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)
- Osteology Foundation Research Grant
- Buser Implant Foundation
- Swiss Dental Association (SSO)
- German Research Foundation (DFG), 2021 -2023 (SCHU-1496/7-1)
- Swiss Government Excellence Scholarships for Foreign Scholars

Highlights



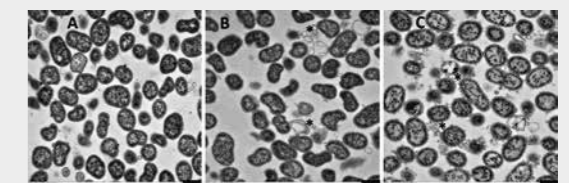
Schematic representation of the effects exhibited by vCM on the early wound healing events. The combination between favorable physicochemical properties and positive effects of the vCM on the cellular behavior ensures successful progression to the next stages of the soft tissue regeneration process.

Laboratory of Oral Cell Biology

We have generated solid evidence for a positive influence of a novel volume-stable biomaterial (vCM), indicated for soft tissue augmentation in periodontal reconstruction surgery, on early wound healing events. Primary human oral fibroblasts, periodontal ligament, and endothelial cells exhibited increased migratory and adhesive properties on vCM. The biomaterial adsorbed several growth factors with great efficiency, stabilized the fibrin clot and maintained an important equilibrium between the coagulation and fibrinolysis as parts of the hemostatic process. Asparuhova MB et al.: *Int J Mol Sci* 2021;22:405. Lin Z et al.: *Front Bioeng Biotechnol* 2021;9:708830. Parisi L et al.: *Clin Oral Investig* 2021;25:2159-73.

Laboratory of Oral Microbiology

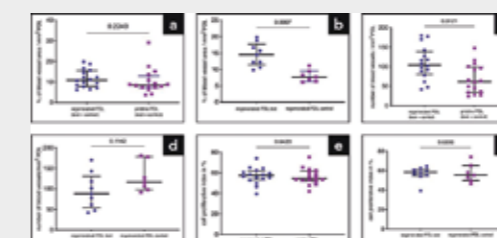
The laboratory evaluates in vitro new treatment options for periodontal and peri-implant therapy. Both standard microbiological methods as well as different biofilm models are used. Besides of antimicrobials, the effect of instrumentation is analyzed in complex models with biofilms and cells (Stähli et al.: *Clin Oral Investig* 2021;25:769-777). Within an Innocoque project (47329.1 INNO-LS), the laboratory screened the potential of formulations to dissolve biofilm. Supported by the Association for Dental Infection Control, the antimicrobial and antibiofilm activity of three different propolis was evaluated (Stähli et al.: *Antibiotics (Basel)* 2021;10:1045).



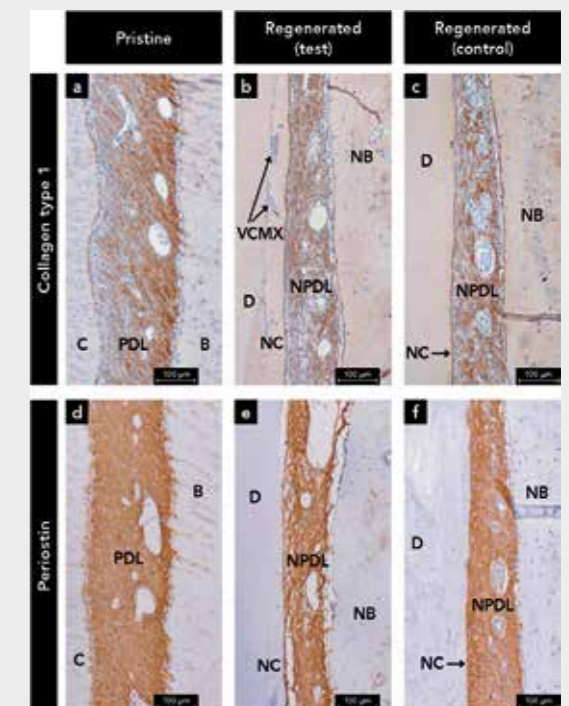
- TEM images of *Porphyromonas gingivalis* without (A) - with 5 min exposure to 25 mg/ml European propolis (B) - Brazilian propolis (C) Bar 500 nm, asterisks show modifications by propolis

Robert K. Schenk Laboratory of Oral Histology

Our laboratory evaluates the biocompatibility and performance of new biomaterials and techniques used to treat hard and soft tissue deficiencies around teeth and dental implants. One of our highlights was that we demonstrated that a collagenous scaffold supported periodontal regeneration of intrabony defects. In particular, angiogenesis was supported (Fig. 1a–d) and the regenerated periodontal ligament had a cell turnover rate that was as high as that of the pristine one (Fig. 1e–f). Immunohistochemistry for collagen type 1 and periostin showed the reconstitution of the extracellular matrix of the regenerated periodontal ligament (Fig. 2) (Imber et al.: *Int J Mol Sci* 2021;22:10915).



Histomorphometrical assessment of blood vessels and cell proliferation

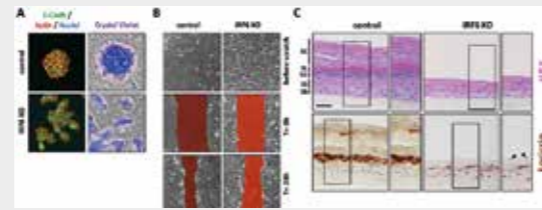


Immunohistochemistry for collagen type 1 and periostin

Laboratory for Oral Molecular Biology

Variants within the Interferon Regulatory 6 gene (IRF6) are associated with Cleft Lip/Palate cases. IRF6 regulates the proliferation/differentiation balance in keratinocytes and is involved in murine embryonic wound healing. Since a fraction of CLP patients undergoing corrective cleft surgery experience wound healing complications, IRF6 represents an interesting candidate gene linking these two processes. To elucidate IRF6 function in postnatal human keratinocytes, we used N/TERT-1 and OKF6/TERT-2 cells and ablated it by CRISPR/Cas9. We show that IRF6 is required for proper cell colony formation and keratinocyte migration. Additionally, we report that IRF6 is indispensable for proper skin homeostasis as assessed by an irregular staining pattern for the late skin differentiation marker Loricrin and not properly formed skin layers in the absence of IRF6 using 3D skin models. Our data expand the knowledge on IRF6 in human postnatal keratinocytes and help to better understand IRF6-related pathologies.

Girousi E, Muerner L, Parisi L, Rihs S, von Gunten S, Katsaros C, Degen M: *Front Cell Dev Biol* 2021; Sep 30.



A) IRF6 ablation results in irregular morphologies of keratinocyte colonies. Green: E-Cadherin; Red: actin; blue: nuclei. B) Scratch assays show a delay of in vitro wound closure in the absence of IRF6 (IRF6 KO) compared to control keratinocytes after 24 hours. Red: cell-free area (scratch). C) H&E staining (top) and Loricrin staining (bottom) of 3D-organotypic skin cultures using control (left) and IRF6 KO keratinocytes (right). Note that the skin homeostasis is impaired in the absence of IRF6 with aberrant nuclei in the stratum corneum (arrowheads). SB: Stratum Basale; SS: Stratum Spinosum; SG: Stratum Granulosum; SL: Stratum Lucidum; SC: Stratum Corneum. Close-ups are indicated and shown to the right. Original publication: Lack of IRF6 disrupts human epithelial homeostasis by altering colony morphology, migration pattern, and differentiation potential of keratinocytes.

Oral Surgery & Implant Dentistry – clinical

6 mm dental implants have become a safe treatment option for patients with reduced bone height in order to avoid complex vertical bone augmentation procedures. To assess the long-term effectiveness of 6 mm implants, patients underwent a clinical-radiographic follow-up examination after 4.5- 18.2 years in function. The present study demonstrated survival and success rates of 93.2% and 89.2% for 6 mm implants. A factor leading to higher implant failure was smoking, whereas modulating factors increasing annual marginal bone loss included implants placed in the maxilla and implants with a diameter of 4.1 mm compared to 4.8 mm. This research helps to specify indications in the field of minimal invasive surgical interventions by the use of 6 mm implants and carefully selected patients in clinical and daily practice.

Raabe C, Monje A, Abou-Ayash S, Buser D, von Arx Th, Chappuis V. Long-term effectiveness of 6 mm micro-rough implants in various indications: A 4.6- to 18.2-year retrospective study. *Clin Oral Implants Res.* 2021 Aug;32(8):1008-1018. doi: 10.1111/clr.13795.

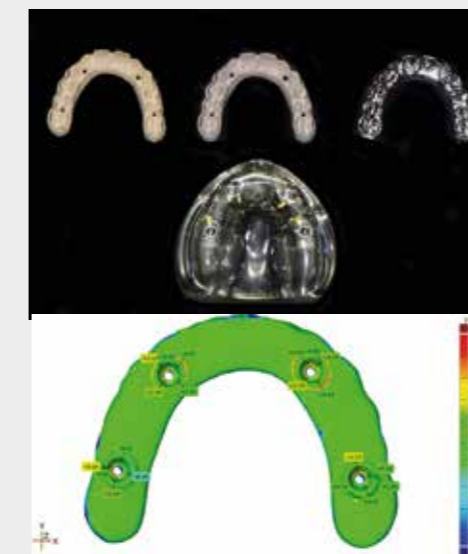


FDI Follow-up (y)

Prosthodontics & Implant Dentistry - laboratory

Our laboratory performs studies on the accuracy of CAD-CAM technologies in obtaining passively fitting prosthesis frameworks made of recently introduced dental materials. This study has shown that the fit of complete-arch implant-supported high-performance polymer frameworks was comparable to that of commonly used titanium frameworks, when these frameworks were milled by using a 5-axis CAD-CAM milling machine. We are currently investigating the mechanical properties of these polymers to understand their potential long-term behaviour intraorally.

Abou-Ayash S, Schimmel M, Özcan M, Özcelik B, Brägger U, Yilmaz B. *J Dent* 2021;113:103784.

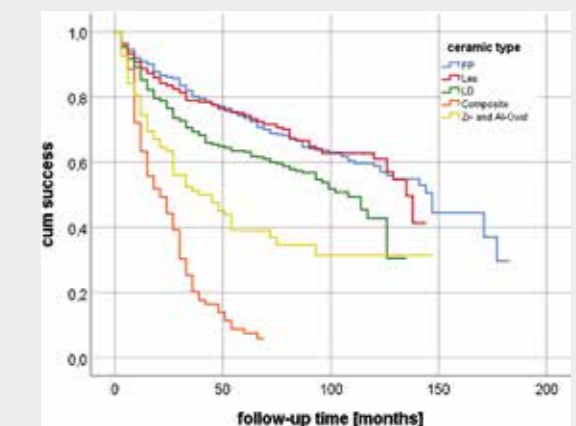


The frameworks tested and the 3D analysis performed by using an industrial-grade software

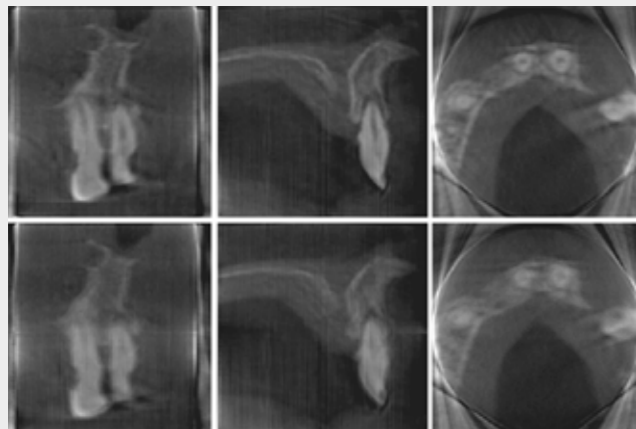
Restorative Dentistry - clinical

In this prospective multi-center, practice-based cohort study rather high annual failure rates were observed for all-ceramic crowns after up to 15 years. Furthermore, operative factors, such as 'restorative material', 'adhesive technique', 'use of an oxygen-blocking gel' or 'use of an EVA instrument', but no patient- or tooth-level factors were significantly associated with failure.

Wierichs RJ, Kramer EJ, Reiss B, Schwendicke F, Krois J, Meyer-Lueckel H, Wolf TG. *Dent Mater* 2021;37:1273-1282.



Kaplan-Meier curve for all-ceramic crowns according to the factor ceramic material



Original (manufacturer) reconstruction (lower images) versus motion corrected (upper images) reconstruction using the proposed method, in a first version [1]

Oral Diagnostic Science

In this interdisciplinary project methods are being developed and evaluated to correct CBCT-data suffering from patient-motion-induced quality issues. Using the projection data of CBCT-machines that are used for 3D-reconstruction and a global sharpness metric an iterative reconstruction technique is developed to enhance such compromised data. The method will particularly consider independent motion of the mandible in relation to the remaining skull. Our approach applies automated 3D segmentation of the mandible image in the CBCT-data by means of artificial intelligence (AI). The solution relies on minimizing a global error metric in an iterative fashion in fitting the six motion parameters for both skull and mandible to the input (projection) data.

Funding: German Research Foundation (DFG), 2021 -2023; CHU-1496/7-1; Niebler S, Schoemer E, Tjaden H, Schwanecke U, Schulze R: Projection-based improvement of 3D reconstructions from motion-impaired dental Cone-beam CT data; *Med Phys* 2020; 46:4470-4480.

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 TRU

Profile

- Teaching students of medicine, dental medicine, pharmacy, biomedicine and biology as well as graduate students at the Graduate School for Cellulare and Biomedical Sciences (GCB)
- 8 research groups in experimental and clinical pathology focus on translational and basic research in cancer, immunology and inflammation.
- External Partners: ARTORG, UniBern; Bern Center for Precision Medicine; Div. of Hematology, University Hospital, Zurich; Institute of Immunobiology, Cantonal Hospital St. Gallen; 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, University of Basel; Roche Pharma Research & Early Development F. Hoffmann-La Roche Ltd., Basel; 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; Brigham Young University, Provo UT, USA

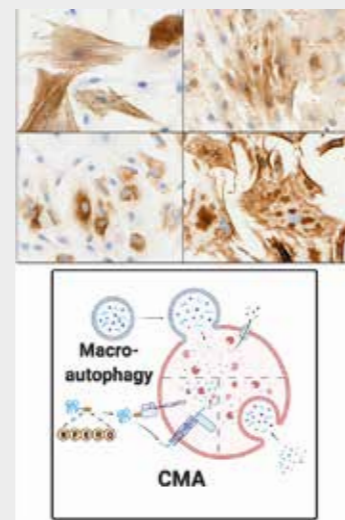
Grants

- Swiss National Science Foundation (9)
- Rising Tide Foundation
- Uniscientia Stiftung
- Swiss Cancer Research/Swiss Cancer League (5)
- Wilhelm Sander Stiftung
- Swiss Lung League
- Helmut Horton-Stiftung

Highlights

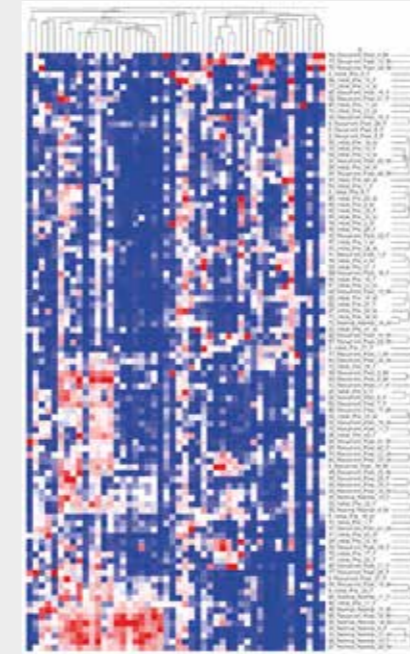
Unravel the functions of autophagy in breast cancer motility

Metastasis formation accounts for the majority of deaths from breast cancer, making it imperative to better understand the mechanisms driving the metastatic cascade in order to develop therapeutic interventions to target it. We earlier discovered an oncogenic splice variant of a transcription factor and named it DMTF1 β . We now show that DMTF1 β promotes invasion and tumor-initiating capacity of breast cancer cells by activating autophagy. It has also been shown that inhibition of autophagy can have undesirable effects in some cancer types and induce epithelial to mesenchymal transition (EMT), one of the early steps of metastasis. Our aim is to identify breast cancer subtypes or cellular conditions in which autophagy inhibition will decrease migration, and those in which the inhibition of autophagy will promote invasiveness.



Cancer-associated fibroblast from breast cancer patient

Molecular Characterization of Recurrent Glioblastoma

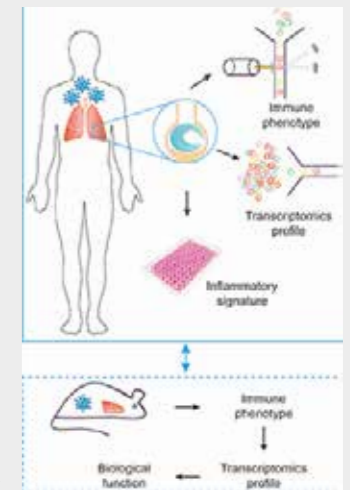


Glioblastoma (GBM) is the most heterogeneous and aggressive primary brain tumors, and represents a particular challenge of therapeutic intervention. In a single-center retrospective study of 43 matched initial and post-therapeutic GBM cases with exceptionally long recurrence period, we performed whole exome sequencing in combination with mRNA and microRNA expression profiling with the aim to identify processes altered in recurrent GBM. Seven mRNAs coding for proteins implicated in Epithelial to Mesenchymal Transition (EMT) and 13 miRNAs implicated in Tumor Necrosis Factor (TNF) and Wnt signaling pathways were significantly dysregulated. To the best of our knowledge, this is the largest cohort of recurrent GBM with long-term resection intervals, that has been analyzed by multi-omics approaches. In future, this approach may help for the development of new personalized medicine. This project is currently supported by the Swiss National Science Foundation.

Heat map analysis of recurrent glioblastoma

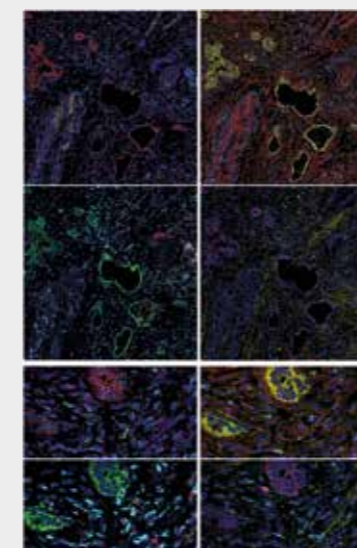
Investigation of the local immune system regulation in COVID-19

The mechanisms leading to severe inflammatory lung disease in some COVID-19 patients are unknown. In this project, we will analyze the cells in the lung lavage of these patients and compare these findings with results from collaborators working on a mouse model of COVID-19. We hope so to reveal targets for COVID-19 therapy.



Graphical abstract

Highly multiplex, spatially resolved immunophenotyping of PDAC for biomarker discovery



The tumor immune microenvironment in pancreatic ductal adenocarcinoma (PDAC) is diverse, comprising various cell types that may either enhance or attenuate tumor immunity and disease progression, as well as response to therapies. It is therefore essential to dissect the immunological landscape in human PDAC tissues and to assess the correlation of various cell subsets and tumor-derived immunosuppressive factors to patient survival and other clinical parameters. Utilizing a novel approach to perform spatially resolved multiplex immunohistochemistry, we intend to delineate the phenotypes of tumor-infiltrating immune subpopulations in exquisite detail. Integrating these findings with transcriptomic data and tumor genotype signatures will allow us to unravel the mechanistic and prognostic relevance of certain immune markers in PDAC.

25-plex imaging mass cytometry (IMC) image of a human PDAC tissue section shown in four images with 6 markers each. Overview (top), zoom (bottom)

Institute of Forensic Medicine (IRM)

Murtenstrasse 26, 3008 Bern
www.irm.unibe.ch



Prof. Christian Jackowski, Director
 Prof. Wolfgang Weinmann, Deputy Director, Forensic Toxicology and Chemistry
 Prof. Michael Liebrecht, Forensic Psychiatry Services
 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
 PD Dr. Wolf-Dieter Zech, Forensic Medicine and Imaging (DL)
 Dr. Martin Zieger, Forensic Molecular Biology (F&L)

Profile

- **Research:** Each of the seven 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 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; Department of Psychiatry, Psychotherapy and Psychosomatics, Psychiatric Hospital, University of Zürich; 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_195382/1)

Highlights

New building

The year 2021 was dominated by the activities around the moving of all IRM departments into the new building at Murtenstreet 26. After a long preparation phase we finally started moving the first employees from our former main building at Bühlstreet 20 by the end of August. Over the following time period of roughly 6 weeks one department after the other made its way to Murtenstreet without any relevant interruption of our services. By mid of October all departments have finally moved into their new facilities and were operative at Murtenstreet 26. Since then the IRM is re-united under one roof again and the former huge logistic efforts to run the institute distributed over several locations in Bern are history.



Front view Murtenstrasse 24-28



Ballistic laboratory

Besides some teething troubles the new building provides a modern infrastructure and the working conditions have improved massively. The new building also hosts a couple of rather specific installations for use in forensic case work, e.g. a ballistic laboratory. Here, shooting incidents can be reconstructed and ballistic experiments can be performed. Every single shot is documented by high speed cameras. On the 28th of September the Swiss Television (SRF) broadcasted its prime time new show "Schweiz Aktuell" live out of our new facilities.

On the 31st of August 2021 the official opening ceremony was celebrated. Bern's senior civil servants Christine Häslar and Christoph Neuhaus as well as the University's Rector Prof. Christian Leumann attended the ceremony and collected first impressions of the new building and its installations.



Opening ceremony



Library and meeting zone



From left to right: Marco Milella and Zita Laffranchi (IRM Bern), Stefania Zingale and Alice Paladin (EURAC Bozen) during data collection and sampling.

"Celts" up & down the Alps: Origin and Mobility patterns on both sides of the Alps during the Late Iron Age (4th -1st century BCE) (CELT.U.D.ALPS)

This 3-years research project emerges from the ongoing collaboration between the Department of Physical Anthropology (IRM Bern) and the Institute for Mummy Studies (EURAC Research, Bozen, Italy). The aims of the project are a) to reconstruct the genetic history and variation of the "Celtic" groups inhabiting the Swiss and Northern Italian territories between the 4th-1st centuries BCE, and b) estimate the degree of mobility characterizing these populations. The applied methods include the analysis of stable isotopes and aDNA from human skeletal remains and the quantitative comparison of these data with paleodemographic and archaeological information.

Principle investigator: Dr. Marco Milella, Anthropologie, Institut für Rechtsmedizin, Universität Bern, Dr. Albert Zink, director of the Institute for Mummy Studies, EURAC-Research, Bozen, Italy

Foundation: Schweizerischer Nationalfond (Projekt-Nr. 10531FL_197103 / 1)
 Grant: CHF 1'029'718.-

Institute of Primary Health Care (BIHAM)

Mittelstrasse, 43, 3012, Bern
www.biham.unibe.ch



Prof. Nicolas Rodondi, Director
Dr. Baris Gencer, Deputy Director
Dr. Patricia Chocano, Ageing
Prof. Reto Auer, Substance Use
Prof. Alice Panchaud, Pharmacy Primary Care
Prof. Sven Streit, Interprofessional Primary Care
Dr. Cinzia Del Giovane, Methodology and Biostatistics



Dr. Roman Hari, Teaching
Dr. Manuel Blum, Research Career Development
PD Dr. Martin Feller, Research Coordination
Dr. Elisavet Moutzouri, Research Coordination

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 and strengthen the development of primary care
- 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, Italian Cochrane Centre, University of Modena and Reggio Emilia, Modena; Division of Pharmacoepidemiology and Pharmacoeconomics, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, USA

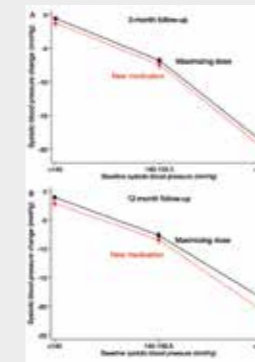
Grants

- Swiss National Science Foundation (eight ongoing projects)
- IICSTs STREAM– Discontinuing Statins in Multimorbid Older Adults without Cardiovascular Disease – a Randomized Non-Inferiority Clinical Trial ESTxENDS – Swiss Cancer Research, Tobacco Prevention Found
- OPERAM – European Union's HORIZON 2020 & Long Term (SNF)
- CONSIGN - Study on impact of COVID-19 infection and medicines in pregnancy
- Safety monitoring of COVID-19 vaccines in the EU (EMA/2017/09/PE) BAG – COVI-Preg CONSIGN- Study on impact of COVID-19 infection and medicines in pregnancy
- Kollegium für Hausarztmedizin, „Starthilfegeld“ (four ongoing projects) and Young Talents in Clinical Research Program
- Swiss Heart Foundation (two ongoing grants)

Highlights

Levothyroxine (LT4) does not prevent depressive symptoms in elderly persons with subclinical hypothyroidism

In this ancillary study of the TRUST-randomized controlled trial including 427 elderly with subclinical hypothyroidism, we found no statistically significant benefit regarding the Geriatric Depression Score (GDS) after 12 months of LT4 therapy as compared to placebo. Results were robust across relevant subgroups. These results do not provide evidence in favor of levothyroxine therapy in older persons with subclinical hypothyroidism to reduce the risk of developing depressive symptoms.
Wildisen et al., JAMA Network Open, 2021.

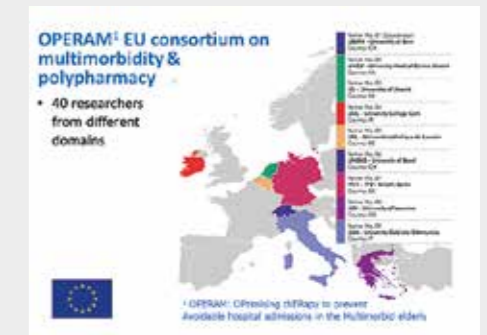


How to intensify hypertension treatment?

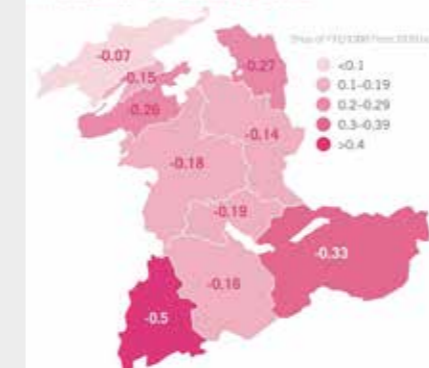
We emulated a trial in >178,000 older adults with systolic blood pressure (SBP) ≥ 130 mmHg despite antihypertensives and compared two intensification strategies: 1) adding a new drug; 2) increasing dose of existing ones. Adding a new drug was associated with a larger SBP reduction at 1 year (-1.1, 95%CI -1.6;-0.6mmHg), but treatment was less frequently maintained. Increasing dose might be a more sustainable strategy in older adults, but future trials should confirm our findings.
Aubert et al., Ann Intern Med, 2021.

Optimizing therapy in multimorbid older adults reduces inappropriate drug prescribing without detriment to patient outcomes

Inappropriate drug prescribing is highly prevalent in older people with multimorbidity and polypharmacy, and has been associated with negative health outcomes, including excess drug related hospital admissions. The multinational cluster-randomized trial OPERAM used a structured pharmacotherapy optimization, performed jointly by a doctor and a pharmacist with the support of a clinical decision software system in multimorbid older adults. Inappropriate prescribing was present in 86% of intervention participants, and while the intervention did not significantly affect drug related hospital admissions, the intervention reduced inappropriate prescribing (mean of 2.7 drugs/patient) without causing detriment to the patient outcomes.
Blum et al., BMJ, 2021.



Difference in full-time equivalent PCPs / 1000 inhabitants from 2020 to 2025



Primary Care Physician (PCP) Workforce 2020 to 2025 in the Canton of Bern

In this cross-sectional study, we aimed to understand the workforce of PCPs in 2020 and 2025 in the Canton of Bern. We used paper/online surveys and telephone interviews for none responders. Eventually, 95% of all PCPs in Bern participated. We found 972 PCPs with an average workload of 7.5 halfdays/week, 13% already >65 years and 19% origin from outside Switzerland. We calculated the full-time equivalent per 1000 inhabitants to be 0.75 in 2020 and drop by 25% until 2025. 40% of students need to become PCP in Bern to offset this drop.
Stierli et al., Swiss Medical Weekly, 2021.

Omega-3 fatty acids supplementations are associated with an increased risk of atrial fibrillation (AF)

In this analysis of 7 randomized controlled trials (n=81,200), marine omega-3 fatty acid supplementation was associated with a significant increased risk of AF compared with placebo (n=2,905; hazard ratio (HR) 1.25, 95%CI 1.07-1.46). The HR was greater in the trials testing >1g/d (HR 1.49, 95%CI 1.04-2.15) as compared with those testing ≤ 1 g/d. (HR 1.12, 95%CI 1.03-1.22, P for interaction<0.001). The HR for AF increased per 1 gr increase of omega-3 fatty acids dosage (HR 1.11, 95%CI 1.06-1.15). The potential risk of developing AF should be discussed with the patients when prescribing marine omega-3 supplementation, especially when prescribing a higher dosage.
Gencer et al., Circulation, 2021.

Institute of Complementary and Integrative Medicine (IKIM)

Inselspital, Freiburgstrasse 46, 3010 Bern; von Roll Campus, Fabrikstrasse 8, 3012 Bern
www.ikim.unibe.ch



Prof. Ursula Wolf
Director

PD Dr. Stephan Baumgartner
Deputy Director

Dr. Julia Viereggs

Profile

- Teaching students of medicine, dental medicine and pharmacology
- 3 research groups
- 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 as used in Complementary and Integrative Medicine
- External partners: University Hospital Inselspital, Dep. of Radiooncology, 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; Arcim Institute/Filderklinik Filderstadt, Germany, Bischoff Textil AG, St. Gallen, University of Geneva; ISS Inc.y Champaign, IL, USA; Multidisciplinary Laboratory of Phamaceutical Sciences, Faculty of Pharmacy, Federal University of Rio de Janeiro, Brazil; University of Pécs, Hungary

Grants

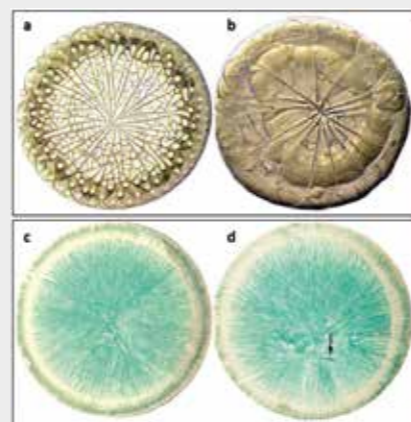
- Swiss National Science Foundation: SNF Bridge Discovery 20B2-1_180983 / 1
- Swiss Cancer League, Cancer Research Switzerland: 4259-08-2017
- Software AG Foundation (SE-P14441)
- Swiss State Secretariate for Education, Research, and Innovation / Leading House for the Latin American Region (University of St. Gallen): SMG 1928

Highlights

Diagnostic tests based on pattern formation in drying body fluids – A mapping review

In the present mapping review, diagnostic tests based on pattern formation in desiccating body fluids were collected. The identified diagnostic tests were grouped according to experimental protocols, type of body fluids investigated, and target conditions. The literature search revealed 1603 publications, out of which 141 were included into the review. We identified six different methods and 30 different diagnostic tests. Amongst these tests are well-known procedures such as ferning tests, whereas other tests are less well-established. In the latter group, the most frequently investigated body fluids were serum, saliva, and blood; the most frequently addressed target conditions were cancer, inflammation, and benign tumors. We recommend conducting further systematic reviews and meta-analyses concerning groups of methods addressing the same target condition.

Kokornaczyk MO, Bodrova NB, Baumgartner S Colloids and Surfaces B: Biointerfaces 208 (2021), S. 112092.

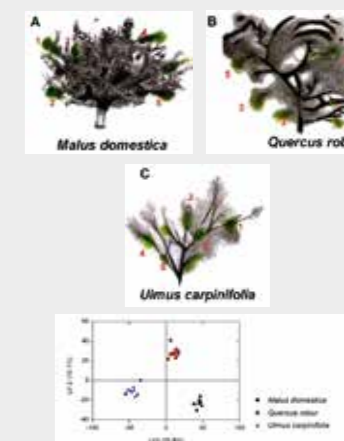


Examples of patterns obtained in diagnostic patterning tests. Desiccated serum droplet of a healthy person (a) and a cancer patient (b); copper-chloride biocrystallization pattern of blood from a healthy person (c) and a cancer patient (d)

Metabolomics by UHPLC-Q-TOF Reveals Host Tree-Dependent Phytochemical Variation in *Viscum album* L.

The in vitro and in vivo effects of *Viscum album* differ according to its host tree. In this study, metabolic profiles of *V. album* ssp. *album* from *Malus domestica* Bork., *Quercus robur* L., and *Ulmus carpinifolia* Gled were compared. Methanolic extracts were analyzed by ultra-performance liquid chromatography, coupled to electrospray quadrupole time-of-flight mass spectrometry. Data were submitted to partial-least square discriminant analysis (PLS-DA). Results showed that the *V. album* samples were clustered into three groups according to the three distinct host trees. Seven compounds with high VIP scores were responsible for this differentiation, amongst others arginine, pipecolic acid or lysine, dimethoxycoumarin, and sinapyl alcohol. The present work highlights the importance of standardized harvest and analytical procedures for the reproducibility of the chemical results of herbal materials.

Jäger T, Holandino C, de Oliveira Melo MN, Peñaloza EMC, Oliveira AP, Garrett R, Glauser G, Grazi M, Ramm H, Urech K, Baumgartner S. *Plants*, 2021.



PLS-DA score plot for first and second latent variables showing the discrimination between *V. album* ssp. *album* from three different host trees

Color-dependent changes in humans during a verbal fluency task under colored light exposure assessed by SPA-fNIRS

We investigated in a randomized cross-over trial how colored light exposure (CLE) and a verbal fluency task (VFT) interact and affect cerebral hemodynamics, oxygenation, and systemic physiology as determined by systemic physiology augmented functional near-infrared spectroscopy (SPA-fNIRS). The subjects' performance depended significantly on the type of VFT and the sex of the subject. Compared to red light, blue evoked stronger responses in cerebral hemodynamics and oxygenation in the visual cortex. Color-dependent changes were seen in the recovery phase of several systemic physiological parameters. This underlines the importance of considering the persistent influence of colored light on brain function, cognition, and systemic physiology in everyday life.

Zohdi H, Egli R, Guthruf D, Scholkmann F, Wolf U. *Sci Rep*. 2021; 11: 9654. Published online 2021 May 6. doi: 10.1038/s41598-021-88059.



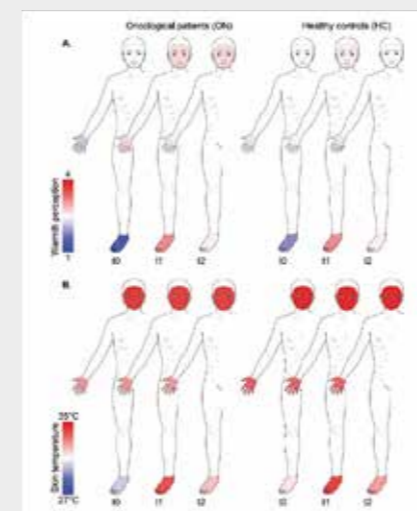
Visualization of the systemic physiology augmented functional near-infrared spectroscopy (SPA-fNIRS) approach developed by IKIM

Increasing Warmth in Oncological Patients: A Randomized Controlled Cross-Over Pilot Trial Examining the Efficacy of Mustard and Ginger Footbaths

We analyzed within a RCT thermogenic effects of footbaths with warm water only and warm water with medicinal powders (*Sinapis nigra* or *Zingiber officinale*) in oncological patients (ON) and healthy controls (HC).

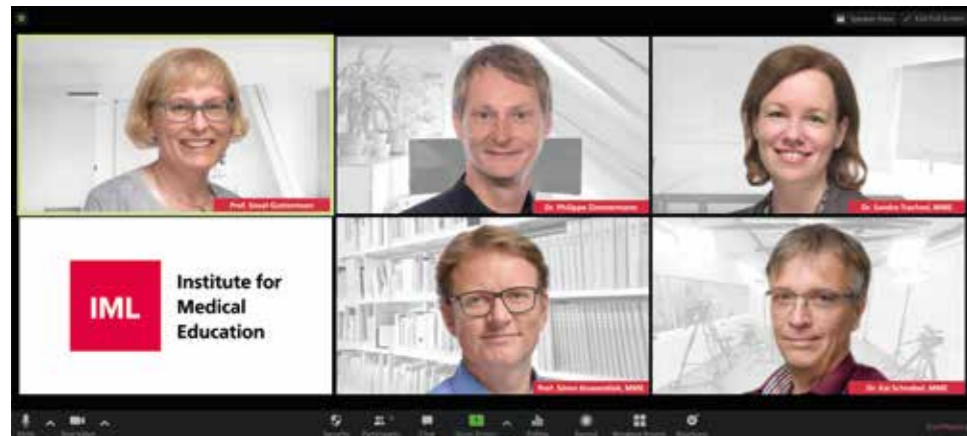
Conclusion: Among adult oncological patients and healthy controls, footbaths with *Sinapis nigra* and *Zingiber officinale* increased warmth perception of the feet longer than with warm water only, but *Sinapis nigra* and *Zingiber officinale* acted differently. The potential impact of regularly administered thermogenic footbaths over extended periods merits further investigation for the recovery of cancer-related sense of cold.

Vagedes J, Kuderer S, Vagedes K, Hiller S, Beissner F, Szóke H, Joos S, Wolf U. *Integr Cancer Ther*; 2021;20:15347354211058449. doi: 10.1177/15347354211058449.



Institute for Medical Education (IML)

Mittelstrasse 43, 3012 Bern
www.iml.unibe.ch/en/iml



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 electronic and online assessment approaches through research, and developing instruments for online assessment; provision of extensive assessment services

Selected Grants

- Digital Learning and Teaching (DLT) (SNF 100019_200811): 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. Tols (LMU München and Leuphana Universität Lüneburg, Germany). PhD candidate: Dr. med. A. Gogollari (IML)
- From threat to challenge (SNF 100019_200831): 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)
- 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
- ERS (European Respiratory Society)/PhD-Grant: «How to improve continuing professional development to foster physician's competencies & patient treatment». PhD Adv.: Prof. S. Huwendiek, PhD candidate S. Ram
- 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 (Pfliegewissenschaften Uni ZH), Prof. S. Guttormsen, IML (Lead project C)
- 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



Excellence in Medical Education

Prof. Sören Huwendiek was the first to be granted membership in our Faculty of Medicine due to excellence in medical education. The election is made by the Faculty Council and is valid for a period of 4 years. This is a great honour for the IML! We congratulate warmly.

Good teaching and research go hand in hand

Educational research provides important building blocks to promote excellence in education. With two new 4 year SNSF projects, we are able to incorporate current themes in teaching and approach them with the necessary care and resources.

<https://tinyurl.com/33m934cc>

Photo: Antonioguillen - stock.adobe.com



Children as simulated patients in practical exams

Use of primary school children as simulated patients in practical exams (OSCE) meets international criteria for good examinations.

<https://tinyurl.com/2p8r4pjh>



10 years of clinical skills exams with Examic EOSCE

As a pioneer in the field of electronic OSCE assessments on tablet computers, the Institute for Medical Education (IML) started supporting clinical examinations with its own software Examic EOSCE 10 years ago.

<https://tinyurl.com/mr2m725w>



Online platform for communication training

Communication is a key skill in healthcare and central to build a good relationship between healthcare professionals and patients. It also contributes to optimal patient care. DocCom.Deutsch (DCD) is an established online learning platform that facilitates the acquisition of communication skills. This year we implemented two new modules into DCD: «Einbindung spiritueller Aspekte in der Patientenkommunikation» [Spirituality] and «Über das Sterben sprechen» [Talking about dying].

<https://tinyurl.com/4v8f9r3r>



Usability & UX: Making complex software easy and intuitive to use

The digital transformation and the pandemic, in particular, has forced us to use a multitude of unfamiliar tools and systems. While every programmer has their own thoughts as to how software is to be used, users might have a very different idea. Our U^x team helps to apply generic concepts to user interfaces and to create software that is easy and intuitive to use.

<https://tinyurl.com/2p8hrc4j>



Clinics at the University Hospital, Inselspital



Department of Anaesthesiology and Pain Medicine
Department of Angiology
Department of Cardiology
Department of Cardiovascular Surgery
Department of Clinical Chemistry
Department of Cranio-Maxillofacial Surgery
Department of Dermatology (DERK)
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
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 and Gynecology
Department of Ophthalmology
Department of Orthopedic Surgery and Traumatology
Department of Osteoporosis
Department of Pediatrics
Department of Pediatric Surgery
Department for Plastic and Hand Surgery
Department for Pulmonary Medicine
Department of Radiation Oncology
Department of Rheumatology, Immunology and Allergology (RIA)
Department of Thoracic Surgery
Department of Urology
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 Fislér
Head of HR

PD Dr. Martin Luginbühl
Chair Spital Tiefenau

Reto Thomann
Head of Nursing

PD Dr. Markus Lüdi
Head of Research

Profile

- 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.
- 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 decision-making in acute care medicine.
- 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.

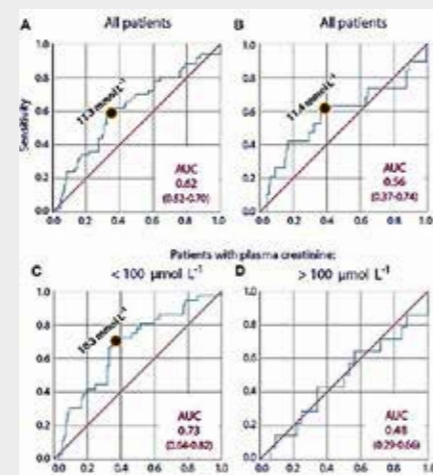
Grants

- Swiss National Science Foundation (SNSF) to Prof. Dr. Patrick Wüthrich
- European Society of Anaesthesiology and Intensive Care ESAIC to PD Dr. Heiko Kaiser
- Innosuisse to PD Dr. Thomas Riva
- Schweizerische Gesellschaft für Intensivmedizin to Dr. Alexander Fuchs and PD Dr. Thomas Riva
- Stiftung BINZ to PD Dr. Jürgen Knapp

Highlights

Preoperative concentrated urine increases the incidence of plasma creatinine elevation after major surgery

A 50% increase in plasma creatinine defines acute kidney injury, a frequent complication after major surgery. Engel et al. investigated the relationship between urine concentration before surgery and the perioperative change in plasma creatinine. They found that high urinary concentration of creatinine before surgery should be considered as a risk factor for postoperative elevation of plasma creatinine. Dominique Engel et al. *Front Med.* 2021.



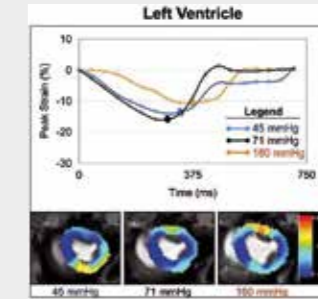
Increasing urinary creatinine concentrations can predict a postoperative increase in plasma creatinine



Front-of-the-neck access to an airway in a pig cadaver.

Cricothyroidotomy competence in anaesthetists assessed in a cadaver model

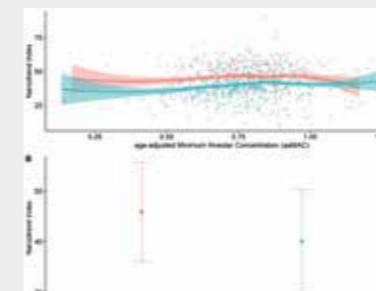
Guidelines recommend cricothyroidotomy for 'cannot intubate, cannot ventilate' situations. While commercial sets have gained widespread use, training of clinicians seems to be key for success. This crossover noninferiority randomised controlled trial investigated whether anaesthetists can successfully perform a surgical cricothyroidotomy using various techniques in a pig cadaver model. Nabecker et al. found that anaesthetists who regularly undergo training are able to accomplish cricothyroidotomy regardless of the equipment used. Sabine Nabecker et al. *Eur J Anaesthesiol.* 2021.



Strain curves and overlays inside and outside the autoregulation zone for the left ventricle

Assessing myocardial function during blood pressure manipulation with cardiovascular MRI

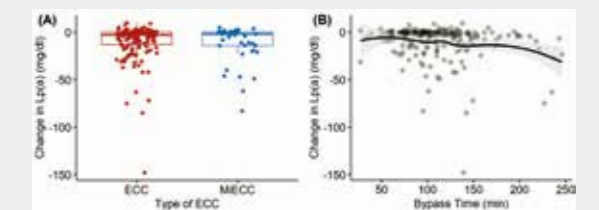
Coronary blood flow is maintained almost constant over a wide range of mean arterial pressures (MAP) through autoregulation. To better understand the impact of changes in left (LV) and right ventricular (RV) function outside of the autoregulation zone (ARZ), Fischer et al. assessed myocardial tissue oxygenation and function with cardiovascular magnetic resonance (CMR) imaging. They found that peak strain is compromised both below the lower limit (LV: $\Delta 1.2 \pm 0.4\%$, RV: $\Delta 4.4 \pm 1.2\%$) and above the upper limit (LV: $\Delta 2.1 \pm 0.4$, RV: $\Delta 5.4 \pm 1.4$) of the ARZ. The data from this animal model can be used clinically to guide individualised blood pressure management. Kady Fischer et al. *Front Cardiovasc Med.* 2021.



Narcotrend Index plotted against age-adjusted MAC in 2 age groups and airwise comparison

MAC and depth of sedation: the paradox of age

Age-adjusted titration of anaesthetics is of critical importance for outcome. Height et al. assessed age dependent minimum alveolar concentration (MAC fraction) and Bispectral index (BIS) values in 909 patients undergoing cardiac surgery with isoflurane anaesthesia and found a linear decrease in end-tidal MAC fraction of 3.2% per age-decade. Unlike to the BIS, mean Narcotrend index values decreased with age at 3.0 index points per age-decade. The authors call to caution that the 'paradox of age' may depend on the sedation monitor. Darren Hight et al. *Eur J Anaesthesiol.* 2021.



Bivariate associations of surgical characteristics with the change in Lp(a) from preoperative to postoperative plasmatc Lp(a)

Lipoprotein(a) and outcomes in cardiac surgery

Altered lipoprotein(a) (Lp(a)) has been shown to be of major importance in cardiovascular disease (CVD), and is an important predictor of morbidity in cardiology and neurology. Heinisch et al. investigated the impact of Lp(a) on outcomes in patients undergoing cardiac surgery. Including 192 patients, they found that increased Lp(a) levels were not associated with increased rates of perioperative stroke or major adverse events in cardiac surgery. Other than for cohorts in neurology and cardiology, elevated Lp(a) might not be a risk factor for perioperative events in cardiac surgery. Paul Philipp Heinisch et al. *Cells.* 2021.

Department of Angiology

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Prof. Iris Baumgartner Head of Department	Prof. Yvonne Döring Head of Research	PD Dr. Marc Schindewolf Senior Consultant	Dr. Ulrike Hügel Senior Consultant	Dr. Alexander Rosenov Senior Consultant	Dr. Benny Wohlfarth Senior Consultant	Györgyi Hamvas Clinical Study Manager
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Profile

- Teaching programs, student lectures and courses (clinical skills), 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: Departments of Angiology from University Hospital Basel & University Hospital Zürich; Cantonal Hospital Luzern; Clinics of Vascular Surgery, Cantonal Hospital St.Gallen; Germany: Institute for Cardiovascular Prevention, University Hospital LMU Munich; West German Morbus Osler Center, University Hospital Essen; Clinic for Vascular and Endovascular Surgery, TUM 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

- Swiss Foundation of Vascular Medicine "Genomic Profiling in Patients with Lower Extremity Peripheral Artery Disease (LEAD)", PD Dr. Marc Schindewolf

Highlights

Updates Angiology

The CoVasc consortium represented by Yvonne Döring and three Co-PIs examines if human cells of the cardiovascular system and the blood brain barrier can be directly infected with SARS-CoV-2 and which consequences this direct infection might have. The project is being conducted as part of the National Research Programme "Covid-19" (NRP78). Corona – [Berner Wissenschaftler nehmen das Virus ins Visier | Der Bund.](#) (German Article)

New cooperation in student training has been established: Students in their practical year at the Technical University of Munich, Faculty of Medicine, will in the future receive permanent training places in angiology and a structured curriculum.

New Journal Club Angiology (Organization Dr. Benny Wohlfarth, Dr. David Köckerling)

Summer School Angiology in Glasshütten (Germany): 7 residents successfully attended. (Next planned for 11/2022)

Admission of Alexandra Tuleja in the PhD Program at the Graduate School for Health Sciences (GHS) in Bern



Photo: Peter Klaunzer (Keystone)

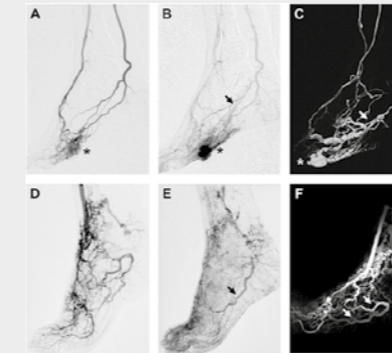
Working with SARS-CoV-2 in the BSL3 laboratory at SITEM Insel.



First Journal Club after resumption: More participants than chairs and a lively discussion after a nice lecture.

Clinical presentation of simple and combined or syndromic arteriovenous malformations

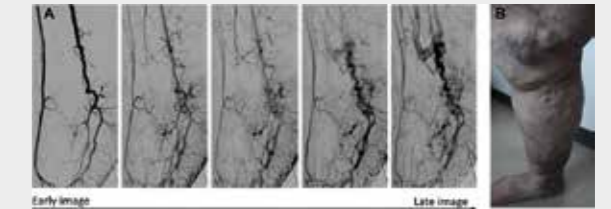
Arteriovenous malformations of the lower extremities (AVMLE) can present as simple or complex combined or syndromic forms (eg, Parkes Weber Syndrome). We aimed to characterize the differences in clinical presentation and natural history of these potentially life- and limb-threatening congenital vascular malformations. [Bernhard et al., JVS 2021.](#)



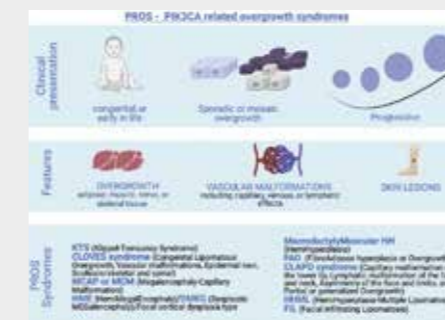
Digital subtraction angiography (DSA) (A/D = early phase; B/E = late phase) and contrast enhanced magnet resonance angiography (C, F) of the foot with a simple arteriovenous malformation (AVM), type IIIB (A-C) in comparison with a syndromic AVM, mixed type II and IV (D-F). *Nidus (simple AVM); -> Venous drainage.

Capillary-venule malformation is a microfistulous variant of arteriovenous malformation

A retrospective clinical analysis of 15 patients with CV-AVM confirmed by a computational flow model enrolled in a prospective database of patients with congenital vascular malformation between January 2008 and May 2018. [Vuillemin et al., JVS 2021.](#)

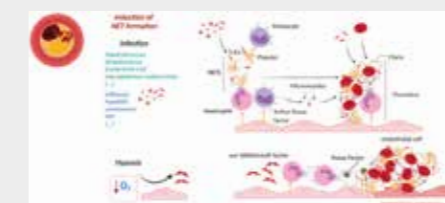


Digital subtraction angiography (DSA) A, DSA of a 58-year-old female patient with late shunting typical for a capillary-venule malformation form of arteriovenous malformations (CV-AVM). B, Clinical presentation, corresponding to the DSA shown in (A) with nonhealing leg ulcers and massive varices of the leg following several varicose vein operations.



A systematic review of the safety and efficacy of currently used treatment modalities in the treatment of patients with PIK3CA-related overgrowth spectrum

PIK3CA (activating mutations of the p110 α subunit of phosphatidylinositol 3-kinases)-related overgrowth spectrums (PROS) include a variety of clinical presentations that are associated with hypertrophy of different parts of the body. We performed a systematic literature review to assess the current treatment options and their efficacy and safety for PROS. [Bernhard, et al., JVS 2021.](#)



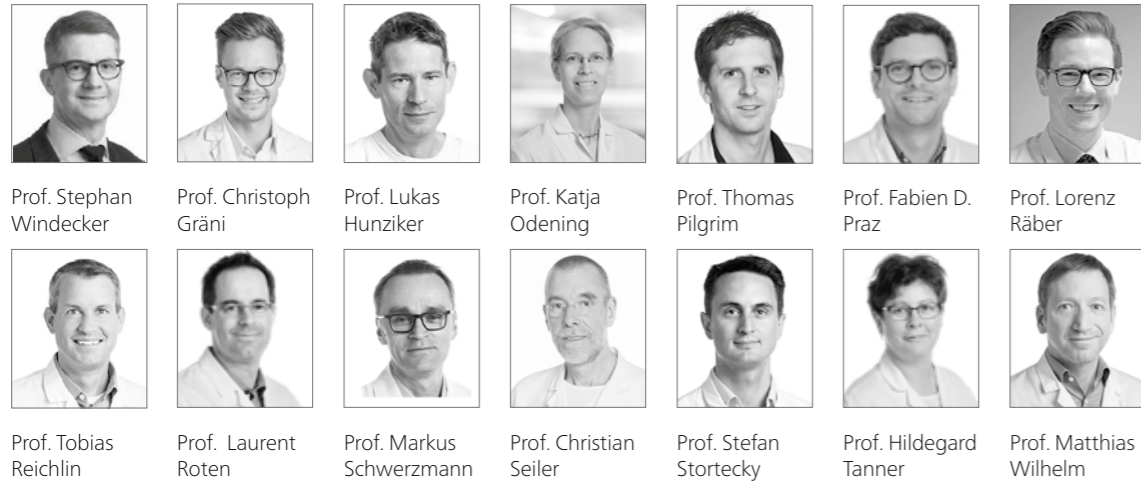
NETs-initiated thrombosis. Pathogens may activate neutrophils to form neutrophil extracellular traps (NETs) which support (immuno) thrombosis.

Neutrophil Extracellular Traps Affecting Cardiovascular Health in Infectious and Inflammatory Diseases

Neutrophil extracellular traps (NETs) are web-like structures of decondensed extracellular chromatin fibers and neutrophil granule proteins released by neutrophils. Understanding the complex role of NETs in bridging infection and chronic inflammation may pave the way for future research on therapeutic targeting of NETs applicable to specific infections and inflammatory disorders. [Thakur et al., Cells 2021.](#)

Department of Cardiology

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Prof. Stephan Windecker, Prof. Christoph Gräni, Prof. Lukas Hunziker, Prof. Katja Odening, Prof. Thomas Pilgrim, Prof. Fabien D. Praz, Prof. Lorenz Räber, Prof. Tobias Reichlin, Prof. Laurent Roten, Prof. Markus Schwerzmann, Prof. Christian Seiler, Prof. Stefan Stortecy, Prof. Hildegard Tanner, Prof. Matthias Wilhelm

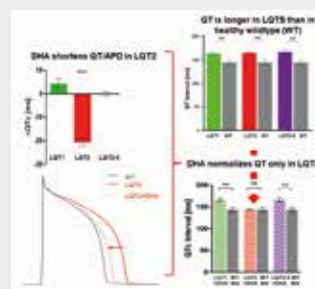
Profile

- 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 diseases, thromboembolic diseases, valvular heart diseases and heart failure; pharmacological therapies in the field of antithrombotic and lipid lowering drugs; studies for the treatment of electrophysiological disorders and in the field of preventive cardiology as well as clinical trials of medicinal products.
- Translational research (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

- NIH RO1 Grant "Polyunsaturated fatty acids as anti-arrhythmic agents" Prof. Larsson (Miami), Prof. Odening
- EJR-RD Grant "Silence LQTS", Prof. Odening, Prof. Wilde (Amsterdam), Prof. Crotti (Milano), Prof. Gepstein (Haifa)
- SNF Grant «Noninvasive anatomical assessment for ruling out hemodynamically relevant coronary artery anomalies – a comparison of coronary-CT to invasive coronary angiography», Prof. Gräni
- 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 trial)» Prof. Wüthrich (Anesthesiology), Prof. Wilhelm
- EU Grant Horizon 2020 CORE MD "Coordinating Research and Evidence for Medical Devices", grant agreement No 965246, Prof. Windecker, Dr Siontis, Prof. Bally (Endocrinology), Prof. Lubbeke (Orthopedics, HUG)

Highlights



Effect of DHA on the QTc-interval from different LQTS subtypes

Genotyp-specific Therapy in Long-QT Syndrom

Long QT syndrome (LQTS) is a genetic cardiac channelopathy predisposing to ventricular arrhythmias and sudden cardiac death. Since current therapies often fail to prevent arrhythmic events in certain LQTS subtypes, new therapeutic strategies are needed. Docosahexaenoic acid (DHA) is a polyunsaturated fatty acid, which enhances the repolarizing IKs current. We investigated the effects of DHA in wild and in different transgenic long QT rabbit models and showed that it could represent a new genotype-specific therapy in LQTS subtypes, in which the alpha- and beta-subunits to IKs are intact - such as LQTS type 2 in which a complete normalization of the QT could be achieved. Castiglione A et al, Europace 2021

Dual Antiplatelet Therapy after PCI in Patients at High Bleeding Risk

The appropriate duration of dual antiplatelet therapy in patients at high risk for bleeding after the implantation of a drug-eluting coronary stent remains unclear. One month after they had undergone implantation of a stent, high bleeding risk patients were randomly assigned to either discontinue dual antiplatelet therapy immediately (abbreviated therapy) or to continue it for at least 2 additional months (standard therapy). One month of dual antiplatelet therapy was non-inferior to the continuation of therapy for at least 2 additional months with regard to the occurrence of net adverse clinical events and major adverse cardiac or cerebral events; abbreviated therapy also resulted in a lower incidence of major or clinically relevant non-major bleeding.

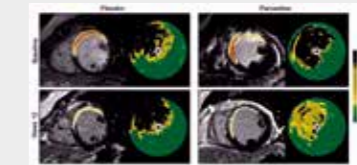


Dual Antiplatelet Therapy after PCI in Patients at High Bleeding Risk.

Valgimigli M et al, NEJM 2021

Effect of Paroxetine-Mediated G-Protein Receptor Kinase 2 Inhibition vs Placebo in Patients With Anterior Myocardial Infarction – A randomized Clinical Trial

Left ventricular remodeling following acute myocardial infarction results in progressive myocardial dysfunction and adversely affects prognosis. This double-blind, placebo-controlled randomized clinical trial was conducted at Bern University Hospital to investigate the efficacy of paroxetine-mediated G-protein-coupled receptor kinase 2 inhibition to mitigate adverse left ventricular remodeling in patients presenting with acute myocardial infarction. Paroxetine did not improve LVEF after myocardial infarction compared with placebo. In patients treated with paroxetine, a reduction of late gadolinium enhancement, a marker for scar formation, was observed. This needs to be investigated in further studies.

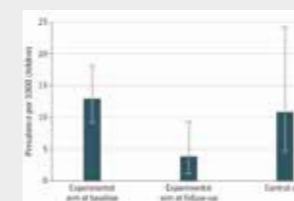


Pilgrim T et al, JAMA Cardiology 2021

Two examples of magnetic resonance imaging with late gadolinium enhancement in the placebo and paroxetine group.

Rheumatic Heart Disease (RHD) in Nepali Children

Echocardiographic screening allows for early detection of subclinical stages of RHD among children in endemic regions. A cluster randomized clinical trial that included students 9 to 16 years of age attending public and private schools in urban and rural areas of the Sunsari district in Nepal has been conducted. In the experimental group, children underwent systematic echocardiographic screening followed by secondary antibiotic prophylaxis in case they had echocardiographic evidence of latent RHD. In the control group, children underwent no echocardiographic screening. Follow-up was performed 4 years after intervention. The results indicated that school-based echocardiographic screening in combination with secondary antibiotic prophylaxis in children with evidence of latent rheumatic heart disease may be an effective strategy to reduce the prevalence of definite or borderline rheumatic heart disease in endemic regions.



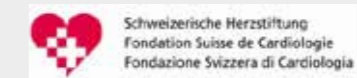
Prevalence of definite and borderline RHD in experimental and control schools.

Karki P et al, JAMA Cardiology, 2021

Impact of periprocedural myocardial infarction on cardiac mortality

One limitation of stent implantation are periprocedural myocardial infarctions (MI), which are often clinically irrelevant. The 4th Universal Definition of Myocardial Infarction (UDMI) has been proposed in most recent guideline documents despite lack of prospective data. The aim of this research was to study the frequency and clinical impact of the 4th UDMI definition as compared to two established definitions (SCAI, ARC-2). In a large consecutive PCI patient cohort from Bern (N=4404) the frequency of periprocedural MI as ascertained by hsTroponin assay was 7-9 times higher when applying the 4th UDMI definition but with limited clinical relevance. This research provides new evidence in support of the established SCAI definition while calling into question the clinical relevance of the guideline endorsed UDMI definition of periprocedural myocardial infarction. Ueki Y et al, JACC, in press, 2021

Prof. Pilgrim has been awarded the SwissHeart Foundation Research Prize 2021 for his outstanding research work on catheter-based heart valve implantation and the control of heart valve disease in developing countries.



Department of Cardiovascular Surgery

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Prof. Alexander Kadner
Head, Center for Congenital Heart Disease, Congenital Cardiac Surgery

Prof. Florian Schönhoff
Consultant Cardiac Surgeon, Aortic Surgery

Dr. Salome Weiss
Research Group Leader

Prof. Sarah Longnus
Research Group Leader

Dr. Paul Libera
Head, Medical Education (Students)

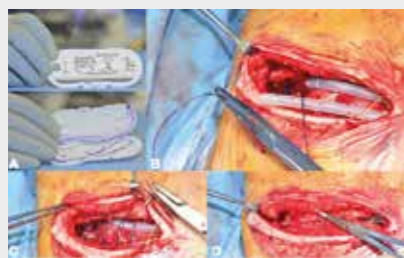
Profile

- Both clinical and preclinical research activities are of paramount importance in the Department of Cardiovascular Surgery. Clinical research is primarily focused on cardiac surgery, aortic surgery and vascular surgery, and can be classified into studies that serve to test clinical devices, which are mostly "industry-sponsored", and "investigator-initiated", which reflect the main areas of expertise of the Department members. One of the main areas of preclinical research includes the identification and development of clinically applicable means to facilitate heart transplantation with donation after circulatory death (DCD). This type of donation has recently been established as a feasible option that provides substantial increases in the number of transplants that can be offered, thereby improving outcomes for patients with severe heart failure
- We are committed to providing a high-quality environment for students at many levels, through medical student teaching with lectures and courses (clinical skills, problem based learning), as well as with the supervision of Master in Medicine and MD dissertation projects. We are also involved in the training of graduate students of the University of Bern, offering lectures and supervising research projects for Master and PhD students. Importantly, we regularly provide research internships for secondary school students participating in Swiss Youth in Science or completing Maturaarbeit projects. All members of the Department are invited to attend weekly interdisciplinary lectures.

Grants

- AARE-TAD (Aortic Aneurysms in 1st degree Relatives from Patients with Thoracic Aortic Disease) study: CHF 42'600; 3Hearts Foundation
- Cardiac graft preservation and evaluation in transplantation with donation after circulatory death: CHF 189'902; MD-PhD Grant, Swiss National Science Foundation (Principal Applicant)
- 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, Swiss National Science Foundation (Principal Applicant)
- EXaCT: EXosomes based Combination Therapy to target multiple signaling within cardioprotective pathways: CHF 318'000; SNF COST Application (Co-Applicant)

Highlights



A: Sternal closure using the STRATAFIX™ PDS (2-0 / CT2) with an anchor design and pattern.
B/C: Sternal closure in running fashion suture technique. D: Fastening and adaptation of the sternal edges for tight closure.

Congenital Heart Surgery

This retrospective study provides an analysis of the suitability and reliability of a novel, absorbable, self-locking, multi-anchor knotless suture with antibacterial technology for sternal closure in pediatric cardiac surgery. We report excellent results regarding the rate of sternal wound infection and improved healing after median sternotomy in pediatric patients.

Heinisch PP, Nucera M, Bartkevics M, Erdoes G, Hutter D, Gloeckler M, Kadner A. Early-experience with a novel suture device for sternal closure in pediatric cardiac surgery. *Ann Thorac Surg.* 2021.

Preclinical Research

Donation after circulatory death (DCD) could improve outcomes for patients with severe heart failure by increasing heart transplantation possibilities; however, clinical protocols require optimization for best graft quality. We reported a novel approach for limiting endothelial damage using tepid, adenosine-lidocaine preservation solution, and demonstrated advantages over the current clinical standard, including improved coronary flow (CF) and reperfusion injury salvage kinase (RISK) signalling. Multiple mechanisms contribute to the improved coronary vasculature preservation with this approach, such as reduced oxidative stress and better maintenance of endothelial integrity. Careful selection of preservation conditions, taking into consideration the pathophysiologic changes that occur with DCD, should help optimize graft quality, and permit the safe expansion of DCD heart transplantation.

Méndez-Carmona N, Wyss RK, Arnold M, Segiser A, Kalbermatter N, Joachimbauer A, Carrel TP, Longnus SL. Effects of graft preservation conditions on coronary endothelium and cardiac functional recovery in a rat model of donation after circulatory death. *J Heart Lung Transplant* 2021.



Improvements associated with tepid, adenosine-lidocaine preservation solution compared to current clinical standard for cardiac DCD graft storage.



Spinal cord ischemia after thoracic-abdominal aneurysm repair: Manual F-waves and NIRS



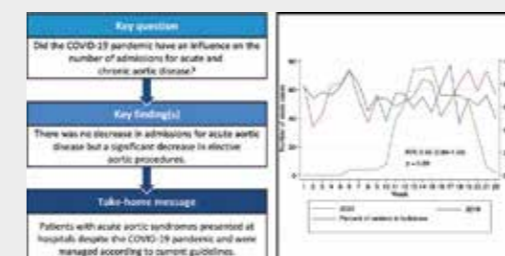
Aortic Surgery

Aortic surgery remains our main clinical research focus. Multicenter, randomized trials are underway to investigate measures to prevent paraplegia in patients undergoing treatment for thoraco-abdominal aneurysms and dissections. Our detailed databases support guideline-relevant publications for the care of patients with heritable disorders of connective tissue with vascular involvement. Our team participates in large, international registries (ARCH Registry, GERAADA, EURAADA); we recently received the first results of a large, international, multi-center study with 22 centers in Europe, the US and Asia investigating reasons for acute aortic dissection in patients below the age of 30 years.

Vascular Surgery

This multicenter study demonstrated that there was no change in the number of acute thoracic and abdominal aortic cases and procedures during the initial wave of the COVID-19 pandemic. The case-load of elective operations and procedures decreased significantly. Further analysis is required to prove that this had no impact on premature mortality.

Czerny M ... Schmidli J ... et al (2021). Impact of the coronavirus disease 2019 (COVID-19) pandemic on the care of patients with acute and chronic aortic conditions. *Eur J Cardiothorac Surg.* 2021.



Specialty courses for medical students

All students of the clinic in the "Blockpraktikum" and "Wahlstudienjahr" programmes (approx. 80 students / year) attend accompanying courses provided by the clinic (bedside teaching, suture techniques, cardiovascular and visceral medicine). In addition, we also offer an introduction to the field of cardiovascular medicine to "PJ students" of the Medical Faculty of the Technical University of Munich within the framework of a special cooperation. These students have the choice of cardiovascular surgery (8 weeks), and since 2021, cardiology and angiology (16 weeks).



Students learn surgical suturing techniques and give case presentations

Department of Clinical Chemistry

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Prof. Martin Fiedler, Director
 Prof. Carlo Largiadè, Deputy Director
 Prof. Ursula Amstutz
 Prof. Alexander Leichte
 Prof. Mojgan Masoodi
 Prof. Michael Nagler
 Prof. Jean-Marc Nuoffer

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).
- 6 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)

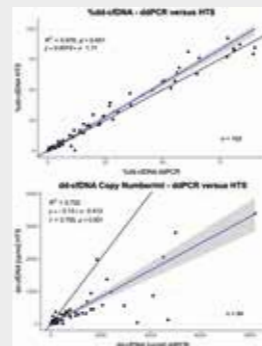
Grants

- Swiss National Science Foundation (grant No. 310030-163205; 310030-188762; 179334; 162691; 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

Quantification of donor-derived cell-free DNA in kidney and liver transplant recipients

Liquid biopsy using quantification of donor-derived cell-free DNA (dd-cfDNA) in body fluids has emerged as a novel approach for allograft monitoring of solid organ transplant recipients. Comparison of droplet digital PCR (ddPCR) and high-throughput sequencing (HTS) using unique molecular identifiers (UMIs) for quantifying dd-cfDNA in urine and plasma of kidney and liver allograft recipients showed a strong linear correlation between both methods for the %dd-cfDNA ($r = 0.98$) and donor copies/ml ($r = 0.76$). The strong correlation indicates the suitability of this novel HTS method for absolute dd-cfDNA quantification (copies/ml) and suggests that the use of a method-independent diagnostic cutoff for %dd-cfDNA may be feasible for minimally invasive graft monitoring. Kung N. et al., Best Poster Award, Annual Assembly of the Swiss Society of Clinical Chemistry 2021



Swiss BioRef – a tool for generating reference values

While personalized medicine is making great progress in many areas, reference values in laboratory medicine are far less individualized. As part of the Swiss Personalized Health Network (SPHN), we have built an interactive tool with a

graphical user interface that allows reference values to be specified not only by age and gender, but also by different disease entities and cohorts. For this purpose, Swiss BioRef offers a choice of different calculation methods for reference ranges and an accreditation conforming reporting. The functional prototype is currently ported to the BioMedIT infrastructure and extended by secure multiparty computation with homomorphic encryption within the MedCo project, forming a model implementation for a future international reference value tool. <https://sphn.ch/seminar-training/swiss-bioref/>

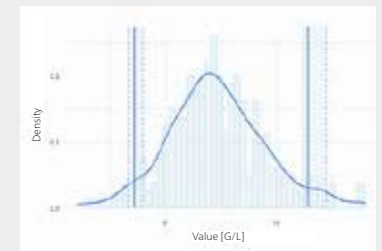
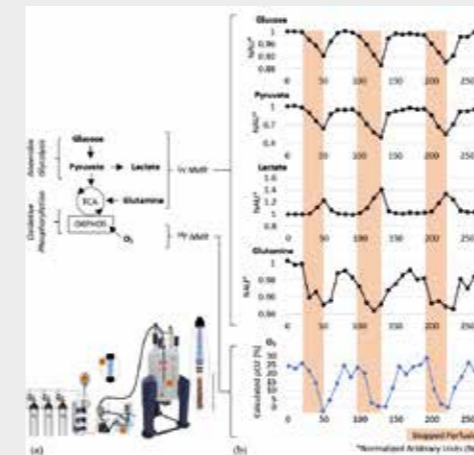


Figure 1: Swiss BioRef graphical user interface (GUI): Personalized reference ranges for leukocytes in a subgroup of patients with diabetes mellitus type 2



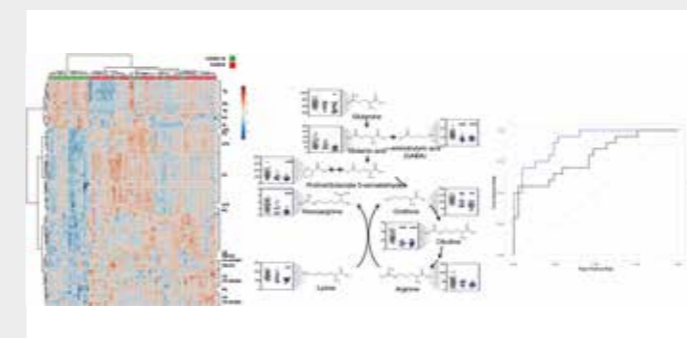
Hertig D, et al, Analyst. 2021 Jul 7;146(13):4326-4339. doi: 10.1039/d1an00041a.

Live monitoring of cellular metabolism and mitochondrial respiration in 3D cell culture system using NMR spectroscopy

Because of the interplay between mitochondrial respiration (aerobic ATP Production) and cellular metabolism (metabolome), the simultaneous monitoring of both cellular processes is essential for the understanding of biological processes in mitochondrial medicine. In this paper we show the feasibility to measure alternately and in real-time mitochondrial respiration and metabolic data combining a commercially available flow tube system with a standard 5 mm NMR probe. We describe in detail a reproducible collagen based 3D culture system for fibroblasts and a bioreactor setup. Using high cell densities of 5–20 million we demonstrate the viability of the cells and describe the effect of the flow rate and cell density on the metabolic activity. Importantly we show the needed sensitivity to detect substrate degradation rates of major mitochondrial fuel pathways and ability to measure rapid O₂ and lactate changes as surrogate marker of oxidative phosphorylation and anaerobic glycolysis.

Metabolic Phenotyping in COVID-19 Patients led to Identification of Disturbed Lipid and Amino Acid metabolic Pathways

We performed a cross-sectional study comparing metabolic signature of hospitalized patients with severe SARS-CoV-2 infection and matched hospitalized control patients without SARS-CoV-2. We identified a distinct metabolic pattern that clearly discriminates COVID-19 and other patients. While several circulating amino acids and related metabolites were reduced in COVID-19 patients; lipids including ceramides, sphingolipids and fatty acids were significantly elevated in COVID-19 patients. Tryptophan metabolism, arginine biosynthesis, sphingolipids and glutamine metabolism were among the top pathways impacted by SARS-CoV-2 infection. GABA plasma levels <0.214 μmol/L (AUC= 0.93) was the best predictive marker for COVID-19 patients and predictive power of GABA significantly exceeded IL-6. Our findings define metabolic alterations in SARS-CoV-2-infected individuals and shed light on pathophysiological processes that contribute to COVID-19 with potential diagnostic and therapeutic indications.



Masoodi, M. et al., Disturbed Lipid and Amino Acid Metabolisms in COVID-19 patients. Journal of Molecular Medicine, 2021 (in press).

Department of Cranio-Maxillofacial Surgery

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Prof. Benoît Schaller Director and Chief Physician	Prof. Tateyuki Iizuka Senior Consultant	Prof. Nikola Saulacic Head of Research Group	Dr. John-Patrik Burkhard Consultant	Dr. Sherin Khalil Resident	Inga Grigaitiene Laboratory Bone Biology	Thuy-Tran Nguyen Laboratory Bone Biology	Prof. Niklaus Lang Senior Scientific Consultant
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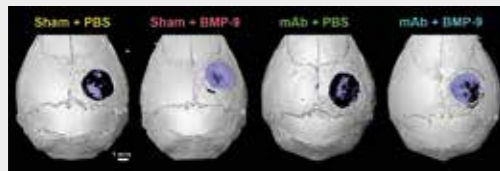
Profile

- 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
- 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; Bone Biology & Orthopaedic Research, Department for BioMedical Research (DBMR), University of Bern, Bern, Switzerland; International Bone Research Association (IBRA), Basel, Switzerland; Geistlich Pharma, Wolhusen, Switzerland; Division of Bone Diseases, Department of Internal Medicine Specialties, Geneva University Hospital and Faculty of Medicine, Geneva, Switzerland; Musculoskeletal Research Unit (MSRU), Department of Molecular Mechanisms of Disease (DMMD), Vetsuisse Faculty, University of Zurich

Grants

- Swiss National Science Foundation Synergia Grant (No. 180367 / 1)
- Swiss National Science Foundation (No. 31003A_182350/1)
- Clinical Research Grant Maxillofacial Surgery, International Bone Research Association/IBRA
- Geistlich Pharma AG (Biodegradable Granulates), Wolhusen, Switzerland
- AO CMF Start-up Grant (AOCMFS)

Highlights



Reconstructed micro-computed tomography images of new bone formed in defects treated with collagen membrane combined with rhBMP-9 after systemic mAb treatment. The light-blue colour indicates new bone in the volume of interest in each group.

Bone Biology Laboratory Osteoinductive potential of recombinant BMP-9

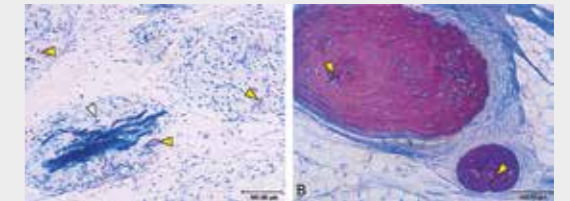
Recombinant human bone morphogenetic protein 9 (rhBMP-9) treatment may be an option to accelerate bone regeneration in a model of antibody-mediated antiresorptive therapy. A monoclonal anti-murine receptor activator of nuclear factor-kappa B ligand (RANKL) antibody (mAb) was used to create a model. rhBMP-9 combined with collagen membrane implanted in bone defects demonstrated substantial osteopromotive potential, with significantly greater new bone volume than control PBS-membranes in both sham and mAb-treated groups. Bone marrow cells isolated from both sham and mAb-treated groups induced a greater osteogenic potential upon stimulation with rhBMP-9.

Collagen-based materials

Collagen-based matrices (CM) have been introduced in medicine and dentistry because of their biocompatibility and capability of promoting wound healing. Cross-linking of CM (Cl_CM) has been developed for the improvement and lower shrinkage rate of non-cross-linked CM (nCl_CM). When compared to nCl_CM, the Cl_CM induced significantly greater total tissue volume in the middle area of the defects, concomitant with a thicker connective tissues regeneration compared to the empty controls. New bone was formed without distinctive borders to the CM. The remnants of collagen fibers with immune cells, including macrophages and giant cells, were occasionally observed. The mineralization of CM (mCM) may further contribute to new bone formation and density. The presence of bone formation around HA particles in mCM suggests a shift from M1 macrophages to tissue regeneration (M2 macrophages). mCM may be used as a scaffold in bone regeneration procedures, without the need of a membrane coverage.



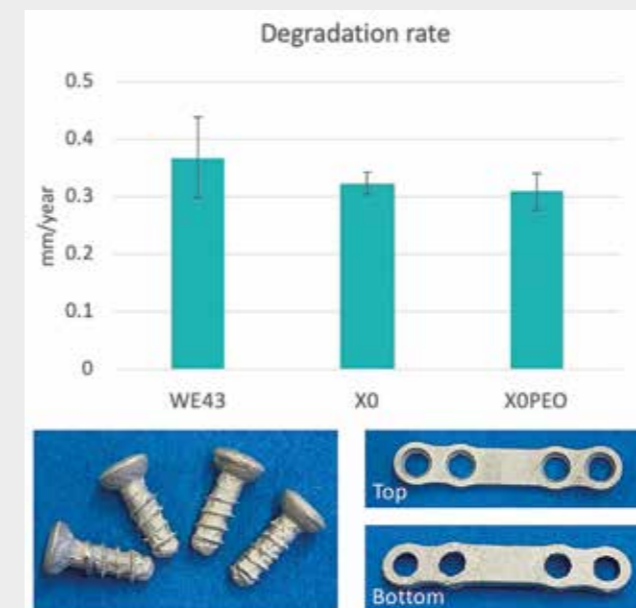
Histological view of the bone defect (sagittal plane). Overview and magnified view of the merged bone labelling (0 week; labelled with calcein, green, 6 weeks; tetracycline, light blue, 12 weeks; alizarin, red)



Observation of residual materials in mCM (A); Residual collagen fibers (white arrowheads) and, hydroxyapatite particles (yellow arrowheads) (B); Residual hydroxyapatite particles surrounded by new bone (yellow arrowheads, bar = 100µm)

In vivo comparison of ultrahigh-purified lean Mg alloys and rare-earth-containing Mg WE43

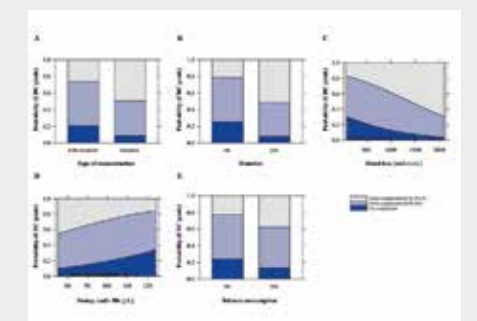
The first part of the in vivo Sinergia project (ETH Zurich/ University of Zurich/University of Bern) was started 2021. This study evaluated different resorbable plate/screw systems in 6 adult sheep and showed very similar degradation rates for magnesium alloy WE43 and uncoated ultrahigh-purified lean Mg alloys (XO). Furthermore, it was demonstrated that a plasma electrolytic oxidation coating surface treatment (XOPEO) led to a better osteointegration, although the volume loss after 8 weeks was similar to the uncoated groups. It is expected that this better bone-implant interface will lead to an improved biomechanical response during fracture healing. This is part of current and future research work.



Implants after 8 weeks in vivo. Degradation products chemically removed.

Perioperative predictors of surgical and medical complications in microvascular free tissue transfer in head and neck reconstructions

In collaboration with the research group led by Prof. Wüthrich, we are investigating the perioperative management of patients undergoing ablative surgery with microvascular tissue transfer in the head and neck region of major surgery with the aim of providing optimal treatment with high patient safety as well as facilitating postoperative recovery by developing guidelines for optimal perioperative care and minimizing postoperative complications in high-risk patients.



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 disease
- Investigation of the skin-specific cytokine interleukin 9 (IL-9) and its role in skin inflammation
- Translational and precision medicine studies in cutaneous T cell lymphoma
- Study of the autoimmune response and the molecular events leading to skin blistering in pemphigus
- A comprehensive systems biology approach to stem cell-mediated skin homeostasis implicating genetic, epigenetic, transcriptional, biochemical and biophysical circuits
- Bioelectricity to enhance wound healing and skin homeostasis
- Impact of epithelial barrier dysfunction on type 2 inflammation
- Characterize clinical and immunopathological features of oral lichenoid diseases
- Clinical trials with biologics and targeted therapies for atopic dermatitis, psoriasis, hidradenitis suppurativa and melanoma, urticarial, and prurigo nodularis
- External partners: Institute for Research in Biomedicine, Bellinzona; Huashan Hospital, Fudan University, Shanghai China; Department of Immunology, University Hospital Zurich, Zurich; C.H.U. Henri Mondor, Paris, France; University Hospital, Düsseldorf, Germany; Universitätsklinikum Marburg, Germany; Institute of Molecular Systems Biology, ETH, Zurich; Centro Studi GISED, Bergamo, Italy; Lübeck Institute for Experimental Dermatology, University of Lübeck; Institute for Biomedical Techniques, Department of Information Technology and Electrical Engineering, ETH Zürich; Department for Neonatology, University Hospital Zürich, University of Zurich; Division Metabolism, University Children's Hospital Zurich; Department of Dermatology and Cutaneous Biology, Thomas Jefferson University, Philadelphia, Pennsylvania, USA

Grants

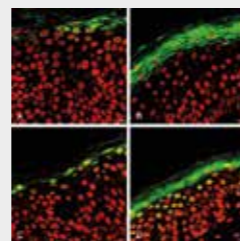
- Ruth & Arthur Scherbath Foundation: Role of PPAR- γ + Th2 cells in allergic skin inflammation. CHF 50'000; 2021-2022
- Swiss National Science Foundation (SNSF) Project grant: Unraveling the role of IL-9 in human skin inflammation; CHF: 700'000; 2020–2024
- SNSF Sinergia grant: Unravel Principles of Self-organization in Injured Tissue", CHF 2'943'631, 2021-2024
- Stiftung für Naturwissenschaftliche und Technische Forschung
- VCCI Foundation to Advance Medical and Translational Research, CHF 264'603
- Private Donation R. Bolliger, CHF 384'000

Highlights

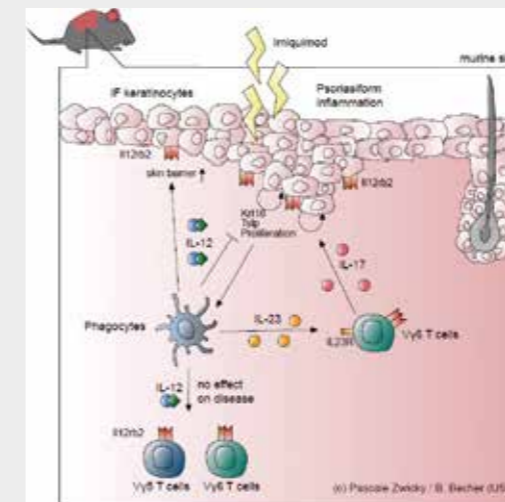
Dupilumab improves epidermal barrier in atopic dermatitis

Dupilumab is the first biologic approved for the therapy of atopic dermatitis (AD). In the skin, dupilumab significantly reduces the inflammatory cell infiltration and cytokine expression including IL-13, and restores the epidermal barrier. Our results provide further evidence that blocking the IL-4/IL-13 receptor breaks the vicious cycle of T helper 2-driven inflammation and barrier dysfunction in the skin, resulting in a significant improvement of AD clinical signs signs and symptoms.

Rohner MH et al. Allergy 2021 Apr;76(4):1268-127.



Filaggrin expression in AD skin before and after dupilumab therapy (A, B) compared to non-lesional (C) and healthy (D) skin



Model roles of IL-12 and IL-23 in psoriasis

IL-12 has a protective role in skin inflammation

Interleukin-12 (IL-12) and IL-23 are cytokines of immune cells which have been known for their pro-inflammatory effects in psoriasis. Accordingly, drugs that block both IL-12 and IL-23 are effective in psoriasis. However, newer drugs that selectively block IL-23 appear to have a stronger efficacy.

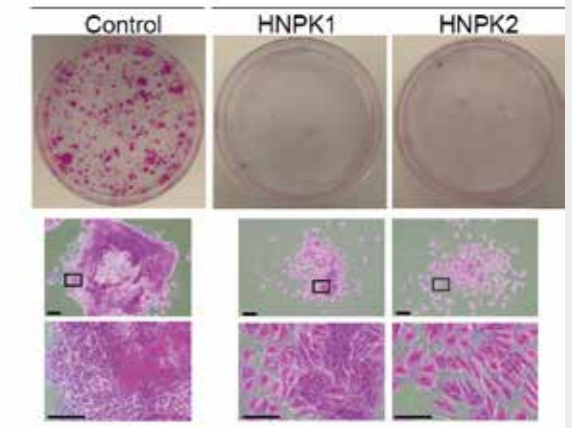
In animal models, not only immune cells but also the keratinocytes recognize IL-12. The latter protects from excessive cell proliferation with epidermal hyperplasia, a characteristic of psoriasis. Thus, the cytokine IL-12 has a protective rather than an inflammatory effect.

In humans, tissue samples obtained from patients under combined IL-12/-23 blockade have been compared with those under IL-23 only blockade. The results show that the protective effect of IL-12 against excessive keratinocyte proliferation is observed in patients receiving selective IL-23 inhibitors, but not IL-12/-23 inhibitors. Together, these data show that IL-23 is responsible for the inflammation and excessive cell proliferation in the skin of psoriasis patients. These studies provide better insight into the mechanisms underlying the clinical observation that IL-23 blockade is more effective than both IL-12 and IL-23 inhibition in management of psoriasis.

P. Zwicky et al. IL-12 regulates type 3 immunity through interfollicular keratinocytes in psoriasis-form inflammation

Science Immunology 2021 Oct 22;6(64):eabg9012.

Colony Forming Units / Stem Cell Units



Colony forming efficiency assay reveals poor stem cell growth (rhodamine stain) in cultured keratinocytes isolated from two dogs with inherited parakeratosis (HNPk)

Genetic and epigenetic control of epidermal stem cells

The understanding of epigenetic networks in stem cell homeostasis represents a cornerstone of interceptive medical treatments in personalized cancer medicine. Studies in Labrador retriever dogs with inherited parakeratosis (HNPk) due to loss of SUV39H2 function identified this epigenetic enzyme as a hallmark in stem cell maintenance in skin. While loss of SUV39H2 function led to stem cell exhaustion, its overexpression correlated with cancer development in animal models and humans. Our data identify SUV39H2 and potentially also SUV39H1 as major gatekeepers in the delicate balance of progenitor fate conversion through H3K9me3 rate-limiting road blocks in basal layer keratinocytes. Balmer P et al. J Cell Biol. 2021 Apr 5;220(4):e201908178.

Department of Diabetes, Endocrinology, Nutritional Medicine and Metabolism (UDEM)

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Prof. Christoph Stettler Prof. Lia Bally Prof. Markus Laimer Prof. Maria Balmer Prof. Zeno Stanga Prof. Regula Everts PD Dr. Michel Hochuli



PD Dr. Roman Trepp Prof. Lilian Witthauer

Profile

- Eight research groups covering the areas of Diabetes Technology, Metabolic Science and Modelling, Food Science, Artificial Intelligence/Data Science, 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: ETH Zürich, Universität Bern, ETH Lausanne, CHUV, Universität Basel, Hochschule St. Gallen, CSEM Neuchâtel, Universities of Cambridge, Manchester, Swansea (UK), Lyon, Rotterdam, Padova, Cologne, Graz, Toronto, Duke, Yale, Berkeley

Grants

- SNSF Sinergia Program (PI Prof. C. Stettler), SNSF Eccellenza Grant (PI Prof. L. Bally), SNSF Eccellenza Professorial Fellowship (PI Prof. M. Balmer)
- InnoSuisse Projects 43273 and 46917 (PI Prof. C. Stettler)
- Swiss Heart Foundation (PI Prof. L. Bally)

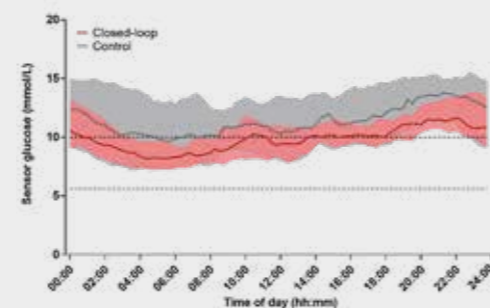
Further Funding Sources:

Swiss Diabetes Foundation, Dexcom Inc. ISS, Nestlé Health Science ISS, Swiss National Kidney Foundation, Helmut Horten Foundation, Scherbarth Foundation, Swiss Diabetes Foundation, Vontobel Foundation, Novonordisk ISS, Boehringer Ingelheim ISS, Bangerter Foundation, Nutricia ISS, Foundation Rolf Gaillard, Swiss Foundation for Nutrition Research Foundation, Helmut Horten Foundation, Swiss Diabetes Foundation, Vontobel Foundation, Novonordisk ISS, Boehringer Ingelheim ISS, Bangerter Foundation, Nutricia ISS, Foundation Rolf Gaillard, Swiss Foundation for Nutrition Research

Highlights

Fully closed-loop insulin delivery in dialysis

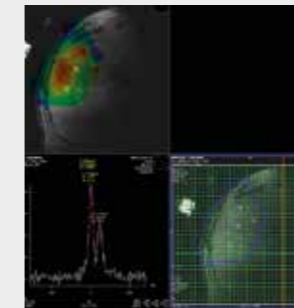
In a joint investigation (paper published in Nature Medicine) with the University of Cambridge UK, we showed that an artificial pancreas system rapidly and significantly improves blood glucose control (including a reduction in the risk of hypoglycemia) in patients with diabetes who require dialysis. This project is part of an overarching research track of UDEM together with local, national and international partners in the field of fully and hybrid loop insulin delivery.



Closed-loop insulin delivery in dialysis

Deuterium Metabolic Imaging for real-time dynamic mapping of human metabolism

Using the ultra-high field 7 Tesla MR scanner and magnetic resonance spectroscopy (MRS), we follow in real-time the uptake and metabolism of labelled glucose in the liver after oral ingestion. This approach allows us to address the differences in hepatic glucose metabolism in populations with altered kinetics of insulin (patients with type 1 diabetes) or glucose-absorption (patients after gastric bypass surgery) compared to matched healthy controls. Acquired knowledge will shed the light on a key player in glucose homeostasis, and the potential utility of Deuterium Metabolic Imaging in the prevention, diagnosis and treatment of metabolic diseases.



The acquisition of DMI data is performed as a 3D MR spectroscopic imaging study, whereby each spatial location is characterized by a deuterium spectral signature. Quantification of the deuterium spectra at each spatial location by spectral fitting leads the metabolic maps for individual metabolic substrates (glucose) and downstream products

Real cars detect hypoglycaemia

The overall goal of the HEADWIND sinergia project is the design and evaluation of a non-invasive in-vehicle hypoglycemia warning system. Using machine learning on data generated in a driving simulator and in a real car setting, we show that hypoglycemia is detected based on driving and gaze behavior. This represents a novel approach to improve traffic safety in individuals with diabetes. Of note, the induction of hypoglycemia in a real car during driving represents a world first. Our findings were presented at various conferences (i.e. 81th Scientific Sessions of the American Diabetes Association, International Conference for Advanced Technologies & Treatments for Diabetes, etc). The project is led by UDEM in close collaboration with the ETH Zurich, University of St. Gallen, LMU München and FAU Nürnberg, and is part of a larger overarching research track of UDEM to develop alternative methods to detect hypoglycemia.



hypoglycaemia warning system



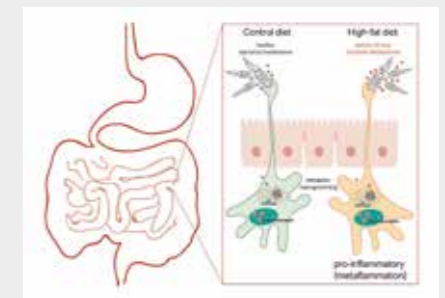
Personalised diet coaching using automatically collected digital receipts from loyalty cards (Diet Coach Project)

Nutrition in a digital world

Digitalization plays an increasingly important role in the field of nutrition, and UDEM integrates entirely novel approaches in several research projects: The Diet Coach 2.0 project in collaboration with the ETH Zürich and Hochschule St. Gallen is a citizen science approach based on large-scale digital grocery receipt data, enabling digital phenotyping, and analyzing nutritional decision making, thereby aiming at novel ways to improve personalized diet coaching. In a collaborative project with the Diabetes Center Berne (DCB) within sitem-insel, UDEM is involved in the development and evaluation of a novel software (Qarbs) for automatic food assessment. The project has already led to the foundation of a start-up company (Carbvis), and Qarbs has been certified as a class 1 medical device by SwissMedic.

Animal to human translation: nutritional modulation of the microbiome, metabolism and immune response

Obesity and diabetes are characterized by a chronic low-grade inflammatory state linking metabolism with altered immune functionality. Gut microbiota and gut peptides are fundamentally involved in this process, but the exact mechanisms are incompletely understood. UDEM clinical and basic researchers study the intersection between gut microbiota metabolites, gut peptides and immune cell metabolism in the pathophysiology of metabolic disorders such as diabetes and obesity. We work with animal and human disease models and develop mass-spectrometric assays for gut peptide profiling (e.g. PP-fold family, Clin Chemistry 09/2021).



Nutrition and microbiota as modulators of immunometabolism

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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:**
MR-physicists and imaging experts support the Translational Imaging Center (TIC) at the sitem-insel in MR methodology and explore new indications for UHF MRI in CNS disorders (as e.g. structural epilepsies, neuroimmunological and vascular disorders).

Grants

- Horizon 2020 INSPIRE MED (Marie Skłodowska-Curie grant 813120).
- NIH Grant 1R01NS1007513-01A1
- SINERGIA CRSII5_180365
- SPHN Driver Project IMAGINE
- SNF grants 170060, 182569, 190817 195801, 189136, 160107, 325230
- Innosuisse 43087.1 IP-LS
- SISF Grants (UHF MRT: Gluco-CEST, Deuterium Imaging, Neuroinfection, Intracranial stenoses, Aneurysms)
- SWISS Heart (Covid 19, posterior circulation stroke, intracranial stenosis)
- SWIFT Direct NCT03192332

Highlights

SWIFT Direct

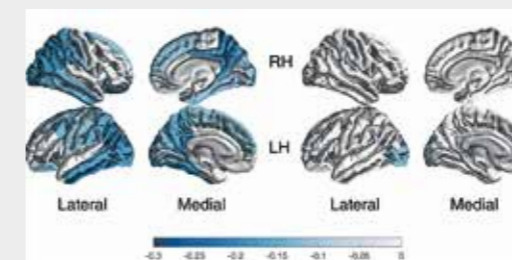
This RCT has been conducted at 48 sites in Europe and Canada by the Neuroradiology and Neurology. The trial enrolled 408 patients in 48 sites to assess the efficacy of intravenous thrombolysis prior to mechanical thrombectomy in anterior circulation stroke. The preliminary results have been presented at the European Stroke Organization Congress and World stroke Organization Meeting in 2021.



A randomized controlled stroke trial

NIH-funded ENIGMA Parkinson's Initiative: A Global Initiative for Parkinson's Disease

To empower the global study of PD, Neuroradiology Bern participates as a subawarded site in the NIH funded largest and most highly powered neuroimaging investigation of Parkinson's disease that is pooling data from 15 cohorts worldwide. The study uses advanced neuroimaging metrics to identify factors that impact disease severity and progression, supporting the development of personalized treatments. The study design offers the first large-scale opportunity to test the generalizability of PD brain biomarkers in a coordinated initiative across multiple PD research centers worldwide.



Cortical imaging signatures in PD patients correlated to severity of PD in an international cohort of 2357 patients and 1182 controls

A platform for integrated neuroscience

The data platform has been selected as funded project within the call "Strategische Forschungsförderung" of the medical faculty.

To overcome problems that are inherent to large scale data analytics, we are complementing existing networking activities by establishing a highly curated, domain-wide neurospecific platform for deep phenotyping in clinical and experimental neuroscience.

The project shall accelerate the evaluation of diagnostic and predictive criteria, monitoring of disease outcomes and research on previously unrecognized markers of disease in stroke, neuroimmunology, sleep medicine and epilepsy and investigate novel biomarkers and therapeutically targetable mechanisms in neuromedicine.



To see the video, place your camera here

Department of Diagnostic, Interventional and Pediatric Radiology (DIPR)

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Prof. Johannes Heverhagen, Director
Prof. Hendrik v. Tengg-Koblogk, Deputy Director
Prof. Adrian Huber, Senior Physician
Prof. Alexander Pöllinger, Senior Physician
Prof. Martin Maurer, Senior Physician
Dr. Verena Obmann, Senior Physician
Dr. Florian Schmaranzer, Senior Resident
Dr.phil.nat. Nico Ruprecht

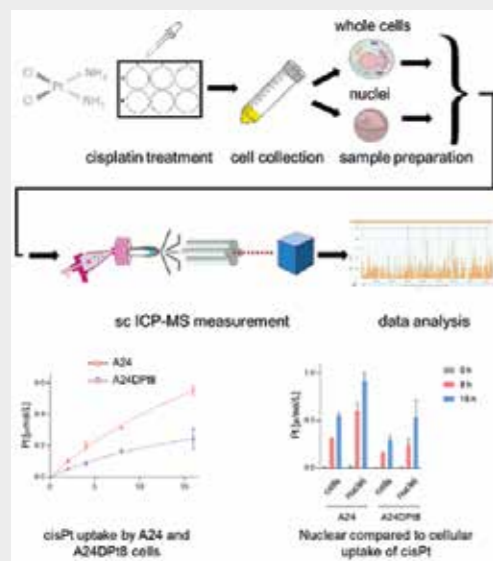
Profile

- teaching medical students, biomedical engineering students, FaGes, and radiographers
- currently performing 14 self-initiated studies, 18 cooperation-studies, and supporting ca.160 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/CHUC 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;

Grants

- SNSF Grant, Project funding: «Intracranial hemodynamics with 4D-Flow Magnetic Resonance Imaging at 7 Tesla (PD Dr. Bernd Jung)
- Best Scientific Poster Award 2021 – summa cum laude, (SGR-SSR), Dr. Sylvia Nyilas
- Junior Fellowship, Society for Pediatric Pneumology, Dr. Sylvia Nyilas
- SNSF Eccellenza Grant: “Quantitative magnetic resonance biopsies: Exploiting signal asymmetries for next generation noninvasive biomarker mapping”, Prof. Dr. Jessica Bastiaansen
- SNSF Grant Project funding (Grant No. 320030_205091) “Automatic and patient-specific 3D MRI models of hip cartilage and labrum – a morphological and biochemical analysis for improved surgical decision making” to Dr. med. Univ. Florian Schmaranzer, MD PhD

Highlights

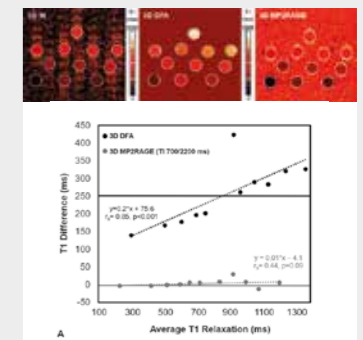


Beyond Single-Cell Analysis of Metallodrugs by ICP-MS: Targeting Cellular Substructures

Single cell-ICP-MS allows precise and accurate quantification of metallodrugs. Using this method, it was shown that cisPt uptake by A24 cells is greater than that of cisPt-resistant A24DP8 cells. The cisPt concentration in the nuclei is also significantly higher than in the cytoplasm. This is true for both cell lines. These findings pave the way for future applications investigating the potency and efficacy of novel metallodrugs developed for cancer treatment. Experimental Radiology carried out this work in collaboration with Prof. Peter Broekmann (DCBP, University of Bern) Audrey et al. Int J Mol Sci 2021 Aug 31; 22(17):9468. doi: 10.3390/ijms22179468.

Magnetization-prepared 2 Rapid Gradient-Echo (MP2RAGE) MRI for B1 Insensitive 3D T1 Mapping of Hip Cartilage: An Experimental and Clinical Validation

The purpose of this study was to compare 3D MP2RAGE MRI with 3D dual-flip angle technique using two-dimensional inversion recovery T1 mapping as a standard of reference for hip cartilage T1 mapping in phantoms, healthy volunteers, and participants with hip pain. Compared with dual-flip-angle techniques, 3D MP2RAGE MRI enabled more accurate T1 mapping of hip cartilage, was less affected by B1 inhomogeneities, and showed high accuracy against a T1 reference in participants with hip pain. This paves way for widespread applications in clinical practice using this technique for a fast, volumetric and accurate T1 mapping. Schmaranzer et al. Radiology. 2021 Apr;299(1):150-158.



Bland Altman of the phantom study showing no T1 bias for MP2RAGE but considerable T1 bias for the 3D dual-flip angle technique compared to T1 reference.

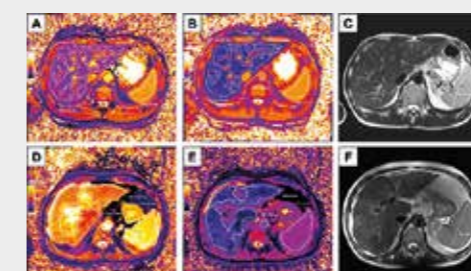


Fig. 1. Measurements of T1 relaxation time and spleen size. Upper row: 36-year-old male patient without chronic liver disease and no clinically significant portal hypertension (noCSPH), lower row: 60-year-old female patient with alcoholic liver cirrhosis (Child B) and decompensated clinically significant portal hypertension (dCSPH).

Noninvasive assessment of clinically significant portal hypertension using $\Delta T1$ of the liver and spleen and ECV of the spleen on routine Gd-EOB-DTPA liver MRI

Purpose: To analyze the predictive value of $\Delta T1$ of the liver and spleen as well as the extracellular volume fraction (ECV) of the spleen as noninvasive biomarkers for the determination of clinically significant portal hypertension (CSPH) on routine Gd-EOB-DTPA liver MRI. Conclusion: $\Delta T1$ of the liver and spleen in addition to ECV of the spleen allow for determination of CSPH on routine Gd-EOB-DTPA liver MRI. Catucci D. et al. European Journal of Radiology, Volume 144, 2021, 109958, ISSN 0720-048X, https://doi.org/10.1016/j.ejrad.2021.109958.

AI-multi-omics-based Prognostic Stratification of COVID-19 Patients in Acute and Chronic State

Purpose and research question: To answer the question of how a current AI-based automatic single-class lesion detection algorithm compares to multi-class expert segmentation on a multicenter set of COVID-19 pneumonia CT images. Using automated lung segmentation of various pathological CT findings such as ground-glass opacities, consolidations, pleural effusions etc. a classifier algorithm is fed for assessing clinical severity in COVID-19 patients in the acute phase. Conclusion: Our AI-model demonstrates promising preliminary results in automated multi-class lesion segmentation. The use of multi-class lesion segmentation appears to be superior to single-class lesion segmentation in assessing severity.



Figure 1. Comparing a general- versus a multi-class lesion segmentation for predicting intubation as a proxy for severity assessment in COVID-19 patients.

Optimisation of the utilisation of the MRI scanners using a modern software tool.

By using the software tool “Teamply Usage” (Siemens Healthineers, Erlagen), we were able to analyze the examination durations and changeover times on 2 clinical MRI scanners in detail over a period of 12 months and thereby identify optimisation potential in the organisation of successive types of examinations and the use of different MRI coils. The results make it possible to further improve the utilisation of the MRI scanners in the future, so that more examinations can be offered to patients. Meyl TP, [...], Maurer MH. Software-Based Evaluation of Optimization Potential for Clinical MRI Scanners in Radiology. Rofo. 2021 Oct 22. Epub ahead of print. PMID: 34687027.

Department of Emergency Medicine

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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
- 8 research groups in these three focus areas
- Investigation of research questions with direct relevance to emergency patients
- External partners: 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

Grants

- SNF Projects as lead investigators:
 - Mixed-method evaluation of an online forward triage tool within the COVID-19 pandemic (SNF No. 196615)
 - The digital diagnostician: how information technology affects medical diagnoses (SNF No. 187284)
 - Schweizer Kongress für Telenotfallmedizin und Digital Health (SNF No. 192842)
- SNF Projects as co-investigators:
 - IOW-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)
- 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

Mixed and virtual reality in emergency training

Our tele-emergency medicine group participates in a Horizon 2020 research project with a multidisciplinary consortium of 19 international partners that aims to transform training to better prepare medical first responders (MFR) for stressful and highly complex disaster situations. Innovative mixed reality (MR) technology is used to combine medical simulators with virtual environments and smart scenario control options. The MFR training framework will improve situational awareness, resilience and effective performance.

www.med1stmr.eu



Digital twins to predict disease progression

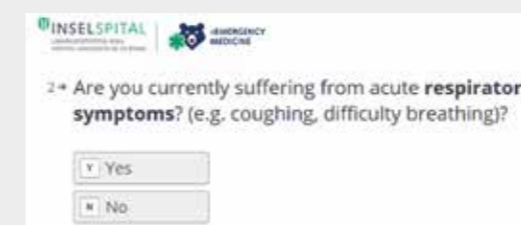
Our department is partner in a European consortium headed by EPFL Lausanne, that proposes the first of its kind digital twin to predict the progression of disease and the need for early intervention in infectious and cardiovascular diseases. A digital twin is a digital representation of an object or process from the real world in the digital world – and more specifically for the case of DIGIPREDICT – of a patient. With this, we introduce cutting-edge technology into emergency medicine for the advancement of patient care.



Online-teaching

Interdisciplinary teaching of emergency medicine

The introduction of the new PROFILES outcome framework mandated a stronger inclusion of emergency medicine into undergraduate education. Together with colleagues from other departments, we implemented an interdisciplinary two-day course covering the first 15 Minutes of frequent emergencies. The highly interactive course was delivered online and was evaluated very well by students and faculty alike.



Coronatest.ch

At the beginning of 2020, many hospitals were overwhelmed with phonecalls, in which people inquired where, when and if to get tested for novel Coronavirus. Within a few days, we implemented the first Swiss online forward triage tool, a website that asked patients simple questions in one of 5 languages and provided a recommendation regarding testing. The tool implemented FOP guidelines and was updated frequently (at times even daily) to account for the changing guidelines and knowledge about the disease.

Department of ENT, Head and Neck Surgery

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Prof. Marco Caversaccio
Chairman



Prof. Roland Giger
Deputy Director



Prof. Martin Kompis
Head of Audiology



Prof. Eberhard Seifert
Head of Phoniatriy



Prof. Georgios Mantokoudis
Head of Cochlea-Implants



PD Dr. Wilhelm Wimmer
Head of Hearing Research Laboratory

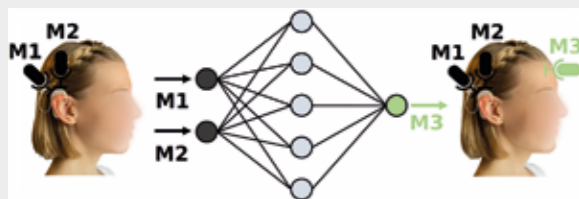
Profile

- Teaching students of medicine and dentists 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, medical image analysis and phoniatics 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 Unit, 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
- Innosuisse Grant, Personalized Tinnitus Relief in Hearing Aids (PASTOR)
- Photography Award for "locations and instruments" at the SNSF Scientific Image Competition 2021

Highlights



Adding a third virtual microphone (M3) can significantly improve filtering out background noises

AI in Hearing Aids

Hearing aid or hearing implant users find it challenging to understand their partner in noisy environments. Researchers from the Hearing Research Laboratory suggest that AI could solve this problem. They trained a neural network to refine a commonly used algorithm. 20 subjects tested the AI-enhanced hearing in cocktail party settings and the speech quality was significantly improved. Patients can therefore benefit, especially in noisy environments.

AI represents an important contribution to the next generation of hearing prostheses, as it has great potential for improving speech understanding, especially in difficult listening situations.

Fischer P. et al., Hearing Research 408 (2021).

Brain stroke diagnosis based on eye movements

In a prospective cross-sectional study, 84 patients with acute vertigo were examined in the emergency department, 56 with a benign cause (vestibular neuritis) and 28 with a stroke. Eye movements (nystagmus) were recorded using a new test method, video-oculography. Patients with vestibular strokes were less able to suppress their spontaneous nystagmus in the light than patients with neuritis. This test was accurate for stroke prediction in patients with an acute vestibular syndrome.

Mantokoudis G. et al., Neurology. 2021.

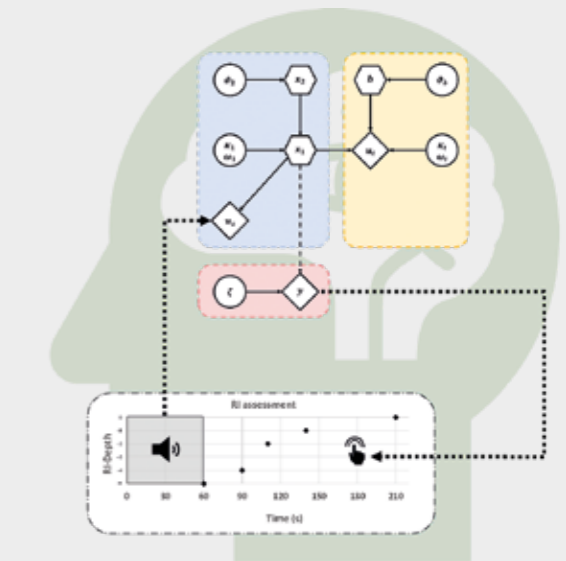


Diagnosing a vertigo patient

Bayesian Brain for Tinnitus

Little is yet known about the mechanisms triggering and controlling tinnitus. To evaluate theoretical hypotheses, the Hearing Research Lab has developed a generative computational model for tinnitus, based on the Bayesian brain concept. The model is able to explain several perceptual tinnitus phenomena that are to date poorly understood. It can be applied for future research and treatment approaches by linking experimental observations with theoretical hypotheses. This is the first experimental setup that effectively allows the input of sound stimuli and plays out a typical tinnitus result.

Hu S. et al., Hearing Research 410 (2021).



Computational tinnitus model

Medical Education at Sitem-Insel

The ENT department and the Institute of Anatomy of the University of Bern successfully conducted the Endoscopic Paranasal Sinus & Skull Base and the Swiss Endoscopic Ear Surgery Course. Live surgeries, anatomical demonstrations, cadaveric dissections and podium presentations by Swiss and international faculty were conducted. The feedback from the course participants was very good and the aim of these courses to provide an excellent, realistic and fruitful learning environment was successfully achieved.



Endoscopic medical training

Department of General Internal Medicine

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Prof. Drahomir Aujesky Director, Chief Physician General Internal Medicine	Prof. Nicolas Rodondi Chief Physician, Head Polyclinic	Dr. Martin Perrig Chief Physician, Head Bedside Wards	Prof. Manuel Haschke Chief Physician, Head Clinical Pharmacology	Prof. Maria Wertli Consultant Physician, Deputy Head Polyclinic	PD Dr. Christine Baumgartner Consultant Physician	PD Dr. Tobias Tritschler Consultant Physician, Deputy Head Bedside Wards
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Profile

- Research focus: Multimorbidity, venous thromboembolism, anticoagulation, variation in care, overtreatment, deprescribing, thyroid diseases, primary care, epidemiology, public health, chronic pain, opioid use, drug metabolism and safety, nicotine dependence, pharmacometrics, machine learning
- 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; Department of Medicine, Ottawa Hospital Research Institute, University of Ottawa, CA; Departments of Primary Care/ Public Health and Internal Medicine, 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; International Network of Venous Thromboembolism Clinical Research Networks (INVENT-VTE)
- Swiss academic partners: Institute of Primary Health Care (BIHAM), University of Bern; Clinical Trials Unit (CTU), University of Bern; Venous thromboembolism network including 23 Swiss university and non-university hospitals; Institute of Biostatistics, Epidemiology, Biostatistics and Prevention, University of Zürich; Department of Health Sciences, Helsana, 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, Hôpitaux Universitaires Genève, Geneva; Swiss Tropical and Public Health Institute, Basel

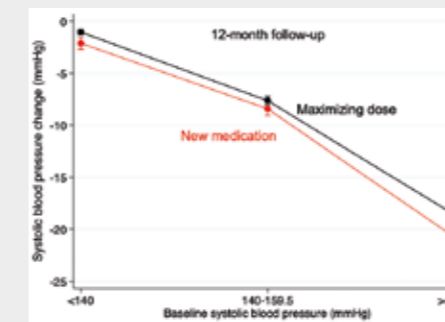
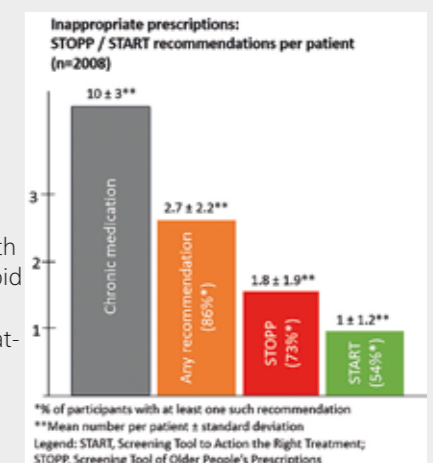
Grants

- Swiss National Science Foundation Investigator Initiated Clinical Trial (IICT) grants no. 193052 and 185616
- Swiss National Science Foundation National Research Program 74 (NFP74) grants no. 167339, 167465, and 167519
- Swiss National Science Foundation grants no. 172676, 179346, 189132, 184042, 201672, and 205067
- OPERAM – European Union's HORIZON 2020 grant agreement 634238
- Novartis Foundation for Medical-Biological Research, Bangerter-Rhyner Foundation, Swiss Society of General Internal Medicine Foundation, Swiss Heart Foundation, 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 Forschungsgrant

Highlights

Optimizing Therapy to Prevent Avoidable Hospital Admissions in Multimorbid Older Adults

Inappropriate drug prescribing is highly prevalent in older people with multimorbidity and polypharmacy, and has been associated with negative health outcomes, including excess drug related hospital admissions. The multinational cluster-randomized trial OPERAM used a structured pharmacotherapy optimization, performed jointly by a doctor and a pharmacist with the support of a clinical decision software system in hospitalized multimorbid older adults. Inappropriate prescribing was present in 86% of intervention participants, and while the intervention did not significantly affect drug related hospital admissions, the intervention reduced inappropriate prescribing without causing detriment to the patient outcomes. Blum MR, et al. BMJ. 2021 Jul 13;374:n1585.



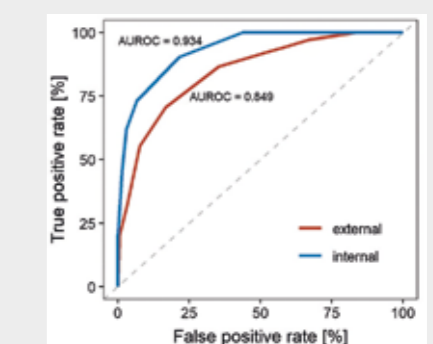
Change in systolic blood pressure between baseline and follow-up, according to intensification approach and baseline systolic blood pressure

Adding a New Medication Versus Maximizing Dose to Intensify Hypertension Treatment in Older Adults

When antihypertensive therapy is not enough to reach the target blood pressure, treatment can be intensified either by increasing the dose of existing medications or by adding a new medication. Since the optimal approach is unclear, we emulated a trial in over 178,000 older US Veterans with a systolic blood pressure ≥ 130 mmHg despite antihypertensive medications. We compared two strategies to intensify treatment: 1) adding a new medication; 2) increasing dose of an existing medication. Compared to intensification by maximizing the dose, adding a new antihypertensive medication was less frequent (24.5% vs 75.5%) and was associated with less intensification sustainability (average treatment effect at 12 months, -15.1%; 95% confidence interval [CI], -15.6% to -14.5%) but slightly larger reductions in systolic blood pressure (absolute difference at 12 months, -1.1 mmHg; 95% CI, -1.6 to -0.6 mmHg). Trials would provide the most definitive support for these findings. Aubert CE et al. Ann Intern Med. 2021 Oct 5.

Development and Validation of a Prognostic COVID-19 Severity Assessment (COSA) Score and Machine Learning Models for Patient Triage at a Tertiary Care Hospital

Clinical risk scores and machine learning models based on routine laboratory values can assist in automated early identification of patients with COVID-19 at risk for severe clinical outcomes, such as need for critical care or death of any cause. They can guide patient triage, inform allocation of health care resources, and contribute to the improvement of clinical outcomes. With a small set of easily obtained parameters at the time of the first positive SARS-CoV-2 polymerase chain reaction test (sex, C-reactive protein, leucocytes, sodium, hemoglobin, glucose, and estimated glomerular filtration rate), the machine learning models and a clinical score developed in this interdisciplinary study, predicted clinical courses with a high degree of accuracy. Schöning V et al. J Transl Med. 2021;19(1):5656.



Area under the receiver operating characteristic (AUROC) of the COVID-19 severity assessment (COSA) score. Training cohort (blue, internal) and validation cohort (red, external)

Department of Geriatrics

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Prof. Andreas Stuck
Department Director

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 is organized in collaboration with internal partners (audiology, cardiology, family medicine, 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

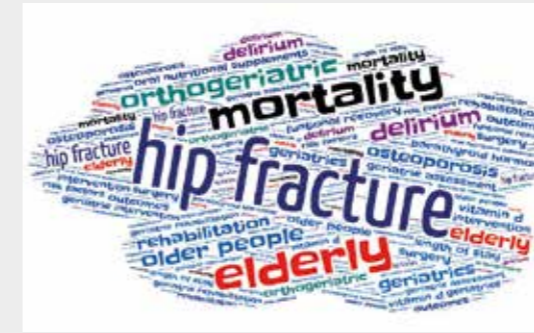
- Swiss Personalized Health Network: Swiss Frailty Network and Repository 2018 to 2022 (Co-Investigator: CHF 1.785 Mio)

Highlights

Geriatrics and Dentistry

In collaboration with Dentistry at the Medical Faculty of Bern we developed a novel core curriculum for dental students. The geriatric teaching programme was based on the European undergraduate curriculum in geriatric medicine for medical students covering the following eight geriatric domains that were considered relevant to dental care: Analgesics, cognitive impairment, decision-making capacity, gait and balance disorder, hearing impairment, malnutrition, polypharmacy and vision impairment. Stuck AK, Schimmel M. A model for a geriatric teaching programme and its impact on self-rated and tested competencies of undergraduate dental students.

Eur J Dent Educ 2021. doi: 10.1111/eje.12668.



Orthogeriatric care

Orthogeriatrics is a rapidly growing field. Geriatric co-management in traumatology and orthopedics has been shown to benefit older patients. We were involved in organizing the second national Orthogeriatrics Day in Zurich, Switzerland and conducted a literature review as a basis for future research in this field.

Bastian JD, Meier MK, Ernst RS, Gieger J, Stuck AE. A bibliometric analysis of orthogeriatric care: top 50 articles. Eur J Trauma Emerg Surg 2021.

Frailty Network

We successfully completed the clinical phase of this national project in the context of the Swiss Personalized Health Network. We conducted frailty-related assessments in more than 300 consecutive geriatric patients, despite challenges related to the COVID-19 pandemic situation.

Gagesch M, Edler K, Chocano-Bedoya PO, Abderhalden LA, Seematter-Bagnoud L, Meyer T, Bertschi D, Zekry D, Büla CJ, Gold G, Kressig RW, Stuck AE, Bischoff-Ferrari HA. Swiss Frailty Network and Repository: protocol of a Swiss Personalized Health Network's driver project observational study. BMJ Open 2021;11:e047429.



Sarcopenia

In several projects we focus on methods for evaluating the presence of sarcopenia in geriatric inpatients.

Bertschi D, et al. Sarcopenia in patients undergoing transcatheter aortic valve implantation (TAVI). J Nutr Health Aging 2021;25:64-70.
Bertschi D, et al. Sarcopenia in hospitalized geriatric patients. Eur J Clin Nutr 2020. doi: 10.1038/s41430-020-00780-7.

Stuck AK, et al. Performance of a Novel Handheld Bioelectrical Impedance Device for Assessing Muscle Mass in Older Inpatients. The Journal of Frailty & Aging (2021): 1-7.



Cardiopulmonary Resuscitation in Very Old Patients

The Swiss Academy of Medical Sciences completely revised the guidelines on "Decisions on cardiopulmonary resuscitation". In discussions with very elderly persons, or with their authorized representatives, to determine the CPR status, it is important to consider the clinical context and bear in mind the individual goals of treatment. Andreas Stuck served as an expert in the guideline development phase and contributed up to date input to the recommendations related to very old patients. The revised guidelines now recommend use of a geriatric frailty assessment to avoid decisions based on chronological age alone (section on medical-ethical guidelines at <https://www.samw.ch/en.html>)



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Prof. Anne Angelillo-Scherer
Director

Prof. Alicia Rovó
Deputy Director

Prof. Sacha Zeerleder
Head Transfusion Medicine, Apheresis & Cell Therapy Laboratory & Program

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 Laboratory Transfusion Medicine

PD Dr. Monica Schaller
Tschan Coordinator undergraduate teaching & Graduate School for Cellular and Biomedical Sciences



Prof. Nicolas Bonadies
Head Clinical Study Management/ Biobanking

SNF Prof. Ramanjaneyulu Allam
Group Leader

PD Dr. Elisabeth Oppliger
Leibundgut Group Leader

Dr. Tata Nageswara Rao
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
- 11 research groups
- 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
- External partners: Steering committee and Advisory Board of Hereditary TTP Registry (www.ttpregistry.net); University Medical Center Amsterdam, Amsterdam, The Netherlands; Department of Experimental Immunohematology, Sanquin, Amsterdam, The Netherlands; Laboratory for Thrombosis Research, IRF Life Sciences; KU Leuven Kulak, Belgium; 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; University Hospital Salzburg, Salzburg, Austria; University Hospital of Freiburg, Freiburg im Breisgau, 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; Therapeutic Immunology, University of Strasbourg, Strasbourg, France

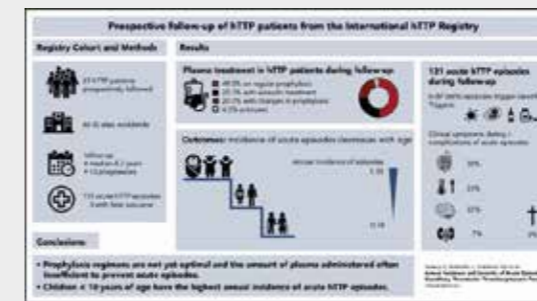
Grants

- 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
- Dutch Thrombosis Foundation (TSN 201604), Amsterdam, The Netherlands
- Health Services Research grant, Swiss Cancer Research (HSR-4085-11_2016)
- Swiss Cancer Grant (KFS-5158-08-2020, KFS-4896-08-2019), SAKK Grant 33/18
- Bernese Cancer League, Jacques und Gloria Gossweiler Stiftung, Olga Mayenfisch 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

Highlights

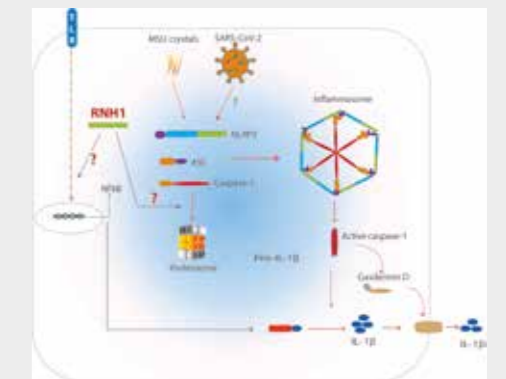
Annual incidence and severity of acute episodes in hereditary thrombotic thrombocytopenic purpura (TTP)

First publication with prospective data from an international registry on the incidence and severity of acute thrombotic thrombocytopenic purpura (TTP) episodes in patients with hereditary/congenital TTP (hTTP). The authors also document the impact of prophylactic ADAMTS13 replacement therapy, the ADAMTS13 genotype, and patient age on these outcomes. Notably, the annual incidence was highest in children and declines with age. This was surprising, as Von Willebrand Factor is a major contributor to cardio- and cerebrovascular-arterial events and is known to increase with age (Tarasco E. et al., Blood, 2020, 137:3563-75).



LRR protein RNH1 dampens the inflammasome activation and is associated with adverse clinical outcomes in COVID-19 patients

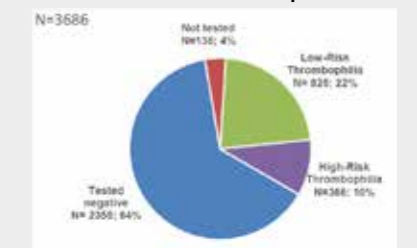
RNH1 mediated antiinflammatory mechanisms: (1) RNH1 could potentially inhibit NF-κB signaling through an unknown mechanism; (2) RNH1 regulates inflammasome activation by controlling caspase-1 protein levels via proteasome-mediated degradation. (Bombacci G. et al., BioRxiv <https://doi.org/10.1101/2021.04.12.438219>).



Thrombophilia testing and impact on treatment decision and recurrence of venous and arterial thromboembolism, and pregnancy morbidity: a retrospective single-center cohort study

Data showing clinical usefulness of thrombophilia testing for treatment decision are limited. We conducted a single-center retrospective cohort study of 3686 eligible patients in a 10-year period. Only 6% work-ups provided a further guidance to extend or initiate anticoagulation. Patients with high-risk thrombophilia had significantly more new venous thromboembolism and pregnancy morbidity. Vrotniakaitė Bajercene K et al., presentation at the Congress of the American Society of Hematology 2021 (Abstract Achievement Award) and Hemostasis Prize 2021, Swiss Society of Hematology

Prevalence of thrombophilia



Influence on treatment

No influence on therapy	Proper decision	Inappropriate decision	Positive	
	Decision to continue	Decision to extend	Overruled result	
Total	n=2010 (54.5%)	n=111 (3.0%)	n=111 (3.0%)	n=551 (14.5%)
n=3686	(56.4%)	(3.0%)	(3.0%)	(15.3%)

NGS Evaluation of a Bernese Cohort of Unexplained Erythrocytosis Patients

In 18% patients, 8 different heterozygous gene variants were found. These patients were therefore diagnosed with congenital erythrocytosis. Two patients had two different gene variants each. All variants were characterized as variants of unknown significance as they had not previously been described in the literature. The rest of patients 82% had no detected gene variants. Thus, the NGS panel can be helpful in determining the reasons for persistent, unexplained erythrocytosis. In our cohort of patients with erythrocytosis, we identified some, thus far unknown, gene variants which may explain the clinical picture. (Jalowiec K.A. et al. Genes 2021, 12, 1951; presentation at the Congress of the American Society of Hematology 2021 and Abstract Achievement Award)

Department of Human Genetics

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Prof. Christiane Zweier
 Director and Chair

PD Dr. André Schaller

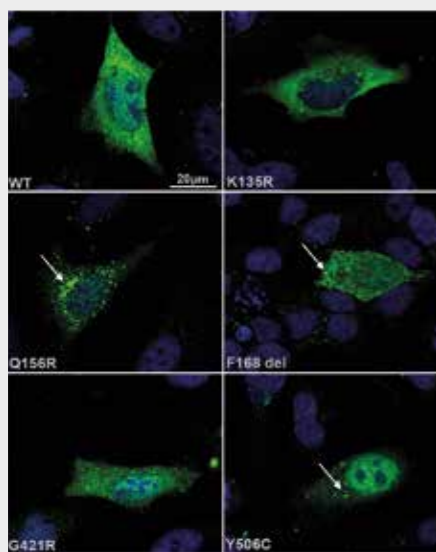
Profile

- 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

- SPHN Swiss GenVar, 2020-2021 (Schaller)
- EU – Marie Curie (837547), 2019-2021 (Gregor/Zweier)
- DFG ZW 184/6-1, 2019-2022 (Zweier)

Highlights



Subcellular localization of FBXO11 altered by missense variants

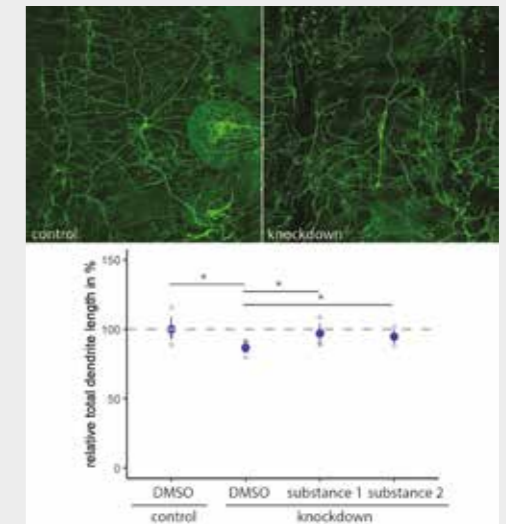
FBXO11 in neurodevelopmental disorders

De novo missense and likely gene-disrupting variants in FBXO11 cause a variable neurodevelopmental disorder (NDD). Through international collaboration we have identified 20 novel individuals with FBXO11 defects and found that phenotypes for missense and likely gene-disrupting variants strongly overlap. We furthermore characterized the effects of missense variants in FBXO11 on protein expression and localization in HEK293 and HeLa cells and found, that most reported missense variants alter either expression levels and/or subcellular localization and are therefore likely resulting in a loss of original function. This suggests that haploinsufficiency of FBXO11 may be the common pathomechanism underlying FBXO11-associated NDDs.

Gregor et al., Hum Mol Genet, 2021, doi: 10.1093/hmg/ddab265

Testing therapeutic potential of substances in Drosophila melanogaster

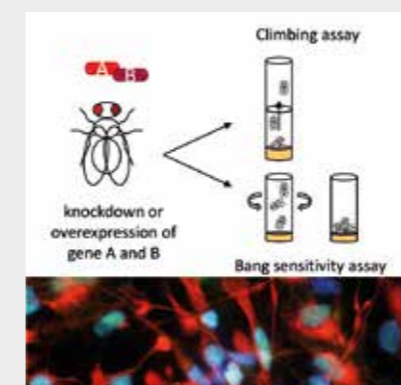
Neurodevelopmental disorders are genetically very heterogeneous with pathogenic variants in more than 1500 genes implicated. These genes often can be connected in functionally coherent modules and processes, for example protein degradation through the ubiquitin proteasome system (UPS). We have started to target phenotypes observed upon knockdown of several UPS-related genes in Drosophila with different substances and found that we can rescue phenotypes involving the wing, dendritic development (multiple dendrite neurons) as well as basic locomotor behavior. Those results provide promising avenues for possible future treatment options in patients.



Drosophila multiple dendrite neurons analyzed in rescue studies

Role of RHOBTB2 in neurodevelopmental disorders

De novo missense variants in the atypical RHO GTPase RHOBTB2 have been identified to cause a developmental and epileptic encephalopathy. These variants result in impaired degradation of RHOBTB2 by the proteasome. In accordance, flies overexpressing the Drosophila orthologue RhoBTB show seizure susceptibility and severe gross neurological impairment. Transcriptome analysis on RNA from heads of these flies now points to deregulation of ion channels contributing to the manifestation of seizures. We use genetic interaction studies in Drosophila and iPSC derived neural precursor cells with altered RHOBTB2 levels to further investigate and characterize the pathomechanisms of RHOBTB2-related developmental and epileptic encephalopathy.



Genetic interaction experiments in Drosophila and neural precursor cells with homozygous knockout of RHOBTB2

SwissGenVar: A platform for clinical grade interpretation of genetic variants to foster personalized health care in Switzerland

Large-scale germline genetic testing is technically feasible today but is hampered by difficulties in variant interpretation. We participate in SwissGenVar, a joint platform of all Swiss university institutes of medical genetics. Its objective is to provide a high quality germline variant interpretation platform for research, based on molecular diagnostic data, while at the same time to also improve molecular genetic diagnostics through harmonized annotation. This joint database of variants identified in patients from Swiss university hospitals, powered with a semi-automated curation pipeline and a consensus-based expert panel for unknown variant annotation, will efficiently support the clinical interpretation of sequence data. This is a prerequisite to facilitate medical interpretation of the variants and to promote personalized health research derived from germline genetic data.



This infrastructure developing project is a nation-wide academic effort to improve genetic variant interpretation, facilitate knowledge sharing and promote personalized health research.

Department of Infectious Diseases

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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 Simbabwe
- Publications: <https://boris.unibe.ch/view/divisions/DCD5A442BB13E17DE0405C82790C4DE2.html>
- External Partners: Swiss Centre for Antibiotic resistance, Anresis; Swissnoso, Swiss HIV Cohort Study; IeDEA, 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_176944 G. Wandeler
- SNF SPARK 19097, A. Atkinson
- SPHN Personalized Swiss Sepsis Study (PSSS), H. Furrer (co-applicant)
- ESTHER Switzerland Partnership Project Grant 17G4, C. Staehelin
- Krebsliga Schweiz KLS-4879-08-2019, G. Wandeler
- Multidisciplinary Center for Infectious Diseases Funding; Project MA_19: Preparedness for surveillance in school rooms in pandemic and epidemic situations: multiple measure approach to estimate transmission and interventions for Covid-19 and seasonal influenza. Co-Lead Ph. Jent

Highlights

Philipp Jent, Head Infection Control

Philipp Jent was nominated Head Infection Control of the INSEL Gruppe in October 2021. Congratulation.



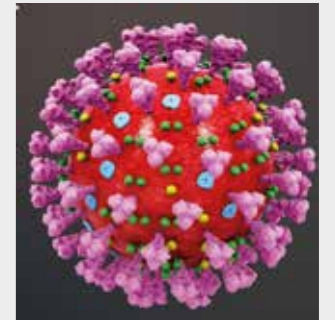
Institutional Health Partnership (ESTHER) Bern University Hospital – Centre Hospitalier Macenta

Funded by ESTHER Dr. Cornelia Staehelin represents our department as the Swiss Partner in this project with the hospital in the forest region of Guinea Conakry to strengthen HIV, Tuberculosis and Hepatitis Care Schoenbaechler et al, Int J Infect Dis 2021; 110:6-14
 Other projects and collaborations in Africa are conducted by Prof. G. Wandeler (IeDEA) and Dr. St.Zimmerli (Zimbabwe).

Involvement in Handling of the COVID-19 Pandemic

Throughout the year 2021, our department was substantially involved in the handling of the pandemic, e.g.:

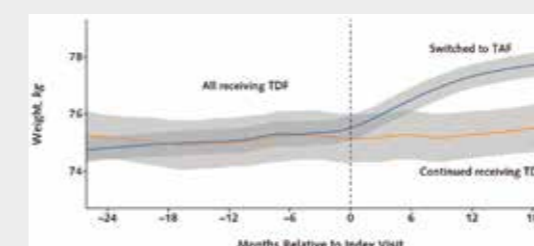
- As unit responsible for pandemic planning and epidemiology experts in the pandemic strategy and internal policy making.
- As consulting unit in the treatment of COVID-patients on normal wards as well as in the ICU
- As prevention and control team in the training and setup of dedicated isolation units and more.
- Medical lead in set-up and organization of the COVID Vaccination Center on the INSEL Campus



Weight and Metabolic Changes After Switching to Tenofovir Alafenamid (TAF) in People Living With HIV (PLWH)

B Surial with the team from Berne and the Swiss HIV Cohort Study published a landmark study about the metabolic changes in in People Living With HIV who switched their antiretroviral therapy to a regimen including TAF, one of the most used NRTI.

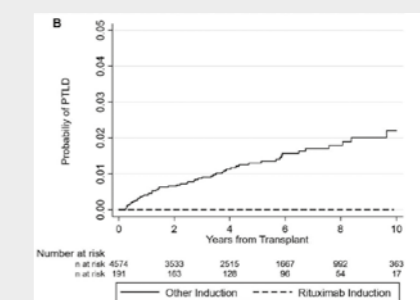
Surial B et al, Ann Intern Med 2021;174:758-767.



Rituximab induction is associated with diminished PTLD incidence in the Swiss Transplant Cohort Study

L Walti, C Hirzel and STCS colleagues analyzed posttransplant lymphoproliferative disorders (PTLD) in solid organ recipients and showed for the first time that Rituximab containing induction therapy prevented PTLD.

Walti L. et al, Am J Transplant. 2021;21:2532–2542.



Department of Intensive Care Medicine

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Prof. Stephan Jakob
 Director, Chief Physician

Brigitte Hämmerli
 Head of Department Nursing

Felix Zürcher
 Head of Management Services

Prof. Joerg C. Scheffold
 Chief Physician, Head of Research

Profile

- Key objective: to gain knowledge on pathophysiological processes, response patterns and therapeutic options in critical illness
- Key focus: organ dysfunction, fluid management, metabolism/immune responses, post-resuscitation care, and severe infections
- diverse set of investigations (i.e. international multi-center trials, IITs, systematic reviews, meta-analysis, animal models on the pathophysiology of cerebral, circulatory and gastrointestinal function)
- extended collaborations with our 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)

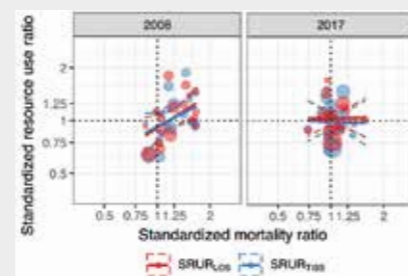
Grants

- Innosuisse innovation project, Selective Adsorption in Sepsis – towards clinical implementation. Innovation project No. 42313.1 IP-LS
- Gottfried and Julia Bangerter-Rhyner Foundation: Fluid Overload and Mortality in Adult Critical Care Patients – A Systematic Review and Meta-Analysis of Observational Studies, No. 0233/2019
- Gottfried and Julia Bangerter-Rhyner Foundation: Protocolled Fluid Removal in Septic Shock (REDUCE) – A Feasibility Study, No. 0364/2020
- Gottfried and Julia Bangerter-Rhyner Foundation: INFLICT-PTSD, support for study project on post-traumatic stress disorder in relatives of intensive care patients, No. 0132/2021
- Gottfried and Julia Bangerter-Rhyner Foundation: EPO-Trauma Study, 8472/HEG-DSV (11.03.2021)
- Investigator Initiated Clinical Trials, SNF, NR 33IC30_198778 (FICUS Trial: A multicenter, cluster-randomized superiority trial of a guideline-based Family support intervention in Intensive Care Units)

Highlights

Takala J et al, Variation in severity-adjusted resource use and outcome in intensive care units, *Intensive Care Medicine*, 2021, DOI:10.1007/s00134-021-06546-4

In this dataset of 207,131 patients treated in 2008–2017 in 21 ICUs in Finland, Estonia and Switzerland, standardized mortality rates (SMR) decreased over time while standardized resource use (SRUR) remained unchanged. Both SMR and SRUR varied widely and independently, and should be used together to compare performance of different ICUs or an individual ICU over time.

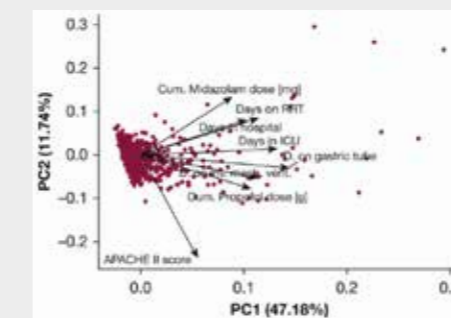


Utiger JM et al, Description of a rat model of polymicrobial abdominal sepsis mimicking human colon perforation, *BMC Research Notes*, 2021, DOI:10.1186/s13104-020-05438-y

Standard rodent sepsis models as cecal ligation and puncture models are frequently not suited for experiments, mainly because they lack surgical repair, and they are difficult to control for severity. Here we present our modification of the rodent colon ascendens stent peritonitis model, where severity of sepsis can be controlled by timing of surgical repair and treatment, and by diameter of the stent. Further, basic hemodynamic monitoring and frequent blood sampling can be achieved, which might guide further treatment.

Zuercher P et al, Risk Factors for Dysphagia in ICU Patients After Invasive Mechanical Ventilation, *Chest*, 2020, DOI:10.1016/j.chest.2020.05.576

In this study, we observed that in ICU patients, baseline neurologic disease, emergency admission, and duration of invasive mechanical ventilation appeared as prominent independent risk factors for dysphagia after adjustment. Because all ICU patients after mechanical ventilation should be considered at risk for dysphagia, systematic screening for dysphagia is recommended in respective critically ill patients.

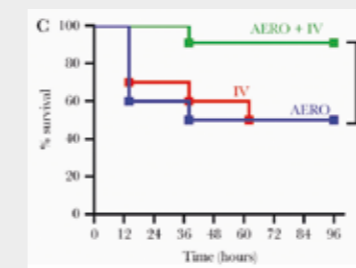


Bachmann KF et al, Estimating cardiac output based on gas exchange during veno-arterial extracorporeal membrane oxygenation in a simulation study using paediatric oxygenators, *Scientific Reports*, 2021, DOI:10.1038/s41598-021-90747-w

In this simulator bench study, we describe a mathematical method based on a modification of the Fick principle to determine the native blood flow through the lung, when an extracorporeal circulation is installed. The accuracy of the method depends on the gas used and the ventilation/perfusion ratio of the lung. The method was protected by a patent together with Unitectra.

Brauchle M et al, Practice of family-centred care in intensive care units before the COVID-19-pandemic: A cross-sectional analysis in German-speaking countries, *Intensive and Critical Care Nursing*, 2021, DOI:10.1016/j.iccn.2021.103139

Open visiting times were reported by 36.3% centers, with significant differences between paediatric (79.2%), adult (21.3%) and mixed-age (41.2%) units. Significantly more German units have open visiting policies and more Swiss units allow children as visitors, compared to the other countries (both $p < 0.001$). Barriers to family-centred care were concerns about children being traumatized, infection and workload.



Prazak J et al, Benefits of Aerosolized Phages for the Treatment of Pneumonia Due to Methicillin-Resistant Staphylococcus aureus: An Experimental Study in Rats, *The Journal of Infectious Diseases*, 2021, DOI:10.1093/infdis/jiab112

We assessed the utility of aerosolized phages in an experimental MRSA model of pneumonia in rats. Aerosolized and IV phages each rescued 50% of animals, while the combination of aerophages and IV phages rescued 91% of animals, which was also significantly better than the standard of care linezolid. Figure: Reproduced by permission of Oxford University Press on behalf of the Infectious Diseases Society of America.

Pförtmueller C et al, COVID-19-associated acute respiratory distress syndrome (CARDS): Current knowledge on pathophysiology and ICU treatment – A narrative review, *Best Practice & Research Clinical Anaesthesiology*, 2021, DOI:10.1016/j.bpa.2020.12.011

In this systematic review, we discuss pathophysiological mechanisms of COVID-19-associated ARDS including severe pulmonary infiltration/edema, inflammation leading to impaired alveolar homeostasis, alteration of pulmonary physiology resulting in pulmonary fibrosis, endothelial inflammation, and immune cell activation. Current evidence on medical interventions for CARDS including pharmacological treatment options (i.e. steroids, tocilizumab, remdesivir) but also supportive therapies (i.e. ventilation strategies, oxygenation strategies, anticoagulation) are critically reviewed.

Department of Medical Oncology

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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 trials
- Largest clinical CAR-T cell program in Switzerland
- Certified phase 1 trial unit
- Development of Biomarkers to further optimize personalised treatment in the field of gastrointestinal oncology
- Sex and gender effects in oncology

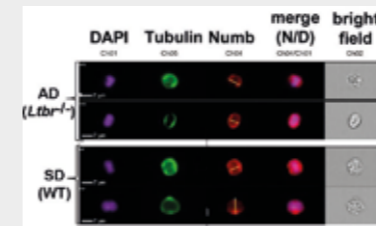
Grants

- SNF Project 31003A_182337
- SNF Sinergia CRSII5_173738
- Krebsliga Schweiz 4534-08-2018
- Helmut Horten Stiftung
- Stiftung Für Klinisch-Experimentelle Tumorforschung (2019)
- SNFS Project 310030_179394
- Swiss Cancer League (Krebsliga Schweiz): KFS-4389-02-2018
- SNFS Project 310030_192675

Highlights

Sex and Gender effects in medicine – biological and social implications

In order to familiarize the medical students with sex and gender differences in biology and medicine, Dr. Berna Özdemir initiated an inter-faculty cooperation between the Interdisciplinary Center for Gender Research (IZFG) and the Medical Oncology of Inselspital for a lecture series which is funded by the University of Bern. The aim of this project is that the students get an insight into the different methodological approaches and develop an interdisciplinary understanding of the gender category in medicine and recognize that the sex and gender of an individual has a decisive influence on their health, their risk for various diseases (e.g. cardiac, oncological) and their treatments. Dr. Berna Özdemir also initiated the Oncology Module of the Certificate of Advanced Studies in Sex and Gender Sensitive Medicine, a joint program of the Universities of Bern and Zurich.



Analysis of symmetric (SD) and asymmetric division (AD) by Numb distribution in purified, dividing WT and *Ltbr*^{-/-} LSCs using Image Stream technology. DAPI in violet, α -tubulin in green, and Numb in red. Plane cell division (yellow line) was assigned based on α -tubulin and the cleavage furrow.

LIGHT/LT β R signaling regulates self-renewal and differentiation of hematopoietic and leukemia stem cells

In this study we show that the signaling of LT β R, a member of the TNFR family, with its ligand TNFSF14 (LIGHT) regulate the quiescence and self-renewal of hematopoietic stem cells (HSC) and leukemic stem cells (LSCs) in mice and men. We found that cell-autonomous LIGHT/LT β R signaling is necessary upon hematopoietic stress to prevent primitive HSCs from exhaustion by promoting symmetric cell division and reducing cell cycling. In contrast, LT β R/LIGHT signaling does not affect steady-state haematopoiesis. The identification of LIGHT/LT β R signaling is an important pathway in the regulation of self-renewal of HSCs and LSCs and may offer new approaches for eliminating LSCs.

Development of Biomarkers to further optimize personalised treatment in the field of gastrointestinal oncology

LAG-3 is an inhibitory immune checkpoint molecule that suppresses T cell activation and inflammatory cytokine secretion. T cell density in the tumor microenvironment of colon cancer plays an important role in the host's immunosurveillance. We could demonstrate that in patients diagnosed with stage II colon cancer, the presence of LAG-3 expression on tumor infiltrating lymphocytes was significantly associated with better 5-year disease-free survival. Assessment of LAG-3 might help to predict outcomes in patients with stage II colon cancer and potentially identify those patients who might benefit from adjuvant chemotherapy. Therefore, LAG-3 may serve as a prognostic biomarker in stage II colon cancer. Rhyner Agocs G et al. J Pers Med 2021;11:749.

Improved CRISPR for therapeutic target discovery

CRISPR-Cas9 genome editing is a powerful tool for discovering new drug targets in oncology. In particular, CRISPR enables researchers to search for therapeutic targets amongst the enormous and poorly-understood «noncoding genome», outside of classically studied proteins. In such studies, CRISPR is used as «molecular scissors» to delete regions of DNA, however the relatively low efficiency of deletion is a major hurdle. The Johnson lab discovered a simple and effective strategy to improve this deletion, thanks to widely-used family of pharmacological agents that inhibit DNA repair pathways. This approach will facilitate future efforts to develop new noncoding therapeutic targets in a variety of cancers. This work was published in the prestigious journal Genome Research.

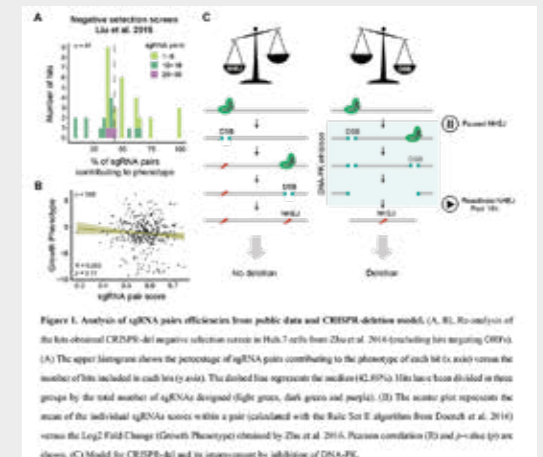


Figure 6. Analysis of sgRNA pairs efficiency from public data and CRISPR deletion models. (A, B). An analysis of the hits obtained CRISPR-del negative selection screen in HeLa 7 cells from Zhou et al. 2014 (including hits targeting ORFs). (A) The upper histogram shows the percentage of sgRNA pairs contributing to the phenotype of each hit (x-axis) versus the number of hits included in each hit (y-axis). The dashed line represents the median (CRISPR) hits have been divided in three groups by the total number of sgRNAs designed (light green, dark green and purple). (B) The scatter plot represents the mean of the individual sgRNA scores within a pair (calculated with the Rank Set E algorithm from Dorsch et al. 2014) versus the Log2 Fold Change (Geneth Phenotypic) obtained by Zhou et al. 2014. Pearson correlation (R) and p-value (p) are shown. (C) Model for CRISPR-del and its improvement by inhibition of DNA-PR.

Rationale for improving CRISPR deletion by slowing the rate of DNA repair.

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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

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 of PhD students for Cellular and Biomedical Science (GCB)
- 9 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, culture of organoids, factors influencing the steroid hormone metabolome
- Aim: improving diagnostic tools and implement of novel therapeutic approaches to enhance patient care.
- External partners: Departement of Chemistry and Biochemistry, Institute of Biochemistry and Molecular Medicine, University of Bern, Switzerland; Departement of Pharmacology and Toxicology, Institute of Social and Preventive Medicine, University of Lausanne, Switzerland; Institute of Pharmaceutical Sciences of Western Switzerland, Geneva, Switzerland; Institute 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, Dallas, USA; Johns Hopkins University, Baltimore, USA

Grants

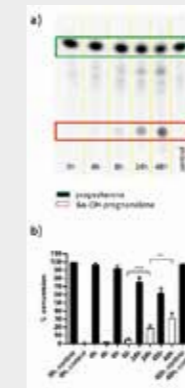
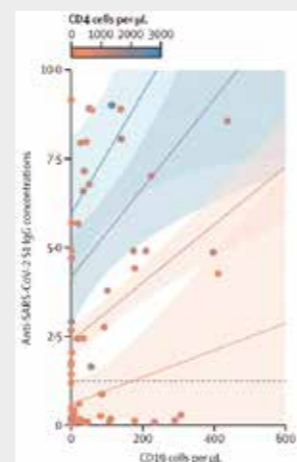
- Swiss National Foundation (310030_182482; 3100A_172974; 310030_188762/1; 331C30_166785/1; 310030_182272; CRSII5_180326; CRSK-3_190714; 4078PO_198281/1; NRP 78)
- NCCR Kidney.ch
- NCCR-Kidney.CH Junior Grant Award
- NCCR TransCure
- Swiss Transplant Cohort Study
- Swiss Cancer League (KFS 3966-08)
- CSL Research Acceleration Initiative Grant
- Nachwuchsförderungsgrants für patientenorientierte Forschung der Insel Gruppe

Highlights

Immune responses to SARS-CoV2 vaccination in patients with a treatment history of anti-CD20 therapies rituximab or ocrelizumab

Patients receiving anti-CD20 B-cell depleting drug therapies develop less humoral and cellular immune responses after vaccination against bacterial or viral pathogens. In collaboration with several clinics and laboratory departments of University Hospital and University of Bern, we have established the RituxiVac cohort of patients receiving anti-CD20 therapies for autoimmune or malignant diseases and transplantation. We found impaired humoral or cellular responses to two or three doses of SARS-CoV2 vaccines in this population in comparison to controls. Moor et al., The Lancet Rheumatology 2021.

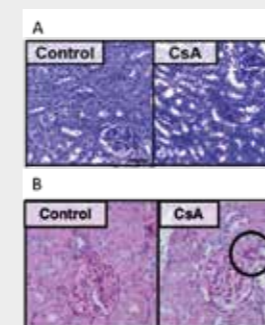
Circulating CD4+ T cells associated with improved humoral vaccination responses, even in patients with low CD19+ B cell counts after anti-CD20 therapy



Steroid hormone bioavailability is controlled by the lymphatic system

Progesterone accounts for immune tolerance. Enhanced progesterone metabolism occurs in preeclampsia and cancer. As lymphatic endothelial cells (LECs) promote tumor immunity, we hypothesized that human LECs modify progesterone bioavailability. LECs efficiently metabolized progesterone and reactivated it from 20 α -hydroxyprogesterone. Progesterone and its metabolites reduced TNF- α and IFN- γ production in activated CD4+ and CD8+ T cells. They were furthermore antiandrogenic and antiestrogenic and expressed several steroid hormone receptors. Given the global area represented by LECs, they might have a critical immunomodulatory control in pregnancy and cancer. Klossner R et al. Sci Rep. 2021.

Thin layer chromatography of progesterone metabolism in LECs



Rat kidneys demonstrate arteriohyaline arteriosclerosis (circled) under CsA treatment compared to control rats

Off-targets of Cyclosporine A may promote Calcineurin Inhibitor Toxicity in the kidney

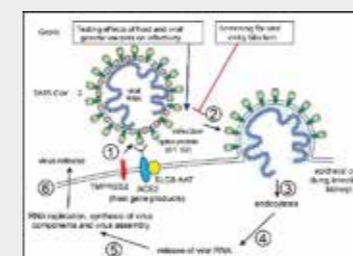
Calcineurin inhibitor toxicity (CNT) is a common side effect in kidney transplanted patients under Cyclosporine A (CsA) treatment. Chronic CNT is characterized by arteriohyaline arteriosclerosis and tubulointerstitial fibrosis. These side effects aggravate the survival of the kidney allograft. CsA acts via the NFAT-axis (nuclear factor of activated T cells) in lymphoid cells. However, in non-lymphoid cells such as renal epithelial cells, it is unknown how CsA induces nephrotoxicity. We investigated the off-targets of CsA in kidney epithelial cells. Our results revealed that inhibition of p38 MAP kinase induces markers for nephrotoxicity, inflammation, and fibrosis. Therefore, we present a non-immune dependent activity of p38 MAPK inhibition.



Models of proximal tubular handling of creatinine and GAA in the presence (upper panel) or absence (lower panel) of SLC16A12

Solute carrier SLC16A12 is critical for creatine and guanidinoacetate handling in the kidney

SLC16A12 is a recently identified creatine transporter of unknown physiological function. A heterozygous mutation in the human SLC16A12 gene causes juvenile cataracts and reduced plasma guanidinoacetate (GAA) levels with an increased fractional urinary excretion of GAA. Our study with transgenic SLC16A12-deficient rats reveals that SLC16A12 is critical for tubular reabsorption of creatine and GAA in the kidney. It furthermore indicates a dominant-negative mechanism underlying the phenotype of humans affected by the heterozygous SLC16A12 mutation. Verouti et al. Am J Physiol renal Physiol 2021.



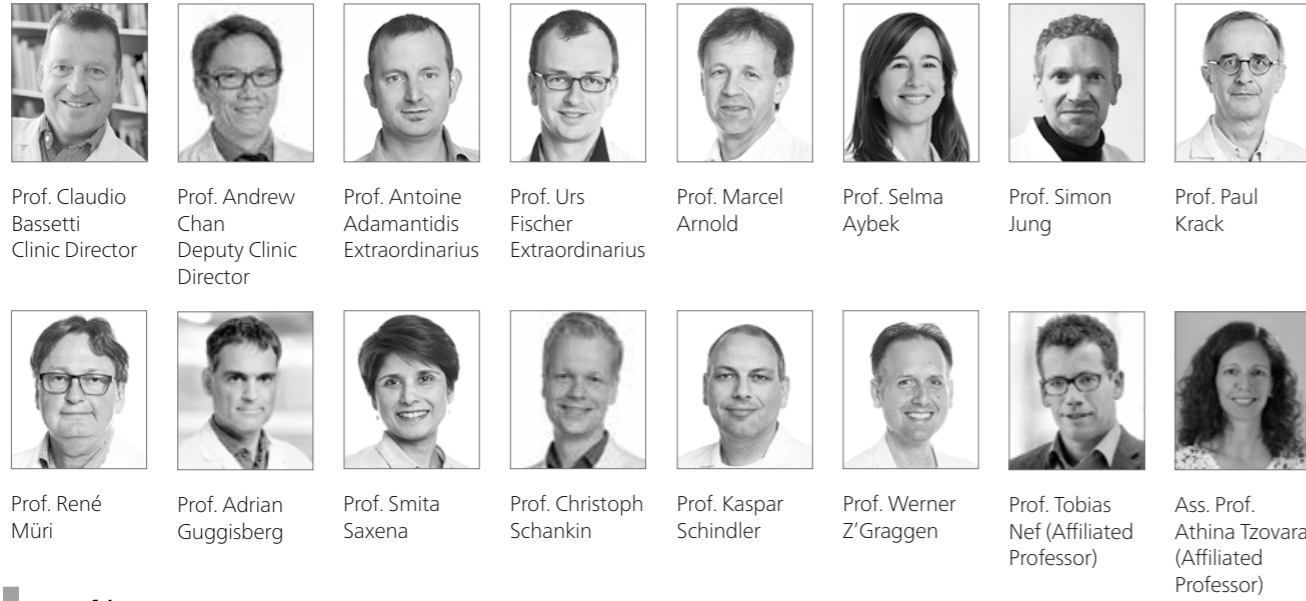
Project outline to investigate the steps involved in SARS-CoV-2 infection in epithelial cells of the lungs, intestines, and kidney

New insights into the COVID-19 pandemic: Genetic polymorphisms, role of SLC6 amino acid transporters, renal aspects, and therapeutic perspectives (NRP 78)

We are investigating what effect genetic variants of host genes, which express products that facilitate SARS-CoV-2 infection, have on the risk of developing the disease and its severity. We argue that genetic variants of certain human SARS-CoV-2 host genes in the cells of affected organs such as the lungs, gastrointestinal tract and kidneys have a significant effect on clinical outcome alongside risk factors such as age, diabetes, and high blood pressure. We are also endeavoring to create the basis for innovative treatments by identifying substances that prevent the virus binding to human cells.

Department of Neurology

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Clinic Director

Prof. Andrew Chan
Deputy Clinic Director

Prof. Antoine Adamantidis
Extraordinarius

Prof. Urs Fischer
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Prof. Marcel Arnold

Prof. Selma Aybek

Prof. Simon Jung

Prof. Paul Krack

Prof. René Mürli

Prof. Adrian Guggisberg

Prof. Smita Saxena

Prof. Christoph Schankin

Prof. Kaspar Schindler

Prof. Werner Z'Graggen

Prof. Tobias Nef (Affiliated Professor)

Ass. Prof. Athina Tzovara (Affiliated Professor)

Profile

- Clinical, translational, basic and nanotechnological 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 research institutions, industry

Grants

- SNSF (career funding grants awarded in 2021): Eccellenza Professorial Fellowship (Dr.med. Maxime Baud); Ambizione Grant (Dr.med. Gerd Tinkhauser)
- SNSF (other project/ career funding grants): 19 grants (7 grants awarded in 2021; 12 running grants: 175615, 179929, 179436, 176985, 166827, 185362, 188761, 179667, 197709, 189077, 175984, 180365).
- Horizon 2020: 5 running grants (MSCA-ITN-2020 956977; MSCA-ITN-2019 860035; ERC Consolidator Grants (725850 and 725825); Eurostars-2 E! 12034/18/Q)
- Others: Swiss Heart Foundation, Swiss Academy of Medical Sciences, Innosuisse, Bangerter-Rhyner Foundation, Baasch Medicus Foundation, Parkinson Schweiz

Highlights

- Publication highlights: 1 international guideline (Bassetti et al., Eur J Neurol.doi:10.1111/ene.14888); 20 publications on COVID-19 (e.g. Chou et al., JAMA Net Open.doi:10.1001/jamanetworkopen.2021.12131)
- Research highlights: Two-year extension of the Interfaculty Research Cooperation (IRC) "Decoding Sleep" (Director IRC: Prof. C.L.A. Bassetti; CHF 1.5 Mio. per year); Strategic Research Funding of the Faculty of Medicine for the project "A digital reference network platform for clinical and experimental neuroscience – deep phenotyping and data integration" (Directors: Prof. A. Chan, Prof. R. Wiest, Prof. T. Nef; CHF 800'000 for 3 years); inauguration of research and development platform NeuroTec

Forecasting epileptic seizures over days

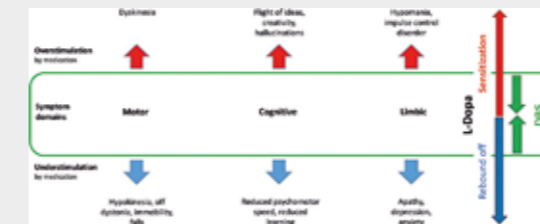
Epilepsy is a prevalent disorder of the brain characterized the random recurrence of seizures, leading patients whose seizures cannot be controlled with medication to live in a state of constant uncertainty. In that context, forecasting seizures represents a wholly grail in epilepsy. Based on their recent discovery that brain epileptic activity fluctuates rhythmically over days, Dr. Baud's team developed a probabilistic forecasting scheme to estimate



seizure risk one to three days in advance, akin to whether forecasting. Such approaches may empower patients to organize their lives around "epileptic storms". – Proix, et al., Lancet Neurol. 2021 Feb;20(2):127-135. doi:10.1016/S1474-4422(20)30396-3.

Subthalamic deep brain stimulation for drug-induced behavioral disorders in Parkinson's Disease

With progressive neurodegeneration in Parkinson's disease (PD), L-dopa leads to increasing sensitization of the dopaminergic system. This contributes to hyper- and hypodopaminergic symptoms across motor, cognitive, and limbic systems. Subthalamic Deep brain stimulation (DBS) counteracts this sensitization by enabling reduction of dopaminergic medication and thus stabilizing the therapeutic response window. The authors propose to consider neuropsychiatric fluctuations and impulse control disorders as new inclusion criteria for subthalamic DBS in PD. – Weiss D. et al., Ann Neurol. 2021 Nov; 90(5): 699-710. doi:10.1002/ana.26164.



Closing the Last Mile in Neurology

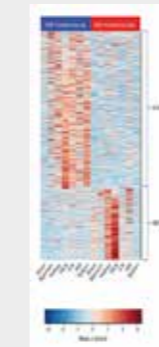
NeuroTec was founded to accelerate the development of technologies that enable the validation and then translation of personalized neurologic diagnostics and therapeutics from the clinic to the patient's home, where the disease dynamics may be assessed more accurately. In the NeuroTec Loft, the living room (a) and kitchen (b) contain sensors that allow fitting a detailed skeleton model onto a patient's body for precise marker-free motion tracking, which is highly informative to analyse pathologic movement patterns. – Schindler KA, et al., Clin. Transl. Neurosci. 2021, 5(2), 13; doi:10.3390/ctn5020013.



The NeuroTec Loft: an instrumented apartment

Different Fumaric Acid Esters Elicit Distinct Pharmacologic Responses

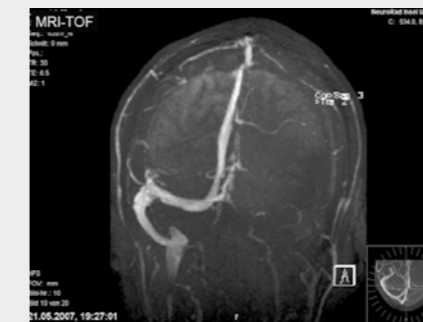
It is unknown, if different fumaric acid esters (dimethylfumarate/DMF, approved for multiple sclerosis; monoethylfumarate/MEF approved for psoriasis) can be used interchangeably. We show that these fumarates regulate distinct biological processes with specific organ penetration and differential transcriptional profiles (DMF brain penetration, oxidative stress response; MEF kidney partitioning, apoptotic pathways). In MS patients, MEF mixtures induce an earlier and more pronounced CD8-lymphocytopenia. These data were relevant in the approval of DMF for multiple sclerosis. – Wipke BT/ Hoepner R, et al., Neurol Neuroimmunol Neuroinflamm. 2021 Jan 19;8(2):e950. doi:10.1212/NXI.0000000000000950.



DMF and MEF Specificity Across Tissues and Blood

Thrombocytopenia and Antibodies in Cerebral Venous Sinus Thrombosis Prior to the COVID-19 Pandemic

Cerebral venous sinus thrombosis in combination with thrombocytopenia and platelet factor 4/heparin antibodies has been reported ChAdOx1 nCov-19 and Ad.26.COVID-19 COVID-19 vaccines. Our international team has demonstrated that in patients with cerebral venous sinus thrombosis prior to the pandemic, baseline thrombocytopenia was uncommon and heparin-induced thrombocytopenia and platelet factor 4/heparin antibodies were rare. – Sánchez van Kammen/ Heldner et al., JAMA. 2021; 326(4): 332-338. doi:10.1001/jama.2021.9889.



Cerebral venous sinus thrombosis in venography

Department of Neurosurgery

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Prof. Andreas Raabe Prof. Werner Z'Graggen Prof. Claudio Pollo Prof. Philippe Schucht Prof. Hans-Rudolf Widmer PD Dr. Ralph Schär PD Dr. David Bervini PD Dr. Kathleen Seidel

Profile

- Our clinical research commitment is driven by the need to improve and refine neurosurgical operations. Focusing on this area, we examine and test how to translate increasingly frequent emerging new technologies into neurosurgical practice. Another focus is on clinical studies or trials to investigate different management or treatment methods. In our laboratory of regenerative experimental medicine, we aim to develop and improve therapeutic strategies for neurodegenerative diseases.
- Teaching profile: 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. Hans-Rudolf Widmer serves as mentor and co-advisor for PhD students of the gcb 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

Grants

- Schweizerische Herzstiftung: Novel patient-specific cerebrovascular 4D surgical simulator
- SNF Sinergia 4 years: HORAO – Polarimetric visualization of Healthy brain fiber tracts for tumor delineation during neurosurgery
- Schweizerische Stiftung für die Erforschung der Muskelkrankheiten: critical illness myopathy
- Krebsliga: Resurge – Randomized Controlled Comparative Phase II Trial on Surgery for Glioblastoma Recurrence

Highlights

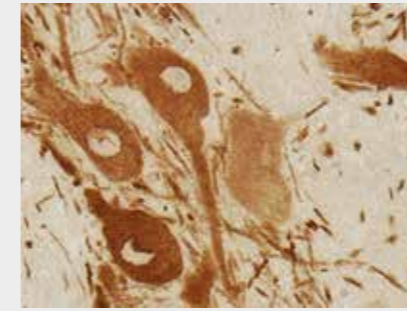
4D simulator brings breakthrough in brain surgery



Aneurysm operations in the brain rank among the most delicate procedures in neurosurgery. The highest demands are placed on surgeons when choosing the type of surgery, planning the route and carrying out extremely delicate procedures on the brain blood vessel. A new training technology jointly developed by Inselspital, Bern University Hospital, and ARTORG Center of the University of Bern will further improve patient safety during future procedures: A new 4D simulator allows planning, testing and optimization of the procedure on an exact 4D model that reproduces single-patient's brain anatomy and also emulates the blood, blood vessels and pulse.

Motor Evoked Potential Warning Criteria in Supratentorial Surgery

This study aims to provide a comprehensive overview of the available evidence on MEP warning criteria in supratentorial surgery. To this end, the emerging framework of a scoping review was used and data from a total of sixty-eight heterogeneous studies were visualized rather than pooled. Overall, MEPs perform well as diagnostic and surrogate biomarkers. Irreversible MEP alterations are associated with a higher number of transient and persistent motor deficits than the reversible ones. The absence of irreversible changes reassures the neurosurgeon that motor function will be preserved in the short and long-term. Further, reversible MEP deteriorations after successful intervention indicate postoperative preservation of motor function. Rigorous quantitative evidence synthesis in the future requires consensus for definitions and standardized terminology. (Asimakidou et al., Cancers 2021).



Age is associated with lower numbers of dopaminergic and Nogo-A expressing neurons in Parkinson's disease

In 2021, the Inselspital Research Laboratory further investigated the relationship of Nogo-A expression in dopaminergic neurons and age in Parkinson's disease. Using a tissue microarray of the human substantia nigra pars compacta, it was found that the number of dopaminergic as well as Nogo-A expressing neurons decreases significantly with increasing age. These observations suggest that Nogo-A plays an essential role in the vulnerability of dopaminergic neurons in Parkinson's disease. Photomicrograph of human substantia nigra pars compacta showing dopaminergic neurons. (Eyer et al., Cells, 2021)



HORAO

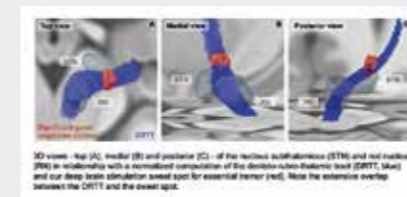
A major challenge in neuro-oncological surgery is the intraoperative identification of fiber tracts and the differentiation between tumorous and healthy tissue. In search of an innovative approach to overcome this challenge, neurosurgeons at Inselspital launched the HORAO project, which consists of a crowdfunding challenge and a subsequent crowd-sourcing challenge. The HORAO project reached its first milestone when a team of researchers from Ecole Polytechnique in Paris won the crowd-sourcing competition during the final conference in 2019, leading to an intensive research collaboration. In 2021, the project achieved the next major milestones: A post-processing machine learning approach was added to the project, and the research team successfully performed the first near-in-vivo measurement series at the Department of Neurosurgery, University of Bern.



Orthostatic headache. The headache typically manifests only when sitting or standing.

Spontaneous intracranial hypotension syndrome

The Department of Neurosurgery continues to maintain a close clinical and scientific collaboration with the Institute of Diagnostic and Interventional Neuroradiology and the Department of Neurology in the diagnostic workup and treatment of patients with spontaneous intracranial hypotension (SIH) syndrome. The state-of-the-art in diagnostics and neurosurgical treatment of SIH syndrome of the Inselspital is recognized both nationally and internationally. This expertise, based on in-house research findings, was recently summarized in a high-impact review article on SIH syndrome in The Lancet Neurology (Dobrocky T et al., Lancet Neurol, 2021).



Towards automatic DBS targeting and programming

Following preliminary results in individual DBS patients, the image-based prediction algorithm was applied to a cohort of patients and was able to confirm a high level of accuracy in predicting the best stimulation area and stimulation amplitude in terms of both clinical and side effects. A publication of these results has been accepted and will be published in the journal Neuromodulation. A similar methodology was used to work on a probabilistic sweet spot for tremor obtained from a large multicenter database. It was possible to show an exact location below the thalamus near the dentorubrothalamic tract (DRTT). This will improve the targeting process and clinical outcomes by maximizing efficacy and reducing side effects caused by DBS.

Department of Nuclear Medicine

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Prof. Axel Rominger
Director
Head of Clinical Research

Prof. Ali Afshar-Oromieh
Deputy Director

Prof. Paul Cumming

Prof. Kuangyu Shi
Scientific Head of Artificial Intelligence and Translational Theranostics

Dr. Eleni Gourni

Profile

- Teaching students in the field of medicine, biomedical engineering, and chemistry. Education of medical technical radiology assistants.
- Research in Radiopharmacy, PET imaging in oncology and neurology with focus on total body PET, implementation of artificial intelligence and support of novel deep learning algorithms in Nuclear Medicine.
- Aim: Improve PET and SPECT techniques in the field of oncology, neurology, and cardiology. Increase the therapeutic spectrum of Nuclear Medicine.
- External partners: 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

Grants

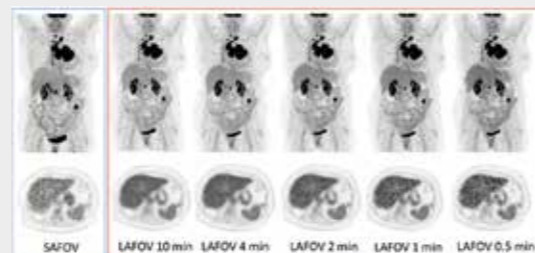
- Swiss National Science Foundation (grant no. 200021_188914; IZKSW3_188350; 310030_192704)
- Swiss Cancer League (grant no. KFS-4723-02-2019)
- FreeNovation Fund, Novartis Foundation
- Berner Krebsliga
- Berger-Janser Stiftung (grant no. 11/2019)

Highlights

Clinical Performance of the New Long Axial Field-of-View Biograph Vision Quadra PET/CT

The LAFOV system could deliver images of comparable quality and lesion quantification in under 2 min, compared to routine SAFOV acquisition. Even shorter LAFOV acquisitions (0.5 min) were of adequate quality with respect to target lesion identification, suggesting that ultra-fast or low-dose acquisitions can be acceptable in selected settings.

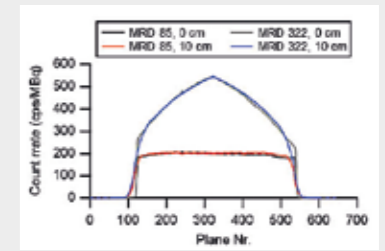
I. Alberts et al. EJNMMI (2021) 48(8):2395-2404.



Comparison between LAFOV and SAFOV

Performance Characteristics of the Biograph Vision Quadra PET/CT using NEMA NU 2-2018 Standard

The Biograph Vision Quadra PET/CT exhibits improved sensitivity and NECR due to the extended AFOV. The high time resolution allows for state-of-the-art noise-reducing TOF reconstructions. The combination of high spatial resolution, high time resolution, and very high sensitivity makes the Quadra a high performance new device in the class of total-body PET scanners.

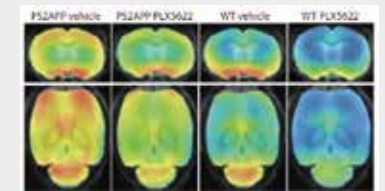


Axial Sensitivity Profile

G. Prenosil et al. J Nucl Med (2021) Epub.

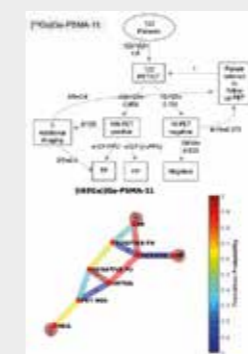
Microglial Activation States Drive Glucose Uptake and FDG-PET Alterations in Neurodegenerative Diseases

Our findings suggest that microglia activation states are responsible for FDG-PET signal alterations in patients with neurodegenerative diseases and mouse models for amyloidosis. Microglial activation states should therefore be considered when performing FDG-PET.



Pharmacological depletion of microglia ameliorates increased glucose uptake in mice with amyloidosis

X. Xiang et al. Sci Transl Med. (2021) Oct 13;13(615):eabe5640.

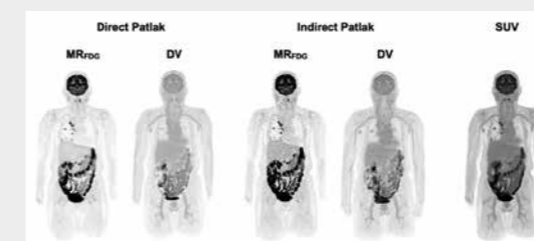


Markov transition chain for 68Ga-PSMA-11

Cancer

The analysis reveals a non-significantly higher PET positivity rate for 18F-PSMA-1007, but finds significantly greater rates of uncertain findings and false positive findings when compared to 68Ga-PSMA-11. We find differences in the two tracers in terms of clinical performance and cost efficacy. The method presented herein is generalisable and can be used with clinical or cost data for other countries or tracers.

I. Alberts et al. EJNMMI (2021) Epub.



Comparison between direct Patlak, indirect Patlak and SUV images of a lung cancer patient

Kinetic modelling and parametric imaging of dynamic FDG datasets from a long-axial FOV PET scanner in oncological patients

We demonstrated feasibility of total-body parametric imaging using direct and indirect Patlak methods and show that this approach can complement standard SUV images by providing substantially better tumour contrast relative to background.

H. Sari et al. EJNMMI (2021) Epub.

Department of Obstetrics and Gynecology

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Division of Obstetrics and Feto-Maternal Medicine



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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

- 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?
- Faculty 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
- Perinatal medicine intramural fund: Several grants for clinical studies

Highlights

Selected publications in 2021

Joerger-Messerli MS et al. Human Wharton's Jelly MSC-Derived Small Extracellular Vesicles Drive Oligodendroglial Maturation by Restraining MAPK/ERK and Notch Signaling Pathways. *Front Cell Dev Biol.* 2021 Mar 23;9:622539.

Spinelli M et al. Preimplantation factor modulates oligodendrocytes by H19-induced demethylation of NCOR2. *JCI Insight* 2021 Oct 22;6(20):e132335.

Salem Y et al. Are children born by cesarean delivery at higher risk for respiratory sequelae? *Am J Obstet Gynecol* 2021 Aug;S0002-9378(21)00866-8.

Vouga M et al. Maternal outcomes and risk factors for COVID-19 severity among pregnant women. *Sci Rep.* 2021 Jul 6;11(1):13898.

Zdanowicz JA et al. Red blood cell transfusion in obstetrics and its implication for patient blood management: a retrospective analysis in Switzerland from 1998 to 2016. *Arch Gynecol Obstet.* 2021; 303:121-8

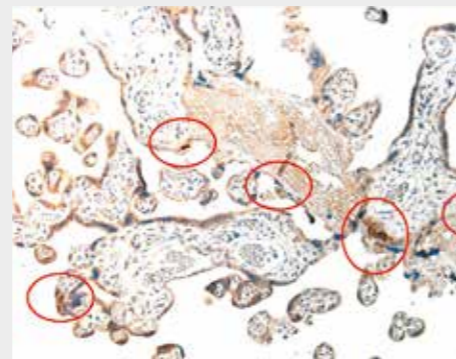


Fig: Detection of SARS-CoV-2 in placental tissue from women with acute COVID-19 in pregnancy (Renz P, Radan A et al.)

Division of Gynecology and Gynecological Oncology



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Director and Head Research

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PD Dr. Sara Imboden

PD Dr. Stefan Mohr

PD Dr. Konstantinos Nirgianakis

Dr. Franziska Siegenthaler

Dr. Thomas Andrieu

Dr. Lea Dümpelmann

Profile

- Pathophysiology of endometriosis and associated pain
- Recurrence and treatment non-response in endometriosis/adenomyosis
- Impact of endometriosis 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: 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

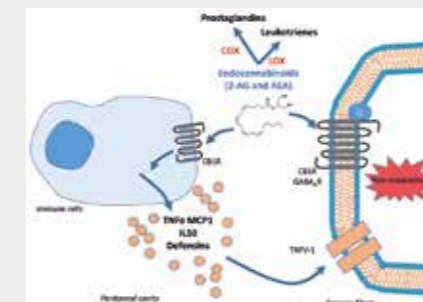
Grants

- Swiss National Science Foundation
- Bern Center for Precision Medicine (BCPM)
- Innosuisse – Swiss Innovation Agency
- Stiftung für Klinisch-experimentelle Tumorforschung

Highlights

Endocannabinoids (ECs) and endometriosis associated pain

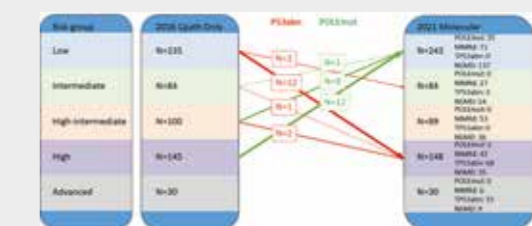
The role of endogenous, pain modulating ECs was examined in detail in groups of patients with precise descriptions of pain. The study has demonstrated a clear link between pain in the abdominal region and elevated EC levels, as well as elevated levels of inflammatory markers. We conclude that ECs both are analgetic and, by activation of the immune system, pain stimulating. Andrieu T. et al, Pain, 2021.



Model of pain modulation by ECs

Molecular diagnostics are evolving in endometrial cancer

In 2021, a joint ESGO/ESTRO/ESP committee updated their evidence-based guidelines for endometrial cancer, recommending a new risk grouping incorporating both clinicopathologic and molecular parameters. In our multi-center cohort of patients with molecular diagnosed endometrial cancer we applied the new risk grouping and compared the results to those of the prior 2016 clinicopathologic system. We found that the application of the 2021 molecular risk groups is feasible and shows significant differences in survival. The change in risk groups is given by TP53 and POLE mutations. IHC for TP53 and MMR and applying POLE sequencing is only needed in selected cases and leads to shifting risk groups both upward and downward for a sizeable number of patients. It is possible to significantly reduce the number of analyses required to implement the classification if resources are limited. Imboden S., Siegenthaler F. et al, Gynecologic Oncology, 2021.



Change between the old and new risk classification

Department of Ophthalmology

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Prof. Martin Zinkernagel
Co-Director
Head of
Outpatient
Department

Prof. Beatrice Früh
Anterior
Segment

Prof. Mathias Abegg
Orthoptic
Goldman
Foundation

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 vitreoretinal 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, Switzerland; 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, Switzerland; Lab for Retinal Cell Biology, Department of Ophthalmology, University of Zurich, Switzerland; Augenklinik, Universitätsspital Basel, Switzerland; Department of Ophthalmology, University Hospital Regensburg, Regensburg, Germany

Grants

- Molecular mechanisms of NR2E3-linked retinal degenerations SNF 33IC3031003A_169237
- Foundation Bertarelli: Associations between the ocular microbiome and the mucosal immune system in dry eyes
- 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 grand
- Foundation Haag-Streit: Development of a keratoconus detection algorithm by deep learning analysis and its validation on Eystar images in a clinical trial
- Hans-Goldmann Foundation: Sensitivity and specificity to diagnose eye disease using an objective, quantitative and semi-automatic eye examination
- Sutter-Stöttner-Stiftung: Verbindung zwischen Gliose und Fibrose bei der Netzhautdegeneration
- Hanela Stiftung: Neurodegeneration im Zentralnervensystem - Gibt es Korrelationen zwischen Hirn und Auge?

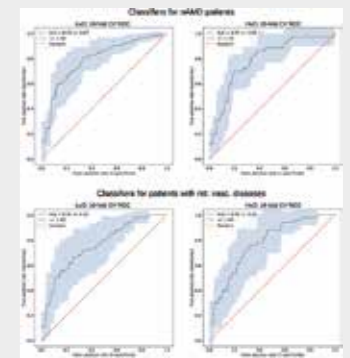
Highlights

Machine Learning Can Predict Anti-VEGF Treatment Demand in a Treat-and-Extend Regimen for Patients with Neovascular AMD, DME, and RVO Associated Macular Edema

We describe the use of an ML algorithm to predict anti-VEGF treatment demand using OCT data from baseline and the first 2 consecutive visits in a retrospective, real-world cohort of multiple retinal diseases. Machine learning classifiers may assist in establishing patient-specific treatment plans in the near future.

Ophthalmol Retina. 2021 Jul;5(7):604-624.

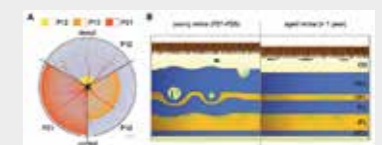
Mean receiver operating characteristic (ROC) curves of both classifiers and for the 2 pathologic groups



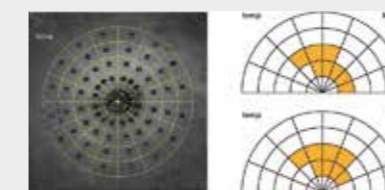
In vivo analysis of onset and progression of retinal degeneration in the Nr2e3 rd7/rd7 mouse model of enhanced S-cone sensitivity syndrome

Our data identified additional S-cones and photoreceptor outer segment maturation as likely triggers of 'rosette' formation. Initial microglia migration towards 'rosettes' is followed by monocyte/macrophage immigration. These findings further illustrate the validity of the Nr2e3rd7/rd7 mouse retina to study ESCS-associated disease mechanisms

Sci Rep. 2021 Sep 24;11(1):19032. doi: 10.1038/s41598-021-98271-7.



Disease mechanisms in C57BL/6J Nr2e3rd7/rd7 mice. Schematic drawing of disease mechanisms in the C57BL/6J Nr2e3rd7/rd7 mouse model of ESCS.

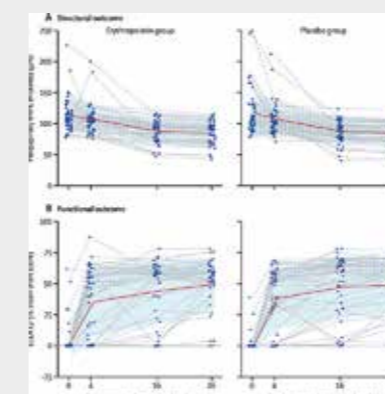


Regions of interest over the Macula for GCIPL comparison and thickness steps over the horizontal raphe.

Differences in morphology and visual function of myelin oligodendrocyte glycoprotein antibody and multiple sclerosis associated optic neuritis

In comparison to multiple sclerosis associated optic neuritis, Myelin oligodendrocyte glycoprotein immunoglobulin G associated optic neuritis is shown to be associated with more prominent acute vision loss and more pronounced global thinning of the pRNFL. Both entities resulted in similar final visual acuity and atrophy of the macular ganglion cell layer.

J Neurol. 2021 Jan;268(1):276-284.



Safety and efficacy of erythropoietin for the treatment of patients with optic neuritis (TONE): a randomised, double-blind, multicentre, placebo-controlled study

Erythropoietin as an adjunct to corticosteroids conveyed neither functional nor structural neuroprotection in the visual pathways after optic neuritis. Future research could focus on modified erythropoietin administration, assess its efficacy independent of corticosteroids, and investigate whether it affects the conversion of optic neuritis to multiple sclerosis.

Lancet Neurol. 2021 Dec;20(12):991-1000.

Global peripapillary RNFL thickness (3-5 mm) and LCLA, by treatment group

Department of Orthopedic Surgery and Traumatology

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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

- Steppacher S., Schmaranzer F.: "Automatic and patient-specific 3D MRI models of hip cartilage and labrum – a morphological and biochemical analysis for improved surgical decision making". Schweizerischer Nationalfonds SNF 2021
- Bastian J: Zementaugmentation am hinteren Beckenring bei osteoporotischen Ermüdungsfrakturen des alten Menschen. Sutter-Stöttner Stiftung 2021
- Wangler S., Schär M. Gueorguiev-Rüegg B., Moser H., Küenzler M.: "Identification of the optimal AC cerclage to restore horizontal stability, an FE-model and cadaveric based study». SECEC/ESSSE basic research grant 2021
- Gantenbein B., Dudli S., Albers C., Hausmann O.: Analysing the Transcriptome of Cells of Intervertebral Discs with Modic Changes and its Relevance for Spinal Fusion. CABMM University of Zurich

Highlights

President of European Hip Society 2021 - 2023

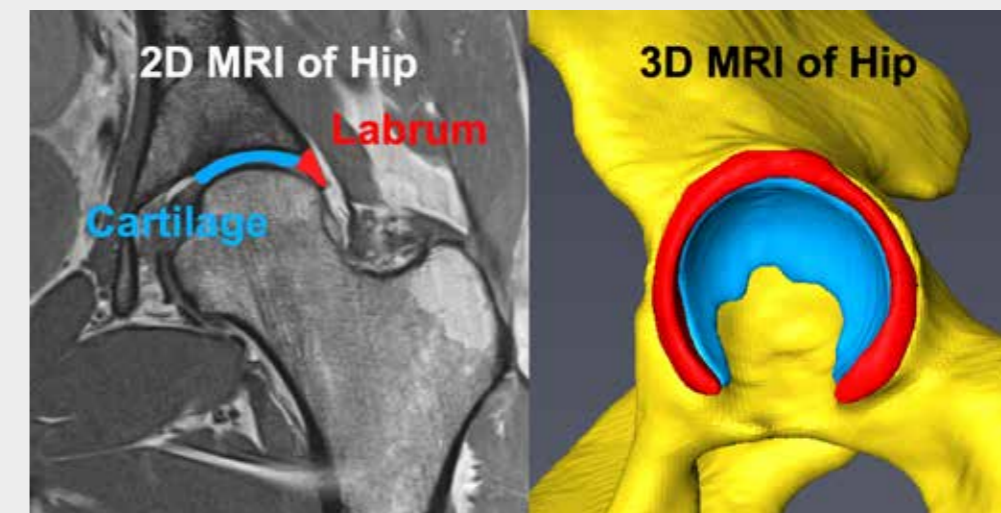
On the occasion of this year's Congress of the European Hip Society (EHS) in Lille on September 10-11, 2021, Prof. Klaus A. Siebenrock, MD, proudly accepted the presidency of the European Hip Society for the next two years.

As the president of this prestigious society, Prof. Siebenrock's goals are twofold: first, to bundle European scientific knowledge and promote academic work in the field of hip and pelvic disease and treatment in Europe, as well as to make it more visible throughout the world. Second, the education and training of young hip surgeons must be intensified. This should be done through fellowships at renowned European hip centers, structured educational courses and common educational content in the future.



Artificial Intelligence (AI) for Automatic 3D-Segmentation of Hip MRI Including Cartilage and Labrum – a SNF funded project

The hip research team has been granted funding by the SNF for an AI-based project with the aim to develop and validated automatic segmentation of hip MRI (600'000 CHF for a 4-year project of the applicants PD Dr. med. Simon Steppacher and Dr. med. et sci. nat. Florian Schmaranzer). The project is in collaboration with the personalised medicine group of the sitem center Inselspital of the University of Bern (project partner Dr. phil. Guodong Zeng). Osseous deformities of the hip joint (e.g. femoroacetabular impingement or hip dysplasia) can lead to osteoarthritis in young patients. The goal of joint-preserving surgery is to correct these deformities to prevent osteoarthritis. Surgical decision making is based on preoperative hip imaging and crucial for long-term success. Current MR imaging is limited to 2D visualization and advanced degenerative changes. The project aims to create 3D models of hip bone, cartilage and labrum using AI for automatic MR segmentation. In addition, a new biochemically sensitive MR sequence (delayed gadolinium enhanced MRI of cartilage [dGEMRIC]) is applied, which can detect cartilage degeneration significantly earlier. 3D MRI models of the hip with biochemically sensitive information will improve the understanding of hip pathomechanism and will allow detection of early cartilage degeneration resulting in more patient-specific surgical planning and superior surgical outcome.



Using artificial intelligence (AI) enables automatic 3D segmentation of hip MRI including cartilage and labrum.

Department of Osteoporosis

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Prof. Kurt Lippuner
 Director and Head Physician

Prof. Ernst Hunziker
 Head Translational Research Group

Dr. Daniela Frauchiger
 Study Coordinator

Dr. Penny Atkins
 Research Project Lead

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 Masterstudents in Pharmacy (year 4) in cooperation with BIHAM (Berner Institut für Hausarztmedizin), University of Bern
- Research Partners: ARTORG Center for biomedical engineering research, 3010 Bern; Centre for Metabolic Bone Diseases, University of Sheffield, UK; ETH Zurich, Institute for Biomechanics, 8093 Zurich; Free University of Amsterdam (ACTA), Amsterdam, the Netherlands; University Hospitals of Geneva, Service of Bone Diseases, 1205 Geneva; Zhejiang Chinese Medical University, Hangzhou, China.

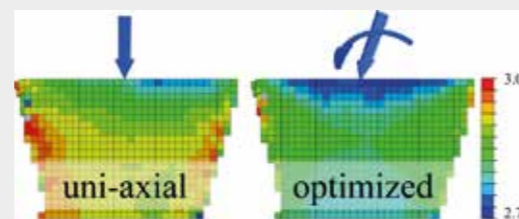
Grants

- MICROMESO SNF project grant no 165510 → 2021 (Co-PI)
- 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

Personalized loading conditions for HR-pQCT-based bone strength

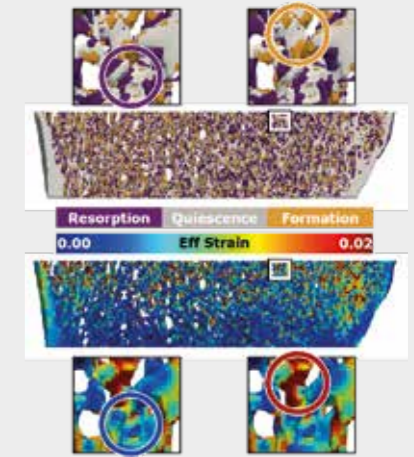
In vivo bone strength can be estimated by patient-specific HR-pQCT-based homogenized finite element (hFE) analysis. The applied loading boundary conditions are usually not personalized but perpendicular to the scan-axis (uni-axial). An optimization procedure was developed based on the form-function relationship of trabecular bone, to estimate personalized physiological loading conditions, retraced from local density and shape. The established optimized, multi-axial load case can store roughly 150% more energy, and the strain distribution is more homogeneous than the uni-axial load case. The promising results encourage refinement of the method and its application in clinics to neutralise the influence of the arbitrary reference line angulation selected during the scan.



Homogenized finite element models of a distal double section at the distal radius. Color scale indicates value of the objective function of the uni-axial and optimized multi-axial load case. Lower objective function values indicate strains closer to an optimal hydrostatic reference strain.

SNSF DACH Fracture study (DACH-Fx)

In collaboration with ETH Zurich, University Hospital Innsbruck, Ulm University, and Insel Orthopaedics, this study follows distal radius fracture patients over one year. Through detailed clinical assessment and HR-pQCT imaging of both the fractured and contralateral radius at six time points, bone remodeling and mechanoregulation can be measured. This study aims to characterize fracture healing at the level of single trabeculae as well as the clinical outcome contribution of age, osteoporosis, and bone biomarkers. In addition, analysis of both the fractured and contralateral images are currently being used to develop machine learning algorithms to identify motion artifact and identify the effect of supplemental Vitamin D and Calcium to bone remodeling and mechanoregulation.

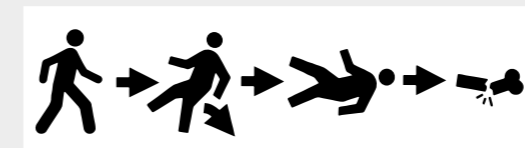


Bone remodeling and mechanics of the contralateral radius shows evidence of mechanoregulation through the regional correlation of bone resorption with low mechanical strain and bone formation with high mechanical strain

Atkins et al. JBMR Plus 2021, Apr 8.

An integrative fragility fracture risk model using recycled computed tomography scans

In this Sinergia (SNF) project conducted in collaboration between the Universities of Bern and Geneva, CT scans which were done for other clinical indications are used to develop and validate a novel integrative fragility fracture risk assessment tool. The model will integrate fall risk, bone strength and fall biomechanics to predict a subject's risk of fracture. First, a fall risk calculator is developed based on parameters suspected to be related to fall risk from other cohorts. Then, anthropometric, DXA and CT data are collected in the frame of a clinical study to estimate loads impacting on the body in case of a fall and to compute the failure load of the hip using subject-specific finite element models. The number of falls and fractures in our cohort are finally obtained via follow-up calls over a period of 3 years.



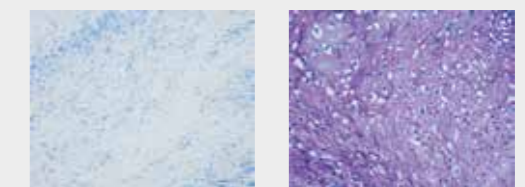
Integrative Hip Fracture Risk Calculator. The risk calculator for hip fracture is based on a mechanistic, probabilistic model that accounts of the risk of falling and filters the falls that result in a fracture. A fracture occurs only when the impact force on the hip that results from fall dynamics exceeds the femoral strength.

The synovium of human osteoarthritic joints retains its chondrogenic potential irrespective of age

The autologous synovium is a potential tissue source for local induction of chondrogenesis by tissue engineering approaches to repair articular cartilage defects such as they occur in osteoarthritis. It was the aim of the present study to ascertain whether the aging of osteoarthritic patients compromises the chondrogenic potential.

Our data revealed that in younger and older age groups alike, synovial explants from osteoarthritic joints can be equally well induced to undergo chondrogenesis.

Hunziker EB et al, Tissue Eng Part A. 2021 Dec 27.



left: Untreated control of human synovium
 right: Chondrogenically transformed synovium

Department of Pediatrics

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Prof. Matthias Kopp, Director
 Prof. Philipp Latzin
 Prof. Christa Flück
 PD Dr. Andrea Klein
 PD Dr. André Kiszun
 Prof. Christoph Aebi
 Prof. Jochen Rössler
 Prof. Karen Lidzba

Profile

- Training of PhD students in programs of the Graduate Schools, MD students, postgraduate training in pediatrics
- Early Life Matters (ELMA): A comprehensive interdisciplinary research strategy based on existing birth cohorts and clinical registers to create a platform for the promotion of pediatric research in Bern. ELMA pursues a translational approach from bench to prevention to understand what early environmental factors affect child health and development
- Endocrinology/Diabetology and Metabolism: Several clinical and translational (lab-based) projects in topics regulation and disorders of steroidogenesis, sex development, growth and obesity. Lab-based, molecular studies of rare genetic diseases. Clinical studies of rare metabolic and common disorders of endocrinology (type 1 diabetes, obesity in childhood).
- Haematology/Oncology: Study on haemophilia related mental illness (multicenter study). Evaluation of wearable devices for continuous vital data monitoring for children with chemotherapy. Needs and quality of life of childhood cancer survivors. Laboratory research on nanomedicine and immune therapy for pediatric sarcoma.
- Infectious Diseases: Pediatric sepsis: Host organization of the Swiss Pediatric Sepsis Study; Partner in a EU Horizon 2020 project; COVID-19 pandemic-related epidemiology of pediatric viral infections.
- Neuropaediatrics: Swiss Registry based clinical research in the domain of pediatric stroke, cerebral palsy, pediatric inflammatory brain disease and neuromuscular disorders. Pediatric stroke: HERO-study, PASTA-Trial an international multi centre treatment trial in pediatric stroke. Analysis on rehabilitation and reorganization after cancer (Brainfit-Study).
- Pediatric Emergency Medicine: Translational decision support research in pediatric emergency medicine (PEM) including a SNF-funded project on lung ultrasound and the design and evaluation of electronic decision-support tools; epidemiology of PEM condition as a member of the EU PEM research network; quality improvement in PEM.
- Pneumology: Research topics are lung development in health and disease, novel lung function tests and state-of-the-art diagnostics in rare diseases (such as cystic fibrosis and primary ciliary dyskinesia). Key projects are the BILD (www.bild-cohort.ch) and the SCILD (www.scild.ch) longitudinal study. Numerous international cooperation partners.

Grants

- Endocrinology/Diabetology/Metabolism: SNF 320030_197725 (Flück), SNF 310030M_204518 (Pandey), Novartis 20A015 (Flück), RNA&Disease UniBE Grant (Pignatti/Flück), IFCAH-ESPE grants (Böttcher/Pignatti)
- Haematology/Oncology: SNF SYNERGIA CRSII5_193694/1 (Rössler), Krebsforschung Schweiz (Ammann), Phospholipid Res. Center (Bernasconi), Fondation ISREC (Brack)
- Infectious Disease: DIAMONDS, Partner (2020-2024)
- Neuropaediatrics: SNF Nr. 193039 (Steinlin), Anna Müller Grocholski Stiftung (Everts)
- Pediatric Emergency Medicine: SNF Nr. 193342 (Keitel), Federal Office of Public Health
- Pneumology: SNF Nr. 182719 (Latzin), 179905 (Yammine), 168173 (Ramsey), 182871 (Frey)

Highlights



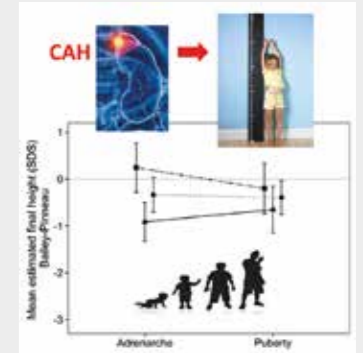
Continuous recording of vital signs with a wearable device (WD) in pediatric patients undergoing chemotherapy for cancer

Continuous recording of vital signs was possible across a very wide age range in pediatric patients undergoing chemotherapy for cancer. We now plan to study feasibility in the Everion® and in further WDs, applying measures to enhance compliance. Support Care Cancer, 2021, Sep;29.

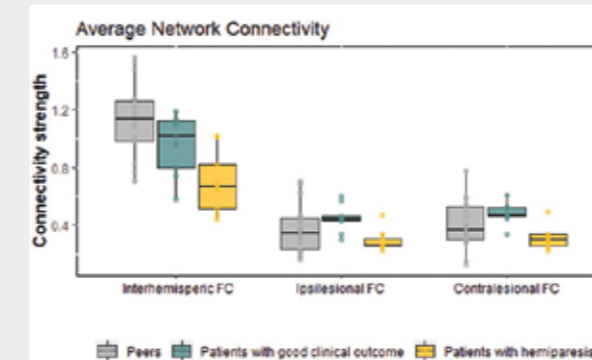
The WD Everion® placed on the upper leg of a 10-month-old child.

Characteristics of Growth in Children With Classic Congenital Adrenal Hyperplasia (CAH)

Although a growth acceleration and bone age progression can be observed in almost 50% of children with classic CAH during the years of adrenarche (e.g. 6-8 years of age), this does not result in a more compromised final height compared with CAH children who do not have bone age progression during these years. Thus, bone age may not be the best marker of metabolic control in CAH patients during the period of adrenarche, and additional growth-promoting treatments in otherwise well-controlled CAH patients seem unnecessary. J. Clin. Endocrinol. Metab., 2021, Oct 2.



CAH patients under glucocorticoid therapy achieve a final height close to normal.



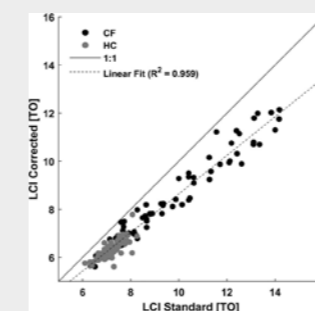
Motor network connectivity after pediatric stroke in patients with/without hemiparesis

Changes in the motor network after pediatric stroke

Children after a stroke may suffer from motor problems, such as hemiparesis. The cortical networks after pediatric stroke in relation to motor outcome have been little studied. We therefore investigated connectivity changes in the motor network after childhood stroke using resting state MRI. The findings suggest that better motor outcome is related to higher motor network connectivity strength. Thus, resting-state functional connectivity might be predictive for motor recovery after pediatric stroke. Science Rep., 2021, 11(1), 1-11.

Correction of sensor cross talk error in Exhalizer D multiple-breath washout device significantly impacts outcomes in children with cystic fibrosis

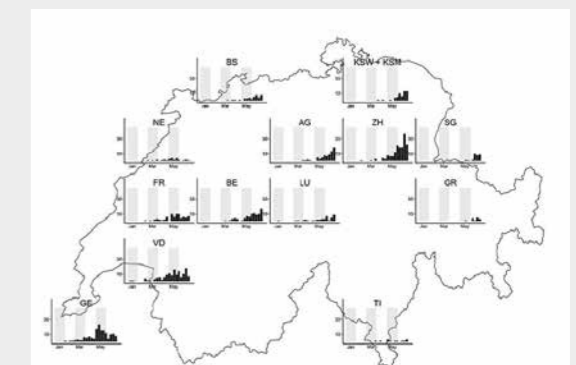
We investigated the sensor accuracy of a commercial lung function device (nitrogen multiple-breath washout) and identified that insufficient correction for cross talk effects in respiratory gas sensors lead to inaccurately calculated tracer gas concentrations. This error results in a 10-15% overestimation of lung function outcomes (lung clearance index and functional residual capacity) and longer test times compared to analysis performed using a proposed correction. J. Appl. Physiol., 2021, 131:3, 1148-1156.



Lung Clearance Index is significantly lowered after sensor correction.

COVID-19 related epidemiology of pediatric viral infections

Pandemic-related population-wide non-pharmaceutical interventions (NPI) have an unexpected impact on the seasonality of major pediatric viral and bacterial infections. We study the effect of NPI on Respiratory Syncytial Virus (RSV) and enteroviruses and found dramatic off-season activity of RSV in summer 2021 and absence of enteroviral meningitis in summer 2020, both of which profoundly affect pediatric in- and outpatient management. Swiss Med. Wkly, 2021 Sep 9.



Off-season RSV activity in Switzerland 2021.

Department of Pediatric Surgery

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<http://www.kinderklinik.insel.ch/de/unser-angebot/chirurgie-allgemein/>



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): Study of the expression of Tim-3 and Gal-9 molecules and their roles in leukemia and in pediatric and adult solid tumors: 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. M. Kordasc, 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

Grants

- Batzebär grants PD Dr. Fasler-Kan, PD Dr. Liebs
- AO foundation grants PD Dr. Ziebarth, Dr. Slongo

Highlights

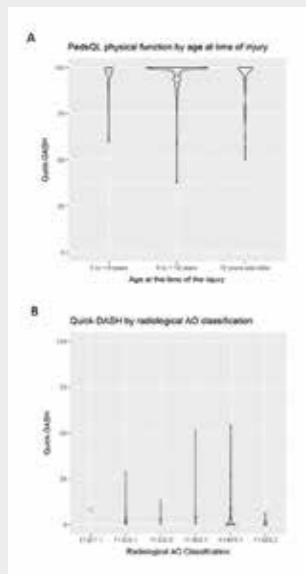


Fig 1 A: Paediatric Quality of Life Inventory (PedsQL) physical function by age groups after proximal humeral fracture. Fig 1 B: Respective Quick Disabilities of the Arm, Shoulder and Hand (Quick-DASH) by radiological AO classification.

Health-related quality of life after conservatively and surgically-treated paediatric proximal humeral fractures

The health-related quality of life (HRQoL) after conservatively versus surgically treated paediatric proximal humeral fractures is poorly understood. We assessed the HRQoL after this injury and asked if HRQoL was associated with age, radiological classification or treatment chosen. Among 228 patients who were treated for proximal humeral fractures between 2004 and 2017, 190 patients completed the Quick Disabilities of the Arm, Shoulder and Hand (Quick-DASH) (primary outcome), the Paediatric Quality of Life Inventory (PedsQL) and questions regarding patient satisfaction. Most fractures (90%) were simple, 10% were multifragmentary. 137 children (72%) were treated nonoperatively, 51 (27%) were treated by elastic stable intramedullary nailing (ESIN). After a median follow-up of 7.6 years (0.8 to 14.3) there was an overall mean Quick-DASH of 4.3 for girls and 1.2 for boys. The mean function score of the PedsQL was 94.7 for girls and 98.0 for boys. The mean psychosocial score of the PedsQL was 92.0 for girls and 94.1 for boys. Surgery and female sex were associated with lower satisfaction. In this cohort of 190 patients, where immobilization for mildly displaced fractures, and closed reduction and ESIN was used for displaced fractures, there was equally excellent mid- and long-term HRQoL when assessed by the Quick-Dash and the PedsQL. Liebs et al., J Child Orthop 15:204-214, 2021.

Functional role of galectin-9 in directing human innate immune reactions to Gram-negative bacteria and T cell apoptosis

Galectin-9, a member of the galectin family of proteins, is conserved through evolution and recent evidence demonstrated its involvement in innate immune reactions to bacterial infections as well as the suppression of cytotoxic immune responses of T and natural killer cells. Molecular mechanisms underlying the functions of galectin-9 remain largely unknown. In this work we confirmed that soluble galectin-9 derived from macrophages binds to Gram-negative bacteria by interacting with lipopolysaccharide (LPS), which forms their cell wall. This opsonisation effect most likely interferes with the mobility of bacteria leading to their phagocytosis by innate immune cells. Galectin-9-dependent opsonisation also promotes the innate immune reactions of macrophages to these bacteria and significantly enhances the production of IL-6, IL-1 β and TNF- α . In contrast, galectin-9 did not bind peptidoglycan (PGN), which forms the cell wall of Gram-positive bacteria. Moreover, galectin-9 associated with cellular surfaces was not involved in the interaction with bacteria or bacterial colonisation. However, galectin-9 expressed on the surface of primary human embryonic cells, as well as soluble forms of galectin-9, were able to target T lymphocytes and caused apoptosis in T cells expressing granzyme B. Furthermore, "opsonisation" of T cells by galectin-9 led to the translocation of phosphatidylserine onto the cell surface and subsequent phagocytosis by macrophages through Tim-3, the receptor, which recognises both galectin-9 and phosphatidylserine as ligands.

Schlichtner et al., International Immunopharmacology 100:108155, 2021

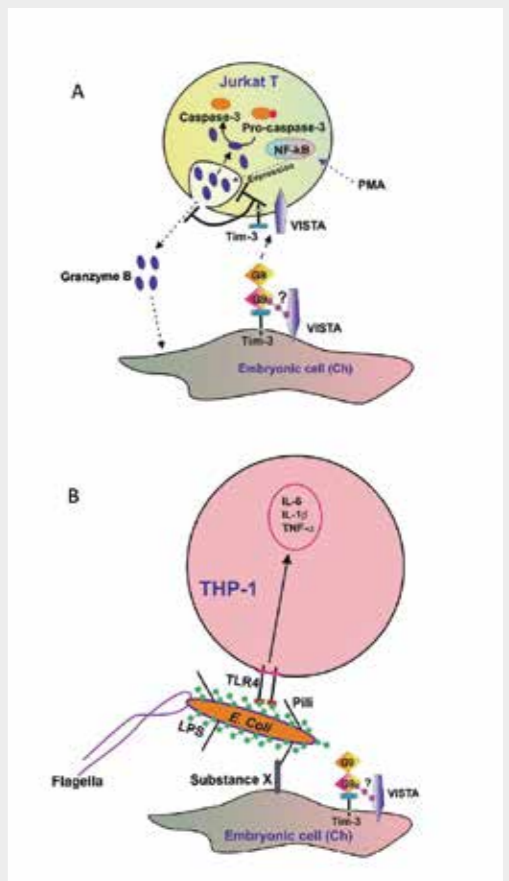


Fig 2 A: Galectin-9 and VISTA play a crucial role in suppressing the cytotoxic activities of T cells on human embryonic cells
 Fig 2 B: Galectin-9 is not involved in colonisation of Gram-negative bacteria on embryonic cells. The innate immune response to these bacteria was measured by detecting the amounts of IL-6, IL-1 β and TNF- α release using ELISA.

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 ($P < 0.05$, respectively). Severe NEC was related to congenital heart disease (CHD — OR 2.6, CI95% 1.2–5.8, $P 0.015$) and patent ductus arteriosus (PDA — OR 3.3, CI95% 1.6–6.9, $P 0.0012$), whereas death was related to the presence of PDA (OR 5.5, CI95% 2.3–14, $P < 0.001$). 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. M. Kordasz et al., Eur J Pediatrics doi.org/10.1007/s00431-021-04266-x, 2021.

Department for Plastic and Hand Surgery

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Prof. Mihai
Constantinescu
Co-Director



Prof. Esther
Vögelin
Co-Director

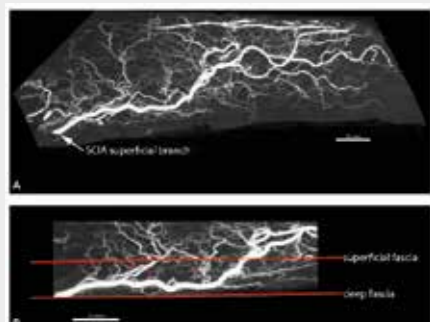
Profile

- 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 and innovative strategies for the diagnosis and treatment of critical ischemic tissue and malignant skin tumors.
- 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.

Grants

- “Novel inorganic nanohybrids for seroma management” (Innosuisse Grant) - 675'965.30 CHF

Highlights



MicroCT-overview illustrating the typical course of the superficial branch of the SCIA

The anatomical reliability of the superficial circumflex iliac artery perforator (SCIP) flap

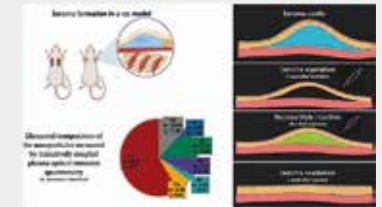
The SCIP flap appears to have a reliable vascular blood supply. The deep branch of the superficial circumflex iliac artery (SCIA) has the anatomic potential to be the preferred pedicle in case larger flaps with longer pedicles are necessary.

Zubler C, Haberthür D, Hlushchuk R, Djonov V, Constantinescu MA, Olariu R. Ann Anat. 2021 Mar;234:151624. doi: 10.1016/j.anat.2020.151624.

Mixed Metal Oxide Nanoparticle Formulations for the Treatment of Seroma

This study demonstrates the ability of inorganic nanoparticle formulations to reduce seroma formation in a rat model, without any detectable systemic adverse effects, emphasizing the potential of nanotechnological solutions in the therapeutic management of seroma in the clinical setting.

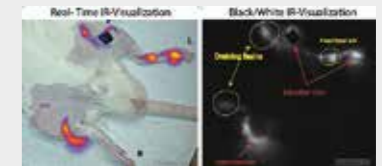
Lese I, Tsai C, Matter M, Wüthrich T, Scheer HS, Taddeo A, Constantinescu MA, Herrmann IK, Olariu R. ACS Biomater Sci Eng. 2021 Jun 14;7(6):2676-2686. doi: 10.1021/acsbomaterials.1c00283.



Presence of Donor Lymph Nodes Within Vascularized Composite Allotransplantation Ameliorates VEGF-C-mediated Lymphangiogenesis and Delays the Onset of Acute Rejection

Vascularized composite allotransplantation lymph nodes play a pivotal role in the regulation of graft rejection and underlines the potential of specifically targeting them in order to control graft rejection.

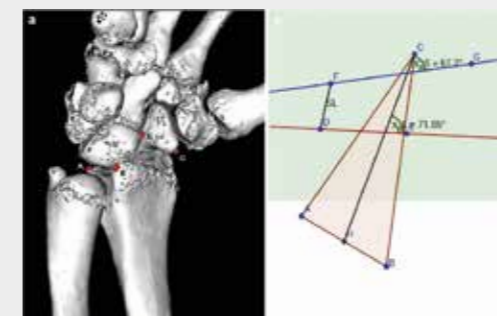
Olariu R, Tsai C, Abd El Hafez M, Milusev A, Banz Y, Lese I, Leckenby JI, Constantinescu M, Rieben R, Vögelin E, Taddeo A. Transplantation. 2021 Aug 1;105(8):1747-1759. doi: 10.1097/TP.0000000000003601.



Representative pictures (ventral views) of near-infrared lymphography. Real time (left) or black/white visualization (right) of near-infrared signal in lymphatic vessels after IGC injection

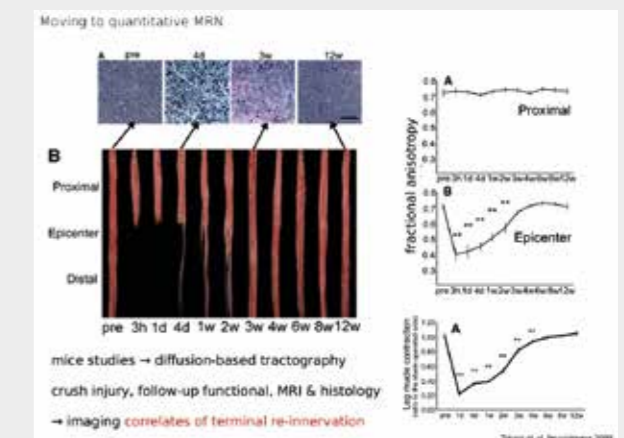
Reconstruction of a transected SL ligament with a bone-ligament transfer from the radio-luno-triquetral ligament reduces SL dissociation under axial load

The described surgical technique causes low donor-side morbidity and may be considered in addition to improve stability of injured scapholunate (SL) ligament if SL ligament suture alone does not appear sufficient. Haug, Luzian C. P.; Adler, Tom; Bignion, Dietmar; Voegelin, Esther (2021), Archives of orthopaedic and trauma surgery, 141(2), S. 341-347. Springer 10.1007/s00402-020-03690-2.



MRI in peripheral nerve lesions of the upper

The goal is to obtain morphologic data about nerve regeneration after traumatic nerve injuries and nerve repair, based on DTI-MRI examination correlated to the clinical and electrophysiological outcome. Consequently, objective signs with MRI examination during nerve regeneration are defined, to get better information for possible treatment options after nerve trauma or - surgery during nerve regeneration in conservatively or surgically treated patients. Extremities – a prospective observational study Merky, Dominique Nellie; Scheidegger, Olivier; Vögelin, Esther



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Prof. Thomas Geiser



Prof. Manuela Funke-Chambour



PD Dr. Gunar Günther



PD Dr. Anne-Kathrin Brill



Dr. Nikolay Pavlov



PD Dr. Sabina Guler



PD Dr. Amiq Gazdhar



PD Dr. Fabian Blank



Prof. Olivier Guenat

Profile

- Mimicking the healthy and diseased lung alveolar barrier with organs-on-chip technologies
- Pathophysiology of lung inflammation and fibrosis
- Exacerbations in fibrotic lung diseases
- Long-term consequences of infection (i.e. COVID-19, Tuberculosis) on the lung parenchyma and fibrogenesis
- Effects of cell senescence on idiopathic lung fibrosis and after COVID-19
- Biomarkers for lung fibrosis
- Effects of SARS-CoV-2 on lung cells
- Tuberculosis research in global health

Grants

- European Developing Countries Clinical Trial Partnership (CoreNB and STAT-TB, via G. Günther, dual appointment, University of Namibia)
- MRC UK – 3HTB study (via G. Günther, dual appointment, University of Namibia)
- Bund – Länder – Programm der Bundesregierung Deutschland (via G. Günther, dual appointment, University of Namibia), Aufbau eines BSL 3 Labors an der University of Namibia
- Lungenliga (Bern) to Amiq Gazdhar
- Lungenliga (Schweiz) to Tiziana Cremona
- Johanna Dürmüller Foundation, COVID-19 lung study, PI Prof. Manuela Funke-Chambour
- Lungenliga Bern, COVID-19 lung study, PI Prof. Manuela Funke-Chambour
- Bangerter Foundation, Senescence and lung fibrosis, PI Prof. Manuela Funke-Chambour
- Lungenliga Schweiz 2019 – 2022 (Lung Organoid Development), Prof. Thomas Geiser, PD Amiq Gazdhar
- Lindenhofstiftung Bern (2020 – 2021), Project Grant Treatment response in inflammatory and non-inflammatory systemic sclerosis
- Swiss National Science Foundation – Bioartificial Microvascularized Lung Alveoli Array, project 185365 (Prof. Olivier Guenat)
- Swiss 3R Competence Center – Idiopathic pulmonary fibrosis-on-Chip, project OC-2019-025 (Prof. Olivier Guenat and Prof. Thomas Geiser)

Highlights

Awards

- Meeting of the Swiss Respiratory Society (SGP) by
- Best Oral Presentation Vedat Burak Ozan (Group Geiser/Gazdhar)
 - Best Oral Presentation (2nd place) Seyran Mutlu (Group Blank)



ATS Cover page, Vol 18, No 12, December 2021

Azithromycin has been suggested for patients with idiopathic pulmonary fibrosis (IPF). We investigated azithromycin in patients with IPF in several centers in Switzerland in a double-blind randomized controlled cross-over study design. There was no significant difference for cough between azithromycin and placebo. However, gastrointestinal adverse effects were more frequent and the use of azithromycin against chronic cough in patients with IPF cannot be supported. This study has been published in the December issue of Annals of the American Thoracic Society. The editors have selected the leading center Bern for the front page cover to underline the importance of this study.

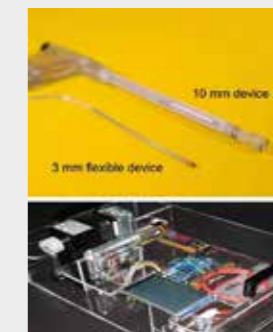
Lung fibrosis and pulmonary rehabilitation

In an extensive, multicenter study a research team with members from Switzerland, Germany, Canada, USA and Australia it was shown that a successful rehabilitation leads to a greater possibility of survival with lung fibrosis. The study, published in the British Medical Journal "Thorax" with PD Dr. Sabina Guler as the first author was conducted by the University of British Columbia, Vancouver, and the University of Bern.



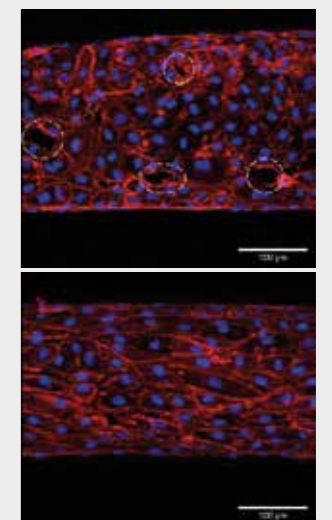
Preclinical cancer research: electrospray successfully tested

Current treatment for any cancer is either surgery, radiotherapy or chemotherapy. Chemotherapy is given systemically to the whole body and a very less percentage of the drug reaches the tumour but causes severe side effects. Electrospray is a physical method that reaches the tumour directly, delivers the drug locally into the tumour. Electrospray is more efficient than current therapies: 80% reduction in tumour volume was observed after electrospray mediated localized treatment compared to conventional treatment in preclinical settings.



Remodelling of an in vitro microvessel exposed to cyclic mechanical stretch

We investigated the effect of mechanical cyclic stretch on pulmonary blood capillaries, as induced by respiratory movements. Instead of using a monolayer of endothelial cells, 3D perfusable microvessels made of human lung microvascular endothelial cells embedded in a gel layer were exposed to cyclic stretch. We observed several phenomena with endothelial monolayers. VEGF-induced angiogenic sprouting significantly decreased in the presence of cyclic stretch. Whereas treatment with VEGF increased vascular permeability, cyclic stretch restored the tightness of the vascular barrier and significantly decreased vascular permeability. One most important finding of this study was that a 3D microvasculature can be subjected to much higher mechanical cyclic strain than described in the literature without disruption of the barrier.



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Prof. Daniel M. Aebbersold
Director



PD Dr. Kristina Lössl



PD Dr. Evelyn Herrmann



PD Dr. Olgun Eliçin



Dr. Mohamed Shelan



Dr. Ekin Ermis



Prof. Steffen Eychmüller



Prof. Peter Manser



Prof. Michael K. Fix



Prof. Yitzhak Zimmer



PD Dr. Michaela Medova

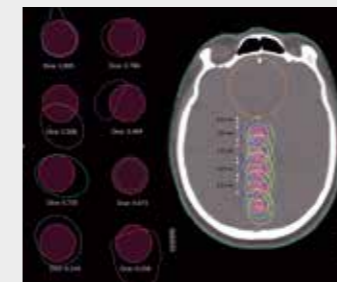
Profile

- 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; (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 Sydney, 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 Excellenza-Grant (Sofia Zambrano)
- EU-Horizon (iLIVE)
- Swiss National Science Foundation
- Innosuisse
- Merck KGaA
- Werner und Hedy Berger-Janser Stiftung
- Research Framework Agreement, Varian Medical Systems Inc.
- sitem-insel Support Fonds
- Faculty of Medicine, University of Bern

Highlights



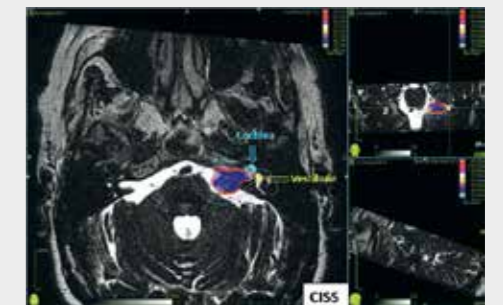
Synthetic experiment to assess the relationship of distance to the target on the dice-dose effect

The predictive value of segmentation metrics on dosimetry in organs at risk of the brain

In this study we presented results, investigating the correlation between popular geometric segmentation metrics and dose parameters for Organs-At-Risk (OAR) in brain tumor patients, and investigated properties that might be predictive for dose changes in brain radiotherapy. We found a low correlation between segmentation metrics and dosimetric changes for OARs in brain tumor patients. Results suggest that the current metrics for image segmentation in RT, as well as deep learning systems employing such metrics, need to be revisited towards clinically oriented metrics that better reflect how segmentation quality affects dose distribution and related tumor control and toxicity. R. Poel, E. Rüfenacht, E. Herrmann et al.; Medical Image Analysis 73 (2021) 102161.

Vestibular dose correlates with dizziness after radiosurgery for the treatment of vestibular schwannoma

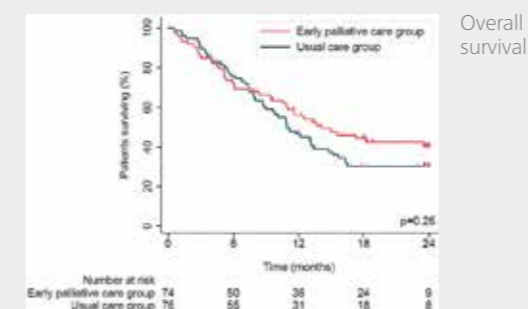
In the literature few data is available on vestibular toxicity and radiotherapy. We conducted this study to evaluate the impact of radiosurgery doses on dizziness in patients with vestibular schwannoma. We found a significant correlation between the radiation dose received by the vestibule during radiosurgery and the vestibular outcome: 5 Gy and above minimum vestibular doses significantly worsened dizziness. Ermis et al., Radiat Oncol., 2021.



MR image showing vestibule with different isodose-lines from a radiosurgery plan

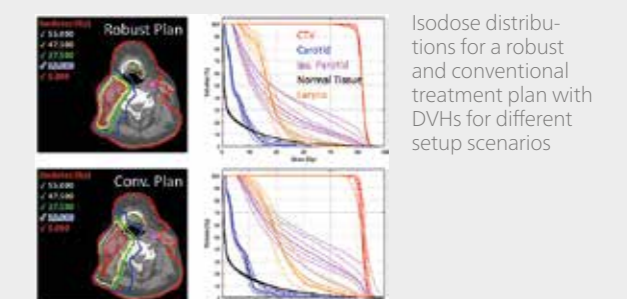
Single early palliative care intervention added to usual oncology care for patients with advanced cancer: A randomized controlled trial (SENS Trial)

In this challenging clinical trial with highly vulnerable patients we found that early palliative care integration performed as a single intervention does not significantly change distress levels or quality of life, but at the same time that addressing the end of life has no negative effect on both outcomes neither. A trend towards longer survival of the intervention group can be observed. Eychmüller et al., Palliative medicine, 2021.



Robust optimization for mixed-beam radiotherapy

Mixed beam radiotherapy combines intensity-modulated photon beams with intensity- and energy-modulated electron beams. For this treatment technique a robust optimization method was developed and experimentally verified. The robust optimization is based on a hybrid direct aperture optimization using accurate Monte Carlo calculated dose distributions. Robust optimized treatment plans were compared with conventional generated plans demonstrating that robust optimization is a promising alternative approach for mixed beam radiotherapy. Heath et al., Med. Phys., 2021.



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Prof. Britta Maurer Prof. Martin Bachmann PD Dr. Monique Vogel PD Dr. Alexander Eggel 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; 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, UK; Allergy Therapeutics (UK) Ltd., Dominion Way, UK; BRSC, Riga, Latvia; Anhui Agricultural University, Hefei, China; Novartis Pharma AG, Basel, Switzerland; Prof. Theodore Jardetzky, Stanford University, USA; Prof. Tony Wyss-Coray, Stanford University, USA

Grants

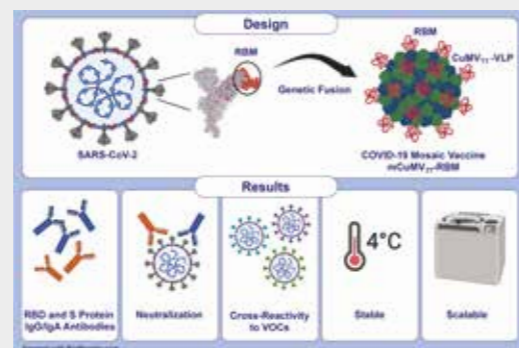
- Swiss Cancer League to Prof. Dr. Martin
- Innosuisse to Prof. Dr. Britta Maurer
- National Institute of Health R01 Subaward to PD Dr. Alexander Eggel
- Jubiläumsstiftung von Swiss Life to Dr. Kerstin Klein

Highlights

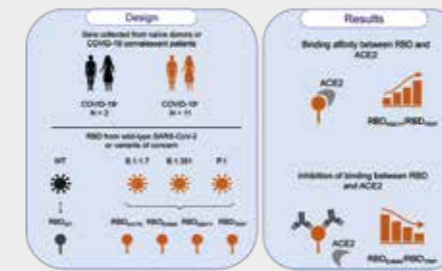
A scalable and highly immunogenic virus-like particle-based vaccine against SARS-CoV-2

Vaccination against COVID-19 is the most way to stop the still on-going pandemic. While available vaccines are effective, it would be desirable to also have more classical vaccines at hand for the future. We have developed a scalable and immunogenic virus-like particle (VLP)-based vaccine by genetically fusing the receptor binding motif (RBM) of the SARS-CoV-2 into cucumber mosaic virus, called CuMVT-RBM. The data showed that this vaccine is highly immunogenic and scalable, capable of viral neutralizing antibodies, which show cross-reactive to mutant RBMs for variants of concern (VOC).

Mohsen, MO et al. Allergy August 2021. doi:10.1111/all.15080.



Development and characteristics of VLP-based COVID-19 vaccine



Binding affinity and inhibition capacity of mutant RBDs

Molecular definition of SARS-CoV-2 receptor binding domains mutations: Receptor affinity versus neutralization of receptor interaction

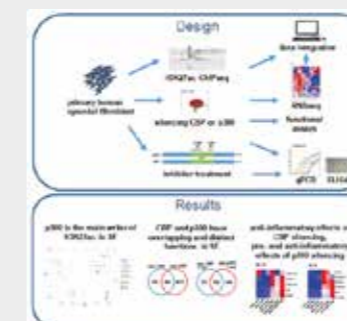
Several new variants of SARS-CoV-2 have emerged since fall 2020 which have multiple mutations in the receptor-binding domain (RBD) of the spike protein. It is unclear which mutations affect receptor affinity versus immune recognition. Thus, we assessed the molecular basis for antibody escape and how the RBD mutations present in two variants of concern (B.1.1.7 and P.1) influence the affinity to the receptor. We demonstrated that single mutations either affect receptor affinity or immune recognition while triple mutants RBD combine both features.

Vogel M et al. Allergy, May 2021. Doi: 10.1111/all.15002.

Individual functions of the histone acetyl transferases CBP and p300 in regulating the inflammatory response of synovial fibroblasts

A persistent H3K27ac is associated with a sustained inflammatory response of synovial fibroblasts (SF) in rheumatoid arthritis. We showed that the histone acetyl transferases (HAT) CBP and p300 undertook overlapping, and in particular at gene levels, distinct regulatory functions in SF. Whereas CBP regulated specifically interferon-response genes, silencing of p300 had pro- and anti-inflammatory functions. Treatment with HAT and bromodomain protein inhibitors targeting CBP/p300 mirrored the effects of p300 silencing, indicating that such inhibitors are not sufficient to be used as anti-inflammatory drugs.

Krošel M et al., J Autoimmun, 2021. Doi:10.1016/j.jaut.2021.102709.

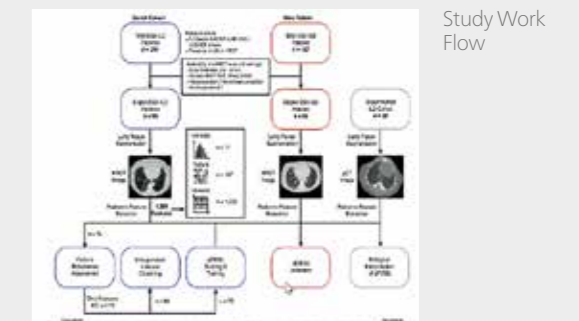


Studying individual functions of CBP and p300 in primary human synovial fibroblasts

Computed tomography-based radiomics decodes prognostic and molecular differences in interstitial lung disease related to systemic sclerosis

Radiomic features calculated from routine medical images show great potential for personalized medicine in cancer. Patients with systemic sclerosis (SSc), a multi-organ autoimmune disorder, have a similarly poor prognosis due to interstitial lung disease (ILD). We showed that radiomic profiling performed on standard-of-care HRCT images served as a non-invasive means to capture the SSc-ILD heterogeneity by decoding clinical and prognostic differences and relaying pathophysiologic information. We provided a clinically applicable quantitative risk score for predicting PFS in SSc-ILD, which improves upon conventional risk factors.

Schniering J, et al. ERJ 10.1183/13993003.04503-2020

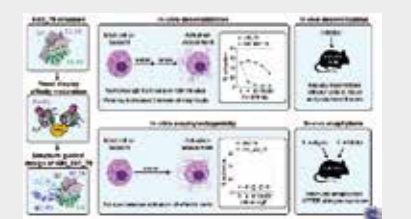


Study Work Flow

Structure-guided design of ultrapotent disruptive IgE inhibitors to rapidly terminate acute allergic reactions

In this study, we developed fast-acting disruptive IgE inhibitors that rapidly and systemically desensitize allergic effector cells in the blood as well as in peripheral tissues of transgenic mice carrying the human high-affinity IgE receptor. These novel disruptive inhibitors are remarkably potent as they can significantly alleviate pre-initiated allergic reactions in a mouse model of systemic anaphylaxis within minutes of application.

Pennington LF and Gasser P et al., JACI, October 2021. Doi: 10.1016/j.jaci.2021.03.050.



Structure guided design of fast, safe and potent anti-IgE inhibitors

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Director a.i.

Prof. Ralph A. Schmid
Former Director

PD Dr. Patrick Dorn

Dr. Roland Kuster

Dr. Adrian Zehnder

Dr. Jon Andri Lutz



Dr. Thanh-Long Nguyen

Dr. Konstantinos Gioutsos

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/Eszen/Changsha (China)/Shanghai China)

Grants

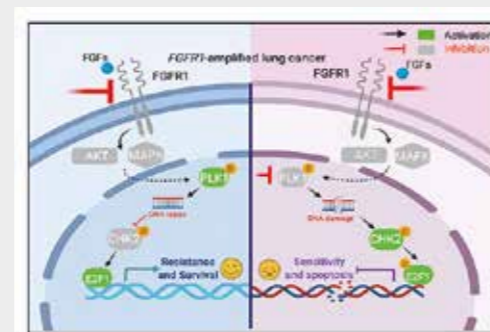
- Swiss National Science Foundation (310030_192648, IZSEZO_195105)
- Swiss Cancer League (KFS-4265-08-2017; KFS-4851-08-2019)
- China Scholarship Council (201606230238; 201708530258; 201606740067; 201808170004; 201906240084)
- Lungeliga Bern

Highlights

Synergistic Combination Therapy for FGFR1-Amplified Lung Cancer

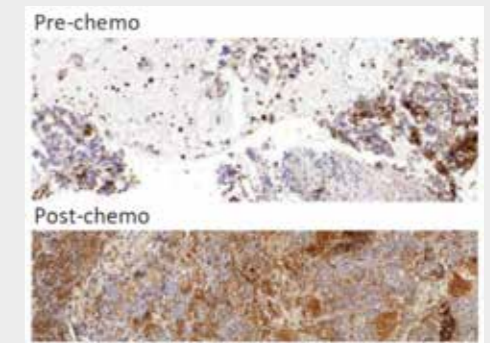
FGFR signaling is frequently activated in lung cancer. However, FGFR inhibitors (FGFRi) have provided little clinical benefit in patients with FGFR1-amplified tumors. We performed kinome-wide CRISPR/Cas9 loss-of-function screens and identified PLK1 as a synthetic lethal target in FGFRi-treated FGFR1-amplified lung cancer cells. Consequently, FGFRi and PLK1i synergize to enhance cancer cell death in vitro and in vivo. Our results reveal PLK1 as a key determinant of FGFRi sensitivity and establish a synergistic drug combination to treat FGFR1-amplified lung cancer.

Yang et al. Cancer Res. 2021; 81: 3121-3133.



Chemotherapy increases CDA and TYMP expression thereby rendering resistant lung cancer cells susceptible to subsequent 5'-DFCR treatment

We performed a small-scale screen of mitochondrial metabolism inhibitors, which revealed that 5'-DFCR selectively targets chemotherapy-resistant lung cancer cells characterized by high CDA and TYMP expression. In a subset of patient tumors, CDA expression was also increased after treatment with neoadjuvant chemotherapy. Gao et al., J Exp Clin Cancer Res, 2021. Apr 19;40(1):138.



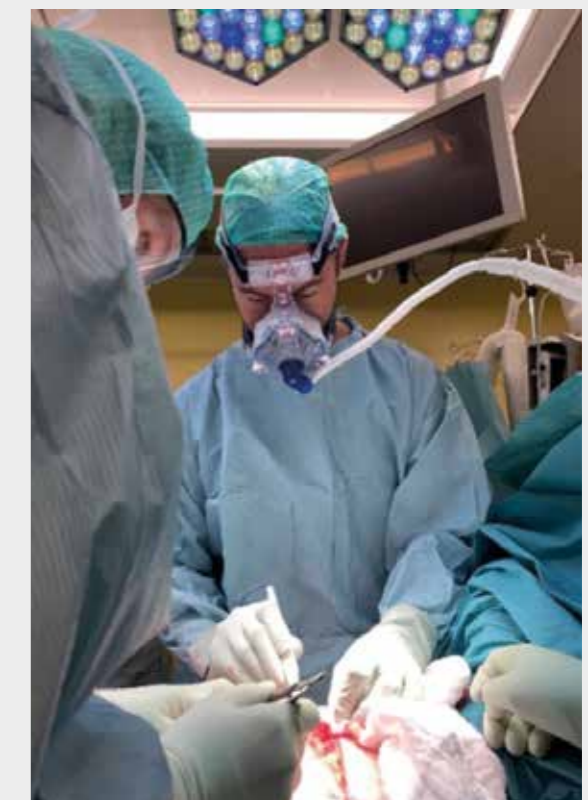
Blunt chest trauma after mechanical resuscitation manoeuvres appears to have a significant impact on the often complicated course.

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., ICVTS (Under review).



The Dangers of Surgical Smoke and the Importance of its Evacuation

We examined the concentrations of surgical smoke generated during surgery by electrocautery devices in our operating theatre. We found that this surgical smoke contains various carcinogenic substances similar to those found in cigarette smoke. We furthermore could show that mobile smoke evacuation systems are able to reduce smoke emissions significantly and might have the potential to also clear the air over the wound from bacterial as well as viral particles including Coronavirus (SARS-CoV-2). (2 Manuscripts under review).



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Prof. George N. Thalmann Prof. Fiona Burkard Prof. Marianna Kruithof-de Julio PD Dr. med. Bernhard Kiss 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.
- 5 Groups (Thalmann, Burkhard, Kruithof-de Julio, Kiss, Monastyrskaya)
- Investigation of pathophysiological processes that contribute to tumor diseases and bladder dysfunction.
- External Partners: 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; Cristina Müller, Center for Radiopharmaceutical Sciences ETH-PSI-USZ, Paul Scherrer Institut, Zürich, Switzerland; 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; Duke University, Durham USA; Swiss Institute for Bioinformatics, HEIG-VD, TKI Bern, ETH Zürich

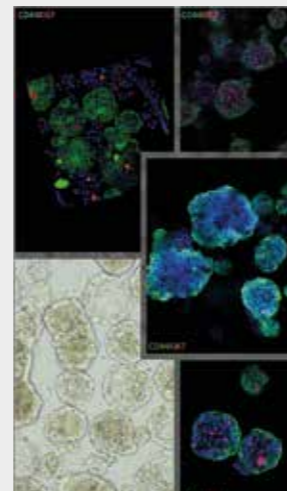
Grants

- Swiss National Science Foundation (#179265, #189149, #184933, #189369, #175773/1, #182966/1, # 202297)
- 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 Grant Nr 41236.1 IP-LS
- 3RCC OC-2019-003
- Initiator Grant (UBERN)
- Cancer Sniffing Dogs, Robmar Foundation

Highlights

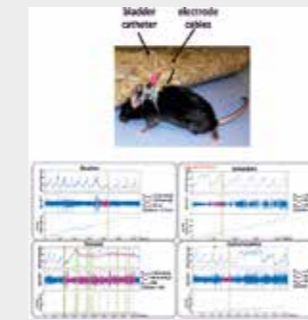
Preclinical Models for the Translational Study of Urological Cancers

We have 1. generated patient derived xenografts (PDX) and patient derived organoids (PDO) from biopsies of prostate and bladder cancer (Karkampouna et al. (2020)). 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.2020). 4. customized the microvasculature-on-chip device to mimic the bone microenvironment. 5. generated a unique PDX BRCA2 mutant



Prostate Cancer Organoids

and fully characterized it (Karkampouna et al. 2020). 6. Performed a medium throughput screen with NEXUS and identified 16 compounds that are currently being used on PDO (Karkampouna et al. 2020; LA Manna 2020 FrOnc). 6. identified CRIPTO, a cell surface protein, as a driver of bone metastatic progression.



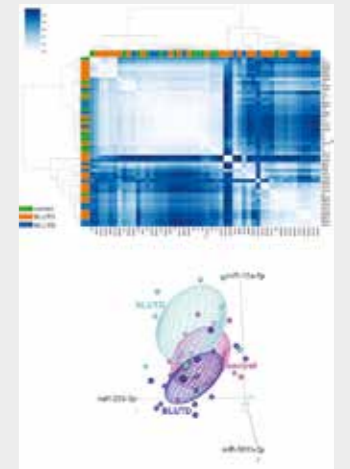
UDI and EMG measurements in awake mice

Novel mouse urodynamic model including repeated detrusor pressure and external urethral sphincter activity measurements

Urodynamic investigation (UDI) is the only objective method to assess bladder function in humans. We developed the first mouse model including detrusor pressure and external urethral sphincter (EUS)-EMG measurements in a repeated manner. The presence of electrodes next to the EUS does not obstruct the bladder outflow as no differences were found in urodynamic parameters between the two groups. Midazolam, Fentanyl and Hydromorphone interfere with the physiological bladder function, causing detrusor pressure increase in all three drug conditions. The exposure to Hydromorphone significantly increased the duration of micturition cycles and detrusor control was lost upon Fentanyl exposure, leading to urine leakage. Therefore, we suggest to perform UDI in mice in an awake condition and to omit drug exposure.

Urinary miRNA profiles discriminate between obstruction-induced bladder dysfunction and healthy controls

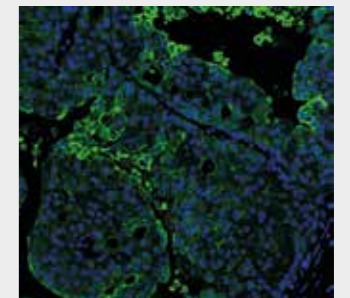
The symptoms of urgency, frequency and incomplete emptying are often shared between the benign prostatic obstruction-induced (BLUTO) and the neurogenic (NLUTO) bladder dysfunction. We analysed two age-matched groups of healthy subjects and show that the number of secreted urinary vesicles and expression of several miRNAs were higher in the young group. We demonstrate that a three urinary miRNA signature (miR-10a-5p, miR-301b-3p and miR-233-3p) could discriminate between controls and the patients with BLUTO and NLUTO. This panel of representative miRNAs can be further explored to develop a non-invasive diagnostic test for bladder outlet obstruction



Urinary miRNAs discriminate between patients with LUTD and controls

The role of CRIPTO signaling in lethal prostate cancer

Cripto is an oncofetal protein that 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.



Cripto Expression in genetically engineered mice models of prostate cancer

Cancer Sniffing Dogs for the detection of bladder cancer

With the SNIF DOGS SWITZERLAND Association we are testing the potential of dogs trained at detecting urothelial cancers in the urine of patients in order to improve diagnosis and decrease numbers of cystoscopies in follow up. 4 Dogs of different age are being trained after they were socialised in a family. They are able to detect bladder cancer and the detection rates are under analysis and in a next step we will test their capacity prospectively.

Department for Visceral Surgery and Medicine

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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

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 Prof. Guido Beldi, Senior 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
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Dr. med. et phil. Corina Kim, Senior Surgeon Visceral Surgery
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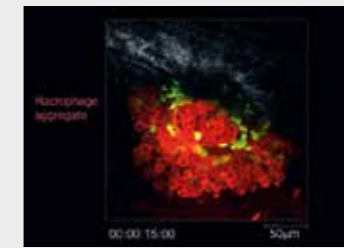
Profile

- Visceral Surgery – Gastroenterology – Hepatology
- Endoscopy Unit; Transplantation
- External Partners: ETH Zurich, Systems Biology; 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, Clinic for Hepatology, Germany; McGill University Health Centre, Division of Gastroenterology & Hepatology and Division of Infectious Diseases, Montreal; SCCS (Swiss Hepatitis C Cohort Study); STCS (Swiss Transplant Cohort Study); FLIP Kohorte (European Tatty Liver: Inhibition of Progression); CLIF Consortium (European Foundation for the study of Chronic Liver Failure); VALDIG Consortium (Worldwide Vascular Liver Disease Group).

Grants

- SNF: STOP? II trial - Cluster randomized clinical trial to test the implementation of a toolbox for structured communication in the operating room to reduce surgical mortality (Prof. Guido Beldi, CHF 3'194'160)
- SNF: SINERGIA - Functional chemoinformatic modelling of the host cell metabolome to fight apicomplexan parasites (Prof. Deborah Stroka, CHF 671'175)
- Novartis foundation: Defining macrophage and mesothelial cell interactions in post-surgical injury repair and adhesion formation (Dr. Joel Zindel, CHF 80'000)
- ERC Starting Grant: Microbiota and immune responses at weaning predict the susceptibility to chronic inflammatory diseases in adulthood – WePredict (Prof. Ziad Al Nabhani, CHF 1'368'972)
- Botnar Foundation: Living microbial diagnostics to enable individualized child health interventions (Prof. Andrew Macpherson, CHF 660'000)
- SNF: Disambiguation and reconstitution of an elastic network of microbiota and host in the small intestine upon a feeding challenge (Prof. Benjamin Misselwitz, CHF 499'759)
- NIH: Non-invasive SubHarmonic Aided Pressure Estimation of portal hypertension (Prof. Annalisa Berzigotti, USD 505'597)
- EU: Creation of a multicentre and multidisciplinary European registry of prospective drug-induced liver injury cases (ProEuro-DILI, TransBioLine) (Dr. Guido Stirnimann, CHF 31'284)
- SAMW and Bangerter-Rhyner Foundation (Young talent in clinical research beginner grant): Improving non-invasive assessment of advanced fibrotic metabolic-dysfunction associated liver disease (MAFLD) in diabetic patients (Dr. Naomi Lange, CHF 73'660)

Highlights

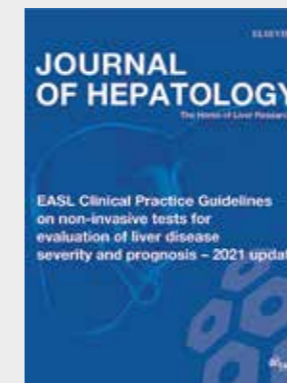


Primordial GATA6 macrophages function as extravascular platelets in sterile injury

A study published in Science 2021 by Joel Zindel, Daniel Candinas, and colleagues demonstrated by using intravital microscopy that the platelet-like aggregation of GATA6+ macrophages leads to post-surgical peritoneal adhesions. This study introduces macrophage aggregation inhibitors and their potential use in treating peritoneal adhesions.

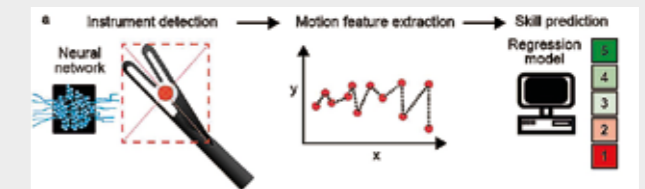
Towards an improved use of non-invasive tests in patients with liver disease and in patients with portal hypertension

Non-invasive tests (NITs) and in particular elastography are increasingly used in hepatology. In 2021 Annalisa Berzigotti chaired the clinical practice guidelines of the European Association for the Study of the Liver on the use of NITs to diagnose, stage and stratify the risk of liver-related events in chronic liver disease, and chaired the panel on NITs in the seventh Baveno Consensus on portal hypertension. The EASL and Baveno recommendations have a large impact on clinical practice worldwide.



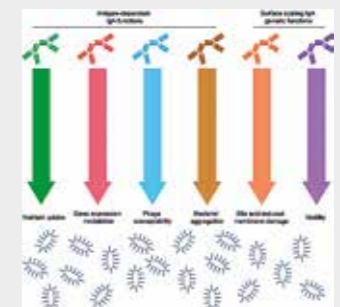
Automated assessment of surgical skills

In a proof-of-concept study researchers from surgery have together with Caresyntax shown the fundamental feasibility of an artificial intelligence (AI)-based assessment of a surgeon's skill in the context of a surgical procedure. Using AI we identified good or moderate surgical skill with high accuracy. Our method of assessing surgical skills was based on the analysis of instrument movement. The research team used a newly developed, three-stage approach using 242 videos of laparoscopic gallbladder removal procedures. The first step was to identify the instruments used. For this purpose, a convolutional neural network was trained to recognize the instruments. In the second step, the movements were analyzed, and their patterns were extracted. In the third step, the extracted movement patterns correlated with rating results by experts using linear regression.



Parallelism of intestinal secretory IgA shapes functional microbial fitness

Immunoglobulin A (IgA) is the most produced antibody class at mucosal surfaces, but very little is known about how it controls our intestinal bacteria. A study published in Nature by A. Macpherson and T. Rollenske shows that the overall secretory IgA antibody response has multiple components that exert different effects on intestinal bacteria. These different functions act in parallel to control our commensal bacteria.



Clinics at the University Hospital, Universitäre Psychiatrische Dienste (UPD)

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University Hospital of Child and Adolescent Psychiatry and Psychotherapy
University Hospital of Psychiatry and Psychotherapy



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Prof. Stefan Klöppel



PD Dr. Jessica Peter



PD Dr. Anna-Katharine Brem



PD Dr. Severin Pinilla

Profile

- Teaching students of medicine as well as graduate students at the Graduate School for Health Science (GHS)
- 2 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
- 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 Zürich, Switzerland; 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)
- Synapsis Foundation, Heidi Seiler Foundation, Peter Bockhoff Foundation
- Velux Foundation
- Bangerter-Rhyner Foundation
- SISF (Sitem Insel Support Funds)
- Age Foundation

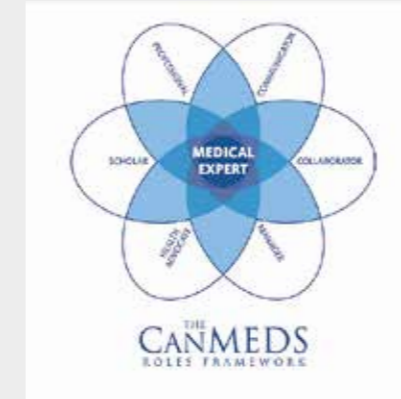
Highlights

Attenuating cognitive decline related to Alzheimer's disease through serious game-based cognitive training

Healthy aging is often accompanied by decline in cognitive functioning. Pathological brain changes that occur in neurodegenerative disorders (e.g., dementia) promote this cognitive decline and result in impairments in activities of daily living. In the current study we investigate the efficacy of a tablet-based cognitive training to improve cognitive performance in individuals with an increased risk of dementia or with mild dementia. Participants train memory, visuospatial functions, and working memory daily over a period of several weeks at home and in small groups. The study is ongoing and we expect to have first results next year.



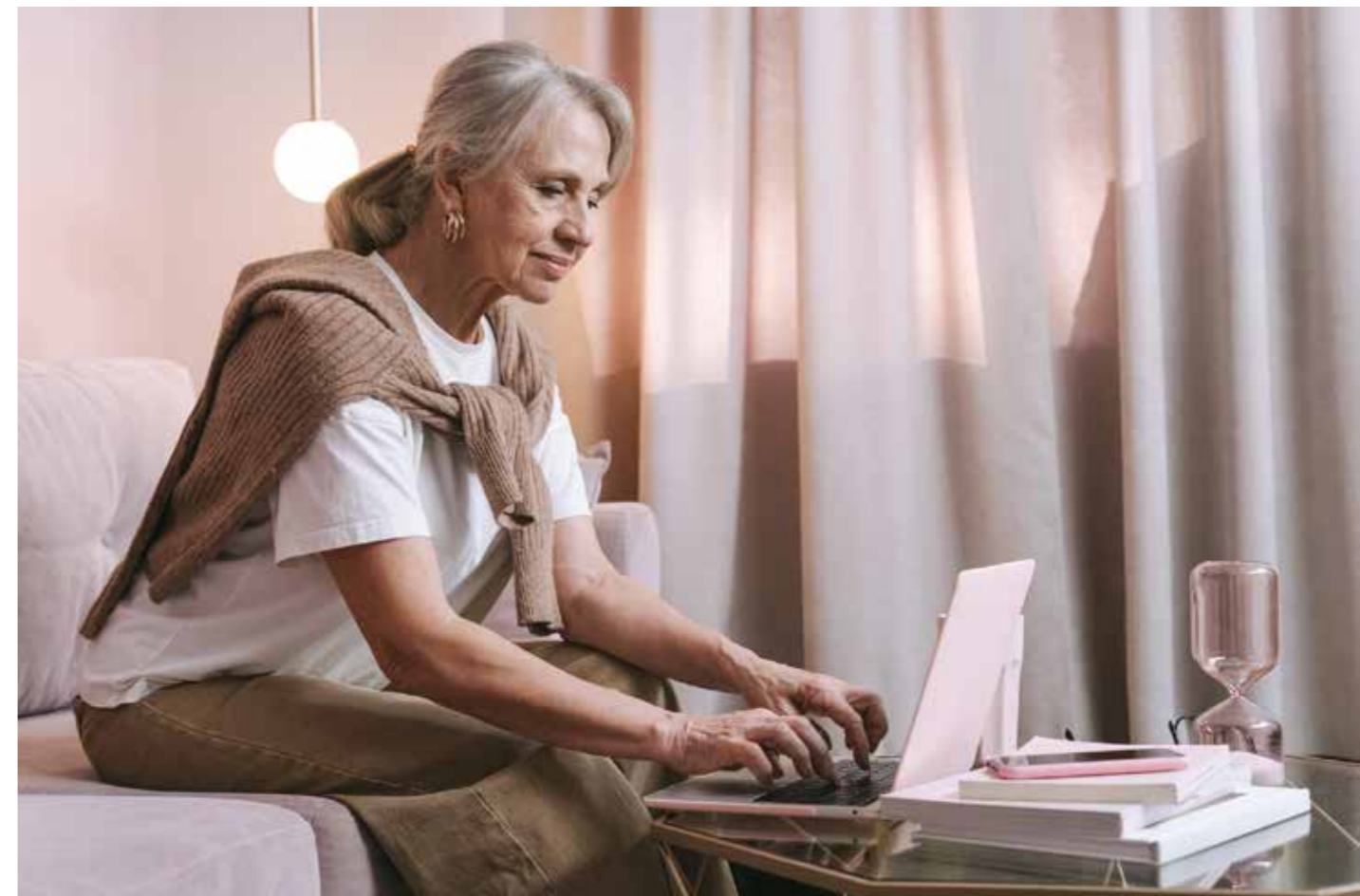
Serious game-based cognitive training



Physician Competencies in Geriatric Psychiatry Residency Training

Developing Entrustable Professional Activities (EPAs) for Geriatric Psychiatry Residency Training

Entrustable Professional Activities are key elements of Competency-based Medical Education (CBME). They operationalize generic physician roles to concrete and observable clinical activities that trainees in old age psychiatry need to master. Currently, we are conducting a national survey and qualitative interview study among clinical residents to identify and develop EPAs for old age psychiatry training. In a subsequent Delphi study, perspectives from clinical experts will be used to finalize a set of EPAs to improve workplace-based curricula for training in old age psychiatry and psychotherapy.



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Prof. Michael Kaess | Dr. Marialuisa Cavelti | PD Dr. Jochen Kindler | Dr. Leila Tarokh | Dr. Chantal Michel

Profile

- 5 research groups, 30 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: Department of Child and Adolescent Psychiatry, Psychiatric Clinics of the University of Basel, Basel, Switzerland; Department of Economics, University of Zurich, Zurich, Switzerland; Developmental Clinical Psychology Research Unit, University of Geneva, Geneva, Switzerland; Department of Child and Adolescent Psychiatry, Heidelberg University, Heidelberg, Germany; University Hospital of Child and Adolescent Psychiatry, Medical University Vienna, Vienna, Austria; Orygen, The National Centre of Excellence in Youth Mental Health, University of Melbourne, Melbourne, Australia; Department of Psychology, University of Oregon, Eugene, USA; Psychiatry and Human Behavior, University of California, Irvine, USA; Department of Psychiatry and Human Behavior, Brown University, Providence, USA; Child Psychiatry Branch, National Institute of Mental Health, Maryland, USA; Upstate Medical University, Syracuse, New York, USA; School of Psychiatry, University of New South Wales, Sydney, Australia & Neuroscience Research, Sydney, Australia; School of Psychology, University of Sussex, UK

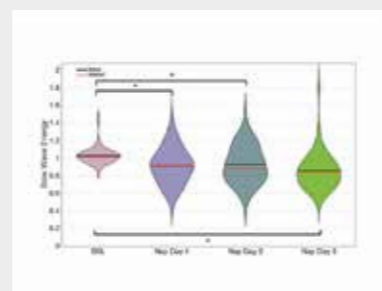
Grants

- Interfaculty Research Cooperation Grant - Decoding Sleep: Sleep subtypes in adolescent depression: Sleep physiology and treatment (PI: Dr. Tarokh)
- SNF Project Grant (182639): Neurobiological Mechanisms of Pain Dependent Stress-Regulation in Adolescent Non-Suicidal Self-Injury (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 (PI: Dr. Michel)
- SNF Project Grant (193279): A smartphone-based ecological momentary assessment and intervention for adolescents with auditory verbal hallucinations (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 (PI: Prof. Kindler, PD Dr. med. Morishima)
- Ebnet-Stiftung in Teufen: SMARTVoices-Study (PI: Dr. Cavelti)

Highlights

Naps not as effective as a night of sleep at dissipating sleep pressure

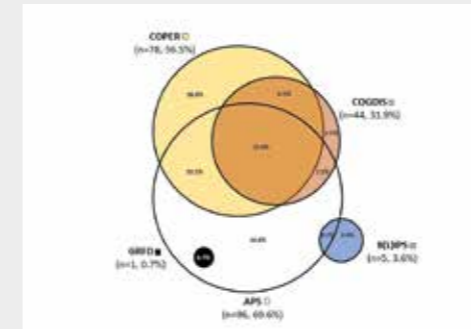
Recently the idea that multiple naps throughout the day can be used as a substitute for nighttime sleep has gained traction. In this study using EEG based measures of sleep homeostasis, we find that despite the same window of sleep opportunity, naps are not as effective at dissipating sleep pressure in a sample of adolescents. Tarokh et al., J Sleep Res, 2021.



Compared to a night of sleep (BSL), less sleep pressure was dissipated on days with naps

Eight year evaluation of the FETZ Bern

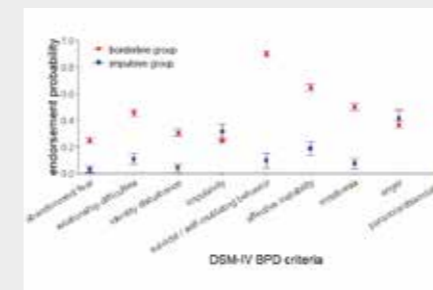
Description and evaluation of an early detection and intervention service for children, adolescents and adults (FETZ Bern) aged from eight to forty years in Bern, Switzerland. The FETZ Bern is the first early detection centre worldwide assessing children aged younger than twelve years as well as adolescents and young adults in one service. Considering that, developmental peculiarities are important in understanding and ultimately treating psychosis, the FETZ Bern, with its emphasis on youth, should be considered as a model for other similar services Michel, Kaess, ..., Kindler, Early Interv Psychiatry, 2021.



Clinical high risk of psychosis subgroups in the FETZ Bern (N = 138)

Heterogeneity of borderline personality disorder symptoms in help-seeking adolescents

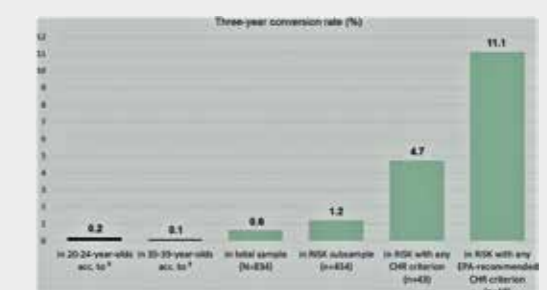
The heterogeneous presentation of borderline personality disorder (BPD) represents a clinical challenge. In this study, we examined the latent structure of BPD in 506 adolescent outpatients. The study provides evidence for two distinct subgroups ("borderline group" and "impulsive group") of adolescents with BPD features that resemble the subtypes of the ICD-10 emotionally unstable personality disorder. Cavelti, ..., Kaess, Borderline Personal Disord Emot Dysregul, 2021.



Latent class profile plot of the SCID-II BPD criteria

Clinical high-risk of and conversion to psychosis: A 3-year follow-up of a cohort study

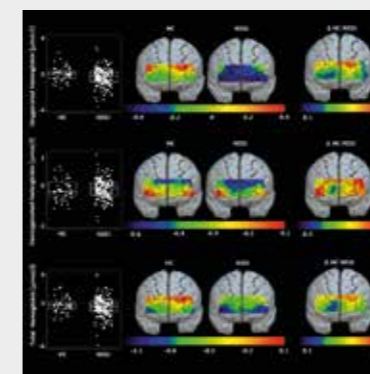
In a follow-up assessment of the BEAR study after 3 to 5 years persons with any lifetime clinical high risk (CHR) symptom at baseline (RISK; n = 434) and age-, sex- and education-matched controls (CONTROL; n = 400) were re-interviewed. At follow-up, five persons – all RISK – had developed a psychotic disorder. This is the first study of the longitudinal association between clinician-assessed CHR symptoms and criteria, and psychosis in a representative community sample. Schultze-Lutter, ..., Michel, Schizophr Res, 2021



Three-year incidence rates of psychosis in the community in relation to earlier reported CHR symptoms and criteria

Adolescents with nonsuicidal self-injury show reduced oxygenation of the prefrontal cortex

Adolescents (12-17 years) with recurrent episodes of nonsuicidal self-injury (NSSI; n = 170) and healthy controls (n = 43) performed a low-demanding resting-state vanilla baseline task. Mean oxygenation of the prefrontal cortex (PFC) and functional connectivity within the PFC were measured using an 8-channel functional NIRS system. Adolescents with NSSI showed significantly decreased PFC oxygenation, while increased PFC connectivity was associated with greater adverse childhood experience as well as greater borderline pathology and depression. Koenig J, ..., Kaess M, Neuroimage Clin, 2021.



Resting oxygenation of the prefrontal cortex in adolescents with nonsuicidal self-injury versus healthy controls

University Hospital of Psychiatry and Psychotherapy

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Prof. Werner Strik Prof. Thomas Dierks Prof. Sebastian Walther Prof. Christoph Nissen Prof. Katharina Stegmayer Prof. Franz Moggi Prof. Daniela Hubl 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
- 16 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

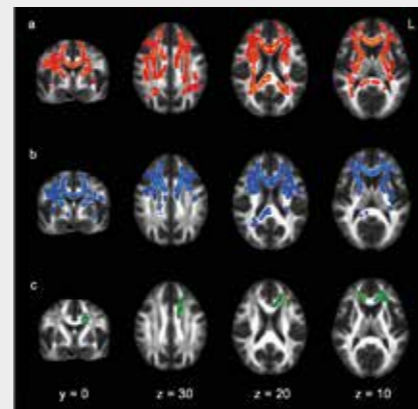
- SNF: 32003B_184717/_182469/_184943/_189058/ 192623, PZGP3_180022, 10531C_179451, 105319_159286
- NIH: R01MH118741
- Swiss Health Promotion Foundation (No. 20.189.K50003), Swiss Foundation for Alcohol Research (No. 283 and 303)
- Fondation Adrian et Simone Frutiger, Novartis Foundation for medical-biological research (19A063), Velux-Foundation, Gesundheitsförderung Schweiz, Volkswagen-Foundation, Synapsis Foundation, Swiss Life Jubiläumsstiftung, Robert-Enke Stiftung
- IRC University of Bern

Highlights

Structural white matter (WM) abnormalities may contribute to abnormal motor behavior in psychosis.

Patients with schizophrenia frequently suffer from abnormal motor coordination, but the etiology of this problem is currently unknown. We tested the link between the severity of neurological soft signs and white matter parameters in schizophrenia. Motor coordination deficits were linked to abnormal white matter microstructure in important motor fiber tracts. This finding sheds light onto behavioral consequences of altered structural connectivity in schizophrenia.

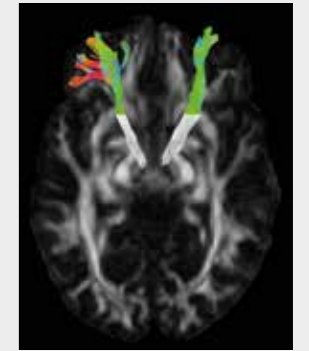
Viher et al. DOI 10.1093/schbul/sbab089.



WM structures (in color) linked to deficient motor coordination in psychosis

The role of the reward system for craving in alcohol use disorder (AUD)

The reward system is crucial for alcohol-seeking behaviour. MRI was used to investigate the role of the orbitofrontal cortex (OFC) and the nucleus accumbens (NAcc) in AUD. We identified volume reductions of the NAcc and reduced connectivity of OFC-NAcc fibre tracts in AUD. OFC-NAcc functional connectivity was associated with craving. Results suggest a pathophysiological model of craving in AUD related to altered OFC-NAcc connectivity patterns
Bracht et al., 2021, doi 10.1038/s41398-021-01384-w.

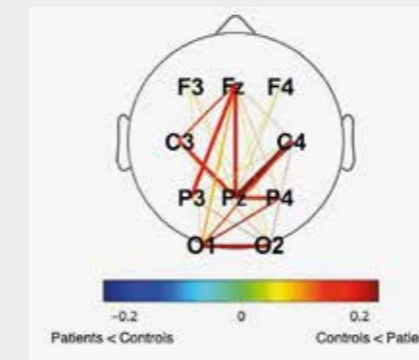


OFC-NAcc fibre tracts (in color) with reduced structural connectivity in AUD

Sleep Neurophysiology in Childhood Onset Schizophrenia (COS)

COS is a rare and severe form of schizophrenia. Here we measured sleep oscillatory activity via the EEG in youth diagnosed with COS. Compared to controls, patients had diminished high frequency power coupled with a unique pattern of hyperconnectivity across widespread brain regions. This study demonstrates the utility of the sleep EEG in studying vulnerable populations and aiding in diagnosis.

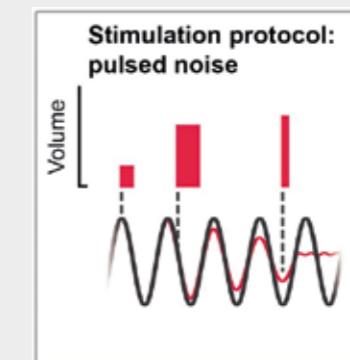
Markovic et al. DOI: 10.1111/jsr.13039.



A pattern of hyperconnectivity was observed in COS patients

Auditory closed-loop modulation of slow wave sleep (SWS) to treat major depression (MD)

We provided first evidence for the feasibility and efficacy of automated detection and suppression of SWS in humans based on auditory closed-loop stimulation. Future studies will investigate the hypothesis that selective suppression of SWS can mimic the rapid antidepressant effect of therapeutic sleep deprivation in MD, potentially driven by sleep-related modifications of altered neuroplasticity in MD. EU patent application (Nr. 21202960.7)

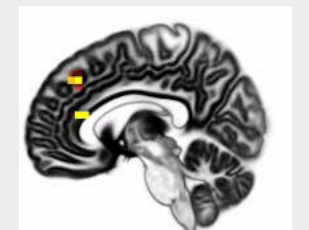


Randomized intermittent tones were used to suppress slow waves sleep

Neurophysiological correlates of alcohol-specific inhibition are associated with craving and relapse in alcohol-use disorder (AUD)

Multi-channel EEG was recorded in patients with AUD during an alcohol-specific Go-NoGo task. The neurophysiology of alcohol-specific versus neutral inhibition was analyzed. This analysis yielded a neurophysiological index of future relapse. The difference between alcohol-specific and neutral inhibition increased with craving.

Batschelet et al., 2021, doi: 10.1016/j.clinph.2021.02.389.



Regions (in color), where activation increases with craving

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