

Universität
Basel



Research Report 2019/2020

University Children's Hospital Basel

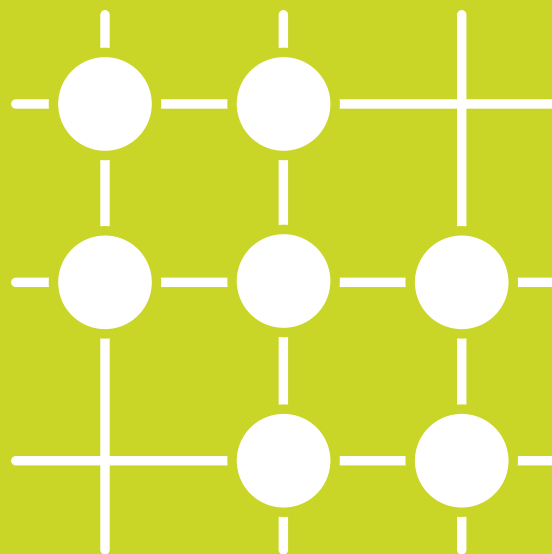


Table of Contents

Editorial	4	· Paediatric Infectious Diseases and Vaccinology	31
UKBB Research at a Glance	6	· Paediatric Surgical Research	32
Future Development of Research Infrastructure	8	· Paediatric Immunology	33
· The Basel University Centre for Rare and Undiagnosed Diseases	9	· Bone Tumour and Limb Reconstruction Group	34
· Growth and Development of the Paediatric Research Centre at UKBB	10	· Immune Thrombocytopenia Research	35
· Biobanking – Current Concept and Future Steps	12	· Paediatric Pharmacology and Pharmacometrics	36
Rising Stars	13	· Mycobacterial and Migrant Health Research	37
· The prognostic value of blood, skin and stool biomarkers in children with food allergies	14	· Neonatal Respiratory and Clinical Epidemiology Research Group	38
· Transition of young people with rheumatic diseases in Switzerland	15	· Childhood leukemia	39
· Nutrient transport in health and disease	16	· Translational Medicine Breath Research	40
Research Groups	17	· Paediatric Endocrinology and Diabetology	41
· Translational Cellular Immunotherapy	18	· Outcomes Research in Paediatric Oncology	42
· Infection Prevention and Control and Antibiotic Stewardship	19	· Paediatric Neurology and Developmental Medicine Group	43
· Paediatric Epileptology and Sleep Research Group (DKF and UKBB)	20	· Paediatric Rheumatology Research Group	44
· Computational Physiology and Biostatistics	21	Publications 2019/2020	45
· Clinical Research in Paediatric Cardiology	22	Promotions and Honours	88
· Paediatric Anesthesia	23	· Habilitations/Dissertations/Master Thesis	90
· Developmental Immunology	24	· Appointments	96
· Neuromuscular Research Group	25	· Awards	97
· Paediatrics and Paediatric Pulmonary Research Group	26	· Young Investigators	103
· Paediatric Gastroenterology & Nutrition	27	Facts and Figures	106
· Molecular strategies in paediatric surgery	28	· Funding and Research	108
· Brain Ischemia and Regeneration	29	· Employees and Publications	112
· Computational Spine Biomechanics	30	Notes	113
		Impressum	115

Editorial



Prof. Sven Schulzke, MD, MSc, FRACP **Head of Research**

I am very pleased to present the UKBB research report 2019–2020 to interested researchers, collaborators, colleagues from clinical and administrative fields, and the wider public. The current research report covers a period of time that was affected by an unparalleled pandemic, however, interested readers will immediately recognise that this challenge has only increased scientific efforts at UKBB and that seized research opportunities clearly outweigh the challenges the research community has experienced.

SARS-CoV-2 and the COVID-19 pandemic

The **COVID-19 pandemic** has dramatically shaped our lives over the past 18 months. For people across the world, the pandemic has caused enormous grief due to serious disease or loss of family, friends, or colleagues. Clearly, COVID-19 represents an unprecedented and highly demanding challenge to current human society in many ways. In terms of research, the pandemic stimulated a vast increase in COVID-19-specific cooperation and research output on both a national and international level.

This is remarkable, as working conditions for researchers were negatively affected by multiple measures aiming at social distancing, i.e., research institutions, laboratories, and clinical studies have suffered from intermittent closure or severe working restrictions. Although the quality of some of the papers published in the context of the pandemic has clearly highlighted the need for meticulous peer-review, it is fascinating to see how quickly the scientific community has reacted to this disruptive crisis both in basic and clinical sciences. Biological knowledge, diagnostic tests, therapies, and vaccinations evaluated in clinical trials related to SARS-CoV-2 have been developed in a fraction of the typically required time. The pharmaceutical industry is producing gigantic amounts of vaccines each day; and large, multinational companies are assisting smaller businesses in the manufacturing of vaccine components. Thus, distributed networking with a common beneficial goal seems to be the key in overcoming this global crisis. On a local level, researchers at UKBB were involved in several national and international initiatives and trials, and their work towards better understanding and treatment of paediatric COVID-19 is ongoing. Despite the pandemic, the research output of UKBB researchers has increased considerably and the number of peer-reviewed publications is growing beautifully: from 157 articles per year in 2016, to over 193 papers in 2018 and 267 papers in 2020, i.e., a 70% increase within just four years.

UKBB Research Strategy 2025

In a focussed team effort over the past two years, we have developed the new UKBB Research Strategy 2025 which focusses on “paediatric research in a digital world”. This new research strategy integrates with the University of Basel’s strategy and is embedded in the overarching strategy of the owners of UKBB, the cantons of Basel-Stadt and Basel-Landschaft. The latter explicitly emphasize UKBB’s role in actively engaging in paediatric research and education and UKBB’s responsibility towards improving networking of researchers affiliated with the University of Basel with other institutions (such as ETH Zurich, the University of Applied Sciences and Arts Northwestern Switzerland, other research institutions on a national and international level, and industry partners). Simultaneously, regulatory requirements for research on children based on the Human Research Act along with general data protection and safety concerns are steadily increasing. Therefore, in order to fulfil these complex and sometimes competing tasks, significant improvements in the IT-infrastructure at UKBB are being made and specific personnel are being hired to help UKBB scientists with the design, conduct, and analysis of their research in the era of digitalisation and under current regulatory conditions.

Early career support

In 2019–2020, UKBB continued to support young scientists through early career programs such as the ‘Club Paediatrics’ for medical students, the **Botnar Special Program for Paediatric Research at UKBB**, and the support of mid-level faculty in basic and clinical sciences. The current report will again provide space for mid-level faculty to present their scientific achievements in the ‘rising stars’ section. These researchers represent a major driving force of scientific development at UKBB and are essential to the functioning of our research environment, as they often simultaneously support both young researchers and established research group leaders.

Further developments

About two years ago, the **Botnar Research Centre for Child Health (BRCCH)** started operating. Since then, the research centre has already achieved important milestones, launched major research initiatives such as the multi-investigator programmes, and contributed to the fight against the COVID-19 pandemic with a fast-track call for COVID-19 research projects. UKBB researchers are actively involved in the latter, namely in a research project aiming to integrate innovative pressure sensors in low-cost ventilators to improve patient care and to help overcome the global shortage of ventilators.

With regards to the **Swiss Personalized Health Network (SPHN)**, the first funding period from 2017–2020 has come to an end and plans for the second funding period (2021–2024) have been made. Switzerland is well-positioned to create a data-driven and learning health system, but hurdles to health data exchange and interoperability remain. Important progress has been made in recent years in establishing an ethical and legal framework, data harmonization and interoperability, and building a secure platform for sensitive data (BioMedIT). New infrastructures have been tested in SPHN-funded projects. In the coming years, infrastructures will be consolidated and implemented toward a sustainable health data ecosystem. National “Data Streams” with scientific lighthouse projects are intended to sustainably strengthen the SPHN network in the second funding period. UKBB continues to be an integral part of the Basel Hub strategy, together with the University of Basel and USB. Considerable efforts are being made by the Basel Hub to address the upcoming scientific and infrastructural changes.

UKBB Research at a Glance

Vision

Research groups at UKBB operate on an international level, demonstrate outstanding research excellence, and have a clear focus leading to beneficial effects of research on health in infants, children, and adolescents.

Research Goals

The main goal of our research is to gain scientific knowledge across basic, translational, and clinical research fields to improve diagnosis, treatment, and prevention of diseases in the entire paediatric age range. We aim to collaborate with associated institutions of SwissPedNet, other partner institutions within and beyond Switzerland, and industry partners in clinical trials. We promote truly translational research from bench to bedside, supporting young scientists in the development of their career through fostering their creativity, scientific thinking and problem-solving abilities, and helping them acquiring methodological skills to obtain scientific independence. This results in successful competitive research grant proposals and growth of research groups.

Key Areas of Research

The key areas of research at UKBB are largely defined by structural professorships at the University of Basel and also include very successful research groups with excellent scientific output independent of structural endowment. The key focus areas of research at UKBB are as follows:

- Developmental paediatrics and pulmonology
- Haematology and oncology
- Immunology, infectious diseases, vaccinology
- Paediatric orthopaedics

Organisation and Governance

Research at UKBB is carried out based on the current research strategy 2025, under the governance of the University of Basel, and embedded in the departmental structure of the medical faculty. Researchers at UKBB are affiliated with one or more of the departments of biomedicine (DBM), biomedical engineering (DBE), clinical research (DKF), or public health (DPH). The head of research and the UKBB research board are responsible for allocation of resources and reporting of research to the executive board and the board of directors.

Quality Control

Standard operating procedures and quality control measures from the department of clinical research (DKF) and its clinical trial unit (CTU) are used for clinical studies in the paediatric clinical trial unit at UKBB. In general, clinical research is embedded in

the DKF and proposals are handled according to the Swiss Human Research Act (HRA) and assessed by the Ethics Commission of Northwestern and Central Switzerland (EKNZ).

Members of the Research Board 2019–2020

Chair: Prof. Sven Schulzke, Neonatology

Dr. Julia Bielicki, Infectious Diseases, Medical Lead Paediatric Research Centre

Prof. Reinald Brunner, Neuroorthopaedics

Prof. Daniela Finke, Developmental Immunology

Prof. Dirk Fischer, Neuromuscular Research

Prof. Urs Frey, Paediatric Pulmonology

PD Dr. Stephanie Gros, Molecular Therapeutic Strategies in Paediatric Surgery

Prof. Ulrich Heininger, Infectious Diseases and Vaccinology

Prof. Georg Holländer, Paediatric Immunology

Prof. Marc Pfister, Paediatric Pharmacology and Pharmacometrics

Prof. Gabor Szinnai, Paediatric Endocrinology

Activities of the Research Board

Strategic research planning

Budget and infrastructure organisation

Allocation of resources to research groups

Career development of young investigators

Organisation of the annual research day

Reporting to the executive board and board of directors



Future Development of
Research Infrastructure

Future Development of Research Infrastructure



The Basel University Centre for Rare and Undiagnosed Diseases



Andreas Wörner, MD

Coordinator Rare Diseases UKBB

Rare Diseases (RD) encompass about 8'000 different conditions with a prevalence of less than 1 in 2'000 inhabitants. In total, about 7 % of the Swiss population have at least one rare disease. RD frequently show chronic clinical courses, often diagnosed in childhood. Because of their rarity, there is a risk of delayed diagnosis within different levels of the healthcare system. Specific medical procedures and disease classifications may lack validation, and treatment may be based on lower grade evidence levels. Available medication for RD is partly not approved by legal authorities, and off-label use is still common.

By initiative of the National Council, a coordination board for RD, kosek (Nationale Koordination Seltene Krankheiten), has been created to establish structures for coordinated care for RD. In 2020, the University Hospital Basel and the University Children's Hospital Basel were jointly approved as the Centre for Rare Diseases Basel. Major improvements in the coordinated care for RD patients have been implemented; since 2018, the RD Helpline Northwest- and Central Switzerland offers direct, experienced support for all questions concerning rare and undiagnosed diseases. For children and adults with complex, yet undiagnosed symptoms, a consultation for patients without a diagnosis has been established. With a multidisciplinary approach from the very start of patient care, several specialists may be involved including geneticists, in order to improve time to diagnosis and treatment. In the future, specialty-specific reference centres will support the 9 Swiss Centres for Rare Disease.

Coordinated research for patients with RD among Swiss and international specialists is essential in order to improve patient care and outcomes. The Swiss Rare Disease Registry SRDR aims to harmonise data exchange between hospitals to set up disease-specific databases and registries. The University Children's Hospital Basel has set a focus on Rare Disease research: in 2020, 38 % of all scientific publications addressed Rare Diseases.

Group Members at the UKBB

- Mike Recher, MD, Coordinator Rare Diseases USB
- Emanuel Christ, MD PhD
- Thomas Daikeler, MD
- Gabor Szinnai, MD PhD
- Peter Weber, MD
- Katrin Bopp, MD
- Evelyn Zehntner-Frischknecht, MD
- Nicole Joho, Office Rare Diseases Basel

Future Development of Research Infrastructure



Julia Bielicki, MD, MPH

Growth and Development of the Paediatric Research Centre at UKBB

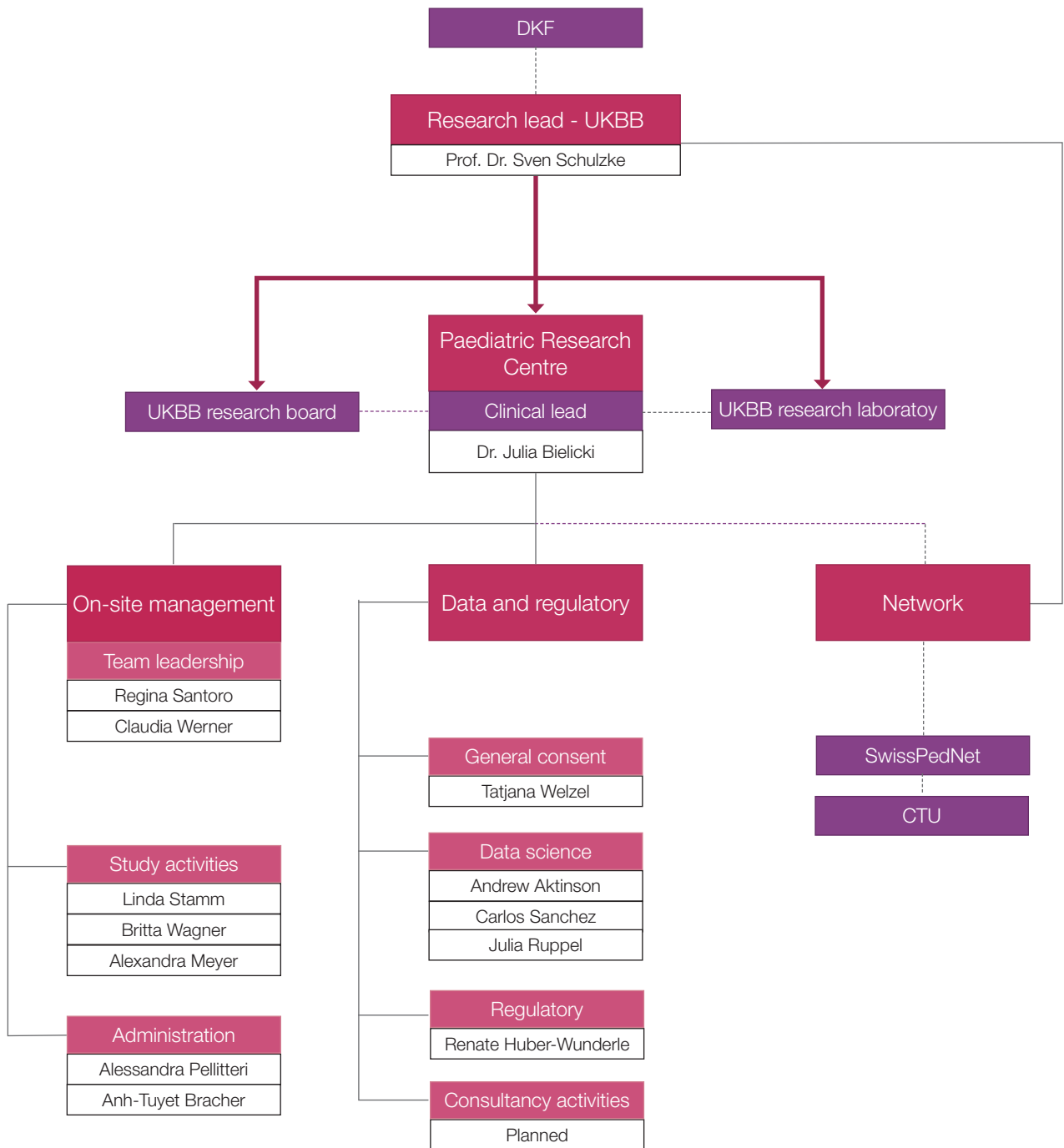
The research infrastructure of the Ambulatory Study Centre at UKBB continues to grow and develop, and we are celebrating by renaming the centre to better reflect its remit and activities!

In 2019–2020, the team at the Paediatric Research Centre (PRC) was involved in 28 studies and looked after over 2'000 patients. The studies include industry-sponsored trials with complex protocols, investigator-initiated observational studies, and investigator-initiated trials.

To sustain the growing portfolio of research and to address gaps in the PRC's quality management process, a standard approach towards supporting principal investigators in negotiating and planning budgets as well as early review of on-site management, most importantly patient visits, was established. The team has grown to include nearly 3 full-time research nursing and administration posts at the end of 2020 as well as strengthening physician involvement. Furthermore, closer collaboration with staff of the research laboratory at UKBB was established to streamline all steps involved in typical clinical studies.

As for everyone at UKBB, COVID-19 had a major impact on the PRC in 2020. This was reflected by the PRC team's involvement in four related projects, ranging from data collection for national surveillance efforts through a serology study involving UKBB personnel to participation in an international study on household transmission funded through the European Commission's Horizon 2020 programme.

In 2021, we are looking forward to welcoming new members to the PRC family: the team will grow to ensure optimal support for clinical researchers at UKBB in the areas of data management and regulatory expertise.



Future Development of Research Infrastructure



PD Stephanie Gros, MD

Biobanking – Current Concept and Future Steps

The efforts of the UKBB biobanking team of Stephanie Gros and Andrea Marten include establishing a reliable biobank with the aim of ensuring high bio-sample quality, making cooperative sharing of biological resources more accessible and strengthening research opportunities for the UKBB.

The Swiss Biobanking Platform is orchestrating the development of a network of biobanks that conform to national and international legal requirements and comply with all ethical and quality standards. The goal is to make sample and data sharing possible throughout Switzerland. A biobank contains samples of human and non-human origin, for example liquids, tissue samples, cells, bacteria or others. Samples are intended for diagnostic, therapeutic or research purposes. The sampling is regulated and fully documented. An appropriate governance is required.

Embedded within the Swiss Biobanking Platform (SBP) and the Basel Personalized Health Initiative we have established a biobanking software at the UKBB to ensure correct documentation and harmonization of all biobanking processes, including sample collection, transport, treatment, preparation, storage and distribution, which will ensure comparable quality standards in all Swiss biobanks. The standards for sampling and additional biobanking capacities are currently defined in cooperation with the Personalized Health Initiative of the University of Basel.

The next steps to ensure high-impact research on children's diseases through sampling of a growing number of bio-specimens include the establishment of a standardized bio-sampling process, the expansion of storage capacities, the legally and scientifically correct handling of samples and data, and the refining of IT processes in answer to scientific needs. Establishing governance for the biobank will ensure effective use of these samples for relevant research questions. Qualified personnel are essential to professionalize these processes.



Rising Stars

Rising Stars



**Felicitas Bellutti Enders,
MD PhD**

Group members

- Felicitas Bellutti Enders,
MD PhD
- Prof. Karin Hartmann, MD
- Sandra Marti-Pasqual,
study nurse

The prognostic value of blood, skin and stool biomarkers in children with food allergies

Food allergies (FA) affect up to 8% of children. The risk is even higher in children with atopic dermatitis. The majority of children with egg and milk allergy—the most common food allergies in the first years of life—outgrow their allergy. Even though several risk factors such as IgE levels and wheal size of skin prick tests for the persistence of FA have been described, there are no biomarkers available to predict whether or not a child will outgrow his/her FA. In recent years, allergen immunotherapy (AIT) has been proven efficient at treating food allergies. The earlier in life this treatment is started, the better the outcome, with lower side effects and a better tolerance of the incriminated food.

In our current study, we investigate blood cytokines, stool and skin microbiome with the goal of defining new biomarkers for the persistence of food allergies. In an international collaboration together with the Children's Hospital Sankt Gallen, the Laboratory of Translational Immunology, Utrecht, Netherlands and the Lübeck Institute of Experimental Dermatology, Germany we will investigate the three organ systems' (blood, skin and gut) microbioma, which are known to be involved in the development and the resolution of food allergies, through minimal invasive methods. Blood will be collected via dried blood spots (DBS). Blood cytokines will be analysed after extraction of these DBS using a two-tailed approach detecting the most relevant inflammatory proteins first via quantitative real-time PCR using the Proximity Extension Assay technology. These markers will then be measured quantitatively by a multiplex immunoassay. Skin and gut microbioma, collected via superficial skin swaps and a stool probe, will be analysed by 16S-RNA. We expect that children with persistent allergy have a different cytokine profile and different gut and skin microbiota than those outgrowing their allergy. They might therefore be identified early in follow up and could benefit from early intervention such as AIT.

Transition of young people with rheumatic diseases in Switzerland

About 50% of paediatric patients with rheumatic diseases need ongoing medical care in adulthood. To ensure optimal short- and long-term outcomes (e.g. disease activity, quality of life, adherence to medical treatment), careful transition from paediatric healthcare services to adult-focussed healthcare is essential.

Our previous study assessing current transitional care practices in all Swiss paediatric rheumatology centres and their collaborating adult centers (N=20) showed heterogeneity across centers, including collaboration between paediatric and adult centers.

Based on these findings, all 20 centres agreed to participate in the **HEROES** (rHEmatology tRansition of yOung pEople in Switzerland) research project. This project aims to develop, implement and evaluate a transitional care program for adolescents and young adults with a paediatric rheumatic disease moving from paediatric to adult healthcare settings in Switzerland. Development of the transitional care program will be based on contextual analysis of the centers and assessment of patients', their parents' and healthcare professionals' experiences. For the evaluation of the transitional care program we will use an effectiveness-implementation hybrid design, in which there will be data collection on the effectiveness of an intervention in relation to patient- and parent-reported and disease-related outcomes, as well as implementation outcomes such as the acceptability, fidelity and feasibility of the intervention. A multicenter, quasi-experimental pretest-posttest approach will be utilized to collect data on the effectiveness of the transitional care intervention, e.g., quality of life, healthcare utilisation, and disease activity. Implementation outcomes will be assessed following implementation of the intervention. Quantitative and qualitative data will be collected to evaluate both the effectiveness of the intervention and implementation outcomes.



Lut Berben, PhD, RN
Transitional Care Research

Nurse scientist, department of nursing development

Group members

- Andreas Wörner, MD
- Mary-Louise Daly, RN
- Thomas Daikeler, MD

Rising Stars



**Raphael N. Vuille-dit-Bille,
MD, PhD**

Paediatric Surgery

Group members

- Pascal Flüchter, PhD student
- Fabian Lunger, MD student
- Svenja Erne, MD student
- Julian Muff, MD student
- Kim Tai Vuong, Master's student
- Aline Schärer, Master's student
- Stefano Maric, Master's student

Nutrient transport in health and disease

Basic Research

During my PhD (funded by the Swiss National Foundation) I worked on expression, function and regulation of small intestinal nutrient (i.e. amino acid and monosaccharide) transporters.

Building my own research group later on we were able to show that newborns lack expression of amino acid transporter SIT1, as well as of Fructose transporter GLUT5 in the small intestine. This novel finding could explain why infants often suffer from Fructose malabsorption symptoms. In support of this work, I received the research award from the Swiss Society of Paediatric Surgery in 2019.

More recently we showed that plasma citrulline (a clinical marker of short bowel syndrome) level is linked to expression of intestinal amino acid transporter LAT4 in the small intestine and correlates with its metabolite arginine in urine.

Funded through the “Personenförderung” Program of the Department of Surgery at the University Hospital Basel (2020) and through the Research Fund for Junior Researchers at the University of Basel (2021) in collaboration with Prof. C. Schneider (University of Zürich) and Prof. J. Dunn (Stanford University), we are currently assessing expression of named nutrient transporters in spring-distended small intestine, a novel method to elongate small bowel in patients suffering from short-bowel syndrome.

In future projects we will assess the role of nutrient transporters in the placenta from mothers of newborns with intrauterine growth restriction in the lab at the UKBB. Furthermore, we will assess the expression of nutrient transporters in cancer cells, as proliferating tumour cells are highly dependent on nutrients in the tumor microenvironment.

Clinical research and Cochrane Systematic Reviews

In 2021 we were able to publish two Cochrane Systematic Reviews. Thereof, one was selected for the British Journal of Surgery Award Session by the Swiss College of Surgeons in 2021.

In collaboration with T. De Trey (UKBB) and Prof. B. Taylor (ETH Zürich) we are currently developing a pressure-sensing dynamic compression bracing system to treat patients with Pectus Carinatum (a common thoracic wall deformity in adolescents).

We are about to publish the first case series of adolescents with varicocele treated with a novel minimally-invasive extraperitoneal technique.



Research Groups*

*in alphabetical order by Research Group Leader's name

Translational Cellular Immunotherapy

- Natural killer (NK) cells
- Acute leukemia
- Children
- Graft-versus-leukemia effect
- Innate immunity
- Memory NK cells



Maya Caroline André, MD, PhD
Research Group Leader

Group Members at the UKBB

- Hanna Zhao, MD, PhD
- Lisa Schwab, PhD
- Franziska Ginsberg, cand. med.
- Katharina Seel, cand. med.
- Ben-Felix Broesamle, cand. med.
- Tamar Ioseliani, cand. med.
- Sunghee Lee, MSc
- Sarah Bühler, technician

The DNA methyltransferase inhibitors (DNMTi) 5-AzaCytidine (5-AzaC) and 5-Azadesoxycytidine (5-Aza2dC) are widely used in the treatment of myelodysplastic syndromes and acute myeloid leukemia to reverse the “epigenetic silencing” of tumour suppression genes. It has been noted that nanomolar doses of DNMTi may exert sustained changes in critical signalling pathways involved in AML tumorigenesis without inducing direct cytotoxic effects. We had previously observed in NOD SCID IL2R γ ^{-/-} NSG mice that transplantation of healthy donor stem cells (SCs) resulted in sustained graft-versus-leukemia (GvL) effects mediated by immature NK cells when particularly low-doses of 5-AzaC were administered during SC differentiation. Following this observation, we subsequently provided evidence that 5-AzaC does not regulate NK cell differentiation itself but rather triggers the emergence of an inflammatory myeloid cell population, which is capable of triggering via so-far-un-known mechanisms the NK cell functionality. However, our own detailed RNAseq analysis revealed that the gene expression pattern seen in our inflammatory macrophages is fundamentally different from the gene expression pattern described in AML SCs that have been exposed to equally low doses of DNMTi. Since we propose a crucial role for the macrophage-mediated sterile inflammation in the host’s innate immune response to leukemia, we currently ask the question if the epigenetic control of inflammation is comparable in myeloid cells derived from healthy SC donors and patients with MDS/AML. To this aim, we make use of stored bone marrow and peripheral blood samples of a large cohort of AML patients that has been treated with DNMTi and that will allow in-depth analysis of inflammatory macrophages “before” and “after” the initiation of therapy. A better understanding of how inflammatory myeloid differentiation is maintained in MSD/AML patients will be a pivotal step in further establishing an “epigenetic niche therapy” as an adjunctive form of immune stimulation.

Infection Prevention and Control and Antibiotic Stewardship

The main focus of the group was on implementing the SNF-funded KIDS-STEP trial (CI Prof Johannes van den Anker, co-lead Dr Bielicki, grant number 173532) investigating whether adjunct treatment with corticosteroids in children hospitalised with CAP is more effective in terms of the proportion of children reaching clinical stability and whether such adjunct treatment is no worse in terms of CAP relapse. This included several publications, such as publication of the trial protocol but also pieces reflecting on the impact of the COVID-19 epidemic on the conduct of a trial aiming to enrol children hospitalised with lower respiratory tract infection.

Furthermore, the following projects were conducted in 2019/2020:

- Amikacin therapeutic drug monitoring in neonates at UKBB (Master's thesis P. Fankhauser, in collaboration with the paediatric pharmacology and pharmacometrics group).
- Stability of amoxicillin and clavulanic acid under different environmental conditions (Ines Mack)
- Acceptability and feasibility of continuous vital sign monitoring using wearables for children with serious infections in hospital (Ines Mack)
- Association of perioperative antibiotic prophylaxis strategy with post-operative surgical site infection after appendectomy (Hanna Schmid, in collaboration with Swissnoso, Kinderspital Zürich and Ostschweizer Kinderspital)
- Implications of antibiotic packsize for antibiotic stewardship (Dissertation J Furi, in collaboration with Swissnoso)
- SARS-CoV-2 Household transmission study conducted as part of RECOVER funded through Horizon 2020
- SARS-CoV-2 serological assessment to identify infection after high-risk exposures in the daycare setting (in collaboration with Erasmus Medical Centre in Rotterdam)

NeolPC is a programme of work looking at infection prevention and control in neonatal intensive care and was funded by Horizon 2020 with 10 million euros (Scientific coordinator Dr Julia Bielicki). It has two overarching aims: 1) to bring together interested units in a global clinical practice network; 2) to build a platform for research into infection prevention and control interventions in neonatal intensive care. NeolPC brings together more than a dozen international partners, including scientists from the UKBB pharmacometrics group, SwissTPH, and the University of Zurich.

- **Antibiotic stewardship**
- **Antimicrobial resistance**
- **Randomised controlled trials**
- **Covid-19**
- **Infection prevention and control**



Julia Anna Bielicki,
MD, MPH, PhD
Research Group Leader

Group Members at the UKBB

- Regina Santoro, Trial manager
- Malte Kohns, MD, Trial physician
- Patrick Fankhauser, Master's student
- Julia Furi, MD, Dissertation
- Ines Mack, MD, Research physician
- Hanna Schmid, MD, Research physician

Paediatric Epileptology and Sleep Research Group

- Childhood Epilepsy
- Cerebral Plasticity
- Nocturnal Regeneration
- Development of Sleep



PD Alexandre N. Datta, MD
Research Group Leader

Group Members at the UKBB

- Nadine Oser, PhD, psychologist
- Martina Hubacher, MD, PhD, psychologist
- Annette Nageleisen-Weiss, neuropsychologist and psychotherapist, PhD student
- Julia Lehner, pediatrician, MD student
- Sangeeta Jethwa, pediatrician, MD student
- Tobias di Marco, scientist, PhD student
- Several master's students

Our main research topics consist of **paediatric epileptology and paediatric sleep medicine.**

Brain plasticity in children with epilepsy is a main emphasis, mainly in self-limited focal epilepsy of childhood with centro-temporal spikes, which is the most frequent focal epilepsy in childhood and often associated with neuropsychological deficits. Cross-sectional as well as longitudinal observation studies with control groups including multiple techniques of functional brain MR, polysomnographic analysis of sleep—in particular for signs of nocturnal regeneration and quantification of the electrographic activity of epilepsy—are our main focus. These projects are, in part, in collaboration with Dr. Bigna Bölsterli and Prof. Reto Huber from the Children's Hospital Zurich and Prof. Sarah Lippé from the University of Montréal, Canada.

Lately, the phenotype/genotype description of a new genetic developmental and epileptic encephalopathy has resulted from an international collaboration.

Our second research topic concerns the development of sleep and its quality aspects, in particular at the beginning of life but also for other paediatric ages. Exogenous and endogenous factors like light, phototherapy, infection, caffeine treatment and their impact on ultradian and circadian rhythm are our special interest. These works are an inhouse collaboration with Dr. Gilbert Koch, Prof. Mark Pfister, and Prof. Sven Schulzke.

The study group has national and international study collaborations: we are working together with Prof. Pablo Sinues on therapeutic antiepileptic drug monitoring guided by exhaled breath analysis, with Prof. Bassetti, University Hospital of Bern and Prof. R. Khatami within the SNF SPHYNCS study on the Swiss Primary Hypersomnolence and Narcolepsy Cohort, with Prof. Maja Steinlin, University Children's Hospital in Bern within the SNF PASTA (Paediatric Arteriopathy Steroid Aspirin) study, a multicentre, randomized-controlled trial with blinded outcome assessment study, and the Doose study in collaboration with PD Dr. Christian Korff in Geneva and the REGAIN study, an international consortium studying the etiology of Rolandic Epilepsy, led by Prof. Deb Pal at Kings College in London.

Computational Physiology and Biostatistics

In 2019, in collaboration with the University of Amsterdam, we concluded a project devoted to the characterisation of healthy and asthmatic volunteers before and after infection with a rhinovirus using longitudinally recorded respiratory and inflammatory biomarkers. Our findings provide evidence for a loss of adaptive capacity of the respiratory system due to asthma, resulting in an impaired ability to cope with external perturbations. More details in Sinha A. et al. (2019). Loss of adaptive capacity in asthmatic patients revealed by biomarker fluctuation dynamics after rhinovirus challenge. *Elife*, 8, e47969.

In 2020, we concluded a collaboration with the Royal Brompton Hospital, London, in which we applied our method of fluctuation-based clustering to a cohort of asthmatic children. This method, previously developed in our group, uses machine learning and aims at characterising patients based on their lung function fluctuation patterns. In this study, we identified three patient clusters, in particular, a subgroup with high inflammatory parameters, poor asthma control, and more frequent exacerbations. This proved our method's usefulness in combination with a disease tele-monitoring tool in areas located far away from tertiary care centers. We also explored the idea of using the three clusters found as a data base against which new asthma patients are compared. We found that patients with relatively fewer lung function measurements can be correctly assigned to one of the three clusters in the data base. From the clinical characteristics of the cluster the patient is assigned to, specific therapeutic and disease management strategies may be derived. Our findings can be found in Jochmann A. et al. Fluctuation-based clustering reveals phenotypes of patients with different asthma severity. *ERJ Open Research*. 2020. 6(2).

Moreover, in 2020, motivated by the highly topical issue of fast and accurate detection of human respiratory viral infections, we assessed the discriminatory power of inflammatory and lung function parameters for the detection of rhinovirus infections, while taking into account naturally occurring fluctuations. Learn more in Sinha A. et al. Can Measurements of Inflammatory Biomarkers Be Used to Spot Respiratory Viral Infections? *Viruses*. 2020. 12(10), p.1175.

- **Analysis of (patho-)physiological time series**
- **Data driven and machine learning-based disease phenotyping in asthma**
- **Mathematical modeling of host-pathogen interaction**
- **Mathematical epidemiology**



Edgar Delgado-Eckert, PhD
Research Group Leader

Group Members at the UKBB

- Anirban Sinha, PhD
- Ivo Strebel, MSc
(PhD student, employed by University of Basel)
- Thilagavathy Jagan, MSc
- Carlos Sanchez, MSc

Clinical Research in Paediatric Cardiology

- **Cardiac function by advanced echocardiography and spiroergometry**
- **Cardiac repolarisation**
- **Heart rate variability**
- **Early detection of nocturnal hypoglycemia**



Prof. Birgit C. Donner, MD

Research Group Leader

Group Members at the UKBB

- Ramona Keiser, cand. med., doctoral student at University Basel
- Arianna Lauro, cand. med., master's student at University Basel (completed 2021)
- Anne Auderset, cand. med., master's student at University Basel (completed 2020)

The paediatric cardiology research group focuses on clinical studies identifying patients at risk for cardiac sequelae.

Long-term cardiopulmonary function in preterm-born children.

Recently developed tools in three-dimensional real-time echocardiography in combination with cardiopulmonary exercise testing are applied for functional analysis of a cohort of formerly preterm children at school age (followed by Prof. S. Lemola, Faculty of Psychology of the University of Basel).

In cooperation with Prof. Dr. Daniel Trachsel, paediatric pneumology, this cohort was compared with an age-matched control in respect to parameters reflecting cardiopulmonary function and hemodynamics. Preliminary data show that the maximal oxygen uptake in spiroergometry is significantly diminished in formerly preterm infants, but individual factors like activity and a healthy life style are strong confounders. These results might help to detect patients at risk for pulmonary hypertension or ventricular dysfunction and contribute to the establishment of preventive measurements.

Nocturnal hypoglycemia in diabetic children: influence on cardiac repolarisation and autonomic heart rate regulation.

This prospective study is a close collaboration with Sara Bachmann/ Prof. Dr. Urs Zumsteg and the diabetology research group at UKBB in order to investigate the influence of nocturnal hypoglycemia on cardiac repolarisation and autonomic heart rate regulation in children with type 1 diabetes mellitus. The combination of continuous nocturnal glucose measurements and ECG analysis enabled us to study changes in the duration of repolarisation and parameters of heart rate variability (HRV) related to hypoglycemia.

Recent data show alterations in heart rate variability and QT duration in diabetic children with nocturnal hypoglycemia.

Current analysis is aimed at developing algorithms for early detection of hypoglycemia by changes in HRV and therefore might further improve metabolic control and prevent complications.

Paediatric Anesthesia

Respiratory complications remain the leading cause of morbidity in children undergoing anesthesia. Our group's longstanding research activities exploring effects of anesthetic drugs, airway instrumentation and respiratory monitoring were extended in the present reporting period. Efforts were especially dedicated to evaluating airway reflexes, which pose critical risks in paediatric anesthesia. Main research activities were centered on the development of advanced respiratory monitoring tools.

A precise measurement of airway pressure is a long-held demand, since mechanical ventilation may induce pressure-related iatrogenic lung damage. Therefore, the control of applied pressures in the airways and lungs is of paramount importance in order to guide ventilation modalities. This was of distinct concern within the context of the current Sars-CoV2 pandemic. In view of a potential shortage of ventilators, or based on financial constraints, a large number of initiatives came up with low-cost open source ventilator (OSV) designs. Here, two major limitations arise. First, special concern arises from the fact that the use of OSV may result in excessive harm to lung tissue. Second, even with the use of the current technologically advanced ventilators and ventilation strategies, mechanical ventilation may still cause significant ventilator-induced lung injury. In collaboration with the Product Development Group, ETH ZH, the project "COVent – Improve ventilation safety by means of intra-tracheal pressure monitoring – a fast-track solution" was launched and got funding support by the Botnar Research Center for Child Health, Basel.

Briefly, we will assess described low-cost OSV's regarding their characteristics/regulations to prevent ventilation-associated lung injury. In addition, commercially available pressure sensors suitable to be used in ventilation systems will be evaluated and publicly documented. Finally, we aim to integrate a commercially available pressure sensor, which will be attached as an add-on system to the tip of standard endotracheal tubes. We will test the hypothesis that such improved monitoring can be a decisive component for safe mechanical ventilation strategies, and guide improved adjustments in low-cost open source or technologically sophisticated ventilators.

- Airway
- Respiratory Monitoring
- Safety



Prof. Thomas O. Erb MD, MHS
Research Group Leader

Group Members at the UKBB
– Nikola Stankovic, MD, PhD

Developmental Immunology

- **Innate Lymphoid Cells**
- **Mucosa**
- **Inflammation**
- **Development**
- **Cytokines**



Prof. Daniela Finke, MD
Research Group Leader

Group Members at the UKBB

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- Frank Lehmann, PhD
- Claudia Teufel, PhD student
- Nicola Davaz, master's student
- Mounaim Khayi, intern
- Daniel Staehli, civilian service helper
- Philipp Cedro, civilian service helper
- Annick Peter, technician
- Edit Horvath, technician
- Martha Gaio, administrative assistant

Cells of the innate and adaptive immune system cooperate to achieve an equilibrium of immune responses that maintains tolerance to self-antigens (Ags), nutrients and commensal bacteria, but clears foreign Ags and eliminates tumour cells. The focus of our research is to understand the direct cell-cell recognition between innate lymphoid cells (ILCs) and adaptive immune cells, and to identify pathways which control the development and tissue-specific immune function of ILCs in health and disease.

Characterizing the mutual interactions of ILC3s and T cells and their impact for adaptive immunity.

Although group 3 innate lymphoid cells (ILC3) are efficient inducers of T cell responses in the spleen, they fail to induce T cell proliferation in the gut. We showed that microbiota-induced IL-23 is a crucial signal for mTORC1-dependent silencing of MHC II in ILC3s, thereby reducing their capacity to present antigen to T cells in the intestinal mucosa. Our results identified biological circuits for tissue-specific regulation of ILC3-dependent T cell responses.

Defining the molecular signature of ILC3s.

We established an in vitro differentiation protocol to generate ILC progenitors from hematopoietic stem cells. We are using this model to further characterize stages of ILC development and identify new genes involved in the process of ILC commitment. By Crispr/Cas9-mediated gene knockout strategies we are deleting candidate genes, which are uniquely expressed in the ILC progenitor subset knockout, and test their impact on ILC development in vivo.

Role of ILC3s in inflammatory diseases.

ILCs have a protective immune function at mucosal tissues but can also contribute to immunopathology and inflammation. We showed that serine/threonine kinase mechanistic target of rapamycin complex 1 (mTORC1) and mTORC2 regulate maintenance of ILC3s at steady state and pathological immune response during colitis. During colitis loss or inhibition of mTOR in ILC3s resulted in less severe immunopathology in the colon. Collectively our data show a critical role for mTOR in controlling ILC3 cell numbers and ILC3-driven inflammation in the intestine.

Neuromuscular Research Group

Our main scientific activity are clinical studies aimed to delay disease progression in neuromuscular diseases. Currently, we investigate whether tamoxifen has a positive impact on the course of the disease symptoms of DMD patients. We coordinate a multicentre, 48-week double-blind, placebo-controlled randomised clinical parallel trial (RCT) using a 1:1 design with a total number of 80 ambulant (6.5–12-year old) DMD patients. This trial is funded by ERA-NET 2016, the Swiss National Science Foundation, and various patient organisations of Switzerland, the UK, NL, Spain and Monaco (FSRMM, Duchenne UK, Duchenne Parent Project NL and Spain, and Association Monégasque Contre les Myopathies). For more information, please refer to www.tamdmd.ch.

In addition, we have performed a single centre, double-blind, placebo-controlled randomised clinical crossover trial (RCT) using a 1:1 design with a total number 41 patients to investigate the efficacy of ketone bodies to prevent migraine attacks. Patients were randomised 1:1 into placebo or beta-hydroxybutyrate groups before entering the first treatment period. Each treatment period was 12-weeks long followed by 4 weeks of washout phase and 4 weeks of run-in phase before entering into the corresponding second treatment period. The primary endpoint was the number of migraine days in the last four weeks of treatment, adjusted for baseline. Unfortunately, we did not observe a clinically significant amelioration of migraine frequency or intensity under DL-beta-hydroxybutyrate treatment as compared to placebo regarding number of migraine days (mean difference [95 % CI]: -1.1 [-5.07, 2.85]) or migraine intensity (0–10 VAS: 1.5 [-0.8, 3.7]). This trial was funded by the Swiss National Science Foundation.

- Investigator initiated clinical trials
- Duchenne muscular dystrophy
- Tamoxifen
- Ketonebodies
- Migraine prevention



Prof. Dirk Fischer, MD
Research Group Leader

Group Members at the UKBB

- PD Andrea Klein, MD
- Patricia Hafner, MD
- Sara Nagy, MD
- Niveditha Putananickal
- Daniela Rubino-Nacht
- Karin Wild

Paediatrics and Paediatric Pulmonary Research Group

- Asthma
- Developmental Lung Physiology
- Air Pollution
- Genetics
- Respiratory Disease
- Computational lung physiology



Prof. Urs Frey, MD, PhD
Research Group Leader

Group Members at the UKBB

- Olga Gorlanova, MD
- Jakob Usemann, MD, PhD
- Anja Jochmann, MD
- Edgar Delgado-Eckert, PhD
- Pablo Sinues PhD
- Sven Schulzke, MD
- Isabel Gonzalez, head study nurse
- Katrin Gerber-Windisch, study nurse
- Amelia Imolesi, study nurse
- Maya Weber, study nurse
- Uri Nahum, PhD, mathematician
- Fiona Beck, research officer

The current research activity of Prof. Frey's group is focussed around the ongoing BILD cohort study research, funded by the Swiss National Science Foundation. The project – “Impact of Air Pollution on Proinflammatory and Autophagy-Related Mechanisms Involved in the Development of the Respiratory System in Infants” – began in 2018. This project is a direct continuation of a series of projects based on the ongoing prospective birth cohort, BILD, which investigates the impact of environmental factors on lung growth and development, and subsequent consequences for later respiratory morbidity in early childhood. There is increasing evidence from several birth cohort studies, including the BILD cohort, that air pollution exposure in early childhood has an impact on respiratory morbidity. Evidence from countries with high air pollution levels has shown that exposure to both particulate matter and NO₂ is associated with impaired lung growth and asthma. Previously, we found that low-level air pollution exposure in Switzerland was associated with impaired lung function after birth and respiratory symptoms in infancy. We focussed particularly on the vulnerability of premature-born infants to air pollution, and the protective effects of breastfeeding. There are multiple biological mechanisms such as the infant's oxidative stress response, which are involved in their susceptibility to air pollutants. Recently, we started to investigate these mechanisms using multiomics technologies and machine learning approaches.

We are also collaborating with international research consortia such as BIOAIR, BIOFLUC, PASTURE, and U-BIOPRED, all investigating different aspects of childhood asthma, severe asthma and early-life risk factors for late adulthood COPD. Together with Edgar Delgado-Eckert, PhD and his computational physiology group, we are investigating machine learning clustering and prediction model approaches in order to identify treatable asthma phenotypes and asthma risk groups.

Paediatric Gastroenterology & Nutrition

We are studying the interplay of movement, inflammatory activity and psyche: projects are performed in collaboration with the Institute of Sports and Sports Science and the University Psychiatric Clinics Basel. (Legeret C, Mählmann L, Gerber M, et al.: Favourable impact of long-term exercise on disease symptoms in paediatric patients with inflammatory bowel disease. BMC Paediatrics, 2019, 19:297). A completed clinical study entitled “The comparison of the therapeutic effect of acupressure therapy and Iberogast® (STW-5) in children with functional nausea – a randomised clinical trial with sham conditions” has been submitted for publication and is in the review process. As part of the Swiss IBD Cohort collaboration, 9 papers were published in 2019/2020.

In collaboration with the International Paediatric Endoscopy COVID-19 Alliance we published on changes in paediatric endoscopic practice during the Coronavirus Disease 2019 pandemic (Gastroenterology 2020 Oct;159(4):1547–1550. Changes in Paediatric Endoscopic Practice During the Coronavirus Disease 2019 Pandemic: Results From an International Survey. W Ruan, D S Fishman, D G Lerner, et al.). We are also in the process of studying quality improvements in paediatric endoscopy. Furthermore, a project was initiated for the study of motility in intestinal failure patients as well as a project generating a new endoscopic tool for extraction of foreign bodies. A collaboration with a swiss start-up in the field of nutritional support is in progress.

- Inflammatory Bowel Disease
- Functional Gastrointestinal Disorders
- Epidemiology
- Intestinal Rehabilitation



PD Raoul I. Furlano, MD
Research Group Leader

Group Members at the UKBB

- Marc A. Sidler, MD
- Corinne Légeret, MD
- Ilektra Athiana, MD, fellow

Molecular strategies in paediatric surgery

- Neuroblastoma – mechanisms of proliferation and migration
- Novel therapeutic strategies
- Preclinical and orthotopic models
- Molecular imaging
- Influence of hypoxia on tumour progression



PD Stephanie Gros, MD
Research Group Leader

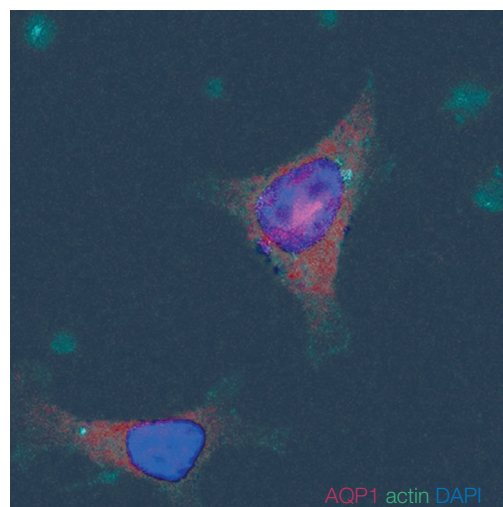
Group Members at the UKBB

- Zihe Huo, PhD student
- Urs Kym, MSc
- Nicola Pini MD student
- Stefanie Volkart, MD student
- Antonia Leutert, MD student
- Remo Bilang, MD student

Neuroblastoma is a rare disease but accounts for 15% of cancer-related deaths in childhood. High-risk neuroblastoma patients are included in the High-Risk Neuroblastoma Study 1.8 of SIOP-Europe trial. Currently, clinical trials allow testing of experimental therapies only in very-high-risk patients at very-late stages of tumour disease. With this disease being rare, and tumour biopsy material at time of diagnosis being sparse, an even greater challenge for introducing new therapeutic drugs is presented.

In our research we are targeting tumour proliferation under hypoxia as well as hypoxia-induced metastases by using several potent preclinical tumour cell inhibitors, some of which have already reached Phase I clinical trials. Our specific targets are 1) the enzyme carbonic anhydrase IX (CAIX) (Drenckhan et al., J Enzyme Inhib Med Chem. 2018), which promotes tumour cell proliferation, and 2) the water channel aquaporin 1 (AQP1) that primarily facilitates tumour cell migration in neuroblastoma (Huo et al., Front Cell Dev Biol. 2021; Pini et al, Children 2021). With regard to a clinical perspective, our recent findings provide the foundation for the inhibition of metastatic spread by targeting AQP1-facilitated migration and hypoxia-induced transitioning of cells to a more aggressive phenotype. This makes AQP1 an excellent exemplary target for inhibition of the metastatic process.

We have successfully established the use of microcalorimetry to test treatment response of targeted therapeutics against hypoxia-related factors in clear cell sarcoma of the kidney and neuroblastoma (Gros et al., Int J Mol Sci. 2019). We are currently working towards refining preclinical tumours that allow us to analyse the metastatic process and to test novel therapeutics directed at defined stages of this process.



AQP1 and actin expression in migration neuroblastoma cell

Brain Ischemia and Regeneration

Neuroimmune interactions and CNS regeneration

Our laboratory conducts basic and translational research aiming at testing and developing protective and regenerative strategies to repair the central nervous system (CNS) after injury.

Neonatal hypoxic-ischemic encephalopathy (HIE)

HIE is a brain injury that causes significant mortality, and up to 25% of surviving infants endure lifelong neurological deficits, collectively referred to as cerebral palsy (CP). Currently, therapeutic hypothermia is the only approved therapy, nevertheless the rates of death and severe disabilities in treated children remain high. Thus, there is an urgent need for alternative therapies. A major research goal of our laboratory is to study the cellular and molecular determinants of neuroprotection and neuroregeneration in the developing brain.

Neuroimmune interactions during brain ischemia

Using a rat model of neonatal hypoxia-ischemia (HI), we recently showed that microglia in the subventricular zone (SVZ) have a very distinct response to injury when compared to microglia in the adjacent cortex or corpus callosum. Specifically, we found that up to 33 days after HI, SVZ microglia (i) accumulate, (ii) are activated and phagocytic, and (iii) upregulate immunomodulatory and neurotrophic genes, features not observed in non-neurogenic areas. Altogether these data suggested a functional impact of SVZ microglia on neurogenesis after a developmental brain injury. (Fisch et al., 2020). We are now investigating how Whartons-Jelly-derived Mesenchymal Stem Cells modulate the microglial function in the neurogenic niche.

Neuroprotective mechanisms of hypothermia-role of RBM3, a cold inducible protein

In collaboration with Prof. Dr. Sven Wellmann we examined the role of RNA-binding motif protein 3 (RBM3), a cold-inducible stress protein. Hypothermia up-regulates RBM3, which is neuroprotective under stressful conditions. We were able to demonstrate that RBM3 stimulates neuronal differentiation and inhibits HI-induced apoptosis in the SVZ and the subgranular zone of the hippocampus, while promoting neural stem cell (NSC) proliferation after HI injury only in the SGZ. We unraveled a novel RBM3-IMP2-IGF2 signalling pathway in the hippocampus that explains the niche-dependent regulation of neurogenesis after adult HI (Zhu et al., 2019). In a second paper we showed that RBM3 overexpression significantly increased the proliferation and cell viability of NSC under hypoxic conditions (Yan et al. Front Cell Dev Biol 2019) (SNF grant 31003A_163305).

- Neonatal Hypoxic-Ischemic Brain Injury
- Stem Cells
- Neuroinflammation
- Microglia Neurogenesis
- Brain Regeneration



Prof. Raphael Guzman, MD
Research Group Leader

Group Members at the UKBB

- PD Stephanie Gros, MD
- Boris Radanovic, MD Student
- Sarah Stricker, MD, Postdoc
- Xinzhou Zhu, MD, Research Associate

Computational Spine Biomechanics

- Segmental Spinal Stiffness
- SpineBot
- 3D Spinal Length
- Patient-Reported Outcome Measures
- Neuromuscular Scoliosis



Prof. Carol Claudius Hasler, MD
Research Group Leader

Group Members at the UKBB

- Daniel Studer, MD (Project Leader SpineBot)
- Prof. Heide Elke Viehweger, MD (Project Leader PROMs)
- Christoph Heidt, MD
- Thomas Angst, master's student
- Anna Frei, master's student

SpineBot

The SpineBot project for intraoperative assessment of segmental spinal stiffness represents the core of our research activities. The project has been financially supported by the Swiss National Science Foundation and the project leader, Dr. Daniel Studer, has received funding from the Toggenburger Foundation and the University of Basel through the research fund for young researchers. The existing collaboration with Prof. Philippe Büchler from the ARTORG Centre of the University of Bern was successfully expanded in 2020 with the involvement of Prof. Georg Rauter from the University of Basel's Department of Bio-medical Engineering. After construction of the hexapod-based robotic system "the SpineBot", a validation study was published in 2020. The next steps include the optimisation of the SpineBot, simulating the application on cadaveric spines, before finally performing intraoperative measurements.

The expected results will be unique in terms of providing accurate, reliable and repeatable in-vivo data of patient-specific segmental spine stiffness. They enable a basis for the creation of detailed finite element models of the spine, to correlate preoperative clinical radiological assessments of spinal biomechanical properties against intraoperative data, to develop and virtually test new surgical implants and optimise conservative and surgical treatment. This could be a decisive step towards fusionless surgery with preservation of function and mobility.

3D Spinal Length

Based on a free downloadable software to determine the three-dimensional length of the spine, we are in the process of a master's thesis to compare the actual length of the spine against the previous two-dimensional gold standard.

Patient-reported Outcome Measures (PROMs)

Assessment of the quality of medical interventions is shifting from clinical parameters to the perceived benefit of the patient aiming towards a sustainable improvement of health-related quality of life. Under the leadership of Prof. Viehweger, the implementation of Patient-Reported Outcome Measures (PROMs) has been incorporated into an overall project of the UKBB.

Neuromuscular Scoliosis

In the context of a master thesis we are investigating the effect of brace treatment in patients with cerebral palsy and to what extent surgical measures can be prevented or delayed.

Paediatric Infectious Diseases and Vaccinology

Our main area of research is in the field of **pertussis**, specifically its epidemiology, burden of disease, and prevention by vaccines. This research is done in collaboration with national (Swiss Public Health Office and Swiss Pediatric Surveillance Unit, Mack et al 2020) and international collaborators (Ristic et al., 2019, Son et al., 2019, Chitkara et al., 2020). Our second area of research deals with the epidemiology, burden of disease and vaccine prevention of **varicella** (Savoia et al., 2019).

Acceptance of recommended vaccines or – its opposite – vaccine hesitancy (recently included in the top 10 threats for global health by WHO) has been an area of increasing research by our group including not only healthcare workers but also the public (Erb et al., 2019, Schneider et al., 2020, Imahorn et al., 2020, Erb et al., 2020). Further important activities are in the field of **bone infections** (Manz et al., 2020) and, more recently, **COVID-19** (Grötzinger et al., 2020)

The **COVID-19 pandemic** has kept all members of my group extremely busy, including those with their own research groups (Nicole Ritz) or associated with a different research group (Julia Bielicki). Management of the pandemic on a local, regional, national and international level has been significantly influenced by members of my group and myself. Further, a surveillance project on **varicella in Switzerland** (SPSU) has been intensively prepared (Michael Büttcher and myself): it is well-advanced and now ready for launch.

- **Pertussis**
- **Vaccines**
- **Vaccine Hesitancy**
- **Varicella**
- **COVID-19**



Prof. Ulrich Heininger, MD
Research Group Leader

Group Members at the UKBB

- Ines Mack, MD
- Hanna Schmid, MD
- Nora Manz, MD
- Michael Büttcher, MD
- Prof. Jan Bonhoeffer, MD

Paediatric Surgical Research

- **Hirschsprung's Disease**
- **Enterocolitis**
- **Neuroimmunology**
- **Microbiome**



Prof. Stefan Holland-Cunz, MD
Research Group Leader

Group Members at the UKBB

- Simone Ross-Keck, MD, PhD
- Virginie Galati-Fournier, technician
- Michèle Moesch, MD student

In a multicentre study started in 2015 including different centers from Switzerland and Germany, patients with Hirschsprungs Disease (HD) are being recruited.

In a study assessing the intestinal neuroimmune system we investigate the effect of lacking intrinsic nerve cells on the immune system and hence on the susceptibility of Hirschsprung-associated enterocolitis (HAE). We are currently in the publication process of hereby obtained results.

In 2019 a retrospective validation study was established assessing the extrinsic intestinal nerve fibers in HD patients as possible prognostic marker for HAE. The manuscript is currently in the writing phase (MD thesis of Michèle Moesch).

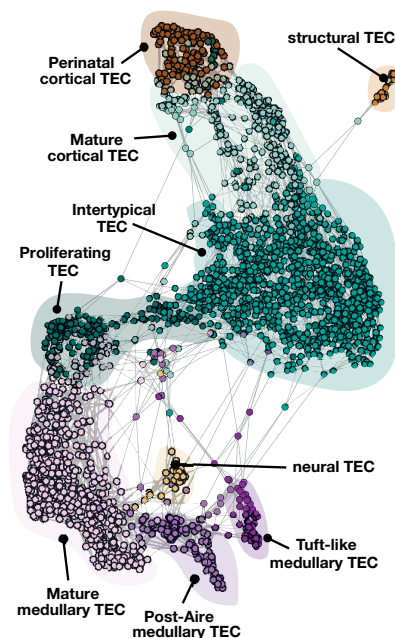
In order to assess the intestinal neuroimmune regulation in HD patients on a molecular level, an in-vitro model was established in 2020 identifying possible target receptors. Hereby obtained data will be the basis for novel therapeutic approaches in-vivo (i.e. mouse models and clinical studies). For upgrading statistic quality since 2019 our research group intensified the collaboration with the Paediatric laboratory (training for biomedical analysts).

Paediatric Immunology

The thymus is the anatomical site where T cells are generated. They provide protective immunity against pathogens whilst ignoring the individual's own tissues. Thymic epithelial cells (TEC) are instrumental in this process as they commit hematopoietic precursors to a T cell fate and select T cells capable of interacting with an individual's antigen presenting cells. Furthermore, a unique TEC subset collectively expresses an almost complete repertoire of protein coding genes and thus creates a library of self-peptides essential for T cell self-tolerance.

Our research seeks to detail the genetic and epigenetic control of TEC development and function. Recent and ongoing work focuses on:

- The transcription factor FOXP1, a TEC master regulator. We have identified the DNA binding motif of FOXP1, and determined the factor's molecular structure and molecular interactome.
- The complexity of TEC lineage development. Using lineage tracing and single cell transcriptomics across the life course of mice, we have identified at least 9 separate TEC subtypes (Figure) and showed that TEC progenitors are the principal targets of aging. Hence, the quiescence of TEC progenitors is a major factor underlying thymus involution and affects its regeneration.
- The epigenetic control of TEC biology. We have shown that interference with histone modifications, miRNA generation or RNA binding profoundly impairs both TEC development and function and consequently thymus biology. Some of the changes are only apparent in adult mice thus revealing a differential dependence at early vs late stages of development.
- The relevance of TEC metabolism. We have found that the homeostasis of adenine nucleotides influences quantity and quality of TEC, including their mitochondria and superoxide production, and deviates thymopoietic function.



A SPRING-layout of the shared nearest-neighbour graph of single TEC, derived from scRNA-seq transcriptional profiles. Cells are coloured by a clustering that joins highly connected networks of cells based on a random walk. Clusters are annotated based on comparisons to known TEC subsets and stereotypical expression profiles.

- **Thymus Development**
- **Thymic Epithelial Cell**
- **T Cell**
- **Genetics & Epigenetics**
- **Lineage Fate**



Prof. Georg Holländer, MD
Research Group Leader

Group Members at the UKBB

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- Irene Calvo-Asensio, PhD
- Martha Gaio, administrative assistant
- Katrin Hafen, technician
- Veysel Kaya, PhD Student
- Anja Kusch, PhD Student
- Lucas Musette, PhD Student
- Saulius Zuklys, PhD

Bone Tumour and Limb Reconstruction Group

- Reconstructions and Tumours
- Deformities
- Hip
- Infections



PD Andreas H. Krieg, MD
Research Group Leader

Group Members at the UKBB

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- Kraus Manel, MD
- Zdzislaw Krol, PhD
- Chao Dong, MD
- Isabel Belinger, master's student
- Sebastian Kaufmann, master's student

Research finished during 2019 – 2020

1. Potential of paediatric adipose tissue as a cell/tissue source for bone regeneration in children
The goals of this study were to evaluate the potential of paediatric adipose tissue as a cell/tissue source for bone regeneration. This study was performed and co-operated with Tissue Engineering Lab in DBM. The manuscript of this project has been finished and will be submitted soon.
2. Personalized 3D- printed guide for resection of malignant bone tumours and following reconstruction
The goals of this study were to demonstrate the potential of treatment outcome in the field of orthopedic oncology by using a 3D printed guide. The major party was performed by Miss Isabel Beglinger as her Master Thesis.
3. Acetabuläre Überdachung nach Triple-Beckenosteotomie bei Patienten mit schwerer Legg-Calvé-Perthes Krankheit bezogen auf die Ontogenese
This is a doctoral thesis work conducted by Mr. Adam Kratky as his MD Thesis. 2 publications are under preparation and the dissertation was successfully peer reviewed in 04-2021.

Researches are still on going

1. Allograft bypass and reconstruction technique combined with long term bracing in the treatment of congenital pseudarthrosis of the tibia.
We plan to do a retrospective study on the CPT patients who accepted allograft bypass or reconstruction operation between 2009 and 2018. One part of this project was performed by Mr. Sebastian Kaufmann as his Master Thesis.
2. The application of isothermal microcalorimetry in bone and soft tissue sarcoma.
The aim of the study was to evaluate the possible application by using isothermal microcalorimetry in the prognosis of bone and soft tissue sarcoma.
3. Survivorship and clinical outcome of tumour prosthesis reconstruction in pelvic and extremities tumour patients
This project is now a co-operation with another bone tumour center in Zurich.
4. Tenosynovial Giant Cell Tumour (TGCT) in Basel

From 2016 to 2018, we successfully co-operated with Novartis to perform a Phase II study of MCS110.

We are in contact with another pharmaceutical company (Deciphera) to perform a new clinic trial Phase III whose agent can also treat TGCT by blocking CSF-1.

A retrospective study to review the outcome of TGCT patients in Basel in the last 20 years is ongoing.

Immune Thrombocytopenia Research

The Intercontinental Cooperative ITP Study Group (ICIS) was founded 1997 (www.itpbase1) with 4 registries aiming to establish a worldwide network of scientists and clinicians involved in the field of immune thrombocytopenia (ITP). The Pediatric and Adult Registry on ITP and the Splenectomy Registry are open for patient recruitment with 4'600 patients as of March 2021.

In September 2019 the 6th ICIS Expert Meeting was held in Switzerland with the topic "Critical questions in ITP in children and adults". Thirty distinguished experts discussed diagnostic and therapeutic problems over three days. The 7th ICIS Meeting is scheduled for 2022.

Thrombopoietin-receptor agonists (TPO-RAs) are platelet growth factors that stimulate the c-mpl receptor expressed on megakaryocytes and megakaryocyte precursors. It has been observed that a subgroup of patients with ITP remains in remission when terminating therapy with these drugs. We hypothesized that TPO-RAs exhibit tolerogenic functions, mediated by an increased mass of platelets that exerts various immunogenic actions. We thus planned and activated two multicenter investigator-driven clinical trials, 1) "Immunomodulation with romiplostim in young adults with ITP" – a one-arm pilot intervention trial, and 2) "Immunomodulation with eltrombopag and dexamethasone in young and midlife adults with ITP" – a randomized trial. Recruitment of the first trial was completed in 2020. The second trial is now approved and can be started.

In a Canadian-Swiss collaboration, data from the ICIS Splenectomy Registry were analyzed and published. Splenectomy, initiated by Paul Kaznelson, a medical student, and successfully performed by Herman Schloffer in Prag in 1916, belongs until now to the therapeutic standards for patients with ITP. Our data confirmed the clinical value of splenectomy in children with ITP. Only the age of the patients predicted the response of splenectomy: the older the patient the higher the odds of response.

Practice guidelines have become powerful tools for clinicians. We participated in the guideline development of German-speaking countries, United States and in an international consensus. Through the expert participation in these groups networks needed for future research and clinical collaboration have been created.

- Paediatric Pharmacology
- Clinical Pharmacology
- Systems Pharmacology
- Pharmacometrics
- Paediatric Clinical Trials



Prof. Thomas Kühne, MD
Research Group Leader

Group Members at the UKBB

- Monika Imbach, study nurse
- Caroline Martin Asal, study nurse
- Alexandra Schifferli, MD
- Verena Stahel, study nurse

Paediatric Pharmacology and Pharmacometrics

- Paediatric Pharmacology
- Clinical Pharmacology
- Systems Pharmacology
- Pharmacometrics
- Paediatric Clinical Trials



Prof. Johannes van den Anker, MD, PhD

(Paediatric Pharmacology);

Prof. Marc Pfister, MD

(Pharmacometrics and Systems Pharmacology)

Research Group Leaders

Group Members at the UKBB

- Verena Gotta, PhD, PharmD
- Gilbert Koch, PhD
- Andrew Atkinson, PhD
- Julia Bielicki, MD, PhD
- Tatjana Welzel, MD
- Sara Bachmann Brenner, MD
- Michael Büttcher, MD
- Stéphanie Leroux, MD, PhD
- Victoria Ziesenitz, MD
- Britta Steffens, PhD
- Cornelis Smit, PhD
- Jantine Brussee, PhD with Swiss TPH
- David Ternant, PhD
- Natalie Schönfeld, MD cand.
- Tamara van Donge, PhD cand.
- Ricarda Foulk, Sarah Koechlin PharmD
- admin/project management
- several master's students

Prof. Dr. med. Johannes van den Anker and Prof. Dr. med. Marc Pfister direct Paediatric Pharmacology at UKBB as well as the National Center for Paediatric Pharmacology and Pharmacometrics (SwissPedPha). The primary focus of this national centre is to perform clinical and translational research in the areas of developmental pharmacology, pharmacometrics (PMX) and systems pharmacology (computer modeling and simulation), pharmacogenetics and pharmacoepidemiology.

In addition, paediatric pharmacology consultation services are provided at UKBB to strengthen the safe and effective use of medicines in neonates, infants, children and adolescents.

We also train the next generation of clinician-scientists, paediatric clinical pharmacologists, pharmacometricians and system pharmacologists and have been successful in getting support from Roche and Idorsia for our PhD program in paediatric pharmacology.

We develop PMX- and AI-based models with the goal of building clinical decision support tools to optimise and personalise care for paediatric patients. As such, we founded the start-up company NeoPrediX (www.neopredix.com) to translate our innovative algorithm to forecast hyperbilirubinemia and phototherapy (European patent) into a certified prediction tool that supports clinical decisions to further enhance monitoring and treatment in newborns.

We also have received several grants including (i) an SNF grant for the “KIDS-STEP” investigating adjunct corticosteroid therapy in hospitalised children with community-acquired pneumonia (CAP), (ii) a grant from the ETH foundation to develop a computer model that accounts for physical activity to personalise insulin treatment in children with type-1 diabetes mellitus (collaboration with ETH Basel), and (iii) an international DRG-SNF grant to develop an intelligent software called OptiDose to optimise treatment in children with hypo- or hyperthyroidism (collaboration with University of Constance, Germany).

Mycobacterial and Migrant Health Research

Diagnosis of tuberculosis and other infections using biomarkers

The main research focus is to improve the diagnosis of tuberculosis in children, by expanding the knowledge on all aspects of epidemiology and prevention and investigating novel child-friendly diagnostic biomarkers.

This was done through the following research projects:

- A Horizon-2020-funded research and innovation action entitled: REACH: Russian European Alliance for research among women, Children and adolescents impacted by HIV, TB and HCV
- A prospective multicentre Swiss Study evaluating novel immunodiagnostic tests for childhood tuberculosis: Childhood Tuberculosis in Switzerland (CITRUS) study.
- The evaluation of novel immunodiagnostic tests for tuberculosis infection and disease in an adult HIV cohort in Switzerland (NOVDA study) in collaboration with the Swiss HIV Cohort Study.
- Salivary cytokines in children as biomarkers for oral health, infectious diseases and oncology (CytoSal Study) in collaboration with the departments of oncology, dentistry and oral health.

The first novel and improved blood biomarkers for the diagnosis of tuberculosis in children and HIV-infected individuals have been identified. In a next step, differentiation of TB disease stages is now being explored in larger patient populations.

Health needs of asylum-seeking children

Further research focuses are on the health needs of asylum-seeking children cared for at the UKBB.

This enhances our knowledge on all aspects of diseases and disease patterns specific to asylum-seeking and refugee children including infectious diseases and non-communicable diseases. This has been done through a large retrospective analysis of asylum-seeking and non-asylum-seeking children at the UKBB including over 200'000 visits to the hospital over 2 years. The research included 5 sub-studies on reasons for admission, preventable admissions, rare and complex diseases, non-physician visits and the quality of care delivered to asylum-seeking children. These findings are now used for teaching in our institution and to revise local, national and international recommendations for the care of asylum-seeking and migrant children.

- Tuberculosis
- Biomarkers
- Immune-diagnostics
- Refugee
- Asylum-seekers



PD Nicole Ritz, MD, PhD
Research Group Leader

Group Members at the UKBB

- Noemi Meier, MSc, PhD student
- Nora Fritschi, MD, PhD student
- Julia Brandenberger, MD, research physician, PhD student
- Manuela Hauser, doctoral student
- Sina Buser, master's student
- Myriam Gmünder, master's student
- Mirjam Kissling, master's student

Neonatal Respiratory and Clinical Epidemiology Research Group

- **Preterm Birth**
- **Respiration**
- **Autonomic Dysregulation**
- **Neonatal Lung Disease**



Prof. Sven Schulzke, MD, MSc, FRACP

Research Group Leader

Group Members at the UKBB

- Fabienne Berger, MD candidate
- Corinne Bürgin, MD
- Roland Gerull, MD
- Isabel Gonzalez, study nurse
- Mareike Hug, MD
- Carlos Sanchez Roldan, MSc
- Sirée Kämpfen, MD, PhD candidate
- Sereina Müller, master's student
- Roland Neumann, MD
- Benjamin Stöcklin, MD, PhD

Our aims are to better understand and support the growing respiratory system of neonates along with systematically summarising the evidence in the field to provide up-to-date knowledge to caregivers.

Prognostic value of heart rate variability in preterm infants

We initiated a prospective cohort study assessing the predictive value of sample entropy on hypoxaemic events in preterm infants immunised in the hospital. We examine whether sample entropy, a measure of complexity in a time series of heart beats, helps clinicians to pre-emptively assess the risk of hypoxaemic events after immunisation. More than 150 infants have been recruited thanks to the excellent efforts of the study team. Within this SNSF-funded project, we also investigate associations of heart rate variability and hypoxaemic events following cessation of caffeine citrate therapy or stopping of respiratory support, both representing important milestones of maturation in the life of a preterm infant.

Chronic lung disease of infancy

Within a group of experts assembled by the European Respiratory Society (ERS), we contributed to a guideline on the long-term management of children with bronchopulmonary dysplasia. This international effort aims to summarise current knowledge on long-term treatment of chronic lung disease of infancy in a systematic review and assessment of the evidence using the GRADE approach. We suggest monitoring with lung imaging using ionising radiation in a subgroup only (for example, severe cases or recurrent hospitalisations) and monitoring with lung function in all children.

Albino trial

The Albino trial is an international multi-centre randomised trial in term infants with hypoxic-ischaemic encephalopathy following birth asphyxia. In addition to cooling, participants receive two doses of allopurinol on day one of life in order to alleviate secondary effects of brain hypoxia. This trial involves obtaining written informed parental consent and giving the first dose of medication within 45 min of life through a central line while making absolutely sure that proper resuscitation of infants is prioritised over trial procedures. Not surprisingly, international recruitment is extremely challenging and we are proud to have successfully recruited the first Swiss infants to this trial.

Childhood leukemia

Our research explores the molecular mechanisms of paediatric acute myeloid leukemia (AML). Based on its rarity and genetic heterogeneity, we perform most of our studies in cell- and mouse models. In 2019/20, we worked on two major subjects.

A) We studied the impact of the cellular origin and transforming potential of AML-associated fusion oncogenes in inducible transgenic mice. The NUP98-MLL fusion is the only AML-associated MLL rearrangement in which the entire C-terminus of the protein is maintained. We found that transgenic expression of NUP98-MLL resulted in myelodysplastic syndromes (MDS) and AML in mice (Fisher et al., 2020). The ETO2-GLIS2 fusion is a hallmark of acute megakaryoblastic leukemia (AMKL) almost exclusively affecting paediatric patients. Strikingly, induction of ETO2-GLIS2 in mouse fetal HSC rapidly induced a fully reversible AMKL, while expression in adult mouse bone marrow resulted in AML. Our first in vivo model for ETO2-GLIS2-driven AMKL showed that the phenotype of paediatric AML is determined by ontogeny-dependent susceptibility for transformation (Lopez et al., 2019).

B) Genetic inactivation of the nuclear interacting SET domain protein 1 (NSD1), a histone methyltransferase involved in paediatric AML, in the hematopoietic system of the mouse unexpectedly resulted in a disease closely phenocopying human acute erythroleukemia (AEL). Functional studies revealed that NSD1 is a novel regulator of erythroid differentiation and leukemogenesis (Leonards et al., 2020). To better understand the molecular pathology of AEL, we genetically characterised a series of primary patient samples. We found three molecular subgroups including patients carrying TP53 mutations, epigenetic mutations, and others. We established a transcriptomics-based space in which, independently of the genetic subgroup, most AEL samples exhibited a unique mapping that was clearly different from other AML forms. In >25% of the cases, we found aberrant expression of transcriptional regulators related to the activity of the master transcription factor GATA1. Our work indicates that AEL is a genetically heterogeneous disease in which the erythroid identity results in part from the aberrant activity of key erythroid transcription factors like GATA1 (Fagnan et al., 2020).

- Acute Myeloid Leukemia
- Modelling
- Molecular Mechanisms



Prof. Jürg Schwaller, MD
Research Group Leader

Group Members at the UKBB

- Amandine Bovay, PhD (Swiss National Science Foundation)
- Maria Piqué-Borras, PhD (Swiss Cancer League)
- Marwa Almosaillekh, PhD student (until 03/2020)
- Samantha Tauchmann, PhD student
- Hughes-Etienne Chatel-Soulet, PhD student
- Federica Valigi, PhD student (from 09/2020)
- Sabine Ehret, Laboratory technician
- Frederik Otzen Bagger, Bioinformatician (until 03/20)

Translational Medicine Breath Research

- **Breath Research**
- **Therapeutic Drug Monitoring**
- **Metabolomics**
- **Translational Medicine**
- **Personalised Medicine**



Prof. Pablo Sinues, PhD
Research Group Leader

Group Members at the UKBB

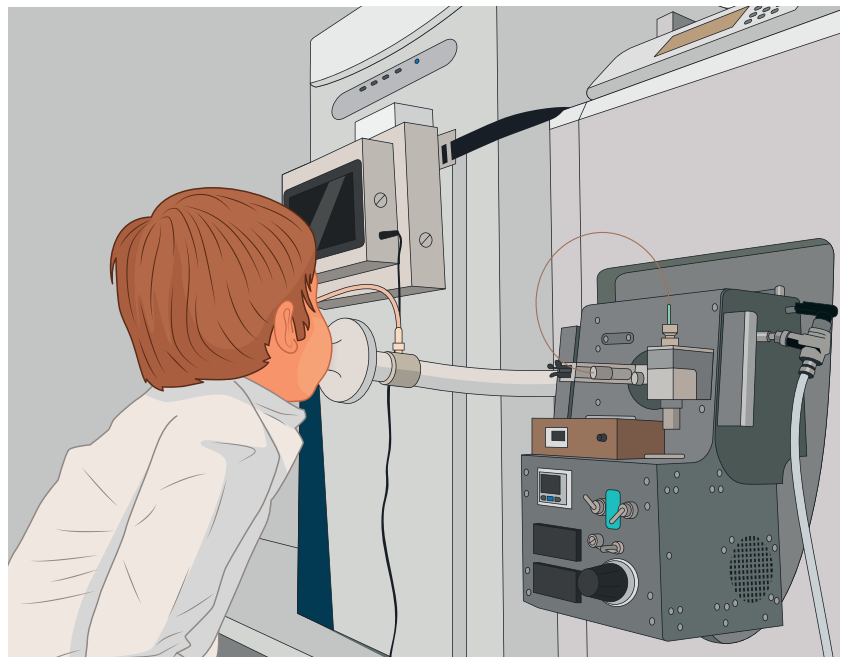
- Amanda Gisler
- Nadine Oser, PhD
- Kapil Dev Singh, PhD
- Mohamad Awchi
- Jakob Usemann, MD
- Kim Arnold
- Isabel Gonzalez
- Fabienne Decrue, MD
- Méline Richard
- Jiafa Zeng

Diagnosis of infectious diseases: Pneumonia (SNF 320030_173168; 2018–2022)

Our objective is to diagnose bacterial pneumonia using a non-invasive breath test that will deliver a positive/negative response, and will be used to identify a subset of disease-causing pathogens in 15 min. This research project is structured in three layers. It entails the analysis of volatile metabolites emitted by i) bacterial cultures in vitro, ii) infected mice and iii) human clinical cases. In the case of bacterial cultures, we have identified a number of biomarkers allowing to differentiate two of the most common species causing pneumonia with unprecedented speed thanks to the very high sensitivity of the analytical platform we have developed.

Therapeutic drug monitoring guided by breath analysis (SNF PCEGP3_181300; 2019–2024)

Our goal is to optimise the therapeutic regimen of paediatric patients to maximise efficacy and minimise side effects by a rapid breath test. We have gathered preliminary solid data in epileptic patients (UKBB and USZ). These results show that real-time breath analysis of epileptic patients provides reliable estimations of systemic drug concentrations along with risk estimates for drug response and side effects. These results have led to a manuscript (Communications Medicine). In addition, a patent application has been filed and Deep Breath Intelligence AG (spin-off from the University) is expected to acquire an exclusive license agreement. Our vision is to develop and bring into routine clinical practice new tools to improve patients' diagnosis and personalise therapeutic interventions.



Paediatric Endocrinology and Diabetology

Diabetes Research

Over the last two years our team initiated clinical studies focusing on hypoglycaemia (with Paed. Pharmacology and ETH Zürich), ketoacidosis (with Prof. Sinues), quality of life, quality of transition and new diabetes technologies in children with type 1 diabetes (T1D). Further, two long-term studies were successfully finished:

DiaHEART study (with Paed. Cardiology): This observational study analysed influence of nocturnal hypoglycaemia on QTc and heart rate variability (HRV) in children with T1D using continuous glucose monitoring and Holter ECG. A QTc lengthening effect of nocturnal hypoglycaemia was documented. HRV changes occurred even before the onset of nocturnal hypoglycaemia, which may be useful for hypoglycaemia prediction.

CoDIAB study (with Paed. Pharmacology and Children's Diabetes Center, UWA, Perth, Australia): This observational prospective study characterised kinetics and dynamics of copeptin, a surrogate marker of arginine vasopressin (AVP) during paediatric diabetic ketoacidosis (DKA). Significant differences were found between newly diagnosed and known T1D patients suggesting DKA associated changes at the osmoreceptor and renal AVP receptor level (J Clin Endocrinol Metab 2020). Interaction of copeptin with further water regulating hormones is under investigation.

Endocrinology Research

The main research focus is on personalised dosing in children with thyroid diseases (**THYMOD-study** with Paed. Pharmacology and Dept. of Mathematics, University Konstanz, SNF-DFG-funded). Dosing of levothyroxine in infants with congenital hypothyroidism and carbimazole for children with Graves' disease is difficult and often results in under- or overdosing. To mitigate the risk of negative neurological outcome and pharmacological side effects, it is essential to establish a personalised dosing strategy that is continuously fine-tuned to the specific needs of infants and children with hyper- or hypothyroidism. Over the last two years we have developed dynamic mathematical models based on population pharmacokinetic/pharmacodynamic (PKPD) principles with individual covariate effects based on retrospective longitudinal disease data from four Swiss paediatric centers (BS, BE, ZH, SG). Prospective data will allow optimisation of the current pharmacometric models.

- Diabetes
- Hypoglycaemia
- Ketoacidosis
- Thyroid
- Pharmacometric Modeling



Prof. Gabor Szinnai, MD, PhD
Research Group Leader

Group Members at the UKBB

- Sara Bachmann, MD
- Marie-Anne Burckhardt, MD, PhD
- Melanie Hess, MD
- Prof. Urs Zumsteg, MD

Outcomes Research in Paediatric Oncology

- Childhood cancer
- survivor
- Cardiovascular outcomes
- Intervention studies



Prof. Nicolas-Xavier von der Weid, MD
Research Group Leader

Group Members at the UKBB

- Christina Schindera, MD/PhD, Study physician
- Simeon Zürcher, PhD student/ Project manager (2019)
- Ruedi Jung, PhD student/ Project manager (2019/2020)
- Tomas Slama, PhD student/ Project manager (2020)
- Iris Bächteli, PhD, Study Nurse
- Myriam Lange, Study Nurse

2019: SURfit Study: Effects of a 1-year partially supervised exercise program in childhood cancer survivors – a randomised intervention study.

The study ended in February 2019 after having recruited 151 survivors. Detailed clinical and biological data, features of the metabolic syndrome and quality of life were recorded for all participants at baseline and after 3, 6 and 12 months on-study. First data about baseline findings showed that this particular population is at high-risk of cardio-vascular complications, with 27 % having high waist circumference, 32 % high blood pressure, 19 % high triglycerides, 20 % an increased composite CVD risk score and 10 % metabolic syndrome. Better fitness, as measured by a better performance during CPET, handgrip and STS, was associated with a lower probability of presenting with the aforementioned cardio-vascular risk factors.

A first analysis of the intervention results (Figure) has just been carried out and shows the benefit of PA on the composite CV risk score, as well in the intention-to-treat (ITT) as in the 3 per-protocol (PP1, 2, 3) analyses.

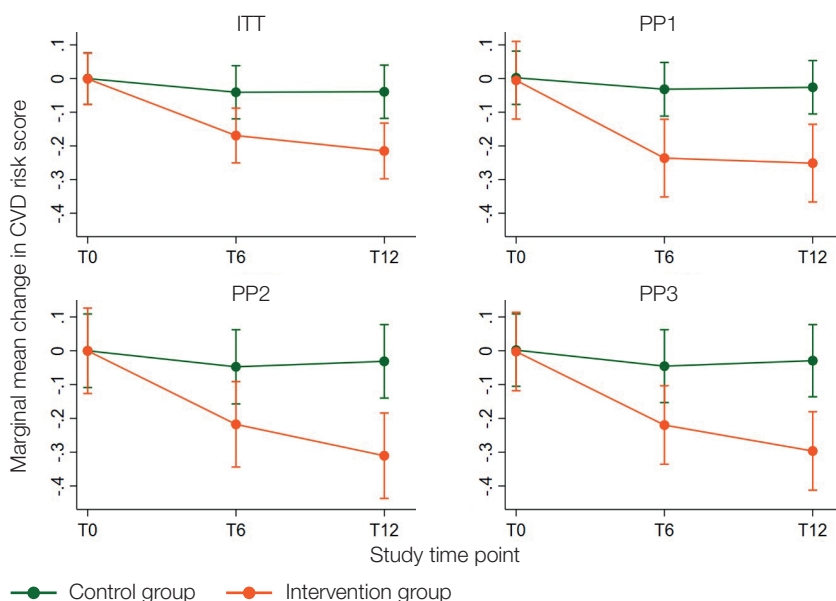


Figure showing the changes of the CVD risk score [z-score] at each study time point and by study group. The group allocation differs for each of the plots. T0=baseline; T6=6 months; T12=12 months post-randomisation. ITT (intention-to-treat): allocation as randomised (N=151); PP1, PP2 and PP3: 3 different per protocol analyses.

2020: Starting in the fall of 2019 and extending up to the start of the Covid pandemics in spring 2020, we realised the SURfit Kids Study, recruiting 25 paediatric (<18 yrs of age) survivors and 25 age- and gender-matched controls, looking at the same cardiovascular risk factors in a much younger population, having shortly terminated their oncological treatment. Data are currently pooled together in the field of a large European study.

Paediatric Neurology and Developmental Medicine Group

The main topics of our research group include developmental disorders, especially in preterm babies, attention, autism, and psychological aspects in neuropaediatric diseases.

Research activities in preterm follow-up.

A. Depoorter investigates electrophysiological signals of attention and learning at neonatal age – her work has been published or accepted for publication.

Nina Bechtel and M. Brotzmann work as members of the Swiss Neonatal Follow-up Group on the analysis of the follow-up data in this research group. They were actively involved in the validation of diagnostic tools. Together with S. Ludyga (DBS), we investigate the effect of sport activities on the cognitive function in preterm children.

Developmental disorders: Attention deficit disorder, autism, and cerebral palsy

M. Brotzmann and myself are in close collaboration with S. Ludyga in another project, investigating the effect of sport activities on attention in children with confirmed attention disorder. In different projects we investigate aspects of autism, in the context of the work by master and doctoral students. For example the effect of early intensive intervention on motor behavior and sensory perception or the development of diagnostic time-points for infantile autism with respect to different information programs in northwestern Switzerland and southern Switzerland (a combined project with colleagues in Ticino (Prof. Ramelli)). S. Jünemann's main research topic is the Swiss Registry for children with cerebral palsy, in collaboration with other swiss centers for paediatric neurology as well as orthopaedics

Rare diseases:

In the last two years, we finished a phase-I study about the effect of immunomodulation by fingolimod on the symptoms of patients with Rett syndrome and took part in an international study of epilepsy in patients with Nicolaidis-Baraitser syndrome. P. Dill works actively to create a national collaboration for patients with neurocutaneous syndromes.

Psychological aspects of neuropaediatric diseases

Beside possible effects of neurological diseases on the cognitive development of children, we focus on emotional aspects and stress experience (i.e. in neuromuscular disorders (V. Gocheva) and epilepsy (A. Nageleisen-Weiss)).

- Development
- Cognition
- Attention
- Autism
- Preterm



Prof. Peter Weber, MD
Research Group Leader

Group Members at the UKBB

- Nina Bechtel, PhD
- Mark Brotzmann, MD
- Patricia Dill, MD
- Antoinette Depoorter, MD
- Stephanie Jünemann, MD
- Annette Nageleisen-Weiss

Paediatric Rheumatology Research Group

- Inflammatory Diseases
- Safety
- Biologics
- Autoinflammation
- Transitional Care



Andreas Wörner, MD
Research Group Leader

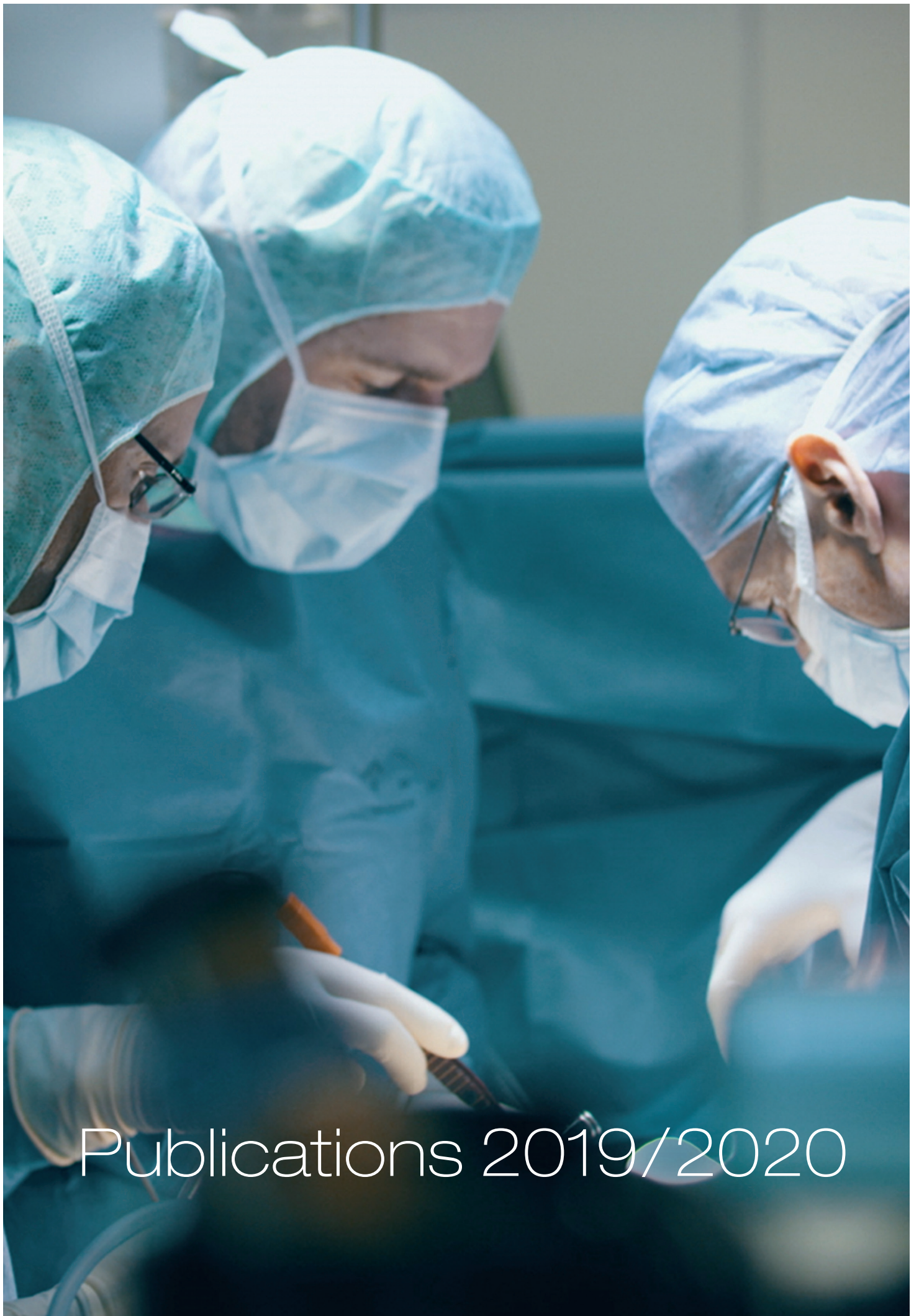
Group Members at the UKBB

- Tatjana Welzel, MD, Fellow
- Thomas Daikeler, MD, Rheumatology USB
- Lut Berben, RN, PhD, Transitional Research
- Mary Daly, RN, Transition Clinic nurse

Rheumatic diseases with onset in paediatric age (pedRD) are caused by immune system disorders, leading to chronic systemic inflammation. The introduction of cytokine-directed biologic therapies has led to major improvements in disease outcomes. With availability of an increasing number of biologics, one focus of research within the UKBB Paediatric Rheumatology Research Group (PRRG) is directed to safety aspects of biologic treatment. Current biologic medications have been licensed by authorities with identical body weight- or body surface-based dosage for various rheumatic diseases. However, pedRD are rare diseases, and the level of evidence for appropriate disease-related dosage from paediatric studies is still low. One PRRG study aims to establish a pharmacokinetic/pharmacodynamic (PK/PD) model of the TNF-alpha inhibitor adalimumab with or without concomitant methotrexate therapy in selected pedRD. This PK/PD model may allow individual, personalized dosage of adalimumab of these pedRD in the future to improve clinical outcomes and to reduce side effects of treatment.

Rare diseases such as pedRD and its treatments need careful monitoring through registers. Since 2014, the *Juvenile Inflammatory Rheumatism Cohort*, a European pedRD register, has collected data from more than 6'000 patients. One of the main goals is the investigation of phase IV medication safety signals. Dr Woerner is member of the steering committee and principal investigator of the vaccination module.

A successful transition from paediatric to adult care is essential to empower young people in relation to their chronic illness, to improve adherence and to reduce disease activity. Using an implementation research approach, the PRRG team has developed a detailed transition program for pedRD patients between 12 and 20 years of age. In a subsequent project, the PRRG team investigated the current practice of transition in all Swiss centres for paediatric rheumatology. Further projects within the Swiss transition network for paediatric rheumatology focus on new standards for transitional care in rare diseases.



Publications 2019/2020

Publications 2019/2020

in alphabetical order by Research Group Leader's name

Maya Caroline André, MD, PhD

Peer reviewed article

Morishima T, Krahl AC, Nasri M, Xu Y, Aghaallaei N, Findik B, Klimiankou M, Ritter M, Hartmann MD, Gloeckner CJ, Stefanczyk S, Lindner C, Oswald B, Bernhard R, Hähnel K, Hermanutz-Klein U, Ebinger M, Handgretinger R, Casadei N, Welte K, Andre M, Müller P, Bajoghli B, Skokowa J. LMO2 activation by deacetylation is indispensable for hematopoiesis and T-ALL leukemogenesis. *Blood*. 2019 Oct 3;134(14):1159–1175.

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Felicitas Bellutti Enders, MD, PhD

Peer reviewed article

Wienke J., Bellutti Enders F., Lim J. Mertens JS. van den Hoogen L, Wijngaarde C., Yeo JG., Meyer A., Otten HG., Fritsch-Stork RDE., Kampuis SSM., Hoppenreijns EPAH., Armbrust W., van den Berg M., Hissink Muller PCE., Tekstra J, Hoogendijk JE., DEakin CT., de Jager W., van Roon JAG, van der Pol LW., Nistala K., Pilkington C., de Visser M., Arkachaisri T., Radstake TRDJ, van der Kooi AJ., Nierkens S., Wedderburn LR., van Royen-Kerkhof A., van Wijk F. Galectin-9 and CXCL-10 as biomarkers for disease activity in juvenile Dermatomyositis: a longitudinal cohort study and multi-cohort validation, *Arthritis&Rheumatology* 2019. Aug;71(8):1377–1390. doi: 10.1002/art.40881. Epub 2019 Mar 12. Commented in *Nature Review Rheumatology* March 2019.

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Lut Berben, PhD, RN

Peer reviewed article

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Helmy R, Scalco de Almeida S, Denhaerynck K, Berben L, Dobbels F, Russell CL, de Aguiar Roza B, De Geest S, BRIGHT study team. Prevalence of medication nonadherence to co-medication compared to immunosuppressants in heart transplant recipients: findings from the international cross-sectional BRIGHT study. *Clin. Ther*. 2019, 41(1): 130–136.

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Julia Anna Bielicki, MD, MPH, PhD

Peer reviewed article

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Prof. Ulrich Heininger, MD

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Prof. Sven Schulzke, MD, Msc, FRACP

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Prof. Pablo Sinues, PhD

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Raphael N. Vuille dit Bille, MD, PhD

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Prof. Peter Weber, MD

Peer reviewed article

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Andreas Wörner, MD

Peer reviewed article

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UKBB
Dr. med. Thomas Schiemmer
Oberarzt Orthopädie



Promotions and Honours

Habilitations/Dissertations/Master Thesis

Adjunct Professorship

Name	First name	Title	Research Group
Bonhoeffer	Jan	Adjunct Professorship	Vaccine Safety Research
Trachsel	Daniel	Adjunct Professorship	Paediatric Pneumology and Intensive Care

Habilitations

Name	First name	Title	Research Group
Gros	Stefanie	Umhabilitation: Metastasierung und Therapie im orthotopen Ösophaguskarzinom Mausmodell Chirurgie/Kinderchirurgie	Molecular strategies in paediatric surgery

Dissertations

Name	First name	PhD/ MD	Title	Super-visor	Research Group
Almosailleakh	Marwa	PhD	Insights into cellular and molecular mechanisms of normal and malignant hematopoiesis from mouse models	Jürg Schwaller	Childhood leukemia
Berger	Fabienne	MD	Overlapping borders: limit of viability and late terminations of pregnancy – a retrospective multicentre observational study	Sven Schulzke	Neonatal Respiratory and Clinical Epidemiology Research Group
Decrue	Fabienne	PhD	The effects of environmental stimuli, in particular air pollution, on lung development in preterm and term infants and children	Urs Frey	Paediatrics and Paediatric Pulmonary Research Group
Erb	Miriam	MD	Child-Parent Immunization Survey: How well are national immunization recommendations accepted by the target groups	Ulrich Heiningner	Pediatric Infectious Diseases and Vaccinology
Füri	Julia	MD	The potential negative impact of antibiotic pack on antibiotic stewardship in primary care in Switzerland: a modelling study	Julia Bielicki/ Andreas Widmer	Paediatric Pharmacology and Pharmacometrics
Gisler	Amanda	PhD	The impact of environmental tobacco exposure, air pollution and vegetation on respiratory symptoms and the development of asthma and allergy in early childhood	Urs Frey	Paediatrics and Paediatric Pulmonary Research Group
Hermann	Katharina	MD	Mismatch response in preterm and asphyxiated neonates: A functional electrophysiological investigation of attention and habituation	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Imahorn	Noemi	MD	What Matters to Parents Regarding Immunization of Their Children: Systematic Analysis of Expert Advice to Parents in an Internet Forum	Ulrich Heiningner	Pediatric Infectious Diseases and Vaccinology
Keiser	Ramona	MD	4D Analysis of Left Ventricular Function and Rotational Mechanics by Speckle Tracking – Normal Values and Values under Growth Hormone Therapy for the Paediatric and Adolescent Population	Birgit C. Donner	Clinical Research in Paediatric Cardiology

Habilitations/Dissertations/Master Thesis

Dissertations

Name	First name	PhD/MD	Title	Supervisor	Research Group
Leuvenik	Raphael	MD	Multidisciplinary paediatric chronic pain therapy improves pediatric pain disability index and school absence – outcomes of the first Swiss inpatient program	Wilhelm Ruppen/ Andreas Wörner	Paediatric Rheumatology Research Group
Manz	Nora	MD	Long-term outcomes of acute osteo-articular infections in children	Ulrich Heiningner	Pediatric Infectious Diseases and Vaccinology
Meier	Noemi	PhD	Evaluation of novel immunodiagnostic tests in the diagnosis of tuberculosis	Nicole Ritz/ Manuel Battegay	Mycobacterial and Migrant Health Research
Moesch	Michèle	MD	A new prognostic marker for Hirschsprung's associated enterocolitis	Stefan Holland-Cunz	Paediatric Surgical Research
Pini	Nicola	MD	AQP1-driven migration in neuroblastoma	Stephanie Gros	Molecular strategies in pediatric surgery
Piqué Boras	Maria Riera	PhD	Molecular mechanisms of acute erythroid leukemia: learning from rare chromosomal translocations in pediatric patients	Jürg Schwaller	Childhood leukemia
Schindera	Christina	PhD	Cardiovascular disease after childhood cancer	Nicolas v. d. Weid	Outcomes Research in Pediatric Oncology
Schönfeld	Nathalie	MD	Caffeine preserves quiet sleep in preterm neonates	Alexandre N. Datta/ Marc Pfister	Pediatric Epileptology and Sleep Research Group Paediatric Pharmacology and Pharmacometrics
Sigg	Nora	MD	Current practice of transition in Swiss Pediatric Rheumatology centres	Thomas Daikeler	Paediatric Rheumatology Research Group
Teufel	Claudia	PhD	mTOR-mediated regulation of group 3 innate lymphoid cell numbers and cytokine responses	Daniela Finke	Developmental Immunology

Master Thesis

Name	First name	Title	Supervisor	Research Group
Auderset	Anne	Die Gefahr nächtlicher Hypoglykämien: QTc-Intervalle in Abhängigkeit von nächtlichen Hypoglykämien bei Kindern und Jugendlichen mit Diabetes mellitus Typ 1	Birgit C. Donner/ Sara Bachmann	Clinical Research in Paediatric Cardiology
Behrens	Lynn	The Susceptibility to Other Infectious Diseases Following Measles During a Three Year Observation Period in Switzerland	Ulrich Heining	Pediatric Infectious Diseases and Vaccinology
Berni	Angela	Why, when, how. A retrospective analysis of hospitalisations of children with type 1 diabetes	Gabor Szinnai/ Sara Bachmann	Paediatric Endocrinology and Diabetology
Bilang	Remo	Language impairment in children with self-limited epilepsy with centrotemporal spikes supervisor	Alexandre Datta	Pediatric Epileptology and Sleep Research Group
Böhringer	Sarah	Cardiovascular Health in Childhood Cancer Survivors	Nicolas v. d. Weid	Outcomes Research in Pediatric Oncology
Bologna	Katja	Reduced Cardiorespiratory Fitness in Childhood Cancer Survivors	Nicolas v. d. Weid	Outcomes Research in Pediatric Oncology
Buser	Sina	Reasons for admission in asylum-seeking and non-asylum-seeking patients in a paediatric tertiary care center	Nicole Ritz/ Julia Brandenberger	Mycobacterial and Migrant Health Research
Davaz	Nicola	In situ detection of murine MHC II+ ILC3s in health and disease	Daniela Finke	Developmental Immunology
Fankhauser	Patrick	Retrospective quality control study to evaluate current amikacin dosing and therapeutic drug monitoring practices in preterm and term neonates	Julia Bielicki/ Marc Pfister	Paediatric Pharmacology and Pharmacometrics
Gmünder	Myriam	Asylum-seeking children with medical complexity and rare diseases in a tertiary hospital in Switzerland	Nicole Ritz/ Julia Brandenberger	Mycobacterial and Migrant Health Research

Habilitations/Dissertations/Master Thesis

Master Thesis

Name	First name	Title	Supervisor	Research Group
Hagmann	Sarah	Vergleich des therapeutischen Effektes von Akupressur Therapie und Iberogast® bei Kindern mit funktioneller Nausea	Raoul I. Furlano/ Corinne Légeret	Paediatric Gastroenterology and Nutrition
Heiri	Andrea	Analysis of children with secondary immune thrombocytopenia (ITP): an observational study of children of the PARC-ITP Registry	Thomas Kühne/ Alexandra Schifferli	Immune Thrombocytopenia Research
Helbling	Madlaina	Investigation of alpha7 nicotinic acetylcholine receptor expression on human macrophages	Stefan Holland-Cunz	Paediatric Surgical Research
Kana-galingam	Pratheev	Copeptin kinetics in response to an osmotic stimulation in healthy volunteers and patients with diabetes insipidus	Marc Pfister	Paediatric Pharmacology and Pharmacometrics
Kusch	Anja	Investigation of the role of H3K27-trimethylation in thymic epithelial cell development and function	Georg Holländer/ Irene Calvo-Asensio	Paediatric Immunology
Lauro	Arianna	Long-term cardiopulmonary function in preterm born children	Birgit C. Donner	Clinical Research in Paediatric Cardiology
Lohmann	Clarissa	Migrainous infarction in children and adolescents: A case report and systematic review of published cases	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Monnerat	Sophie	High Impact Physical Activity and Bone Health of Lower Extremities in Childhood Cancer Survivors: A Cross-sectional Study of SURfit	Nicolas v. d. Weid	Outcomes Research in Pediatric Oncology
Neudecker	Daniela	Height references for children published by Eiholzer: retrospective evaluation regarding the treatment of children below the 3 rd percentile.	Gabor Szinnai	Paediatric Endocrinology and Diabetology
Neumann	Geraldine	Physical Fitness in Swiss Childhood Cancer Survivors	Nicolas v. d. Weid	Outcomes Research in Pediatric Oncology

Name	First name	Title	Supervisor	Research Group
Peter	Jelissa	Thyroid diseases in children with Down syndrome: a retrospective multicenter study	Gabor Szinnai	Paediatric Endocrinology and Diabetology
Renggli	Luzia	Copeptin Kinetics and Its Relationship to Osmolality During Rehydration for Diabetic Ketoacidosis in Children	Marc Pfister	Paediatric Pharmacology and Pharmacometrics
Schmid	Marc	Langzeitfolgen nach retrogradem, femoralen Zugang für Beinverlängerung mittel einem motorisierten intramedullären Nagel	Andreas H. Krieg	Bone Tumor and Limb Reconstruction Group
Sommer	Michael	Time to initial diagnosis of autism spectrum disorder: a retrospective analysis over 10 years	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Volkart	Stefanie	Die Verteilung von Aquaporin 1 im Gastrointestinaltrakt und im enterischen Nervensystem der Maus	Stephanie Gros	Molecular strategies in pediatric surgery
Weber	Myriam	Fatigue in Childhood Cancer Survivors – Influence of a personal Physical Activity Program and Determinants of Fatigue	Nicolas v. d. Weid	Outcomes Research in Pediatric Oncology
Wohlwend	Nicolas	Early intervention for children with autism spectrum disorder: retrospective study of its impact on motor development	Peter Weber	Paediatric Neurology and Developmental Medicine Group
Zimmermann	Tamara	The role of natural killer (NK) cells and T cells during the pre-symptomatic phase of acute myeloid leukemia (AML)	Jürg Schwaller	Childhood leukemia

Appointments

Name	First name	Organisation	Appointment	Research Group
Szinnai	Gabor	European Thyroid Journal	Admission to the Editorial Board	Paediatric Endocrinology and Diabetology
Wörner	Andreas	Swiss Paediatric Surveillance Unit (SPSU)	Election for president	Paediatric Rheumatology Research Group

Awards

Name	First name	Congress/Society	Project/Title	Research Group	Award
Almosailleakh	Marwa	22 nd meeting of the European Red Cell Society (ERCS)	Inactivation of the nuclear interacting SET domain protein 1 (NSD1) impairs terminal erythroid differentiation and results in erythroleukemia in mice	Childhood leukemia	Frontiers in Physiology Award for basic research – Poster Prize
Bachmann	Freya	ACoP10, American Conference on Pharmacometrics	OptiDose: Computing the optimal individual dosing regimen with constraints on model states to include side effects	Paediatric Pharmacology and Pharmacometrics	ACoP10 Trainee Award 2019
Behrens	Lynn	UKBB-Research Session Master Students	Susceptibility to Infectious Diseases Following Measles During a 3 Year Observation Period – A Case Control Study	Pediatric Infectious Diseases and Vaccinology	Oral Presentation Prize
Bielicki	Julia	St George's University of London	EU Horizon2020 Projekt "NeoIPC"	Infection Prevention and Control and Antibiotic Stewardship	Outstanding Senior Lecturer of the year award 2019/2020
Bielicki	Julia	St George's University of London	Consumption of oral antibiotic formulations for young children according to the WHO Access, Watch, Reserve (AWaRe) antibiotic groups	Infection Prevention and Control and Antibiotic Stewardship	Outstanding research paper of the year award 2018/2019
Brandenberger	Julia	Swiss Society for Paediatrics SSP/SGP	Health care provided to asylum- and non asylum-seeking children at a Swiss tertiary hospital	Mycobacterial and Migrant Health Research	Poster Prize

Awards

Name	First name	Congress/Society	Project/Title	Research Group	Award
Brussee	Jantine	American College of Clinical Pharmacology at the ACCP Annual Meeting 2019	A pediatric covariate function for CYP3A-mediated midazolam clearance can scale clearance of selected CYP3A substrates in children	Paediatric Pharmacology and Pharmacometrics	New Member Abstract Award
Brussee	Jantine	USB Clinical Research Day 2018	Ivermectin dosing strategy to achieve equivalent exposure coverage in children and adults	Paediatric Pharmacology and Pharmacometrics	Best Oral Presentation Prize
Burckhardt	Marie-Anne	Swiss Society of Endocrinology and Diabetology	Deep phenotyping in pediatric type 1 diabetes: towards personalized diabetes management	Paediatric Endocrinology and Diabetology	Clinical Young Independent Investigator Grant
But	Ludmilla	Swiss Society of Endocrinology and Diabetology	Short stature and normal hGH stimulation – don't forget craniopharyngeoma	Paediatric Endocrinology and Diabetology	Best Oral Presentation Prize
Calvio-Asensio	Irene	EMBO Workshop	ThymE: T cell and thymus biology 2019	Paediatric Immunology	Poster Prize
Daly	Mary Louise	Swiss Rheumatology Society	A transition clinic or a clinic for young people – what's in a name? The challenges of developing a transition clinic from the ground up	Paediatric Rheumatology Research Group	Best Abstract Prize
Davaz	Nicola	UKBB-Research Session Master Students	Geographical localization of ILC3 in spleen, lymph node and small intestine of Wildtype and C. rodentium infected mice	Developmental Immunology	Oral Presentation Prize

Name	First name	Congress/Society	Project/Title	Research Group	Award
Decrue	Fabienne	University of Basel	Exposure to moderate air pollution and associations with lung function at school age. A birth cohort study	Paediatrics and Paediatric Pulmonary Research Group	DKF Research Day Best Poster Prize
Decrue	Fabienne	Mary & Ewald E. Bertschmann-Stiftung	Exposure to moderate air pollution and associations with lung function at school age. A birth cohort study	Paediatrics and Paediatric Pulmonary Research Group	Dissertation Prize
Epple	Christian	University of Basel	Prefabrication of a large pedicled bone graft by engineering the germ for de novo vascularization and osteoinduction	Paediatric Surgery Research	Medical Faculty Award for best Dissertation
Frei	Benjamin	Swiss Pediatric Surgery Society	Acute compartment syndrome (ACS) in children – Beware of “silent” compartment syndrome	Paediatric Surgery Research	Prix Basilisk
Frey	Urs	Swiss Society for Paediatrics SSP/SGP	For his achievements in Swiss Paediatrics	Paediatrics and Paediatric Pulmonary Research Group	Fanconi Prize
Gächter	Pascal	UKBB-Research Session Master Students	THYMOD Study: Modelling of Thyroid	Paediatric Endocrinology and Diabetology	Oral Presentation Prize

Awards

Name	First name	Congress/ Society	Project/Title	Research Group	Award
Hubacher	Martina	Swiss Epilepsy League	The absent mind	Pediatric Epileptology and Sleep Research Group	Research Recognition Award
Nageleisen-Weiss	Annette	Swiss Academy of Childhood Disability	Bad news-Diagnose: Epilepsie im Kindesalter – Erlebte Belastung zum Zeitpunkt der Diagnosevermittlung und im zeitlichen Verlauf.	Paediatric Neurology and Developmental Medicine Group	Anna-Müller-Grocholski-Prize 2019
Neudecker	Daniela	UKBB-Research Session Master Students	Überprüfung der klinischen Relevanz der neuen Wachstumskurven nach Eiholzer bezüglich Behandlung von Kindern unter der 3. Perzentile anhand der Daten von Kindern im UKBB	Paediatric Endocrinology and Diabetology	Oral Presentation Prize
Neuhaus	Cornelia	Stiftung Physiotherapie Wissenschaften	Treatment for patients with Osgood Schlatter disease by a physiotherapy program: TrOPhy-Study.	Physical Therapies	PhD Grant
Peter	Jelissa	University of Basel	Thyroid diseases in children with Down syndrome: a retrospective multicenter study	Paediatric Endocrinology and Diabetology	2019 Karger Award 2 nd rank
Schmid	Hanna	University of Basel	Perioperative Antibiotic Prophylaxis in Paediatric Appendectomies in Switzerland	Paediatric Infectious Diseases and Vaccinology	DKF Research Day Best Poster Prize

Name	First name	Congress/Society	Project/Title	Research Group	Award
Sinues	Pablo	Swiss Group for Mass Spectrometry	For his research in the field of mass spectrometry	Translational Medicine Breath Research	4 th SGMS award
Tauchmann	Samantha	European School for Hematology (ESH) conference on erythropoiesis control and ineffective erythropoiesis	Inactivation of the nuclear interacting SET domain protein 1 (NSD1) impairs terminal erythroid maturation and results in erythroleukemia in mice	Childhood leukemia	Oral Presentation Prize
Tauchmann	Samantha	XXXII. Kind-Philipp-Tagung für pädiatrisch hämatologische und onkologische Forschung	Inactivation of Nsd1 impairs terminal erythroid maturation and induces erythroleukemia	Childhood leukemia	Oral Presentation Prize
van den Anker	John	PPA, Pediatric Pharmacy Association	The Sumner J. Yaffe Lifetime Achievement Award in Pediatric Pharmacology and Therapeutics	Paediatric Pharmacology and Pharmacometrics	The Sumner J. Yaffe Lifetime Achievement Award in Pediatric Pharmacology and Therapeutics 2019
Fuchs & van Donge	Aline & Tamara	Pfizer Research Award/ Paediatrics	Quantitative Analysis of Gentamicin Exposure in Neonates and Infants Calls into Question Its Current Dosing Recommendations	Paediatric Pharmacology and Pharmacometrics	Pfizer Research Award 2019
van Donge	Tamara	British Journal of Clinical Pharmacology	Methadone dosing strategies in preterm neonates can be simplified	Paediatric Pharmacology and Pharmacometrics	Best Paper by a Young Researcher Award 2019

Awards

Name	First name	Congress/ Society	Project/Title	Research Group	Award
Volkart	Stefanie	University of Basel	Hormone Dosing in Congenital Hypothyroidis	Molecular strategies in pediatric surgery	Medical Faculty Award for Master Thesis 2020
Vuille-dit-Bille	Raphael	Swiss Pediatric Surgery Society	Mucosal Monosaccharide Transporter Expression in Newborns with Jejunoileal Atresia and along the Adult Intestine'	Paediatric Surgery Research	Prix Nachwuchs
Welzel	Tatjana	47. Congress of the German Society of Rheumatology (DGRh), the 33. Annual Conference of the German Society of Orthopaedic Rheumatology (DGORh) and the 29. Annual Conference of the German Society of Paediatric Rheumatology	Rare disease with sacroiliitis	Paediatric Pharmacology and Pharmacometrics	Scientific research award

Young Investigators

Name	First name	Supervisor	Research Group	Program	Project Title
Bielicki	Isabella	Stefan Holland-Cunz	Paediatric Surgery Research	Special Program Paediatric Research	Reliability and validity of telephone follow-up for surgical site infection surveillance post discharge in paediatric surgery
Büchler	Elisabeth	Sven Schulzke	Neonatal Respiratory and Clinical Epidemiology Research Group	Special Program Paediatric Research	The predictive value of sample entropy for successful weaning of respiratory support in preterm infants
Burckhardt	Marie-Anne	Urs Zumsteg	Paediatric Diabetology	Special Program Paediatric Research	The impact of flash glucose monitoring on glycaemic and psychosocial outcomes in children with type 1 diabetes
Bürgin	Corine	Kerstin Jost	Neonatal Respiratory and Clinical Epidemiology Research Group	Special Program Paediatric Research	Esophageal Signals to Monitor Respiratory Rate of Preterm Infants
Cremer	Martin	Ulrich Heiningen/Sirée Kämpfen	Paediatric Infectious Diseases and Vaccinology	Special Program Paediatric Research	Pertussis and influenza vaccination rate during pregnancy and measures to improve pertussis vaccine acceptance – a single center, prospective implementation approach
Hug	Mareike	Sven Schulzke	Neonatal Respiratory and Clinical Epidemiology Research Group	Special Program Paediatric Research	The predictive value of sample entropy for discontinuation of caffeine therapy in preterm infants
Kraxner	Angelika	Urs Frey	Paediatrics and Paediatric Pulmonology Research	Special Program Paediatric Research	Characterization of innate lymphoid cells in cord blood of term and preterm infants

Young Investigators

Name	First name	Supervisor	Research Group	Program	Project Title
Bellutti-Enders	Felicitas		Paediatric Allergy	Research Fond University of Basel	Potential prognostic value of blood cytokine profile, skin and stool microbiome in children with food allergies
Burckhardt	Marie-Anne		Paediatric Endocrinology and Diabetology	Research Fond University of Basel	Deep phenotyping in pediatric type 1 diabetes: towards personalized diabetes management
De Pieri	Enrico		Computational Spine Biomechanics	Research Fond University of Basel	Investigating the influence of lower-limb torsional malalignment on children's motion and joint loads
Vuille-dit-Bille	Raphael		Paediatric Surgery Research	Research Fond University of Basel	Intestinal function following Intestinal Spring Expansion
Bellutti-Enders	Felicitas		Paediatric Allergy	University of Basel antelope Program	
Burckhardt	Marie-Anne		Paediatric Endocrinology and Diabetology	University of Basel antelope Program	
Diesch	Tamara		Outcomes Research in Paediatric Oncology	University of Basel antelope Program	
Gotta	Verena		Paediatric Pharmacology and Pharmacogenetics	University of Basel antelope Program	
Gros	Stephanie		Molecular strategies in paediatric surgery	University of Basel antelope Program	

Name	First name	Supervisor	Research Group	Program	Project Title
Decrue	Fabienne		Paediatrics and Paediatric Pulmonary Research Group	University of Basel "Stay on Track"	
Sommer-Jørgensen	Vivienne		Paediatric Surgery Research	University of Basel "Stay on Track"	
Decrue	Fabienne		Paediatrics and Paediatric Pulmonary Research Group	SNF Flexibility Grant	n.a.
Jost	Kerstin		Neonatal Respiratory and Clinical Epidemiology Research Group	SNF Postdoc Mobility Grant	Deep machine learning based NEWS (Newborn Early Warning Signs)
Pramana	Isabelle		Neonatal Education Group	SIWF Qualification Grant	Modified Peytons's 4 step model for teaching umbilical vein catheter insertion





Facts and Figures

Funding and Research

Overview Third Party Funds UKBB 2019 (CHF)

Category	Balance 1.1.2019	Inflow of Funds	Use of Funds	Balance 31.12.19
Competitive Research	3'388'448	3'692'214	-3'191'662	3'889'000
Non-Competitive Research	2'078'683	4'127'916	-3'420'060	2'786'538
Contract Research (from 2020 on)				
Research and Teaching	972'044	683'788	-672'840	982'992
Patients	1'396'531	927'962	-765'516	1'558'977
Total	7'835'706	9'431'880	-8'050'078	9'217'508
Research Total	5'467'131	7'820'130	-6'611'722	6'675'539
Thereof competitive	3'388'448	3'692'214	-3'191'662	3'889'000
% Competitive of Total	62 %	47 %	48 %	58%
EU-Funding	119'741	0	-49'862	69'880
% EU-Funding of Total	2%	0%	1%	1%

Administered by	Balance 1.1.2019	Inflow of Funds	Use of Funds	Balance 31.12.19
UKBB	5'581'546	5'332'675	-4'071'501	6'842'719
Uni Basel	2'253'321	1'858'238	-1'737'630	2'373'928
Uni BS/UKBB	-	2'148'990	-2'148'990	-
USB	840	91'978	-91'957	861
Total	7'835'706	9'431'880	-8'050'078	9'217'508

DBM	Balance 1.1.2019	Inflow of Funds	Use of Funds	Balance 31.12.19
DBM UKBB	242'368	349'373	-242'698	349'043
DBM Unibas	629'794	406'093	-492'940	542'948
DBM USB	840	91'978	-91'957	861
Total	873'002	847'444	-827'595	892'852

Overview Third Party Funds UKBB 2020 (CHF)

Category	Balance 1.1.2020	Inflow of Funds	Use of Funds	Balance 31.12.20
Competitive Research	3'889'000	3'446'580	-3'602'160	3'733'421
Non-Competitive Research	2'664'204	3'121'002	-2'663'361	3'121'845
Contract Research	122'334	496'145	-278'380	340'098
Research and Teaching	982'992	575'509	-562'123	996'378
Patients	1'558'977	856'172	-966'519	1'448'630
Total	9'217'508	8'495'407	-8'072'543	9'640'372
Research Total	6'675'539	7'063'727	-6'543'901	7'195'365
Thereof competitive	3'889'000	3'446'580	-3'602'160	3'733'421
% Competitive of Total	42 %	41%	45%	39%
EU-Funding	69'880	618'022	-690'350	-2'448
% EU-Funding of Total	1%	7%	9%	0%

Administered by	Balance 1.1.2020	Inflow of Funds	Use of Funds	Balance 31.12.20
UKBB	6'842'719	4'242'322	-3'927'582	7'157'459
Uni Basel	2'373'928	2'343'327	-2'235'203	2'482'052
Uni BS/UKBB	-	1'829'221	-1'829'221	-
USB	861	80'538	-80'538	861
Total	9'217'508	8'495'407	-8'072'543	9'640'372

DBM	Balance 1.1.2020	Inflow of Funds	Use of Funds	Balance 31.12.20
DBM UKBB	353'854	181'352	-209'024	326'182
DBM Unibas	542'948	383'537	-436'747	489'738
DBM USB	861	80'538	-80'538	861
Total	897'663	645'427	-726'309	816'781

Funding and Research

Change of Third Party Funds UKBB 2019/2020

Category	Balance 1.1.	Inflow of Funds	Use of Funds	Balance 31.12.
Competitive Research	500'552	-245'634	-410'498	-155'579
Non-Competitive Research	585'522	-1'006'913	756'699	335'307
Contract Research	122'334	496'145	-278'380	340'098
Research and Teaching	10'948	-108'279	110'716	13'385
Patients	162'446	-71'791	-201'003	-110'347
Total	1'381'802	-936'472	-22'465	422'864
Research Total	1'208'408	-756'402	67'821	519'826
Thereof competitive	500'552	-245'634	-410'498	-155'579
% Competitive of Total	-20%	-7%	-4%	-20%
EU-Funding	-49'862	618'022	-640'489	-72'328
% EU-Funding of Total	-1%	7%	8%	-1%

Administered by	Balance 1.1.	Inflow of Funds	Use of Funds	Balance 31.12.
UKBB	1'261'174	-1'090'353	143'919	314'740
Uni Basel	120'607	485'090	-497'573	108'124
Uni BS/UKBB	0	-319'769	319'769	0
USB	21	-11'440	11'419	0
Total	1'381'802	-936'472	-22'465	422'864

DBM	Balance 1.1.	Inflow of Funds	Use of Funds	Balance 31.12.
DBM UKBB	111'487	-168'021	33'673	-22'861
DBM Unibas	-86'847	-22'556	56'193	-53'210
DBM USB	21	-11'440	11'419	0
Total	24'661	-202'018	101'286	-76'071

University Budget and Third-Party Funds

Year	2015	2016	2017	2018	2019	2020	
University Budget	8.93	8.95	9.12	8.95	8.89	8.42	Million CHF
External Funds	5.56	6.19	8.45	7.65	7.82	7.06	Million CHF

Distribution of the Research Funds by Categories (CHF)

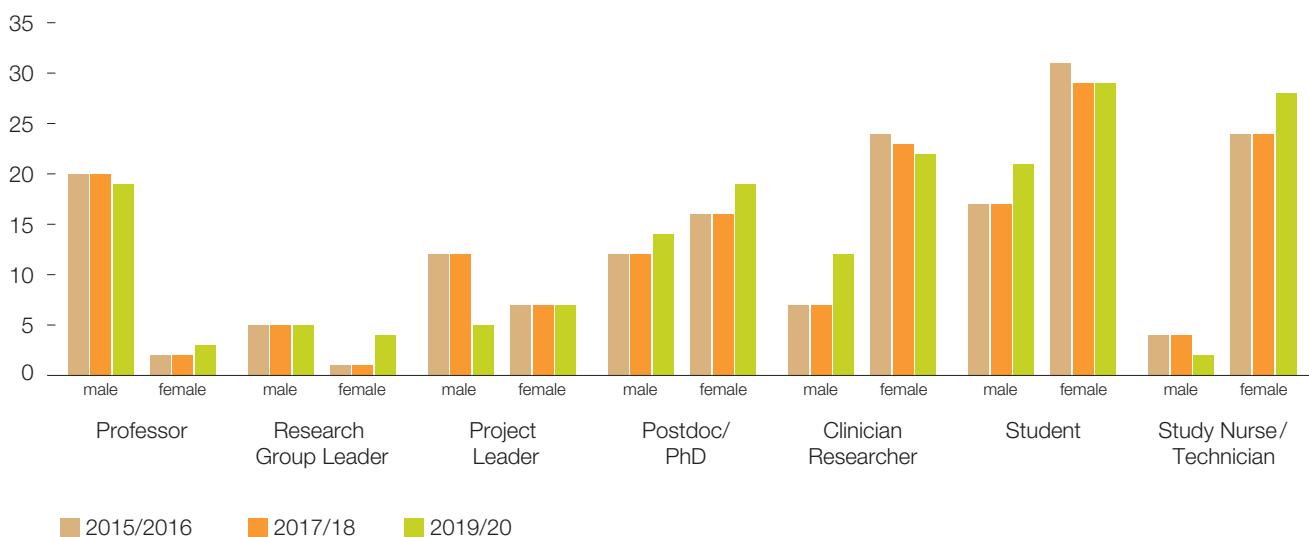
Botnar Professorship	291'656
Eckenstein-Geigy Professorship	2'327'661
EU	618'022
Research Fund Junior Researchers (University)	202'658
SNF	1'302'497
Special Program Paediatric Research	356'100
University Budget	8'418'515
Other foundations and donations	1'965'134
Total	15'482'242

Funding by Research Areas (CHF)

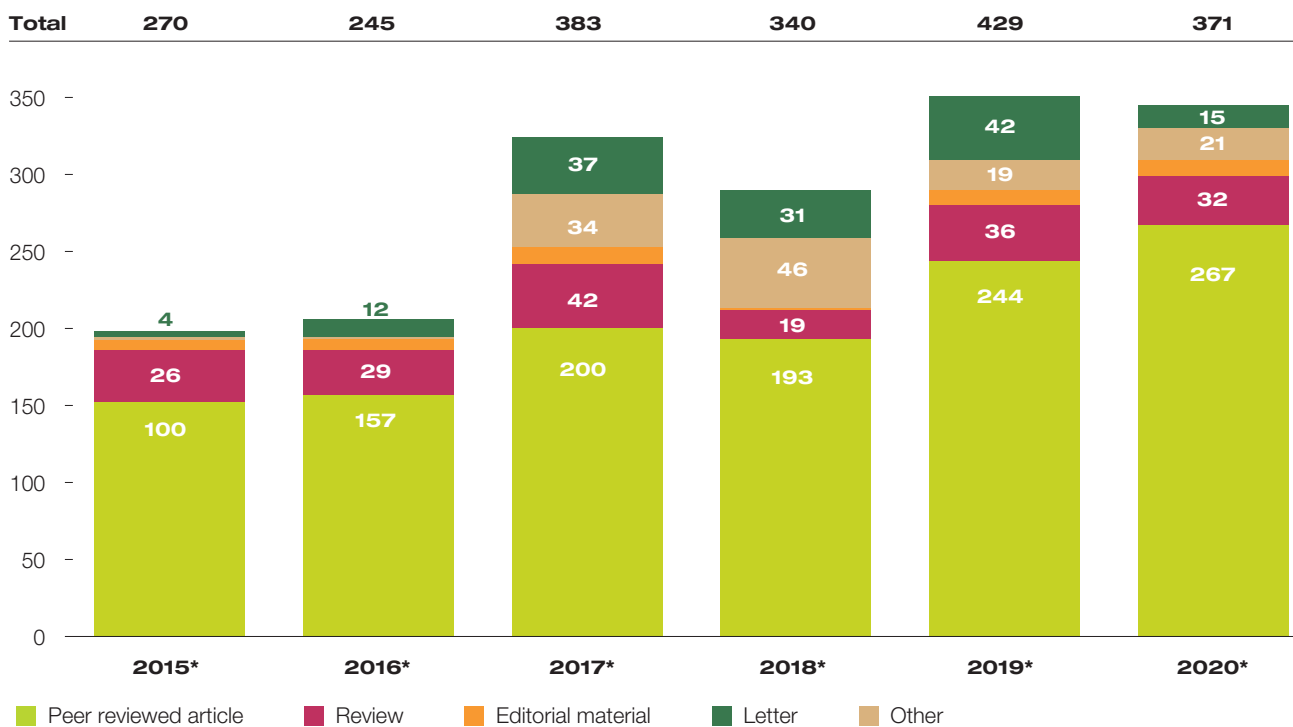
Immunology (2)	395'223
Infectiology and Vaccinology/Brigton Collaboration (3)	733'016
Neuropaediatrics (3)	1'630'146
Oncology/Haematology (3)	461'667
Orthopaedics/Neuroorthopaedics (3)	339'690
Pharmacology (3)	2'327'661
Pneumology/Neonatology (4)	914'071
Surgery (3)	80'000
Others (7)	182'255
Total	7'063'727

Employees and Publications

Gender Distribution/UKBB Research



Number of published articles 2015–2020



*meeting reports and abstracts excluded

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