

Scientific Report of the URPP «Integrative Human Physiology»

1 Summary/Zusammenfassung

1.1 Summary

During the last decade excellent modern techniques enabled researchers to decode the human genome and to unravel a huge amount of molecular mechanisms. Nevertheless, this is not enough to understand the complexity of human body as a whole. Integrative Human Physiology aims at integrating single findings in order to better understand complex functions at the level of the whole organism. Basic scientists and clinicians work together to combine findings from basic science with knowledge from clinical applications.

The University Research Priority Program (URPP) «Integrative Human Physiology» (IHP) was established in 2005 with the goal to promote research in integrative human physiology. From the beginning, the financial resources of the URPP IHP have been used for funding of all activities of the Zurich Center for Integrative Human Physiology (ZIHP), a center of competence of the University of Zurich¹.

During the last years the ZIHP has successfully developed into a unique and excellent instrument to connect scientists beyond institutional or faculty borders. A funding program for a total of 49 cooperative projects as well as several successful seminars and symposia promoted scientific collaborations and network activities among the members of the ZIHP, in particular between basic and clinical scientists. Research projects have been promoted, which combined investigations at the level of molecules, cells, organs, and the whole organism. Several of the cooperative projects paved the way to a number of larger cooperative networks at a national and international level and for external funding, demonstrating the high quality of research performed. Additionally, the ZIHP is proud to have hosted a total of four outstanding young scientists in the positions of assistant professors and to be able to offer them a springboard for their academic career. All of them secured permanent faculty positions at different Swiss or European Universities. To increase research efficiency, the ZIHP has established the core facility «Zurich Integrative Rodent Physiology» (ZIRP), which is nowadays run jointly by the ZIHP, the Institute of Physiology and the NCCR Kidney.CH. The ZIRP has continuously grown and successfully applied to become the first «Integrated Technology Platform» of the University Zurich ensuring continuation of activities beyond the period financed by the URPP IHP.

A further goal of the ZIHP was and remains the promotion of young researchers. The PhD Program in Integrative Molecular Medicine (imMed), established within the ZIHP, conveys to PhD students important knowledge for their future career. The program is part of the Life Science Zurich Graduate School (LSZGS) and offers attractive activities such as graduate courses, alumni-events and an annual retreat.

Finally, the ZIHP promotes the dialog between science and society and makes the research performed within the ZIHP visible and understandable to the public. ZIHP members and their research partners present mainly within the very successful public *Wissen-schafft Wissen* series topics of general interest in the field of medicine and physiology. The public is invited to participate to the discussion. Additionally, a newsletter is regularly sent to more than 1800 subscribers and the ZIHP webpage contains information on events, research activities, and other news.

¹ The name «ZIHP» is by now very well known, thus it is used in this document to report on the activities that have been financed by the URPP IHP.

1.2 Zusammenfassung

Im letzten Jahrzehnt hat die Wissenschaft das Erbgut des Menschen entschlüsselt und eine Vielzahl von molekularen Zusammenhängen aufgeklärt. Die Analyse von einzelnen biologischen Prozessen reicht jedoch nicht aus, um den Menschen in seiner Ganzheit zu verstehen. Dazu muss der ganze Organismus im Fokus stehen. Das Wissen aus der biologischen Grundlagenforschung muss mit demjenigen aus der klinischen Anwendung kombiniert werden und Forscher aus beiden Bereichen müssen eng zusammenarbeiten. Die Integrative Humanphysiologie hat zum Ziel, einzelne Prozesse zu erforschen und zu integrieren, um komplexe Vorgänge und grössere Zusammenhänge im menschlichen Körper zu verstehen. Der Universitäre Forschungsschwerpunkt (UFSP) «Integrative Humanphysiologie» (IHP) wurde 2005 gestartet mit dem Ziel, Forschung im Bereich der integrativer Humanphysiologie zu fördern. Die finanziellen Ressourcen des UFSP IHP wurden von Anfang an für die ausschliessliche Finanzierung des Zürcher Zentrums für Integrative Humanphysiologie (ZIHP) - ein Kompetenzzentrum der Universität Zürich - verwendet².

Das ZIHP hat sich zu einem hervorragenden Instrument entwickelt, um Forschende über die Instituts- oder Fakultätsgrenzen hinweg zu vernetzen. Durch die Finanzierung von insgesamt 49 gemeinsamen Forschungsprojekten und durch die Organisation von regelmässigen Seminaren und Symposia förderte das ZIHP die Kooperation zwischen Grundlagenforschern und Klinikern. Dabei förderte es insbesondere Forschungsvorhaben, die Untersuchungen auf der Ebene der Moleküle, der Zelle, der Organe und des gesamten Organismus kombinieren. Bereits mehrere grosse nationale und internationale Forschungsprogramme sind aus diesen Projekten hervorgegangen, was die Qualität der Forschung bestätigt. Das ZIHP hat zudem zwei Assistenzprofessuren eingerichtet, einen ausgezeichneten Sprungbrett für insgesamt 4 junge Stelleninhaber. Alle vier haben im Anschluss an ihre Assistenzprofessur eine permanente Professur entweder an einer schweizerischen oder an einer europäischen Universität erhalten. Um die Forschungseffizienz zu steigern, hat das ZIHP die Plattform «Zürich Integrative Rodent Physiology» (ZIRP) gegründet, die derzeit durch das ZIHP, das Physiologie Institut und das NCCR Kidney.CH getragen wird. Das ZIRP ist über die Jahre hinweg kontinuierlich gewachsen und ist seit 2016 die erste «Integrierte Technologieplattform» der Universität Zürich. Die Plattform wird ihre Aktivitäten nach dem Abschluss des UFSP IHP fortsetzen.

Ein weiteres Ziel des ZIHP war und bleibt die Förderung des wissenschaftlichen Nachwuchses. Mit dem Doktoratsprogramm in integrativer molekularer Medizin (imMed) bereitet das ZIHP die Doktorierenden auf das Leben in der Arbeitswelt vor. Das Doktoratsprogramm ist in der Life Science Zurich Graduate School (LSZGS) integriert und bietet attraktive Aktivitäten wie beispielsweise Weiterbildungskurse, Alumni-Treffen und jährliche Klausurtagungen.

Schliesslich ist es ein Anliegen des ZIHP, die neuesten Entwicklungen aus den Bereichen Forschung und Wissenschaft an die Öffentlichkeit zu kommunizieren. Hauptsächlich im Rahmen der sehr erfolgreichen Reihe *Wissen-schaf(f)t Wissen* präsentieren ZIHP-Mitglieder und ihre Forschungspartner tagesaktuellen Themen aus den Bereichen Medizin und Physiologie und laden die Öffentlichkeit zur Diskussion ein. Ein Newsletter mit mehr als 1800 Abonnenten und die Website mit Pressespiegel, Veranstaltungskalender und Publikationsverzeichnis informieren laufend über alle Neuigkeiten.

² Da der Label «ZIHP» sehr gut bekannt ist, wird es in diesem Dokument durchgehend gebraucht, um über die vom UFSP IHP finanzierten Aktivitäten zu berichten.

2 Structural development

2.1 Initial situation, design and development

Within the general aim to support excellence in research, the University of Zurich has decided to promote integrative human physiology. In the last decades, excellent modern molecular techniques have revolutionized medical biology, but at the same time this rapid development has caused the integrative approach in physiology to be neglected. By promoting integrative human physiology, the University of Zurich had the objective to counteract this trend and to focus science on the whole organism, not only on cellular or molecular biology. Integrative human physiology looks at the human body as whole organism. Single findings at the level of molecules, cells and organs are integrated with the aim to better understand complex functions at the level of the whole organism. Towards this aim, different model systems are used and combined. Basic scientists and clinicians work together in interdisciplinary research projects.

The Zurich Center for Integrative Human Physiology (ZIHP) was founded in March 2005 and is an interdisciplinary center of competence of the Faculty of Medicine at the University of Zurich. It cooperates with the Faculty of Science and the Vetsuisse Faculty. Members of other research institutions in Zurich participate as associated members. From 2005 until 2016, the financial resources of the URPP «Integrative Human Physiology» (URPP IHP) enabled the activities and programs of the ZIHP. From the beginning, the ZIHP has been subdivided in 4 research topics:

Topic A: Cardiovascular research

The aim is to understand the regulation of the cardiovascular system at the cellular, organ and systemic levels. The focus is on the structure and the function of vessels, on the adaptation of the system to stress and on cardiac perfusion, mainly by means of medical imaging.

Topic B: Oxygen and movement

The aim is to understand the mechanisms of oxygenation and deoxygenation and their regulation at the systemic as well as at the cellular/molecular level. This includes studies on the molecular-physiological mechanisms of oxygen sensing, the regulation of respiration (especially under special conditions such as hypoxia, exercise or sleep) and the molecular and structural adaptation of the musculature.

Topic C: Milieu intérieur / Homeostasis

The aim is to understand the homeostatic mechanisms that maintain equilibrium in the human body compartments. For this purpose the functioning of solute exchange regions (such as epithelia of the intestine, liver and kidney) and the process of metabolic regulation are analyzed. Research at the molecular and cellular level is complemented by systemic physiological approaches.

Topic D: Central Regulation and Coordination

The aim is to understand the brain as sensitive and controlling organ within a complex environment. System-oriented approaches are incorporated in sleep-physiology, vestibulo-oculomotoric and spatial perception, neuropsychology, neurophysiology and control of movement. These are complemented by cognitive neuroimaging and computational neuroscience, which at the same time function as important links between basic and clinical-oriented research.

To promote integrative, interdisciplinary, and translational cooperation, the ZIHP launched the first competitively funded cooperative research projects in 2007. The consortium had to include representatives from at least three groups of the University of Zurich and/or the University Hospital

Zurich across disciplines and from basic as well as clinically oriented research. Within these projects there was a strong focus on the education of young researchers: Apart from few exceptions, funding was only used for positions of PhD or MD-PhD students and for consumables. All projects were reviewed and discussed by the Scientific Advisory Board as well as by the Steering Committee of the ZIHP. From 2007 until 2016 the ZIHP financed a total of 49 cooperative projects. All ZIHP full and junior members were entitled to apply for cooperative project grants. Eligibility criteria for full membership are a position as an independent research group leader with a running grant by the SNF or the EU or equivalent. The junior membership is reserved to young researchers who are belonging to a ZIHP member group with temporary employment (e.g. assistants and senior assistants) and are working at least partially independently with own funding and own projects. At the end of 2016, the ZIHP counted 151 members.

Furthermore, from the beginning the ZIHP established two assistant professorships in integrative human physiology.

Besides promoting research with direct funds, the ZIHP promoted networking of its members by organizing annual symposia and regular seminars.

2.2 Structural goals and achievements

Structural goals

The main goal was to build a network of translational integrative science in human physiology at the University of Zurich. To achieve this goal the ZIHP aimed at:

- Promotion of research activities that combine investigations at the levels of molecules, cells, organs and the whole organism thereby bringing the complex functions of the human body into focus.
- Strengthening of long lasting connections between basic and clinically oriented research in health and disease. The ZIHP supported the progress of clinical research projects evolving from basic science studies.
- Promotion of young researchers at the graduate and postgraduate level through establishment of the Master Program in Human Biology and of the PhD Program in Integrative Molecular Medicine (imMed). Furthermore, establishment of 2 assistant professorships in integrative human physiology.
- Increase of the research efficiency by establishing and providing a Core Facility for physiological experiments in rodents.
- Organization of seminars, symposia and other networking events.
- Making the ZIHP and the integrative approach to human physiology well known both in the scientific community and in the public.
- Acquisition of additional funds for continuation of the ZIHP as a competence center beyond 2016.

Achievements

The ZIHP very successfully reached all its main goals:

- Scientific collaborations and networking were enabled by financing a total of 49 cooperative projects.
- Several of the completed cooperative projects paved the way to larger cooperative networks at a national and international level and for external funding. These achievements demonstrate that the ZIHP provides an attractive platform for extending long lasting interactions to prestigious cooperative networks in science and industry.
- The promotion of young researchers was achieved by the establishment of the Master Program in Human Biology – since 2009 completely independent from the ZIHP – as well as the PhD Program in Integrative Molecular Medicine (imMed). Furthermore, more than 100 PhD positions within the cooperative project grants and the ZIHP assistant professorships were funded.
- The ZIHP was proud to host four outstanding young scientists as assistant professors: They all were able to attract considerable third party funding and successfully pursued their research activities, resulting in numerous publications as senior authors, but also as co-authors together with other researcher of the ZIHP and the University Hospital Zurich, underlining the collaborative nature of the ZIHP. All assistant professors secured permanent faculty positions in either Switzerland or Europe (Germany and Denmark).
- Research efficiency was increased by establishing and providing the Zurich Integrative Rodent Physiology (ZIRP) Facility. The ZIRP Facility successfully applied in 2015 to become the first «Integrated Technology Platform» at the UZH to ensure continuation of activities beyond the period financed by the URPP IHP. Although still being organizationally affiliated to the competence center ZIHP, the ZIRP Facility is nowadays financially independent.
- Many researchers of the ZIHP and other research institutions were brought together at the annual ZIHP symposia and at the numerous seminars and mini-symposia which hosted nationally and internationally renowned speakers. Furthermore, international events organized by ZIHP members have been sponsored.
- The high visibility of the scientific output of the ZIHP was reached by asking members of the ZIHP to acknowledge the financial support by the URPP IHP and/or mention the ZIHP in the affiliation section. This has resulted in almost 2000 «ZIHP-labeled» original publications or reviews. Many of them were co-authored by several ZIHP members not originating from the same institute or clinic («joint publications»).
- Research performed within the ZIHP was made visible to the public through the event series *Wissen-schafft Wissen* (started 2008). A report on most events was published on the public online portal of the University of Zurich *UZH News*. This exposure helped to further increase the popularity of the series. Moreover, the ZIHP participated in the «Parcours des Wissens» within the 175th anniversary of the University of Zürich as well as to two editions of «Scientifica». Public events not only make the research performed within the ZIHP visible to the public but also show the link between topics of everyday life and our research.
- The electronic newsletter *ZIHP News* allows keeping up-to-date with the activities of the ZIHP and its members. Furthermore, it allows a broader audience to understand the aims and activities of the ZIHP.
- The acquisition of further substantial third party funding for the future financing of the ZIHP proved to be very difficult. Nevertheless, a first step was made with the receipt of a legacy. Thanks to the financial support from the medical faculty (MeF) and from the Faculty of Science (MNF), as well as executive support from the Vetsuisse faculty, the ZIHP is able to continue to exist as a competence center. However, financing research projects or even

assistant professorships as done within the URRP IHP will not be possible in the future unless significant external funding is established.

2.3 Perspectives beyond the URPP

Fortunately, several structures that have been established thanks to the financial resources of the URPP IHP will continue to exist beyond 2016. Researchers and students will continue to benefit from the established network in the future. Since the budget for the ongoing support will be limited, the ZIHP steering committee has identified several key aspects that are deemed crucial for the program.

One keystone of the ZIHP's success has been the education of students and young researchers. The imMed PhD Program will continue to be part of the competence center. More information on the program is covered in section [5.1 Academic career development](#).

With the goal to further network scientists and to provide a stimulating environment for our students, the ZIHP will also continue organizing the annual ZIHP symposium. The symposium will give students and young researchers the chance to present their research and to connect with peers in their field and beyond. To secure financial support, the ZIHP will apply for sponsoring contributions from different sources, such as the Kontaktgruppe für Forschungsfragen (KGF).

The ZIHP Newsletter is a useful resource for students, ZIHP members as well as the interested public and gives the ZIHP office the chance to communicate its events and its members' achievements. In the future, the ZIHP plans to publish newsletters quarterly or as needed.

Another strategy to promote scientific exchange by the ZIHP has been the financial support of small conferences and seminars (see [4.1 Scientific events](#)). This will continue in the future although with reduced resources.

The extremely valuable work of the Zurich Integrative Rodent Facility (ZIRP) will continue to be supported by the ZIHP organizationally. In the past years, the ZIRP has grown substantially and is offering ZIHP-affiliated and external researchers a wide range of techniques to help answering specific research questions using rodent models. The structure and work of the ZIRP is outlined in more detail in section [3.2 Cooperation, synergies and added value](#).

Apart from organizational and financial support, the ZIHP helped connecting scientists who created new networks, such as the national competence centre (NCCR) Kidney.CH and the rare disease initiative (radiz). Since its beginnings, the ZIHP has worked towards building these networks which operate independently with great success. Details about the established networks can be found in section [3.2 Cooperation, synergies and added value](#). In the next four years, the ZIHP aims to continue building new networks based on past experiences, but with new focus groups. Since a number of ZIHP researchers are already involved in one or more other networks, the ZIHP steering committee has determined areas of research that have fewer networks so far, with the goal of connecting these areas and establishing funding opportunities in the future. Concerted effort will be made to build a network on topics around oxygen and movement. The ZIHP is comprised of experts in the field of hypoxia, which includes studies on inflammatory pathways and adaptation to high altitudes, as well as in the field of exercise physiology and motor control or development. The ZIHP will promote networking events such as mini-symposia by providing both financial and organizational support. The final goal will be to apply for funding such as the SNSF Synergia or for flagship projects of the «Hochschulmedizin». Several programs could potentially lead to funding for the envisioned network.

Another important goal of the ZIHP has always been the public outreach to inform, inspire and educate the interested public about topics involving physiology and medicine. The public seminar series *Wissen-Schaff(f)t Wissen* continues to attract a broad audience, with a large number of regular attendees. The invited speakers are members of the ZIHP or researchers from other institutions in Zurich, and in a number of instances the public outreach has led to substantial media coverage of their research. This publicity work is therefore considered a great success for all involved parties. In the future, the ZIHP is committed to stay in touch with the public by following measures:

- We will continue to host the seminar series *Wissen-Schaff(f)t Wissen*, inviting 3-4 speakers each semester to talk about their research. We will continue to publish articles about the events on UZH News, thereby increasing the audience significantly.
- The ZIHP will give a small contribution to ZIHP researchers who participate in public events organized by the University of Zurich and ETH, such as the popular science fair Scientifica.
- As an ongoing effort, we will recruit and engage ZIHP researchers to share their research at future events involving public outreach.

3 Research

3.1 Main scientific achievements

Research projects performed within the ZIHP covered a wide range of aspects of human physiology. All of them had the common goal to involve clinicians and basic scientists and thereby to link experimental research approaches performed in animal models with studies made with human subjects. Moreover, the projects provided a remarkable framework for the education of a new generation of scientists and medical doctors involved in biomedical research. In particular, PhD students who were supported financially by the ZIHP in the context of these projects and who were educated in the imMed PhD program received excellent training and had the opportunity to acquire essential skills for their future. It is also noteworthy that these projects generated very strong publications that demonstrate the active collaboration of basic science laboratories located in preclinical institutes with research groups belonging to clinical departments and working on disease-related questions.

From the beginning, the ZIHP has been subdivided in 4 research topics. Although several research projects covered aspects from more than one topic, the main scientific achievements are summarized for each field separately.

3.1.1 Research Topic A: Cardiovascular research

A total of 43 research groups within the ZIHP-network performed cardiovascular research. During the funding period of the URPP IHP, the ZIHP has selected and established 9 cooperative projects in this research field. Their focus ranged from clinical aspects of metabolic syndrome and atherosclerosis to lipid metabolism. These cooperative projects resulted in 71 scientific publications in peer reviewed journals.

Several cooperative projects addressed *vascular health*, starting with a work in 2007 by C. Matter and colleagues who launched a bench-to-bedside project that identified targets for a timely diagnosis of vulnerable plaques focusing on plaque inflammation, new vessel formation and biomarkers of plaque vulnerability.

Another project by A. von Eckardstein et al. established a new avenue of research on circulating *microRNAs*, by identifying their role in the pathogenesis of metabolic syndrome and its sequelae as well as their value as blood markers for laboratory diagnostics.

A diverse group of clinicians around A. von Eckardstein teamed up to determine *metabolism, function and regulation of HDL and lipids* in different contexts: Their transcytosis through endothelial cells, their role in survival of pancreatic beta cells, their role in hypoxia-induced foam-cell formation, their contribution to intestinal innate immune and inflammatory bowel disease (IBD), and their cardiovascular effects in patients with coronary artery disease.

The collaborators of another bench-to-bed side project led by T. Hornemann aimed to characterize the putative toxic effects of *deoxy-sphingoid bases* in insulin-producing cells, in diabetic rats, and in patients with diabetes.

Sirtuins are molecular sensors of caloric restriction. Sirtuin 1 was the focus of a collaborative project led by C. Matter that investigated the role of Sirtuins in regulating the response of the immune system. The research consortium investigated how failure of the adaptive mechanisms of the immune system promotes deregulations such as atherogenesis and thrombosis, diabetes, osteoporosis, rheumatoid arthritis, sickness behavior syndrome, and IBD. A similar translational approach with a different research question was applied in a recent project by C. Matter et al. looking at the role of Sirtuin 6 (Sirt6) in arterial thrombosis. The researchers used endothelial cells, an in vivo mouse loss-of-function model, and leukocytes from patients with acute coronary syndromes to investigate the role of Sirt6 in arterial thrombus formation.

A collaboration led by E. Bategay investigated the pathways around *endothelial mTORC2* in different contexts such as in angiogenesis, in the control of vascular function in perivascular adipose tissue, and in endothelial cells during ischemic preconditioning.

3.1.2 Research Topic B: Oxygen and movement

The scientific focus of topic B, oxygen and muscle biology, encompassed a total of 44 research groups including three ZIHP assistant professors: Prof. Handschin (*PGC-1alpha and mitochondrial biogenesis*), Prof. Lundby (*Epo and exercise*) and Prof. Frew (*VHL disease and HIF signalling*).

Christoph Handschin was appointed as ZIHP assistant professor in December 2006 and he left Zurich again in February 2009 to accept a tenured professorship at the University of Basel. As post-doc in the Spiegelman lab, using genetically modified mouse models, he made seminal discoveries on the function of the PGC-1 α transcription factor in muscle differentiation, metabolism and function. While being at the ZIHP, he continued this research with a focus on adaptation of the muscles to exercise as well as on pathological conditions leading to muscles diseases such as type 2 diabetes, muscle atrophy and dystrophy. He published in top journals (JCI, G&D, Nature).

Carsten Lundby was appointed as ZIHP assistant professor in February 2010 and he stayed with the ZIHP until the end of the URPP in December 2016 when he left for a full professorship at the University of Copenhagen. During this time, he consolidated his leading role in exercise physiology and Erythropietin (Epo) function, as documented by an impressive number of 108 publications with the Zurich address.

Coming from the Krek lab at ETHZ, Ian Frew was elected as ZIHP assistant professor starting in spring semester 2010, further supported by an SNF professorship and an ERC starting grant. With the ending of the URPP, he was appointed as full professor for experimental oncology at the University of Freiburg im Breisgau. Already during his post-doc in the Krek lab, he started to investigate the role of oxygen-regulated signaling pathways in tumor formation as well as to unravel the additional genetic mutations that are required for clear cell renal cell carcinoma (ccRCC) development in familial von Hippel-Lindau (VHL) disease. He systematically developed novel methods to perform combinatorial genetic testing in vitro and in vivo which resulted in the discovery of additional mutations required for ccRCC tumor progression.

In addition to these three assistant professors, the ZIHP supported since 2007 a total of 13 cooperative projects in the research field of oxygen and movement. These cooperative projects directly resulted in 48 scientific publications in peer reviewed journals. Several major scientific achievements were reported in a number of field studies at *high-altitude*. A project led by K. Bloch investigated human sleep behavior, respiratory pattern and psychomotor activity at moderate to high-altitude in Davos Wolfgang and Jakobshorn. The data show subtle alterations in the first days even at moderate altitude and may help to better understand the effects of mild hypoxemia especially in patients with cardiovascular disease.

Several high-altitude projects were conducted by the ZIHP assistant professor C Lundby in collaboration with other groups from the ZIHP-network. His research included studies that investigated the interplay between brain and muscles in order to understand exercise reactivity and fatigue. All of these studies led to novel insights into the adaptive processes involved in altitude acclimatization and exercise effects. Related to these high-altitude studies are three projects led by A. Bogdanova and M. Gassmann, respectively, with the goal to investigate erythropoietin (Epo) function, the major hormone involved in systemic low-oxygen adaptation. These projects led to novel insights into the roles of Epo in organ protection, improved cognitive functions, and iron homeostasis.

A study led by M. Maggiorini evaluated pharmacological pre-treatments with the corticosteroid dexamethasone to avoid high-altitude pulmonary edema (HAPE) in mountaineers. The results of the study suggest that dexamethasone prevents HAPE by decreasing stress, inflammation and by increasing vasoactive peptides with vasodilatory and natriuretic properties. The same treatment was evaluated in exercising humans as well as laboratory animals, demonstrating the integrative nature of this exemplary project. Similar integrative human projects were conducted by M. Toigo on *exercise modalities*, such as the combination of vibration plates with limb ischemia, amongst others, to increase insulin sensitivity.

3.1.3 Research Topic C: Milieu Intérieur / Homeostasis

A total of 77 research groups, including the ZIHP assistant professors Carsten Wagner and, partially, Ian Frew, represented four areas of expertise within this research field, namely «Metabolism and endocrinology», «Nutrition: digestion, absorption and regulation», «Kidney: transport, metabolism and pathophysiology», and «Immune system and inflammation».

Carsten Wagner was appointed as ZIHP assistant professor 2006. He was also Scientific Director of the core facility in rodent physiology (ZIRP, see [3.2 Cooperation, synergies and added value](#)) until December 2016. His research focuses on kidney physiology in the context of the whole organism. In particular, he studied several transport mechanisms mainly in the mouse model. Of crucial importance is his work on the role of proton secretion in the renal tubule for systemic acid-base balance. In addition to this, he contributed important studies in the field of phosphate and amino acid transport. Thanks to his excellent publications he won the Franz-Volhard Award and he was appointed to a full professorship at the physiology institute of the University of Zurich in 2009.

Ian Frew's research encompassed hypoxia signaling and kidney pathophysiology. His research achievements are covered in section [3.1.2 Research Topic B: Oxygen and movement](#).

During the 12 years of support by the URPP «Integrative Human Physiology» the ZIHP has funded 17 cooperative projects covering many different aspects of homeostasis research. The projects directly resulted in 65 publications in peer reviewed journals.

About half of the projects centered on questions involving the *intestine*, its absorptive function and also its inflammation. For instance, one project led by G. Kullak-Ublick has focused on the

regulation and functional characterization of transporters for drugs and endogenous substances in the human small intestine, whereas another project led by F. Verrey was centered on the mechanism and control of amino acid absorption. Several projects centered on inflammatory bowel disease (IBD). One project led by G. Rogler investigated the role of pH receptors for intestinal inflammation, whereas another project led by M. Scharl tested the role of protein tyrosine phosphatase non-receptor type 2 (PTPN2) not only in inflammatory bowel disease, but also in rheumatoid arthritis and colorectal carcinoma. Another consortium around O. Boyman studied the modulation of innate and adaptive immune responses in IBD. Finally, a recent, short IBD-related project led by I. Frey-Wagner investigated the influence of genetic polymorphisms of the host on the gut microbiota composition and the resulting consequences on chronic inflammatory disorders.

Eating control has been another central theme for two funded projects led by T. Lutz and L. Asarian, respectively. One project studied the effect of altitude and hypoxia on eating and the second one addressed in translational studies endocrine and brain control of eating in rats and pre- and postmenopausal women. Additionally, the project mentioned above addressing the control of amino acid absorption also substantially contributed to the understanding of eating regulation, specifically by dietary amino acids.

Four projects investigated homeostasis questions centering on *kidney function*. One consortium around ZIHP-professor C. Wagner investigated pathways of aldosterone action in kidney and vasculature whereas a second consortium around C. Cohen gained important insights into the relevance of glucocorticoids for renal development and epithelial cell function in health and disease using fish, mouse models, and also human material. A further project led by O. Devuyst addressed in a mouse model system the role of the renal proximal tubule in metabolism in the context of rare diseases and in particular the possibility to ameliorate such conditions with bone marrow transplantation. Finally, a last kidney-centered project led by A. Serra addressed the role and regulation of fibroblast growth hormone 23 (FGF23) in health and chronic kidney disease (CKD).

Intriguing and successful were the studies of T. Hennet et al. focusing on the properties and benefits of *maternal milk*. The first project looked at effects of maternal milk on intestinal microbiota using a mouse model of colitis and also by using dendritic cells as protagonist cells. The second project assessed the regulatory functions of soluble oligosaccharides from maternal milk on immune cells and intestinal microbiota, and determined receptors and signaling pathways involved in the sensing of oligosaccharides.

Additional projects focused on the role of islet amyloid polypeptide (IAPP) derived deposits in vascular dysfunction in diabetes (led by T. Lutz) and on the role of inflammatory mediators in metabolic stress (M. Donath et al.). Finally, a project addressing the question of hemoglobin-associated pathologies (led by D. Schaer) and one on the role of innate immunity and drug metabolism in severe cutaneous adverse drug reactions (L. French et al.) were also supported.

3.1.4 Research Topic D: Central Regulation and Coordination

A total of 71 research groups within the ZIHP-network work or worked on topics around «Central Regulation and Coordination». The ZIHP has funded 10 cooperative projects covering a broad area of neuroscience. Most projects were focusing on humans but also animal models (zebrafish and mice) were included. The applied approaches encompassed a wide range of methods, covering genetics, pharmacology, neuroimaging, electroencephalography and behavior. A total of 69 publications in peer reviewed journals resulted from these collaborative projects and few further publications are still to be expected.

3 cooperative projects encompassed *sleep and cognition in health and disease*. One project by HP. Landolt and colleagues aimed to investigate whether cognition and sleep share a functional basis in humans. The study demonstrated that adenosinergic mechanisms contribute to the regulation of attention and of inter-individual differences in functional aspects of the wake and sleep EEG in healthy adults irrespectively of habitual sleep duration. In normally developed children instead, sleep duration was negatively correlated with IQ scores. Another project, led by R. Huber and colleagues, tested the effects of three weeks of intensive cognitive training on sleep, brain structure and cognitive performance in children and adolescents. Subjects of the training group showed an increase in sleep intensity. This increase seems to be closely related to learning induced cortical plasticity. Further, a relationship of sleep intensity and cerebral tissue oxygen saturation measured with near-infrared spectroscopy was established. Finally, another cooperative project led by HP. Landolt investigated the effects of COMT inhibition on the consequences of sleep deprivation in healthy adults. The enzyme COMT degrades dopamine in prefrontal cortex and can be inhibited by tolcapone, used in Parkinson therapy. In a patient study the effects of COMT inhibition on motor function and vascular and neuronal protection are currently examined.

3 further cooperative projects investigated different aspects of *brain development*. Functional brain maturation was assessed in a study by D. Brandeis and colleagues using simultaneously recorded EEG-fMRI. Differences between children and adults during a cognitive working memory task as well as between children with and without epilepsy could be assessed with this technique. Another multimodal imaging and spectroscopy study by R. O’Gorman and colleagues linked the major system markers for typical and atypical brain development. For instance, adults with ADHD showed increased GABA concentrations in the basal ganglia while children showed a trend towards decreased GABA concentrations relative to age-matched controls, indicative of increased inhibitory neurotransmission with brain maturation in ADHD. In a third project C. Hagmann and colleagues discovered that preterm born and term born children do not differ in regional brain volume. However, very preterm born children showed negative associations between volumes of specific brain regions and working memory performance. In term born peers, no correlations were observed.

2 cooperative projects, both of them led by D. Straumann, focused on the *vestibular and oculomotor system*: In the first project the integration of sensory input originating in the vestibular and in the visual system during gait and postural control was quantified and mathematically modeled. In the second project the etiology of infantile nystagmus syndrome (INS) was studied by combining research in zebrafish, mouse, and human patients. The zebrafish mutant *belladonna*, characterized by retinotectal projection errors and by ocular motor instabilities, was used as a disease model. Furthermore, hypopigmented mice with associated retinotectal projection errors were screened for ocular motor instabilities and identified as potential mammal model. The findings from the animal models combined with quantifications in humans and mathematical models strongly support the hypothesis that retinotectal projection errors are associated with ocular motor instabilities in INS.

A cooperative project by D. de Quervain et al. focused on the *physiology of human emotional memory*: Emotionally arousing events are typically well remembered, but there is a large interindividual variability for this phenomenon. It was observed that a functional deletion variant of ADRA2B, the gene encoding the alpha 2b-adrenergic receptor, is related to increased responsivity and connectivity of brain regions implicated in emotional memory.

Finally, a recent cooperative project by E. Seifritz et al. investigated the role of glutamate homeostasis in the reward center of the human brain and its role in addiction.

3.2 Cooperation, synergies and added value

The cooperative research projects described above were integrative on several levels: from molecules to cells, organs and organisms as well as across disciplines and from basic to clinically oriented research. The combined expertise of the consortium represented an «added value» in the sense that the outcome was more than the sum of its parts. The scientific output of cooperative projects resulted in a total of 253 publications ([see attachment A](#)).

ZIHP cooperative projects as catalysts for larger cooperation

Several of the completed cooperative projects paved the way to larger cooperative networks at a national and international level and to receive external funding. All of these larger cooperative networks are led by ZIHP members, with a number of additional ZIHP members as consortium participants. These achievements demonstrate that the ZIHP provided an attractive platform for extending interactions to prestigious cooperative networks in science and industry. Examples are the following:

- **National Center of Competence in Research (NCCR) *Kidney.CH*** revolving around the theme «Kidney – Control of Homeostasis». The center, with the University of Zurich as leading house, was conceived by several ZIHP members involved in renal homeostasis research together with colleagues from other Swiss Universities. This project has been one of the few selected among approximately 100 applications in the 2010 series.
- «*HDL: From biological understanding to clinical exploitation*» (**European COST Action** with several members of the ZIHP-funded cooperative project «metabolism, function and regulation of high density lipoproteins»)
- «*TransCard: Translating disease to cardiovascular health*» (**FP7-HEALTH** with several members of the ZIHP-funded cooperative project «metabolism, function and regulation of high density lipoproteins»)
- «*A systems biology approach to anti-atherogenicity and anti-diabetogenicity of high density lipoproteins (HDL)*» (**SystemsX project** with members of the ZIHP-funded cooperative project «metabolism, function and regulation of high density lipoproteins»)
- «*HypoxiaNet: Hypoxia sensing, signalling and adaptation*» (**European COST Action**)
- **A Transatlantic Network of Excellence funded by the Fondation Leducq** with the title «*High-density lipoprotein dysfunction in the development of cardiovascular disease and as a therapeutic target*» was awarded. It evolved from a ZIHP-funded cooperative project.
- «*Inflammation and acute coronary syndromes*», a collaboration within the Special Program University Medicine (**SPUM**) of the Swiss National Science Foundation
- *radiz - Rare Disease Initiative Zurich* (**Clinical Research Priority Programs of the UZH**)
- *Sleep and Health* (**Clinical Research Priority Programs of the UZH**)
- **RESOLVE**: A systems biology approach to RESOLVE the molecular pathology of two hallmarks of patients with metabolic syndrome and its co-morbidities; hypertriglyceridemia and low HDL-cholesterol (**FP7 action**)
- *EpoCan*: Understanding the role of erythropoietin and its receptor in different pathologies apart from red blood cell production (**FP7 action**)

ZIHP Assistant Professorships

With its assistant professorships the ZIHP is proud to have provided to 4 outstanding scientists in the field of translational integrative human physiology an excellent springboard to success. All professors have attracted considerable third party funding and all of them successfully applied for a full professorship. Prof. Carsten Wagner started a permanent position at the University of Zurich in 2009. Prof. Christoph Handschin is Professor at the Biozentrum University of Basel since 2009. Prof. Ian

Frew started in January 2017 as Professor for Oncogenic Signalling at the BIOS Centre for Biological Signalling Studies, Albert-Ludwigs-Universität Freiburg, Germany. Prof. Carsten Lundby started in January 2017 as Clinical Professor at the Department of Clinical Medicine, Rigshospitalet, Copenhagen.

The facility «Zurich Integrative Rodent Physiology»

From its beginnings, the ZIHP worked towards the establishment of a facility with the goal to support and strengthen research activities in the field of integrative physiology by providing infrastructure and know-how for the advanced analysis of rodent physiology. Additionally, the facility aimed to strengthen the inter-disciplinary cooperation and optimize the use of available infrastructure by providing a platform where researchers can link each other to share resources and establish collaborations.

Originally founded in 2006 by the ZIHP as a «core facility for rodent physiology», the facility has been re-organized in 2011 and is since then supported by two additional stakeholders: the Institute of Physiology and the NCCR.Kidney.CH. During this reorganization it was renamed into «Zurich Integrative Rodent Physiology» (ZIRP) and a steering committee was formed consisting of representatives of the three stakeholders. Additionally, user fees were introduced and the ZIRP launched its own website: www.zirp.uzh.ch.

From the beginning, the facility provided several devices for metabolic measurements such as metabolic cages or equipment to assess activity and exercise. In 2012, three new platforms were founded: A biochemistry platform for the analysis of small volume blood and urine samples, an imaging platform with an optical imaging system for in vivo bioluminescence and fluorescence imaging and an in vivo micro CT, and the telemetry platform for radio telemetry acquisition of physiological parameters in freely moving rodents. Since 2013, the ZIRP also offers microsurgical services and an EchoMRI instrument for body composition analysis was added to the imaging platform.

Meanwhile, the ZIRP is well established and is open to all members of the University, the ETH Zurich, and the University Hospitals. External research groups and companies are also welcome to use this service. The services offered by the ZIRP attract increasing numbers of users and ZIRP's staff is more and more involved in project planning and organization whilst the number of inquiries for technically demanding and time-consuming services also increases.

At the end of 2015, ZIRP was approved as the first «Integrated Technology Platform (ITP)» of the University of Zurich, and the University leadership decided to support the ZIRP for at least 3 years with CHF 100'000 per year starting in 2017. However, the ZIRP is still operated by one full-time equivalent staff position and it proves to be more and more challenging to cover the growing request for services and the respective administrative effort with the current financial situation. Consequently, for the future, the ZIRP needs to source further financial support, restructure its services and/or increase its fees to be able to finance its staff and increase its activity level in order to fulfill all demands.

4 Events and public relations

4.1 Scientific events

To promote scientific collaborations and networking among the members of the ZIHP, numerous symposia, mini-symposia and seminars have been organized during the past 12 years. These activities are continued beyond the reporting period.

Annual symposia with around 200 attendees brought together basic and clinical researchers, ZIHP members and students. Keynote lectures were given by renowned national and international experts and covered topics through all fields of human physiology. PhD students and young researchers had the opportunity to present and discuss their work with a broad audience either during one of the short oral presentations or during the poster session with around 80 posters. Awards were given for the best presentation and for the best four posters. The central location either at the University Hospital Zurich or at the Haldeliweg encouraged even busy clinicians to join the meeting throughout the day.

The *plenary meeting* of the ZIHP members was always held within the symposium. On the following day, a *meeting of the Scientific Advisory Board* took place where the applications for cooperative project grants were discussed and the strategic orientation of the ZIHP was evaluated.

The ZIHP organized several *mini-symposia* on translational research from bench to bedside. Basic and clinically oriented researchers presented their work, followed by a panel discussion. The aim was to promote translational projects and to start future collaborations.

From 2005 until 2015, the ZIHP organized a *bi-weekly seminar series in integrative human physiology*. During the semester invited external speakers alternated with ZIHP members talking about their work. To increase the attractiveness and reachability also for clinicians and students at the hospital - who have fewer opportunities to participate in similar events - the seminar series was organized as a lunch seminar and moved from the Irchel campus to the University Hospital Zurich from autumn term 2009 on.

Starting 2008, the ZIHP organized in a regular manner *ZIHP Special Seminars*. ZIHP members invite a guest speaker to Zurich for an individual seminar. The talk is usually given either at Irchel campus or in the home institution of the ZIHP member. All ZIHP members and all students of the imMed PhD Program receive the invitation. The ZIHP supports the travel expenses of the speaker up to an amount of CHF 500.

Furthermore, the ZIHP *sponsored* over the years several *international events, conferences, or symposia* organized by ZIHP members. If the application was approved by the steering committee, the ZIHP member received up to CHF 5'000 for the event and was obligated to acknowledge the ZIHP on the conference program.

The imMed PhD Program organized a seminar series on *career possibilities* from 2007 until 2011. The goal was to provide students with inspiring ideas on various career opportunities. Speakers coming from different fields presented their own career paths and gave advice. In 2012, a new series called *Vision 2020* was launched. This series is supported by the SUK – Program «Doktoratsprogramme» and continues beyond 2016. A committee of PhD students selects interesting topics on biomedical developments that are going to shape our society within the next years and invites experts from industry, academia, and politics for an interactive discussion.

4.2 Public relations

A further focus of the ZIHP is public relations. Making the ZIHP visible and well-known to the public does not only bring science of the University of Zurich in general and of integrative human physiology in particular to the public, but it also helps to attract the attention of potential sponsors.

The main public relations activity of the ZIHP was and remains the public event series *Wissen-schaf(f)t Wissen*. The program was started 2008 in cooperation with the Stiftung Careum Zürich and aims at presenting «hot» topics of biomedical and physiological research to a broad audience. The events show the link between everyday life and research done within the ZIHP and at research institutions in Zurich. The events include talks and podium discussions and are followed by lively discussions with the large audience. Reports on these events appear mostly on the public online portal *UZH News* of the University of Zurich and thereby reach a broad readership. *UZH News* is a main source of inspiration for the national press. The series received the *Science Communication Award* from the Swiss Society for Cell Biology, Molecular Biology and Genetics which was awarded within the USGEB Annual Meeting on January 27/28, 2011 in Zürich.

Within the 175th anniversary celebration of the University of Zurich, the ZIHP contributed to one of the main events, the *Parcours des Wissens*, an interactive exhibition. During nine days (March 8-16, 2008) the fascination and diversity of interdisciplinary research could be experienced in direct contact with the involved researchers. The ZIHP participated with the following projects:

- Research for sick hearts: atherosclerotic plaques, cardiovascular regenerative medicine, heart failure and cardiac arrhythmia (Cardiovascular Research, Cardiovascular Surgery and Clinic for Cardiology)
- Physical inactivity and its consequences (Institute of Physiology)
- The body balance: food intake, obesity and type 2 diabetes (Institute of Veterinary Physiology)
- Regulation and coordination of the brain: sleep, eye and head movements (University Children's Hospital, Institute of Pharmacology and Toxicology and Department of Neurology)

On September 26, 2008 and on September 25, 2009 the *Zurich Researchers' Nights* took place, simultaneously to similar events in more than 30 other European cities. Several ZIHP members participated in this event and presented their work to the general public.

The ZIHP contributed to the *Scientifica - Zürcher Wissenschaftstage* in August 2011 with several short presentations of ZIHP members around the topic «Energie für den Körper», and with the sponsoring of the exhibit of a walkable model of the human intestine that attracted very much attention. In August 2013, the ZIHP contributed again to the *Scientifica* with a booth on nanoparticles («Magnetische Nanopartikel in der Medizin: Freund oder Feind?»). Moreover, several ZIHP members participated with further booths and short presentations. Participation to the 2017 edition is planned.

The *ZIHP website* is the main communication tool and offers various services, e.g. information on current activities and events, open positions, press review etc.

An electronic *newsletter (ZIHP-News)* containing announcements and reports of events, articles on ZIHP-funded cooperative projects, information on new members, the imMed PhD program, awards, recent publications etc. was published in a regular manner throughout the reporting period. The newsletter archive can be found on the website: Services > Newsletter. The *ZIHP-News* are conceived for both scientists and general public and turned out to be an important communication tool.

Nowadays they are sent to almost 2000 subscribers in Switzerland and abroad. Some *ZIHP News* appeared as *Special Issue* in a printed version.

Several reports on the ZIHP and the research activities of its members appeared in the *public press* over the years. A press review can be found on the website: Services > Press Review.

5 Academic career development and gender equality

5.1 Academic career development

The promotion of young researchers is one of the main aims of the ZIHP. Besides having funded the work of 4 assistant professors as well as more than 100 PhD positions within the cooperative projects, the ZIHP established the Master Program in Human Biology as well as the PhD Program in Integrative Molecular Medicine (imMed). The Master Program in Human Biology, which promotes young researchers on the undergraduate level, has been completely independent from the ZIHP since 2009. The program is well-established within the Biology curriculum of the Faculty of Science of the University of Zurich.

The imMed PhD Program – which is part of the Life Science Zurich Graduate School - offers students a scientific environment that combines basic and clinical research and offers a broad range of advanced training opportunities. Moreover, students are integrated in the ZIHP network and actively participate to the ZIHP seminars and symposia.

A total of 280 students participated so far in the program. Most of the students involved in the ZIHP-funded cooperative projects are or were enrolled in the imMed PhD Program. The PhD program commission and the program coordinator go to great lengths to ensure the optimal supervision of students and to provide advice if necessary. Both the commission and the students of the imMed PhD Program constantly evaluate the catalogue of graduate courses and adapt it to the needs of the students. The annual retreats, the seminar series, and the career events with the imMed alumni are highly successful for both scientific and social exchange. They will be continued beyond 2016.

The imMed PhD Program continues to be organizationally embedded in the ZIHP beyond the reporting period. It is however since several years for the most part financially independent due to the resources of the Bologna program of the University of Zurich and of the SUK – Program «Doktoratsprogramme».

5.2 Gender equality

Within the students of the imMed PhD Program, the female proportion was 63%. Within the funded PhD / MD-PhD positions of the cooperative projects the proportion of women was 65%.

Within the ZIHP members in the reporting period the proportion of women was 22%.

The ZIHP and the ZIRP Coordinating Offices have been always run by women working part-time. During the reporting period several maternity covers were successfully organized. All coordinators came back to their position after a period of maternity leave. Several PhD students within the cooperative projects started a family during their studies and could continue their research after maternity leave working part-time if wished.

6 Conclusions

Max Gassmann, Chairman of the Steering Committee

The ZIHP that has been financed by the URPP IHP throughout the last twelve years is a success story of the University of Zurich. The mission was to link basic science with clinical needs for the patient. To this end, scientists from the University of Zurich involved in basic research had to be linked to research-oriented physicians from the University Hospital and from the Children Hospital among others. This task was fully accomplished as can be seen by over 250 publications from cooperative projects of groups that had never worked together before. This integrative and translational effort allowed our ZIHP members to publish in very high-ranking journals that expect data from molecular and cellular aspects up to the pathophysiological mechanism in the patient. Some collaborative efforts were so fruitful that those members successfully established several highly prestigious networks such as the NCCR termed *kidney.ch*. Of note, membership of the ZIHP was always open for interested scientists from every field, as long as they could prove their excellence (for example by a running SNF project). The ZIHP counted end of 2016 151 members.

Furthermore, we recruited a total of four young assistant professors that performed very well while being ZIHP professors and thus all have found a permanent faculty position in either Switzerland (Zurich and Basel) or Europe (Freiburg and Copenhagen). Apart from this, we established the well-known PhD Program in integrative molecular Medicine (imMed) that by now has been the home of 280 PhD students. From the very beginning on, we realized that we need a rodent facility, which we indeed established at the Institute of Physiology and later termed «Zurich Rodent Integrative Physiology» (ZIRP). Both the imMed PhD Program and the ZIRP are nowadays mostly independent of the ZIHP.

Finally, we organized numerous scientific meetings, retreats and workshops from which a lot of younger and older scientist could benefit. Our activities are regularly presented in the *ZIHP News* that has about 1800 subscribers. It was also our intention to present the scientific achievements of our researchers to the public, e.g. the taxpayers. To this end we established a very successful public series of talks named *Wissen-schaf(f)t Wissen* that still are very popular and frequented by about 100-200 visitors per lecture.

The ZIHP success story continues. After 12 years of generous support from the URPP IHP, for which we are very thankful, we opt for alternative financial resources. Some help comes from the Faculty of Medicine, the Faculty of Science, and the Vetsuisse Faculty but also a legate and some small companies mainly support our public and scientific meetings. We do hope that more soft money can be recruited so that we can continue to support excellent projects at cutting edge of research. Integrative translational research is what we need at present. We envision that the ZIHP will continue to support those projects.

Anhänge

A Bibliography

5 most important publications that arose from projects financed by the URPP IHP

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B Scientific and public events

Scientific events

Annual symposia

- September 29-30, 2005: **Opening symposium**. Keynote lectures:
 - **Opening lecture:** C. elegans: A Rosetta Stone for deciphering the human genetic blueprint
Kevin Strange, Vanderbilt University, Nashville, USA
 - Human research in hypoxia between bench and bedside
Peter Bärtisch, Medical University Clinic, Heidelberg, Germany
 - Vestibular loss causes hippocampal atrophy and impaired spatial memory in humans
Thomas Brandt, Neurological Clinic, Ludwig-Maximilian-University Munich, Germany
 - Glucose as a signal to control glucose and energy homeostasis
Bernard Thorens, Department of Pharmacology and Toxicology, University of Lausanne
 - Integrative human physiology and the cardiovascular system - a step into the future?
Thomas Lüscher, Cardiology, UZH
- September 22, 2006: **2nd annual main symposium**. Keynote lectures:
 - Endothelium-dependent contractions revisited
Paul M. Vanhoutte, Department of Pharmacology, University of Hong Kong, China
 - Structural and functional plasticity of skeletal muscle tissue and its molecular basis
Hans Hoppeler, Institute of Anatomy, University of Bern, Switzerland
 - The diverse functions of the serum and glucocorticoid inducible kinase
Florian Lang, Institute of Physiology, University of Tübingen, Germany
 - Artificial gravity - an integrative solution for long duration space flights
Laurence R. Young, Massachusetts Institute of Technology, Cambridge, USA
- August 31, 2007: **3rd annual main symposium**. Keynote lectures:
 - Molecular mechanisms of plaque instability
Mat J.A.P. Daemen, Department of Pathology, University of Maastricht, Netherlands
 - Brain, balance and behavior
Adolfo M. Bronstein, Division of Neurosciences and Mental Health, Imperial College London, UK
 - Leptin resistance in melanocortin circuits
Michael A. Cowley, Oregon National Primate Research Center, Beaverton, USA
 - TOR signaling and control of cell growth
Michael N. Hall, Biozentrum, University of Basel, Switzerland
- August 22, 2008: **4th annual main symposium**. Keynote lectures:
 - Immune mechanisms in atherosclerosis
Göran K. Hansson, Department of Medicine, Karolinska University Hospital, Stockholm, Sweden
 - Sleep from mice to humans: a genetic approach
Mehdi Tafti, Center for Integrative Genomics, University of Lausanne, Switzerland
 - Hypothalamic control of energy homeostasis
Jens C. Brüning, Institute for Genetics, University of Cologne, Germany
 - Genetic insights into the VHL-PHD-HIF oxygen response pathway
Patrick H. Maxwell, Division of Medicine, University College London, The Rayne Institute, London, UK

- August 28, 2009: **5th annual main symposium**. Keynote lectures:
 - Inflammation as key player in atherosclerosis
François Mach, Cardiology Department, Geneva University Hospital, Geneva, Switzerland
 - Hypoxia – Inflammation crossing: Where to go?
Joachim Fandrey, Institute of Physiology, University of Duisburg-Essen, Essen, Germany
 - The nitric oxide/nitrite cycle in human physiology
Alan N. Schechter, Molecular Medicine Branch of the National Institutes of Diabetes and Digestive and Kidney Diseases (NIH, NIDDK), Bethesda, USA
 - Water and solute transport across biological membranes: One hundred years of Overton's rule
Olivier Devuyst, Division of Nephrology, UCL Medical School, Brussels, Belgium

- August 27, 2010: **6th annual main symposium**. Keynote lectures:
 - Minerals in motion: from new transporters towards new concepts
Prof. René J. M. Bindels, Nijmegen Centre for, Molecular Life Sciences, Radboud University Nijmegen, the Netherlands
 - Powerlines for muscle work: Structural design and functional integration in the oxygen and fuel pathways
Prof. Ewald R. Weibel, Institute of Anatomy, University of Bern, Switzerland
 - Functional imaging of the brain: a window into the human vestibular system
Prof. Marianne Dieterich, Department of Neurology, Ludwig-Maximilians University of Munich, Germany
 - Cofactor networks in the control of metabolism
Prof. Johan Auwerx, Laboratory of Integrative Systems Physiology (LISP), EPFL, Switzerland

- August 26, 2011: **7th annual main symposium**. Keynote lectures:
 - Differential and integral views of genetics in the context of systems biology
Prof. Denis Noble, Cardiovascular Physiology, University of Oxford, UK
 - Risky communication in atherosclerosis
Prof. Brenda Kwak, Department of Pathology and Immunology, University of Geneva, Switzerland
 - Skeletal muscle as an endocrine organ
Prof. Bente Klarlund Pedersen, Centre of Inflammation and Metabolism (CIM), Rigshospitalet, Copenhagen, Denmark:
 - Potassium channels: Critical determinants of adrenal hormone secretion
Prof. Richard Warth, Department of Physiology, University of Regensburg, Germany

- August 24, 2012: **8th annual main symposium**. Keynote lectures:
 - Circadian rhythms, sleep and cognition: an integrative and multidisciplinary approach
Prof. Derk-Jan Dijk, Surrey Sleep Research Centre, University of Surrey, UK
 - Nuclear receptor control of the metabolic syndrome and its cardiovascular complications
Prof. Bart Staels, Faculty of Pharmacy, University of Lille, France
 - TOR signaling in growth and metabolism
Prof. Michael N. Hall, Biozentrum, University of Basel, Switzerland
 - What have we learned from congenital polycythemia and Tibetan adaptation to high altitude?
Prof. Josef T. Prchal, Hematology Division, Internal Medicine Department, University of Utah, USA

- August 23, 2013: **9th annual main symposium**. Keynote lectures:
 - Interorgan communication in the control of pancreatic beta-cell mass and function
Prof. Bernard Thorens, Center for Integrative Genomics, University of Lausanne, Switzerland
 - Cellular mechanisms of skeletal muscle fatigue
Prof. Håkan Westerblad, Department of Physiology and Pharmacology, Karolinska Institute, Stockholm, Sweden
 - Stress and the programming of brain function and behavior – A focus on aggression
Prof. Carmen Sandi, Laboratory of Behavioral Genetics, EPFL Lausanne, Switzerland
 - Signaling regulation of endothelial permeability
Prof. Asrar B. Malik, Center for Lung and Vascular Biology, University of Illinois, Chicago, USA

- August 29, 2014: **10th annual main symposium**. Keynote lectures:
 - Fraud, plagiarism, and other “minor” problems in science
Dr. Ton de Craen, Department of Internal Medicine, Leiden University Medical Center, the Netherlands
 - A look into the genome of myocardial infarction
Prof. Heribert Schunkert, German Heart Center, Munich, Germany
 - Still the better polypill: exercise
Prof. Bengt Kayser, Institute of Sports Sciences, University of Lausanne

- August 21, 2015: **11th annual main symposium**. Keynote lectures:
 - Elucidation of oxygen sensing pathways: Implications for physiology and medicine
Prof. Sir Peter Ratcliffe, Nuffield Department of Medicine, University of Oxford, UK
 - NoncodingRNAs in cardiac (patho)physiology
Prof. Dr. Dr. Thomas Thum, Institute of Molecular and Translational Therapeutic Strategies (IMTTS), Hannover Medical School, Germany
 - Drugs and placebos: What's the difference?
Prof. Dr. Fabrizio Benedetti, National Institute of Neuroscience, University of Turin, Italy
 - Klotho: Calcium-phosphate metabolism and aging
Prof. Dr. Florian Lang, Institute of Physiology, University of Tübingen, Germany

- August 26, 2016: 12th **annual main symposium**.
Keynote lectures:
 - The relevance of brown adipose tissue for metabolic health
Prof. Dr. Joerg Heeren, Institute for Biochemistry and Molecular Cell Biology, University Medical Center Hamburg-Eppendorf, Germany
 - Proteomic variability: Measurement and phenotypic consequences
Prof. Dr. Ruedi Aebersold, Institute of Molecular Systems Biology, ETH Zurich
 - The new era of Cognitive Computing: Smart Machines
Dr. Matthias Kaiserswerth, Former Director, IBM Research – Zurich, now Managing Director of the Hasler Foundation, Bern*Farewell lectures:*
 - What did we achieve in those years?
Prof. Dr. Carsten Lundby, ZIHP Professor, Institute of Physiology, UZH
 - Interplay between HIF-alpha transcription factors, primary cilia and cell cycle tumour suppressor genes in clear cell renal cell carcinoma
Prof. Dr. Ian Frew, ZIHP Professor, Institute of Physiology, UZH*Special session «From academia to spin-off»:*
 - Dr. David Fluri, InSphero AG, Schlieren
 - Prof. Dr. Emanuela Keller, NeMoDevices – Insights inside the brain, Zurich*Concluding remarks:*
 - The future of integrative and translational research
Prof. Dr. Alan Schechter, Molecular Medicine Branch, NIDDK, National Institutes of Health, Bethesda, MD, USA, Member of the ZIHP Advisory Board

Mini-symposia

- June 25, 2008: **1st mini-symposium on translational research from bench to bedside**: Gastroenterology
- April 16, 2010: **2nd mini-symposium on translational research from bench to bedside**: «The microvasculature during tissue growth, tissue regression and hypoxia».
- June 11, 2010: **Symposium in honor of Prof. Heini Murer**. *In cooperation with the Institute of Physiology and the University of Zurich*
- November 21, 2011: **3rd mini-symposium on translational research from bench to bedside**: «Visualizing men and mammals: Zurich's imaging experts meet». *In cooperation with the Institute of Forensic Medicine*

Seminar series in integrative human physiology

- October 25, 2005: New anti-inflammatory strategies to reduce atherosclerosis
Prof. François Mach, Division of Cardiology, University Hospital, Geneva
- November 8, 2005: Alveolar responses to hypoxia
Prof. Heimo Mairbäurl, Universität Heidelberg, Deutschland
- November 22, 2005: Diabetes, obesity and metabolic syndrome
Prof. Steve Woods, University of Cincinnati, USA

- December 6, 2005: Recording single neurons in the hum
Prof. Cristof Koch, Division of Biology, Caltech, Pasadena, CA, USA
- December 20, 2005: Kinins and flow-mediated vascular dilatation
Chantal M. Boulanger, INSERM, Centre de Recherche Cardiovasculaire Lariboisière, Paris
- January 17, 2006: Deep tissue imaging using 2-photon microscopy
Prof. Fritjof Helmchen, Institut für Hirnforschung, Universität Zürich
- January 31, 2006: Visualizing the hypoxic response in mammalian cells
Prof. Joachim Fandrey, Universität Essen, Deutschland
- March 14, 2006: Lox is essential for hypoxia-induced metastasis
Prof. Amato Giaccia, Department of Radiation Oncology, Stanford University School of Medicine, USA
- April 4, 2006: Exploring the human circadian clock: from behavior to cells to genes and back again
Dr. Steven A. Brown, Institute for Immunology, Charité-Humboldt University, Berlin, Germany
- April 18, 2006: Understanding Von Hippel-Lindau disease through mouse models
Dr. Ian J. Frew, Institute of Cell Biology, ETH Zurich
- May 2, 2006: Non-invasive imaging in rodents: towards molecular readouts
Prof. Markus Rudin, Institute of Biomedical Engineering, University and ETH Zurich
- May 16, 2006: Branching tubes: common theme in the development of epithelial organs
Prof. Markus Affolter, Division of Cell Biology, Biozentrum, University Basel
- May 30, 2006: Visual images of the body and the multisensory construction of the body schema
Prof. Francesco Pavani, Department of Cognitive Sciences and Education, University of Trento, Italy
- June 13, 2006: Progenitor cells for cardiovascular repair: molecular mechanisms and clinical relevance
Prof. Stephanie Dimmeler, Molecular Cardiology, University Frankfurt, Germany
- June 27, 2006: Does the brain become hypoxic during exhaustive exercise?
Prof. Niels H. Secher, Department of Anaesthesiology, Rigshospitalet Copenhagen, Denmark
- October 24, 2006: Receptors for protons or lipid messengers or both?
Dr. Klaus Seuwen, Novartis Institutes for Biomedical Research, Basel, Switzerland
- November 7, 2006: Thermophysiology and sleep in humans
Kurt Kräuchi, Centre for Chronobiology, Psychiatric University Clinics Basel, Switzerland
- November 21, 2006: Adhesion molecules and tissue architecture
Prof. Therese J. Resink, Department of Research University Hospital Basel, Switzerland
- December 5, 2006: Vascular effects of alveolar hypoxia
PD Dr. Norbert Weissmann, Justus-Liebig-University Giessen, Germany

- December 19, 2006: Gastrointestinal satiety signals in humans
Prof. Christoph Beglinger, Gastroenterology and Hepatology, University Hospital Basel, Switzerland
- January 16, 2007: Human path integration: space, time, and memory
Dr. Stefan Glasauer, Center for Sensorimotor Research, Ludwig-Maximilians-University Munich
- January 30, 2007: Novel roles for connexins in cardiovascular disease
Prof. Brenda R. Kwak, Division of Cardiology, University Hospital Geneva, Switzerland
- March 20, 2007: Cerebral blood flow: where, when and why?
Prof. Bruno Weber, Institut für Pharmakologie und Toxikologie, Universität Zürich
- April 3, 2007: Molecular mechanisms involved in immune cell migration across the blood-brain barrier during health and disease
Prof. Britta Engelhardt, Theodor Kocher Institut, Universität Bern
- April 17, 2007: Muscle adaptations to endurance and resistance exercise: Molecular mechanisms
Prof. Henning Wackerhage, School of Medical Sciences, University of Aberdeen, UK
- May 8, 2007: Multifaceted roles of PPARs in tissue repair and metabolism
Prof. Walter Wahli, Center for Integrative Genomics, Universität Lausanne
- May 22, 2007: Regulatory roles of miRNAs in metabolism
Prof. Markus Stoffel, Institut für Molekulare Systembiologie, ETH Zürich
- June 5, 2007: Myoglobin, a multifunctional oxygen-binding protein
Prof. Axel Gödecke, Heinrich-Heine-Universität Düsseldorf, Deutschland
- June 19, 2007: The Blue Brain Project: Reverse-engineering the neocortical column
Dr. Sean Hill, IBM T. J. Watson Research Center, Yorktown Heights, New York and Brain Mind Institute EPFL
- September 25, 2007: Islet inflammation in type 2 diabetes: physiology, pathology and therapy
Prof. Dr. Marc Y. Donath, Division of Endocrinology and Diabetes, University Hospital, Zurich
- October 9, 2007: Carbonic anhydrases and pH regulation in hypoxia (tentative)
Prof. Dr. Silvia Pastorekova, University of Bratislava
- October 23, 2007: The role of mouth and gut taste systems in food preference and intake
Prof. Dr. Antonio Sclafani, Department of Psychology, Brooklyn College of CUNY, Brooklyn, New York
- November 6, 2007: Understanding the physiology of endurance performance: the need for an integrative approach
Prof. Dr. Bengt Kayser, Institut des sciences du mouvement et de la médecine du sport, Université de Genève
- November 20, 2007: Oxidant stress, progenitor cells and cardiovascular disease: novel therapeutic approaches?
PD Dr. Ulf Landmesser, Hannover Medical School, Dept of Cardiology and Angiology, Hannover, Germany

- December 4, 2007: Hypoxia signalling pathways in the kidney – two sides of the coin
PD Dr. Michael Wiesener, University Erlangen-Nürnberg
- December 18, 2007: Epithelial sodium channels in health and disease
Prof. Dr. Bernard Rossier, Département de pharmacologie et de toxicologie, Université de Lausanne
- February 26, 2008: Cortical plasticity and sleep slow-waves explored by means of high-density EEG
Prof. Dr. Reto Huber, Zentrum für Schlafmedizin, Kinderspital Zürich
- March 11, 2008: Regulation of NF- κ B-dependent gene expression by protein acetylation
Prof. Dr. Michael O. Hottiger, Institut für Veterinärbiochemie und Molekularbiologie, Universität Zürich
- April 1, 2008: Towards high content screening of isolated cardiac myocytes
Dr. Lars Kaestner, Institut für Molekulare Zellbiologie, Universität des Saarlandes, Homburg, Deutschland
- April 15, 2008: Autoimmune myocarditis: a model for inflammatory cardiomyopathy
Prof. Dr. Urs Eriksson, Klinik für Kardiologie, UniversitätsSpital Zürich
- April 29, 2008: Motor learning in the oculomotor system
Prof. Dr. Andreas Straube, Neurologische Klinik und Poliklinik, Universität München, Deutschland
- May 13, 2008: How the gut talks to the brain
Dr. Carel W. Le Roux, Division of Investigative Science, Imperial College, London, UK
- May 27, 2008: The Psychobiology of Human Intelligence
Prof. Dr. Aljoscha C. Neubauer, Leiter des Arbeitsbereichs Differentielle Psychologie und Persönlichkeitspsychologie, Institut für Psychologie, Universität Graz, Österreich
- September 23, 2008: Vascular Dysfunction: A «sandwich» injury
Prof. Dr. Zhihong Yang, Departement Medizin, Abteilung für Physiologie, Universität Freiburg
- October 7, 2008: Thin air at the top
Prof. Dr. Beatrice Beck Schimmer, Physiologisches Institut, Universität Zürich
- October 21, 2008: Extravasal circulation: what cannot be found in textbooks
Prof. Johannes Vogel, Departement für Vet-Physiologie, Universität Zürich
- November 4, 2008: Synaptic disinhibition in chronic pain states
Prof. Dr. Hans Ulrich Zeilhofer, Institut für Pharmakologie und Toxikologie, Universität Zürich
- November 18, 2008: Role of oxidative stress in tissue repair and cancer
Prof. Dr. Sabine Werner, Institut für Zellbiologie, ETH Zurich
- December 2, 2008: Biomimetic materials for pro-angiogenic therapy
PD Dr. Andreas Zisch, Klinik für Geburtshilfe, UniversitätsSpital Zürich

- December 16, 2008: Regulation of inflammatory gene expression in hypoxia
Prof. Dr. Cormac Taylor, College of Life Sciences, School of Medicine & Medical Science, Conway Institute, Dublin, Ireland
- February 24, 2009: Assessment of motor function after spinal cord injury: implications for clinical trials
Dr. Huub van Hedel, Paraplegikerzentrum Balgrist, Universitätsspital Zürich
- March 3, 2009: Pathophysiological role of estrogen metabolism: a new concept with potential implications in proliferative disorders
Prof. Dr. Raghendra Dubey, Klinik für Reproduktions-Endokrinologie, Universitätsspital Zürich
- March 24, 2009: Importance of the Notch pathway in cardiac tissue homeostasis
Prof. Dr. Thierry Pedrazzini, Departement für Medizin, Universität Lausanne
- April 4, 2009: Acetylation, methylation and micro-RNAs in epigenetic modifications
Prof. Dr. Steffen Gay, Rheumaklinik, Universitätsspital Zürich
- April 28, 2009: Hypothalamic fatty acid synthesis and energy balance
Prof. Dr. Tim Moran, Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA
- May 12, 2009: Integrative ocular motor physiology
Prof. Dr. René Müri, Abteilung für Kognitive und Restorative Neurologie, Neurologische Universitätsklinik, Inselspital Bern
- May 26, 2009: Prolyl 4-hydroxylation – beyond collagens and hypoxia-inducible factor?
Prof. Dr. Johanna Myllyharju, Biocenter Oulu and Institute of Biomedicine, Department of Medical Biochemistry and Molecular Biology, University of Oulu, Finland
- September 22, 2009: Hypoxia signaling in cardiac growth and metabolism
Dr. Jaya Krishnan, Institut für Zellbiologie und Kompetenzzentrum für Systemphysiologie und Metabolische Krankheiten, ETH Zürich
- October 6, 2009: The intestinal innate immune system: TOLLerate or NOD?
Prof. Dr. med. Dr. phil. Gerhard Rogler, Klinik für Gastroenterologie und Hepatologie, Universitätsspital Zürich
- October 20, 2009: Erythropoietin down-regulates threat processing in biomarker models of antidepressant drug action in healthy and depressed individuals
Dr. Kamilla Miskowiak, Department of Psychiatry, Copenhagen University Hospital, Rigshospitalet, Copenhagen
- November 3, 2009: From risk factors to endothelial dysfunction: Putative intracellular signaling
PD Dr. Francesco Cosentino, Klinik für Kardiologie, Universitätsspital Zürich
- November 17, 2009: Transcranial MR-guided focused ultrasound treatment in functional neurosurgery
Prof. Dr. Daniel Jeanmonod, Medizinische Fakultät, Universität Zürich und Department of Physiology and Neuroscience, New York University School of Medicine

- December 1, 2009: The neurogenic vascular niche of the carotid body and its activation by hypoxia, Prof. Dr. José López-Barneo, Instituto de Biomedicina de Sevilla, Hospital Universitario Virgen del Rocío/CSIC/Universidad de Sevilla, Sevilla, Spain
- December 12, 2009: Metabolite profiling in human phenotyping
Prof. Dr. Hannelore Daniel, Zentralinstitut für Ernährungs- und Lebensmittelforschung, Technische Universität München
- March 2, 2010: Measuring the loss of otolith function
Dr. Christopher Bockisch, Neurologische Klinik, UniversitätsSpital Zürich
- March 16, 2010: Non-invasive assessment of coronary artery disease progression using magnetic resonance imaging (MRI)
Prof. Dr. Matthias Stuber, Center for Biomedical Imaging (CIBM), University Hospital Lausanne
- March 30, 2010: Islet inflammation impairs insulin secretion in type 2 diabetes
Prof. Dr. Marc Y. Donath, Klinik für Endokrinologie, Diabetologie und Klinische Ernährung, UniversitätsSpital Zürich
- April 13, 2010: The hypoxia-tolerant subterranean mole rat as a model for cancer survival
Prof. Dr. Aaron Avivi, The Institute of Evolution, University of Haifa, Israel
- April 27, 2010: Mapping large scale neuronal networks in real time
Prof. Dr. Christoph M. Michel, Department of Neuroscience, University of Geneva
- May 11, 2010: HIF-1 as a tissue-specific driving force in gastrointestinal disease
PD Dr. med. Thorsten Cramer, Medizinische Klinik, Hepatologie und Gastroenterologie, Charité - Universitätsmedizin Berlin, Deutschland
- June 1, 2010: Integration of blood volume, electrolyte, and pressure regulation by natriuretic peptides in health and disease
Prof. Dr. Dr. Wolf-Georg Forssmann, Forschungseinheit Experimentelle und Klinische Peptidforschung, Klinik für Immunologie und Rheumatologie, Medizinische Hochschule Hannover und Pharis Group/Cardiorentis, Hannover, Deutschland
- September 28, 2010: Cardiovascular side effects of traditional NSAIDs and paracetamol: Painful lessons
Prof. Dr. Frank Ruschitzka, Klinik für Kardiologie, UniversitätsSpital Zürich
- October 10, 2010: Phylogeny of sleep
Prof. Dr. Irene Tobler, Institut für Pharmakologie und Toxikologie, Universität Zürich
- October 26, 2010: Mechanisms of gene regulation in hypoxia
Prof. Dr. Lorenz Poellinger, Department of Cell and Molecular Biology, Karolinska Institute, Stockholm, Sweden
- November 9, 2010: NAD⁺ as a metabolic regulator of circadian rhythms
Dr. Gad Asher, Department of Molecular Biology, University of Geneva

- November 23, 2010: Audio-visual-vestibular integration in gaze orienting behavior, Prof. Dr. John van Opstal, Department of Biophysics, Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands
- December 7, 2010: Angiogenesis between hypoxia and hypertension
Prof. Dr. Edouard Bategay, Klinik und Poliklinik für Innere Medizin, UniversitätsSpital Zürich
- December 21, 2010: Body weight lowering mechanisms of surgical and non-surgical anti-obesity therapy
Prof. Dr. Thomas Lutz, Institut für Veterinärphysiologie, Universität Zürich
- March 1, 2011: The role of stem cells in the maintenance of bone homeostasis
Dr. Peter J Richards, Center for Applied Biotechnology and Molecular Medicine, University of Zurich
- March 15, 2011: Do circadian clock genes play a role in sleep homeostasis?
Prof. Paul Franken, Center for Integrative Genomics, University of Lausanne
- March 29, 2011: Enteroendocrinology and metabolic receptology – towards novel drug targets
Prof. Thue W Schwartz, Department of Neuroscience and Pharmacology, University of Copenhagen, Denmark
- April 12, 2011: Regulation of gene expression in response to hypoxia
Prof. Luis del Peso Ovalle, Biochemistry Department, Universidad Autónoma de Madrid, Spain
- May 3, 2011: Animal models for CNS inflammation: Cytokines, TH subsets, fashion and reality checks
Prof. Burkhard Becher, Institute of Experimental Immunology, University of Zurich
- May 17, 2011: Modelling working memory
Prof. Klaus Oberauer, Department of Psychology, University of Zurich
- May 31, 2011: The role of the kidney in acid-base homeostasis
Prof. Carsten Wagner, Institute of Physiology, University of Zurich
- September 27, 2011: Cardiovascular magnetic resonance beyond three dimensions
Prof. Sebastian Kozerke, Institute for Biomedical Engineering, University and ETH Zurich
- October 11, 2011: Signals and mechanisms in the control of protein intake
Prof. Daniel Tomé, AgroParisTech, Institute of Technology for Life, Food and Environmental Sciences, Department of Life Sciences and Health, Paris, France
- October 25, 2011: How to non-invasively image oxygenation in tissue in humans
PD Dr. Martin Wolf, Division of Neonatology, University Hospital Zurich
- November 8, 2011: TGR5 at the crossroad of inflammatory and metabolic signaling
Prof. Kristina Schoonjans, Laboratory of Integrative Systems Physiology, EPFL, Lausanne
- November 22, 2011: Milk oligosaccharides, gut microbiota and mucosal immunity
Prof. Thierry Hennet, Institute of Physiology, University of Zurich

- December 6, 2011: Fatigue in autoimmune diseases: CD40 signaling leads to a TNF dependent increase of NREM sleep
Prof. Adriano Fontana, Institute of Experimental Immunology, University of Zurich
- December 20, 2011: The physiology of hypoxic response, and the role of HIFs in its modulation
Prof. Randall S. Johnson, Dept. of Physiology, Development & Neuroscience, University of Cambridge, UK
- February 28, 2012: Brown adipose tissue: heating and slimming us
Prof. Dr. Jan Nedergaard, The Wenner-Gren Institute, Stockholm University, Sweden
- March 13, 2012: Time, speech and the primate brain
Prof. Dr. Martin Meyer, Division of Neuropsychology, Institute of Psychology, University of Zurich
- March 27, 2012: The metabolism of hereditary renal cancer
Dr. Patrick J. Pollard, Nuffield Department of Clinical Medicine, University of Oxford, UK
- April 10, 2012: Genetics and drug discovery - Human as the next animal model
Prof. Dr. Vincent Mooser, Department of Laboratories, CHUV University Hospital Lausanne
- April 24, 2012: Physiological and clinical relevance of thiazide-sensitive renal distal tubule
Prof. Dr. Johannes Loffing, Institute of Anatomy, University of Zurich
- May 15, 2012: How muscle fatigue originates in the brain
Dr. Kai Lutz, Division of Neuropsychology, Institute of Psychology, University of Zurich
- May 29, 2012: The hypoxia connection: its influence on retinal development and neuroprotection
Prof. Dr. Christian Grimm, Lab for Retinal Cell Biology, Department of Ophthalmology, University Hospital Zurich
- September 25, 2012: Hey bHLH transcription factors control cardiovascular development
Prof. Dr. Manfred Gessler, Dept. of Developmental Biochemistry, University of Würzburg, Germany
- October 9, 2012: Typical and atypical networks of memory and cognition in the developing brain
PD Dr. Peter Klaver, MR Center, University Children's Hospital Zurich and Department of Psychology, University of Zurich
- October 23, 2012: Nox family NADPH oxidase: Reactive oxygen species-mediated signaling and its consequences
Prof. Dr. Ralf P. Brandes, Institute for Cardiovascular Physiology, Faculty of Medicine, Goethe-University, Frankfurt am Main, Germany
- November 6, 2012: Adipose tissue expandability, lipotoxicity and the metabolic syndrome
Prof. Dr. Antonio Vidal-Puig, Department of Clinical Biochemistry, University of Cambridge, UK
- November 20, 2012: Regulation of vascular growth by FOXO and sirtuin pathways
Dr. Michael Potente, Institute of Cardiovascular Regeneration, Goethe-University, Frankfurt am Main, Germany

- December 4, 2012: Functional connectivity in magnetic resonance imaging: Applications in basic and clinical research
Dr. Kay Jann, Dept. of Psychiatric Neurophysiology, University Hospital of Psychiatry, Bern
- December 18, 2012: Sleep at high altitude: pleasure or torture?
Prof. Dr. Konrad Bloch, Division of Pulmonology, University Hospital Zurich
- February 26, 2013: Prolyl-4-hydroxylase domain enzymes in the cardiovascular system
Prof. Dr. Dörthe M. Katschinski, Department of Cardiovascular Physiology, University of Göttingen, Germany
- March 12, 2013: From brain to kidney: Osmoregulation in health and disease
Prof. Dr. Olivier Devuyst, Institute of Physiology, University of Zurich
- March 26, 2013: The airbag theory of late-onset Alzheimer's Disease
Dr. Dimitrije Krstic, Institute of Pharmacology and Toxicology, University of Zurich
- April 16, 2013: High density lipoproteins – multimolecular modulators of cell survival and function
Prof. Dr. Arnold von Eckardstein, Institute of Clinical Chemistry, University Hospital Zurich
- April 30, 2013: Mendelian randomization for testing the causality of cardiovascular risk factors
Prof. Dr. Anne Tybjaerg-Hansen, Department of Clinical Biochemistry, Rigshospitalet, Copenhagen University, Copenhagen, Denmark
- May 14, 2013: Strategies for identification and follow-up of complex disease risk genes
Prof. Dr. Anna Köttgen, Division of Nephrology, University of Freiburg, Germany and Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA
- May 28, 2013: Dysfunction of the reward system in patients with schizophrenia
PD Dr. Stefan Kaiser, Psychiatric University Hospital Zurich and Clinic for General and Social Psychiatry, University of Zurich
- September 24, 2013: Fishing for compliments: Studying vision and its disorders in zebrafish
Prof. Dr. Stephan Neuhauss, Institute of Molecular Life Sciences, University of Zurich
- October 8, 2013: Understanding clear cell renal cell carcinoma through mouse genetic engineering
Prof. Dr. Ian Frew, Institute of Physiology, University of Zurich
- October 22, 2013: Conformational PARTiality, the receptor's multiple choice
PD Dr. Reto A. Schüpbach, Division of Surgical Intensive Care Medicine, University Hospital Zurich
- November 5, 2013: Superficial temporal artery to middle cerebral artery (STA-MCA) bypass: who will benefit most?
PD Dr. Oliver Bozinov, Division of Neurosurgery, University Hospital Zurich
- November 19, 2013: Tissue-specific regulation of erythropoietin expression in the liver and kidney
Prof. Dr. Christof Dame, Department of Neonatology, Charité Berlin, Germany
- December 3, 2013: SCN5A: a pluripotent gene leading to different inherited cardiac disorders
Prof. Dr. Dagmar Keller Lang, Division of Cardiology, University Hospital Zurich

- December 17, 2013: Lysosomal control of energy metabolism
Prof. Dr. Carmine Settembre, Telethon Institute of Genetics and Medicine (TIGEM), Naples, Italy
- February 25, 2014: Intraoperative neurophysiological monitoring improves outcome in neurosurgery
PD Dr. Johannes Sarnthein, Division of Neurosurgery, USZ
- March 11, 2014: HIF-PH inhibitors, a novel approach for the treatment of anemia
PD Dr. Ingo Flamme, Bayer Health Care AG, Wuppertal, Germany
- March 25, 2014: Does altitude training improve sea level exercise performance?
Prof. Dr. Carsten Lundby, Institute of Physiology, UZH
- April 8, 2014: Blood pressure genomics - how to make use of new methods to investigate cardiovascular risk
Dr. Georg B. Ehret, Cardiology, Geneva University Hospitals, Geneva
- April 29, 2014: Cystinosis: more than a lysosomal storage disease
Prof. Dr. Francesco Emma, Division of Nephrology, Bambino Gesù Childrens' Hospital, Rome, Italy
- May 13, 2014: Endothelium and tumor microenvironment determines hematogenous metastasis
PD Dr. Lubor Borsig, Institute of Physiology, UZH
- May 27, 2014: Evidence that the lunar cycle influences human sleep
Prof. Dr. Christian Cajochen, Centre for Chronobiology, Psychiatric University Clinics, Basel
- September 23, 2014: Omics methods and technologies for basic and translational research
Prof. Dr. Ralph Schlapbach, Functional Genomics Center Zurich, UZH/ETHZ
- October 7, 2014: Prefrontal thinning affects functional connectivity and regional homogeneity of the anterior cingulate cortex in major depressive disorder: relevance for treatment response
Dr. Simona Spinelli, Department of Psychiatry, Psychotherapy and Psychosomatics, Psychiatric University Hospital Zurich
- October 21, 2014: Erythropoietin and its non-erythroid effects: Translational aspects from mice to humans
Dr. Thomas Haider, Institute of Veterinary Physiology, UZH
- November 4, 2014: Neutrophil function in hypoxia
Dr. Sarah Walmsley, Academic Unit of Respiratory Medicine, The University of Sheffield Medical School, Sheffield, UK
- November 18, 2014: SUMOylation of LRH-1: Wrestling with atherosclerosis
Dr. Sokrates Stein, Laboratory of Integrative and Systems Physiology, EPFL, Lausanne
- December 2, 2014: The NO-cyclicGMP pathway in cardiac diseases: new paradigms and translational applications
Prof. Dr. Jean-Luc Balligand, Institut de Recherche Expérimentale et Clinique (IREC), University of Louvain Medical School, Brussels, Belgium

- December 16, 2014: Visual exploration behavior – a marker of cognitive processing?
Prof. Dr. René Müri, Division of Cognitive and Restorative Neurology, University Hospital of Neurology, Inselspital, Bern
- February 24, 2015: Mitochondrial control of vascular inflammation
PD Dr. Stefan Freigang, Institute of Pathology, University of Bern
- March 10, 2015: OH, the places you'll go! Hydroxylases target the protein synthesis machinery
Dr. Mathew Coleman, School of Cancer Sciences, University of Birmingham, UK
- March 24, 2015: Dietary Potassium and the Renal Control of Salt Balance and Blood Pressure
Prof. Dr. Johannes Loffing, Institute of Anatomy, UZH
- April 14, 2015: Multimodal monitoring of cerebral hemo-dynamics, metabolism and oxygenation in neurointensive care
Prof. Dr. Emanuela Keller, Department of Neurosurgery, USZ
- April 28, 2015: Adipose tissue formation and function and the development of metabolic disorders
Prof. Dr. Christian Wolfrum, Institute of Food Nutrition and Health, ETH Zurich
- May 12, 2015: Monoclonal light chain-associated renal disorders
Prof. Dr. Frank Bridoux, Nephrology, Centre Hospitalier Universitaire de Poitiers (CHU), France
- May 26, 2015: Non-invasive EEG recordings of human neocortical population spikes
Prof. Dr. Gabriel Curio, Neurophysics Group, Department of Neurology with Experimental Neurology, Charité – Universitätsmedizin Berlin, Germany

ZIHP Special Seminars

- June 3 and 6, 2008: Basic mechanisms regulating metabolism and energy homeostasis
Prof. Daniel P. Kelly, Washington University School of Medicine, USA
Prof. Bruce M. Spiegelman, Dana-Farber Cancer Institute and Harvard Medical School, Boston, USA
- May 7, 2009: Phospholemman: cardiac Na regulation in health and disease
Prof. Michael J. Shattock, Cardiovascular Division, King's College London, St Thomas' Hospital, London SE1 7EH, UK
- July 16, 2009: Perlecan domain V improves stroke outcome
Prof. Gregory J. Bix, Texas A&M, College of Medicine, College Station, Texas, USA
- August 7, 2009: Ligand-targeted molecules for imaging and therapy of cancer and inflammatory diseases
Prof. Philip S. Low, Department of Chemistry, Purdue University, West Lafayette, Indiana, USA
- November 26, 2009: Epo and performance and how to detect its misuse
Prof. Giuseppe Banfi, IRCCS Galeazzi and School of Medicine, University of Milan, Italy
Prof. Paul Robach, Ecole Nationale de Ski et d'Alpinisme (ENSA), Medical Department, Chamonix, France

- February 4, 2010: The effect of type 2 diabetes on the cardiovascular response to exercise
Sophie Lalande, PhD, Division of Cardiovascular Diseases, Mayo Clinic, Rochester, USA
- February 8, 2010: New scanning microscopic technique for cardiac biology
Dr. Julia Gorelik, National Heart and Lung Institute, Imperial College London, UK
- May 11, 2010: Hyaluronan mediated platelet-endothelial interactions in inflammatory bowel disease
Carol A. de la Motte, Ph.D., Department of Pathobiology, Cleveland-Clinic, Lerner Research Institute, Cleveland, Ohio, USA
- May 26, 2010: Erythropoietin receptor metabolism and signaling
Dr. Drorit Neumann, Department of Cell and Developmental Biology, Sackler Faculty of Medicine, Tel-Aviv University, Ramat-Aviv, Israel
- June 24, 2010: The symbiotic nature of animal research
Prof. Henry E. Heffner, Department of Psychology, University of Toledo, Ohio, USA
- October 19, 2010: Evidences on satiety induced by proteins in animal and in humans
Prof. Dr. Daniel Tomé, AgroParisTech, Institute of Technology for Life, Food and Environmental Sciences, Department of Life Sciences and Health, Paris, France
- October 22, 2010: Oxygen-regulated expression of the erythropoietin gene in a human renal cell line REPC
Dr. Stilla Frede, Institute of Physiology, University of Duisburg-Essen, Germany
- November 9, 2010: Differential sleep features within the human brain: local aspects derived from intra-cerebral recordings
Prof. Lino Nobili Epilepsy Surgery Centre "C. Munari", Centre of Sleep Medicine, Department of Neuroscience, Niguarda Hospital, Milan, Italy
- February 4, 2011: Mitochondrial function in health and disease
Steen Larsen, Department of Biomedical Sciences, University of Copenhagen, Denmark
- March 23, 2011: S-Nitrosylation and other protein cysteine oxidations: Proteomic identification and role in (hypoxia) cell signalling
Dr. Antonio Martínez-Ruiz, Servicio de Immunología, Hospital Universitario, Madrid, Spain
- May 2, 2011: Impact of physical fitness on vascular regulation and cognition in older women
Prof. Marc J. Poulin, Department of Physiology & Pharmacology, University of Calgary, Canada
- May 26, 2011: hCMEC/D3: an in vitro model of human BBB to study transport and cell infiltration to the brain
Dr. Pierre-Olivier Couraud, Cochin Institute, INSERM/CNRS, Paris-Descartes University, France
- June 1, 2011: Autonomic adjustments to high altitude
Dr. Mikael Sander, The Heart Centre, Rigshospitalet, University of Copenhagen, Denmark
- July 14, 2011: The pulmonary physiology of exercise in the forgotten sex
Prof. Bill Sheel, School of Human Kinetics, Health and Integrative Physiology Laboratory, University of British Columbia, Vancouver, Canada

- September 27, 2011: The anti-metastatic activity of heparin – In vitro approaches to evaluate the mode of action and search for novel targets
Prof. Dr. Gerd Bendas, Pharmaceutical Institute, Pharmaceutical Chemistry II, University of Bonn, Germany
- 22. November 2011: Entwicklungsstörung der Motorik (F82): eine neue Leitlinie und der Forschungsbedarf für die Zukunft
Prof. Dr. med. Rainer Blank, Kinderzentrum Maulbronn und Universität Heidelberg, Deutschland
- February 1, 2012: Humans are a sea-level design
Prof. Peter A. Robbins, Department of Physiology, Anatomy and Genetics, University of Oxford, UK
- March 21, 2012: The hypoxia-induced DNA damage response
Dr. Ester Hammond, Gray Institute for Radiation Oncology and Biology, Department of Oncology, University of Oxford, UK
- May 4, 2012: Would doping at the SOLA be possible?
Prof. Carsten Lundby, Institute of Physiology, University of Zurich
- June 11, 2012: Thoracic aortic aneurysm: evolution of surgery and evolution of research
Prof. Giuseppe Faggian, Cardiovascular Surgery, University of Verona School of Medicine
- June 21, 2012: How to survive at extreme altitude (two lectures)
 - The human lung: did evolution get it wrong?
 - Extreme hypoxia: Lessons from the summit of Mount Everest
 John B. West, School of Medicine, University of California, San Diego, USA
- June 28, 2012: The child is father of the man: The enduring effects of childhood experiences and psychological well-being on adult health
 - Adverse childhood experiences and risk of age-related disease
Prof. Andrea Danese, Institute of Psychiatry, King's College London, UK
 - Children's self control and their nation's health and wealth
Prof. Terrie E. Moffitt and Prof. Avshalom Caspi, De-partment of Psychology and Neuroscience, Duke University, Durham, USA and Institute of Psychiatry, King's College London, UK
This ZIHP Special Seminar was organized together with the Klaus-Grawe-Foundation.
- October 30th, 2012: Fetal programming by glucocorticoids: The epigenome and beyond
Prof. Stephen G. Matthews, Departments of Physiology, Obstetrics and Gynecology and Medicine, Faculty of Medicine, University of Toronto, Canada
- November 22, 2012: The age-old tale of skeletal muscle vasodilation: New ideas regarding erythrocyte dysfunction and intravascular ATP in human physiology
Dr. Brett Kirby, Department of Medicine – Hematology Division; Duke University Medical Center, USA
- May 17, 2013: Heightened sympathetic drive in cardiovascular disease: causes, consequences and therapies
Dr. James Fisher, School of Sport and Exercise Sciences, University of Birmingham, UK

- June 5, 2013: Carbon dioxide partial pressure, syncope and cerebral perfusion
Prof. Johannes J. van Lieshout, Department of Internal Medicine & Laboratory for Clinical Cardiovascular Physiology, Academic Medical Center of the University of Amsterdam, Netherlands and School of Biomedical Sciences, University of Nottingham Medical School, Queen's Medical Centre, United Kingdom
- June 11, 2013: Feed-back mechanisms for erythropoietin - Why does it decline so fast despite sustained hypoxia?
Dr. Niels Vidiendal Olsen, D.M., D.M.Sc., Department of Neuroanesthesia, The Neuroscience Centre, Copenhagen University Hospital Department of Neuroscience and Pharmacology, University of Copenhagen, Denmark
- August 15, 2013: Molecular mechanisms and therapeutic approaches targeting islet inflammation in type 2 diabetes
Prof. Jan Ehnes, Child & Family Research Institute, University of British Columbia, Vancouver, Canada
- August 21, 2013: Acoustic fatheads: Parallel adaptations for underwater hearing in whales, turtles, and sea birds
Prof. Darlene R. Ketten, Department of Otolaryngology and Laryngology, Harvard Medical School, Boston, USA and Biology Department, Woods Hole Oceanographic Institution, Woods Hole, USA
- August 21, 2013: Do whales become seasick?
Prof. Hannes Petersen, Faculty of Medicine University of Iceland & Dept. of Otorhinolaryngology Head and Neck Surgery, Landspítali, University Hospital, Reykjavik, Iceland
- September 19, 2013: The role of the HIF oxygen-sensing pathway in metabolic rewiring and disease.
Prof. Julián Aragonés, Immunology Department, Hospital Universitario de la Princesa, Madrid, Spain
- September 19, 2013: Cerebral erythropoietin regulates the neural respiratory control system during the postnatal development
Prof. Jorge Soliz, Pediatrics, Faculté de Médecine, Université Laval, Québec, Canada
- October 14, 2013: O₂ sensing: causes and consequences
Prof. Nanduri R. Prabhakar, Institute for Integrative Physiology & Center for Systems Biology of O₂ Sensing, University of Chicago, Illinois, USA
- October 31, 2013: Novel anti-fibrotic mechanisms regulating TGFbeta1 signaling in renal epithelia
Dr. Karen Nolan, Diabetes Research Centre, Conway Institute, University College Dublin, Ireland
- October 31, 2013: Regulation of IL-1beta-induced inflammatory signaling by hydroxylases
Dr. Carsten Scholz, Systems Biology Ireland, Conway Institute, University College Dublin, Ireland
- November 28, 2013: The carotid body neurogenic niche and adaptation to hypoxia
Prof. José López-Barneo, Institute of Biomedicine of Seville (IBiS), University Hospital «Virgen del Rocio»/CSIC/University of Seville
- March 11, 2014: Pharmacological studies and pathogen interactions using human brain endothelial cells under laminar flow in vitro
Pierre-Olivier Couraud, Institut Cochin, Paris, France

- March 28, 2014: The squeaky transporter gets the grease: the role of PIP2 on serotonin transporter function
Prof. Dr. Harald H. Sitte, Center of Physiology and Pharmacology, Institute of Pharmacology, Medical University of Vienna, Vienna, Austria
- April 7, 2014: Placental molecular responses to hypoxia at high altitude
Prof. Dr. Graham J. Burton, Centre for Trophoblast Research, University of Cambridge, UK
- April 14, 2014: Transcript Studies in Renal Cell Carcinoma
Prof. Dr. W. Kimryn Rathmell, University of North Carolina at Chapel Hill, USA
- October 31, 2014: Relationship between [Hb] and exercise capacity in high altitude Tibetan natives
Prof. Dr. Peter D. Wagner, Distinguished Professor of Medicine and Bioengineering, School of Medicine, University of California, San Diego, USA
- November 13, 2014: Some physiological and clinical aspects of long-duration space-flights
Prof. Dr. Oleg Yu. At'kov, Cosmonaut and Head of the Dept. of Medical Care and of the Research Clinical Center of the Russian Railways, Chairman of the Dept. of Instrumental Methods of Diagnostics of the Russian State Medical University, Vice-President of the Open Joint Stock Company Russian Railways
- January 20, 2015: Iron homeostasis – a balancing act
Prof. Dr. Martina Muckenthaler, Center of Molecular Medicine, University Clinic of Heidelberg, Germany
- February 26, 2015: Why «less is more»: biology and application of the stress tolerance in hypometabolic critters
Dr. Thomas A. Gorr, Institute of Veterinary Physiology, University of Zurich
- May 8, 2015: microRNAs: The missing link between hypoxia and CD4+ T helper cells?
Dr. Yogesh Singh, Institute of Physiology I, Eberhard Karls University Tübingen, Germany
- June 8, 2015: Erythropoietin and Metabolism: Looking beyond red blood cells
Dr. Constance Tom Noguchi, Chief, Molecular Cell Biology Section, Molecular Medicine Branch, NIDDK National Institutes of Health, USA
- November 19, 2015: The interaction between air pollution and exercise in humans
Prof. Michael Koehle, School of Kinesiology, University of British Columbia, Vancouver, Canada
- March 18, 2016: Oxygen Imaging by Phosphorescence Quenching
Sergei A. Vinogradov, PhD, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA
- June 24, 2016: Developing AAV as a tool for gene delivery to the retina
Sanford Boye, Retinal Gene Therapy Group, University of Florida, USA
- September 12, 2016: The blood-brain barrier in a dish: design of a patient-specific in vitro model using human induced pluripotent stem cells
Asst. Prof. Abraham Al-Ahmad, Dept. of Pharmaceutical Sciences, Texas Tech University Health Sciences Center, Amarillo, USA

- October 12, 2016: What does it take to live to 120 years? Genetic and evolutionary aspects of human longevity
Prof. Dr. Almut Nebel, Institute of Clinical Molecular Biology, Kiel University, Germany
- November 25, 2016: Iron Overload in Sickle Cell Anemia
Prof. Dr. med. Ariel Koren, Pediatric Hematology Unit and The Ruth and Baruch Rappaport School of Medicine, Technion - Israel Institute of Technology, Haifa, Israel
- November 25, 2016: Hereditary Hemolytic Anemias: The Emek Medical Center Experience
Dr. med. Carina Levin, Pediatric Hematology Daycare Unit, Emek Medical Center, Afula, Israel; The Ruth and Bruce Rappaport Faculty of Medicine, Technion - Israel Institute of Technology, Haifa, Israel
- December 7, 2016: New tools to investigate the regulation of kidney and gonadal development
Dr. Karin Kirschner, Institut für Vegetative Physiologie, Charité – Universitätsmedizin Berlin, Deutschland

Sponsorship of international events, conferences, or symposia organized by ZIHP members

- November 17, 2005: **2. Zürcher Stroke-Symposium** «Erholung nach Schlaganfall: Mechanismen und Therapien»
- November 25-30, 2007: «**Hypoxia, from Integrative Biology to Human Disease**», Monte Verità, Ascona, Switzerland
- January 27-28, 2011: **Swiss Eye Research Meeting (SERM) 2011**, Biel, Switzerland
- February 18, 2011: «**Animal sleep: a research topic and a model**», International symposium in honor of Prof. Irene Tobler Borbély, University of Zurich
- October 9–14, 2011: **The impact of hypoxia on cells, mice and men**, Monte Verità, Ascona, Switzerland
- December 9, 2011: **Pain models in humans and animals**, Vetsuisse Faculty of Bern, Switzerland
- January 26 - 27, 2012: **Swiss Eye Research Meeting (SERM) 2012**, Biel, Switzerland
- July 10-14, 2012: **20th Annual Meeting of the Society for the Study of Ingestive Behavior**, ETH Zurich
- August 3-7, 2012: **The 2nd International Leh Symposium 2012**, Leh, Ladakh, India
- August 21-25, 2012: **26th Conference of European Comparative Endocrinologists (CECE)**, University of Zurich, Irchel
- September 19 - 23, 2014: **Ventilation and Circulation in Hypoxia: from mechanisms to patients and back**, Leh, Ladakh, India
- September 26-28, 2014: **8th International Symposium on the CGRP family of peptides**, Monte Verità Conference Centre, Ascona

- September 22, 2015: **first Swiss parabolic flight**
- September 4-7, 2016: **2nd European Meeting on Phototransduction**, Monte Verità Conference Centre, Ascona, Switzerland
- September 24-28, 2016: **4th international Issyk-Kul Leh Symposium**, «Cardio-Pulmonary Acclimatization and Adaptation to High Altitude: from Physiology to Clinical Practice» Cholpon Ata (Lake Issyk-Kul), Kyrgyzstan
- October 22, 2016: **second Swiss parabolic flight**
- October 24-26, 2016: **Joint Franco-Italian-Swiss multinational meeting on blood-brain interfaces** Lyon, France
- November 21-22, 2016: **ARCHES (Audiological Research Cores in Europe) Meeting 2016**, University of Zurich, Switzerland

Seminar series on career possibilities organized by the PhD Program imMed in collaboration with the Institute of Physiology

- November 29, 2007: Christian Zahnd, Molecular Partners Spin-off Firma
- December 13, 2007: Prof. Roland Wenger, Physiologisches Institut, UZH: akademische Karriere, Mann
- January 10, 2008: Detlef Niesen, Novartis Head External Relations
- January 24, 2008: Prof. Ulrike Ehlert, Klinische Psychologie und Psychotherapie: akademische Karriere, Frau, Mutter
- September 24, 2008: Dr. Andrea Arz de Falco, Bundesamt für Gesundheit (BAG)
- October 2, 2008: Dr. Marco Ziegler, Partner McKinsey Zürich. Dr. in Chemie der Universität Fribourg, Research Fellow at UC Berkeley, USA, Dr. Valentina Sartori, Associate McKinsey Zürich. Dr. sc. tech. ETH, Master in Chemical Engineering Politecnico di Milano, Dr. Panco Georgiev, Associate McKinsey Zürich, Dr. med. Universität Zürich, MD/PhD program of University of Zurich and ETH
- November 26, 2008: Dr. Sigrid Aigner, Senior Medical Advisor at Bristol-Myers Squibb SA
- December 10, 2008: Dr. Rosmarie Waldner, Science Journalism, Zentrum für Technologiefolgen Abschätzung, Science-et-cité etc.
- January 21, 2009: Dr. Finola Kathleen Kirstein, Novartis Pharma AG
- September 30, 2009: Dr. sc.nat. Alfred Köpf, European Patent Attorney, Rentsch & Partner, Zurich
- October 21, 2009: Dr. Willy Kinzy, Recruitment Research Basel, F. Hoffmann-La Roche AG, Basel
- November 18, 2009: Dr. Panco Georgiev, Senior Associate, McKinsey & Company, Zurich, Dr. Petra Jantzer, Partner, McKinsey & Company, Zurich, und Marina Mueller, Recruiting Coordinator, McKinsey & Company, Zurich

- December 2, 2009: Dr. sc. nat. et lic.jur. Thomas Wirz, Rechtsanwalt, Maier & Hagger Rechtsanwälte, Zurich
- January 13, 2010: Simone Camargo & Lubor Borsig, Institute of Physiology, UZH
- January 27, 2010: Hooman Momen, Editor, Bulletin of the WHO / Coordinator, WHO Press
- February 10, 2010: Irène Hediger, Swiss Artists in Labs (AIL), Zurich University of the Arts, Zurich
- October 27, 2010: Andreas Caduff, Solianis Monitoring AG, Zurich
- December 8, 2010: Thomas Hempfling, Springer Basel AG & Birkhäuser Basel
- February 2, 2011: Dr. Gabriela Huber-Wegmann, Novartis AG, Basel
- April 20, 2011: Dr. sc. nat. Jürg Lustenberger, Dipl. Pharm. Med. SwAPP, Clinical Trials Center, University Hospital Zurich

Seminar series Vision 2020 organized by the imMed PhD Program

- **Personalized medicine**
 - November 8, 2012: Advanced therapy medicinal products and personalized medicine: state-of-the-art and future perspectives
Dr. Maria Cristina Galli, Istituto Superiore di Sanita, Rome/Italy and Vice chair Gene Therapy Working Group, European Medicines Agency:
 - November 27, 2012: Evolutionary and population genetics in personalized medicine
Dr. Lluís Quintana-Murci, Unit of Human Evolutionary Genetics, Institut Pasteur, Paris/France:
 - January 31, 2013: Genetic testing and personalized medicine: An overview
Dr. Thomas Binz, Federal Office of Public Health, Head of Biosafety and Human Genetics, Bern
 - February 28, 2013: Therapeutic antibodies and personalized medicine: Fiction or reality?
Prof. Dario Neri, Institute of Pharmaceutical Sciences, ETH Zürich
- **Functional Food - Food and Health**
 - April 29, 2013: Food, functions, health claims and consumers
Prof. Liisa Lähteenmäki, Department of Business Administration, Aarhus University, Aarhus, Denmark
 - June 5, 2013: The concept of biofortification and the state-of-the-art with «Golden Rice»
Prof. emerit. Ingo Potrykus, Chairman of the Golden Rice Humanitarian Board, ETH Zurich
 - June 12, 2013: The concept of probiotics - On the path to the Holy Grail
Prof. Dr. Christophe Lacroix, Institute of Food, Nutrition and Health, ETH Zurich

- **Aging**
 - October 10, 2013: Yeast as a relevant model for aging
Prof. Dr. Yves Barral, Institute of Biochemistry, ETH Zurich
 - October 17, 2013: Life Length and Telomeres, a Key Biomarker for Aging and Health
Stephen J. Matlin, CEO of Life Length, Madrid, Spain
 - November 21, 2013: Nutrigenomic approaches to slowing the aging process
Dr. Jamie L. Barger, LifeGen Technologies, Madison, WI / USA
 - January 22, 2014: From cancer metabolism to aging: Sirtuins provide some clues
Prof. Raul Mostoslavsky, Harvard Medical School, Boston / USA
 - February 6, 2014: Novel approaches towards healthy aging: Enhancement of protein quality control
Prof. Adam Antebi, Max Planck Institute for Biology of Ageing, Cologne / Germany
- **Regenerative Medicine**
 - May 15, 2014: Endogenous tissue growth: the new concept in cardiovascular tissue repair and beyond
Dr. Andreas Emmendörffer, V.P. Operations, Xeltis, Zurich, Switzerland
 - May 22, 2014: Biofabrication to create 3D scaffolds: how to design and build complex elastic structures for regenerative medicine
Prof. Dr. Günter Tovar, Institute of Interfacial Process Engineering and Plasma Technology, University of Stuttgart, Germany
 - June 5, 2014: New ways to rewire the injured CNS
Prof. Martin Schwab, Brain Research Institut, University and ETH Zurich, Switzerland
 - June 26, 2014: Induced pluripotency: challenges and opportunities for regenerative medicine
Dr. Paul Fairchild, Co-Director of the Oxford Stem Cell Institute, Oxford, UK
- **Synthetic Biology**
 - October 23, 2014: The biological machine? Synthetic biology and the engineering of biology
Prof. Dr. Sven Panke, Bioprocess Laboratory, ETH Basel
 - December 11, 2014: Integration of environmental signals at cell-matrix adhesion sites
Prof. Dr. Benjamin Geiger, Weizman Institute of Science, Rehovot, Israel
 - January 22, 2015: Synthetic biology and smart therapeutic nanosystems
Guillermo de la Cueva Méndez, Andalusian Centre for Nanomedicine and Biotechnology (BIONAND), Málaga, Spain

- **A trillion Microbes & Me**
 - July 2, 2015: Probiotics: from myth to molecular modes of action
Dr. Patrick Veiga, Senior Scientist - Danone Nutricia Research, Life Science Department, Visiting Scientist - Harvard School of Public Health, Dept. of Immunology and Infectious Diseases
 - July 16, 2015: Gut Microbiota confers protection against Malaria
Miguel Soares, Instituto Gulbenkian de Ciência Oeiras, Portugal
 - December 3, 2015: Back to the Future of Human Milk Oligosaccharides
Lars Bode, School of Medicine, Department of Pediatrics, University of California, San Diego
- **Genetic testing**
 - June 16, 2016: Human Genome at Bargain Price
Prof. Dr. Karl Heinemann, University Hospital Basel
 - June 30, 2016: Genetic testing in domestic animals – how champions are bred
Prof. Dr. Tosso Leeb, University of Berne
 - July 28, 2016: Genetic testing in humans - the hype of precision medicine
Prof. Dr. Sabina Gallati, University of Bern
 - September 1, 2016: Towards Data Driven Medicine
Dr. Gioia Althoff, Sophia Genetics, Switzerland & France
- **Tissue Engineering**
 - September 29, 2016: Materials, cells or tissue for bone repair
Dr. Arnaud Scherberich, Department of Biomedicine, University Hospital Basel
 - November 3, 2016: Biofabricating Living Tissues
Prof. Dr. Marcy Zenobi-Wong, Cartilage Engineering & Regeneration, Dept Health Sciences & Technology, ETH Zurich
 - December 15, 2016: Biomimetic Materials in Tissue Regeneration
Dr. Martin Ehrbar, Department of Obstetrics, University Hospital Zurich

imMed Alumni events

- February 5, 2015: **1st event Alumni PhD Program**
Christian Caprara, Swiss Stem Cell Foundation, Gentilino/TI and Micha Häuptle, GlycoVaxyn AG, Schlieren
- January 14, 2016: **2nd event Alumni PhD Program**
Female perspectives
Charlotte Maag, MSD Merck, Sharp & Dohme, Lucerne
Federica Storti, Lab for Retinal Cell Biology, UZH, Roche fellowship
Susanna Sluka, Deputy Head of the Newborn Screening Lab, University Children's Hospital Zurich
Magdalena Herová and Jeannine Winkler, Biotechnology Space Support Center, Lucerne

Public events

Public event series Wissen-schaff(f)t Wissen

- 22. September 2008: Lauf um mein Leben: Der neue Thriller von Beat Glogger
Lesung mit Hintergrundtalk, Beat Glogger, Wissenschaftsjournalist, Mikrobiologe und ehemaliger Sportler
- 27. Oktober 2008: Mit Eispickel und Stethoskop
Prof. Oswald Oelz, ehem. Chefarzt am Stadtspital Triemli, Extrembergsteiger und Höhenmediziner
- 24. November 2008: Muskelkraft und Molekularbiologie
Werner Günthör, früherer Weltmeister im Kugelstossen
Hans Hoppeler, Muskelforscher an der Universität Bern
- 12. Januar 2009: Schmerzfrei dank Krafttraining - Wissenschaftlich bewiesen oder Wunschdenken?
Dr. med. Sandra Thoma, CEO von Kieser Training Schweiz und Dr. med. Walter O. Frey, CEO von move>med - Swiss Olympic Medical Center
- 27. April 2009: Pillen gegen das Altern
Prof. Felix Gutzwiller, Leiter des Instituts für Sozial- und Präventivmedizin der Universität Zürich und Ständerat und Prof. Roland Jakob, emeritierter Orthopäde des Kantonsspitals Freiburg
- 25. Mai 2009: Vom Dinosaurier zum Elefanten: Wie Giganten funktionieren.
PD Dr. Marcus Clauss, Vetsuisse-Fakultät, Universität Zürich und Dr. Alex Rübel, Direktor des Zürcher Zoos
- 15. Juni 2009: Medizinische Check-ups: Sinnvolle Vorsorge oder kostspielige Strategie?
Prof. Thomas Lüscher, Direktor der Klinik für Kardiologie, UniversitätsSpital Zürich und Initiant von Double Check und Dr. Jürg Kuoni, Arzt und Initiant von Healthcheck GmbH – Kompetenz in Gesundheitsförderung.
- 19. Oktober 2009: Evolution des Menschen: Einflüsse von aussen und von innen
Josef H. Reichholf, Evolutionsbiologe und Buchautor
an der Zoologischen Staatssammlung München.
- 16. November 2009: Sehen und Nicht-Sehen
Christina Fasser, Geschäftsleiterin der Selbsthilfeorganisation Retina Suisse und Prof. Christian Grimm, Augenklinik des UniversitätsSpitals Zürich.
- 14. Dezember 2009: Evolutionäre Medizin: Was Mumien der modernen Medizin erzählen
PD Dr. Frank Rühli, Anatomisches Institut der Universität Zürich
- 11. Januar 2010: Weltraummedizin: Was macht die Schwerkraft mit unserem Körper?
Prof. Hanns-Christian Gunga vom Zentrum für Weltraummedizin in Berlin und Prof. Oliver Ullrich, Weltraum-Biotechnologe an der Universität Zürich.
- 8. März 2010: Impfen - Zwischen Fluch und Segen?
Prof. Dr. med. Christoph Berger, Infektiologe des Kinderspitals Zürich und Dr. med. Klaus von Ammon, Spezialarzt FMH und Homöopath aus Stäfa.

- 12 April 2010: Tier beisst Mensch
Tier-Neurologe PD Dr. Frank Steffen, Klinik für Kleintierchirurgie der Universität Zürich.
- 31. Mai 2010: Malaria: Endlich Fortschritte in der Bekämpfung
Prof. Christian Lengeler, Schweizerisches Tropen- und Public Health-Institut und Dr. Felix Grimm, Institut für Parasitologie der Universität Zürich.
- 25. Oktober 2010: Evolution der menschlichen Kultur
Prof. Carel van Schaik, Professor für Biologische Anthropologie an der Universität Zürich.
- 29. November 2010: Menschliche Evolution aus dem Computer
Prof. Christoph Zollikofer und Dr. Marcia Ponce de León vom Anthropologischen Institut der Universität Zürich.
- 17. Januar 2011: Wirtschaft, Wissenschaft und ihre Wechselwirkung
Dr. Hans Vontobel, Ehrenpräsident des Verwaltungsrats Bank Vontobel AG und Vontobel Holding AG.
- 14. März 2011: Virtuelle Autopsie: Vom Skalpell zum Scanner
Prof. Michael Thali, Institut für Rechtsmedizin der Universität Zürich.
- 4. April 2011: Der Schlaf von Hamstern, Fliegen und Elefanten
Prof. Irene Tobler, Institut für Pharmakologie und Toxikologie der Universität Zürich.
- 23. Mai 2011: Vertrauen, Fairness und Grosszügigkeit: Wie beeinflussen Sexual- und Neurohormone unser Sozialverhalten?
Prof. Ernst Fehr, Institut für Volkswirtschaftslehre der Universität Zürich.
- 20. Juni 2011: Prostata - Wenn eine kleine Drüse Probleme macht
Prof. Tullio Sulser, Klinik für Urologie, Universitätsspital Zürich.
- 3. Oktober 2011: Massgeschneiderte Medizin der Zukunft?
Prof. Ernst Hafen, Institut für Molekulare Systembiologie der ETH Zürich
- 14. November 2011: Das «Knie der Nation»
Skirennfahrer Pirmin Zurbriggen und Sportarzt Bernhard Segesser
- 5. Dezember 2011: «Emergency Room» - zwischen Realität und Fiktion
Prof. Edouard Battegay, Direktor der Klinik und Poliklinik für Innere Medizin des USZ
- 27. Februar 2012: Künstliches Herz statt Spenderherz: Die Herzchirurgie von morgen?
Prof. Volkmar Falk, Direktor der Klinik für Herz- und Gefässchirurgie des Universitätsspitals Zürich
- 26. März 2012: Operation Orang-Utan: Lehren und Lernen auf Sumatra
Prof. Jean-Michel Hatt, Direktor der Klinik für Zoo-, Heim- und Wildtiere der Vetsuisse-Fakultät Zürich
- 7. Mai 2012: Nicht nur die Liebe geht durch den Magen ...
Prof. Michael Fried, Direktor der Klinik für Gastroenterologie und Hepatologie des Universitätsspitals Zürich

- 4. Juni 2012: «Denn sie können nichts dafür»: Hirnreifung beim Kind und Jugendlichen
Prof. Lutz Jäncke, Neuropsychologe an der Universität Zürich
- 29. Oktober 2012: Der Mensch unter Wasser: Faszination und Gefahr des Tauchens
Prof. Dr. Erich Russi, Direktor der Klinik für Pneumologie des Universitätsspitals Zürich
- 19. November 2012: Von Cortison bis Viagra: Wie man die Höhenkrankheit behandeln kann
Prof. Dr. Marco Maggiorini, Leiter der Medizinischen Intensivstation des Universitätsspitals Zürich
- 3. Dezember 2012: Schwindel: Verwirrungen des sechsten Sinns
Prof. Dr. Dominik Straumann, Leitender Arzt der Klinik für Neurologie des Universitätsspitals Zürich
- 11. März 2013: Epo wirkt auch im Gehirn: Nach Blutdoping nun Gehirndoping?
Prof. Max Gassmann, Direktor des Instituts für Veterinärphysiologie an der Universität Zürich und Vorsteher des ZIHP
- 8. April 2013: Fittes Gehirn: Lernen und Neuroplastizität im Alter
Prof. Martin Meyer, Assistenzprofessor für Plastizitäts- und Lernforschung des alternden Gehirns an der Universität Zürich
- 6. Mai 2013: Amputationswunsch von gesunden Gliedern: Xenomelie oder wie das Gehirn den Körper wahrnimmt
Prof. Peter Brugger, Leiter der Abteilung für Neuropsychologie am Universitätsspital Zürich
- 3. Juni 2013: Der Schmerz: Alarm und Fehlarbeit in unserem Körper
Prof. Hanns Ulrich Zeilhofer, Institut für Pharmakologie und Toxikologie der Universität Zürich (*In Zusammenarbeit mit dem Zentrum für Neurowissenschaften Zürich (ZNZ)*)
- 21. Oktober 2013: Leben unter Schwerkraft: Braucht jede Zelle die Schwerkraft?
Prof. Oliver Ullrich, Anatomisches Institut der Universität Zürich
- 11. November 2013: Blutdoping: Einfach, wirkungsvoll und kaum nachweisbar!
Prof. Carsten Lundby, ZIHP-Assistenzprofessor an der Universität Zürich
- 2. Dezember 2013: Kokain und das Ego: Soziales Denken und Handeln bei Kokainkonsumenten
Prof. Boris Quednow, Psychiatrische Universitätsklinik Zürich
- 3. März 2014: Allergien: Amoklauf des Immunsystems
Dr. Georg Schäppi, Biologe und Geschäftsleiter von aha! Allergiezentrum Schweiz
- 7. April 2014: Sichere Lebensmittel: Vom Stall bis auf den Teller
Prof. Roger Stephan, Direktor des Instituts für Lebensmittelsicherheit und -hygiene der Universität Zürich
- 5. Mai 2014: Krank werden im Spital: ein paradoxes Risiko
PD Dr. Hugo Sax, Leiter der Abteilung für Spitalhygiene am Universitätsspital Zürich
- 27. Oktober 2014: Frühe Geburt - späte Folgen?
Prof. Bea Latal, Co-Leiterin der Abteilung Entwicklungspädiatrie am Kinderspital Zürich

- 17. November 2014: Immer mehr Zappelphilippe? Ursachen und Behandlung von ADHS
Prof. Susanne Walitza, Ärztliche Direktorin des Kinder- und Jugendpsychiatrischen Dienstes des Kantons Zürich
- 8. Dezember 2014: Medicine goes nano: kleine Partikel ganz gross
Prof. Beatrice Beck Schimmer, Anästhesistin am UniversitätsSpital Zürich
- 23. Februar 2015: Lungentransplantation; Pioniergeist mit langem Atem
Dr. Walter Weder, Direktor der Klinik für Thoraxchirurgie am UniversitätsSpital Zürich. Er führte die erste erfolgreiche Lungentransplantation in der Schweiz durch.
- 23. März 2015: Ein zurückgewonnenes Lächeln dank Wiederherstellungschirurgie
Prof. Pietro Giovanoli, Direktor der Klinik für Plastische Chirurgie am UniversitätsSpital Zürich
- 20. April 2015: Mit dem Skalpell am ungeborenen Kind
Prof. Martin Meuli, Direktor der Klinik für Kinderchirurgie am Kinderspital Zürich. Er operierte als einer der weltweit Ersten ein ungeborenes Kind im Mutterleib, das an einem offenen Rücken litt.
- 18. Mai 2015: Neurochirurgie: Höchste Präzision durch innovative Technologie
Prof. Luca Regli, Direktor der Klinik für Neurochirurgie am UniversitätsSpital Zürich
- 19. Oktober 2015: Keine Zeit zum Schlafen
Prof. Christian Baumann, Leitender Arzt an der Klinik für Neurologie am UniversitätsSpital Zürich
- 2. November 2015: Reagieren Frauen anders auf Stress als Männer?
Prof. Dr. Ulrike Ehlert, Leiterin des Instituts für Klinische Psychologie und Psychotherapie an der Universität Zürich
- 30. November 2015: Wenn Stress unter die Haut geht
Dr. Siegfried Borelli, Leitender Arzt am Dermatologischen Ambulatorium des Zürcher Stadtspitals Triemli
- 11. April 2016: Lästige Stiche oder Krankheitsübertragung?
Prof. Alexander Mathis, Leiter des Nationalen Zentrums für Vektor-Entomologie, Universität Zürich
- 9. Mai 2016: Vorsicht Sonne! - Welcher Schutz ist der beste?
Prof. Dr. med. Stephan Lautenschlager, Chefarzt am Dermatologischen Ambulatorium, Stadtspital Triemli, Zürich
- 23. Mai 2016: Therapie krebserkrankter Tiere - Hilfe oder Qual?
Prof. Dr. med. vet. Carla Rohrer Bley, Leiterin Onkologie, Zürcher Tierspital
- 20. Juni 2016: Wie beeinflusst die Darmflora unsere Gesundheit?
Prof. Dr. Gerhard Rogler, leitender Arzt an der Klinik für Gastroenterologie, UniversitätsSpital Zürich
- 3. Oktober 2016: Wenn die Erinnerung verblasst
Prof. Dr. Roger Nitsch, Leiter des Instituts für Regenerative Medizin, Universität Zürich. Prof. Nitsch ist Pionier in der Alzheimerforschung und hat mit seinem Team den Antikörper «Aducanumab» entwickelt, der die Behandlung der Krankheit revolutionieren könnte.

- 14. November 2016: Entwickelt sich mein Kind «normal»?
Prof. Dr. Oskar Jenni, Leiter der Abteilung Entwicklungspädiatrie, Kinderspital Zürich. Prof. Oskar Jenni ist Nachfolger des Authors Remo Largo als Leiter der Abteilung Entwicklungspädiatrie.
- 28. November 2016: Familienplanung im Zeitalter des «Social Freezings»
Prof. Dr. Brigitte Leeners, Leitende Ärztin an der Klinik für Reproduktions-Endokrinologie, UniversitätsSpital Zürich

Contribution to the Parcours des Wissens within the 175th anniversary celebration of the University of Zurich (March 8-16, 2008)

The ZIHP participated with the following projects:

- Research for sick hearts: atherosclerotic plaques, cardiovascular regenerative medicine, heart failure and cardiac arrhythmia (Cardiovascular Research, Cardiovascular Surgery and Clinic for Cardiology)
- Physical inactivity and its consequences (Institute of Physiology)
- The body balance: food intake, obesity and type 2 diabetes (Institute of Veterinary Physiology)
- Regulation and coordination of the brain: sleep, eye and head movements (University Children's Hospital, Institute of Pharmacology and Toxicology and Department of Neurology)

Zurich Researchers' Nights

- September 26, 2008: Several ZIHP members presented their research
- September 25, 2009: Several ZIHP members presented their research

Scientifica - Zürcher Wissenschaftstage

- August 26-28, 2011: several short presentations of ZIHP members around the topic *Energie für den Körper* and sponsoring of the exhibition of a walkable model of the human intestine (organized by ZIHP member Prof. Gerhard Rogler).
- August 30-September 1, 2013: The ZIHP participated with one booth on nanoparticles: «Magnetische Nanopartikel in der Medizin: Freund oder Feind? ». In addition, several short presentations and booths organized by ZIHP members

Electronic newsletter (ZIHP-News)

The newsletter archive can be found on the website: Services > Newsletter. Some *ZIHP News* appeared as *Special Issue* in a printed version.

Further activities

- 9. Dezember 2005: Tag der offenen Türen im Labor für Klinische Vestibulo-Okulomotorik: Besichtigung des neuen Linearbeschleunigerlabor.