

Scientific Report of the URPP „Integrative Human Physiology“

1 Management Summary

The University Research Priority Program (URPP) „Integrative Human Physiology“ (IHP) is now in its third and last four-year-period from 2013 - 2016 and runs with around 50% of the financial resources of the previous period. Since its beginning, the URPP IHP is strongly linked with the Zurich Center for Integrative Human Physiology (ZIHP), a center of competence of the University of Zurich. The URPP IHP fully finances the activities of the ZIHP. The name “ZIHP” is by now very well-established and thus used in this document to report on the activities of the URPP IHP.

The main goal of the ZIHP continues to be the promotion of research activities combining investigations at the levels of molecules, cells, organs and the whole organism, thereby bringing the complex functions of the human body into main focus. A second goal is to establish and strengthen long lasting connections between basic and clinically oriented research.

During the last years the ZIHP has successfully developed into a unique and excellent instrument to bring scientists beyond institutional or faculty borders together. Several successful activities and programs were established to accomplish these goals. The funding of cooperative projects promotes scientific collaborations as well as network activities among the members of the ZIHP, in particular between basic and clinical scientists. Several of the completed cooperative projects paved the ways to larger cooperations at a national and international level and for external funding. These networks demonstrate that the ZIHP provides an attractive platform for extending interactions to prestigious cooperations in science and industry.

The ZIHP is proud to host two outstanding young scientists in the positions of assistant professors and to be able to offer them this springboard to success: Prof. Ian Frew and Prof. Carsten Lundby. The PhD Program in Integrative Molecular Medicine (imMed) hosts a great number of students and offers attractive activities such as graduate courses and an annual retreat. The Zurich Integrative Rodent Physiology (ZIRP) Facility which is run jointly by the ZIHP, the Institute of Physiology and the NCCR Kidney.CH has again grown in terms of equipment and users and is currently preparing the documents to apply for becoming a technical platform at the UZH. Many events were organized: from the annual main symposium to scientific seminars and the public *Wissen-schaf(f)t Wissen* series.

Information about events, research activities and other news is spread to about 1800 subscribers of the regularly appearing newsletter *ZIHP News*. In addition, the ZIHP had again a very strong presence in the media of the University of Zurich in 2014 with five reports on events of the *Wissen-schaf(f)t Wissen* series on the online portal *UZH News*.

2 Objectives

2.1 Objectives for the reporting year

- Promotion of research activities that combine investigations at the levels of molecules, cells, organs and the whole organism
- Strengthening of long lasting connections between basic and clinically oriented research in health and disease
- Promotion of young researchers at the postgraduate level (PhD Program in Integrative Molecular Medicine *imMed*) and continuation of the two established assistant professorships

- Making the ZIHP well known in the scientific community and making the research done within the ZIHP visible to the public
- Organization of seminars and symposia
- Increase of the research efficiency by providing a technology platform (ZIRP Facility)
- Acquisition of additional funds for the time period after 2016

2.2 Which objectives and milestones were achieved, which not?

- Scientific collaborations and networking were enabled by financing 16 cooperative projects in the reporting period.
- Several of the completed cooperative projects paved the ways to larger cooperations at a national and international level and for external funding. These networks demonstrate that the ZIHP provides an attractive platform for extending interactions to prestigious cooperations in science and industry.
- Three outstanding single publications that evolved from ZIHP-funded cooperative projects were honoured with the *ZIHP Award*.
- The promotion of young researchers was achieved by the continuation of the PhD Program in Integrative Molecular Medicine *imMed* (see 4.1) and by funding a total of 22 PhD positions within the cooperative project grants.
- Both ZIHP assistant professors, Prof. Ian Frew and Prof. Carsten Lundby, successfully continued their research activities.
- Research efficiency was increased by providing and expanding the Zurich Integrative Rodent Physiology (ZIRP) Facility.
- Research done within the ZIHP was made visible through the public event series *Wissenschaft(f) Wissen*. A report on each of the six events was published either on the public online portal of the University of Zurich *UZH News* or in an issue of the *ZIHP News* and thus further increased the visibility.
- Many researchers of the ZIHP and other research institutions were brought together at the annual symposium in August 2014, at the 14 seminars within the Seminar Series in Integrative Human Physiology and at the six ZIHP Special Seminars.
- The ZIHP is well known in the scientific community since a total of 192 publications mentioning the ZIHP in the affiliations section of the authors appeared in the reporting period.
- With the electronic newsletter *ZIHP News* a communication channel was pursued that allows to keep 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 turned out to be very difficult.

2.3 Updated project planning: Which are the objectives for the next year?

In general, the objectives for the next year remain the same. Since the end of the URPP IHP is approaching the following considerations for the continuation of the ZIHP beyond 2016 were made.

- The research topics represented within the ZIHP are very heterogeneous from *Cardiovascular* to *Oxygen and Movement* to *Milieu intérieur / Homeostasis* to *Central Regulation and Coordination*. This makes it very difficult to raise money. Therefore, the ZIHP plans to focus on topics

around *Hypoxia – Movement – Exercise Physiology – Lung* since Zurich is home to excellent research groups in this area that are not yet linked through a research network.

- The very successful *imMed* PhD Program will be continued within the framework of the Life Science Zurich Graduate School *LSZGS* beyond 2016. It is already for the most part financially independent due to resources of the Bologna II/III program of the UZH and of the SUK - Program *Doktoratsprogramme*.
- The ZIRP Facility is currently preparing the documents to apply for becoming a technical platform at the UZH.

3 Research

3.1 Overview of the activities of the URPP in research: research projects, discussion of research projects within broader context of the URPP, new insights, indication of problems, etc

The ZIHP competitively funds research in integrative human physiology. ZIHP members design cooperative projects that are integrative on several levels: from molecules to cells, organs and organisms as well as across disciplines and from basic to clinically oriented research. Furthermore, the combined expertise of the consortium represents an „added value“ in the sense that the outcome is more than the sum of its parts. Within these projects there is a strong focus on the education of young researchers: Funding can only be used for positions of PhD or MD-PhD students and for consumables. Four of the current projects are so-called *ZIHP Cooperative Sprint Projects* that started by midyear 2014. These are smaller projects with at least two ZIHP full or junior members. All projects are reviewed and discussed by the Scientific Advisory Board as well as by the Steering Committee. Abstracts of the projects are available on the website of the ZIHP: Research > Cooperative Projects.

All ZIHP full and junior members are 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 a successful tool to promote young researchers who are already partially independent. Currently, the ZIHP counts 152 members.

List of cooperative projects mainly funded by the ZIHP / the URPP IHP

Funding period	Members of the project consortium	Title of the cooperative project
01.01.2012-31.12.2014	Cannizzaro V, Ostergaard L, Schüpbach R, Wellmann S	Role of vasopressin on surfactant release and ventilation in the developing lung
01.01.2012-31.12.2014	Landolt HP, Baumann C, Berger W, Brugger P, Buck A	Inhibiting COMT - neuroprotection and wake promotion?
01.01.2012-31.12.2014	Lutz T, Bueter M, Lüscher T, Matter C, Asarian L, Langhans W, Rohrer L	Immediate improvement of lipid metabolism, liver and endothelial function after Roux-en-Y gastric bypass (RYGB) surgery in obese humans and rodents
01.01.2012-31.12.2014	Lundby C, Wolf M, Sarnthein J	Multimodal assessment of brain and muscle as biological basis to understand fatigue
01.01.2012-31.12.2014	Von Eckardstein A, Geier A, Kullak-Ublick G, Gay S, Landmesser U, Serra A	Circulating microRNAs as mediators and biomarkers of the metabolic syndrome and its clinical complications
01.01.2013-31.12.2015	Boyman O, Reichenbach J, Rogler G	Modulation of innate and adaptive immune responses in inflammatory bowel disease

01.01.2013-31.12.2015	Battegay E, Grimm C, Lindenblatt N, Frew I, Clavien PA	Endothelial mTORC2 in mice and man: A target to normalize vascular malignant stress responses?
01.01.2013-31.12.2014	Jung H, Flück M, Lundby C, Lüscher T	Treatment of mitochondrial disorders by low-volume, high-intensity interval training
01.01.2014-31.12.2015	Beck Schimmer B, Keller E, Ogunshola L, Kollias S	Impairment of the blood-brain barrier: Evaluation of the effect of pharmacological postconditioning. A study from in vitro to in vivo to the patient
01.01.2014-31.12.2015	Frey-Wagner I, Scharl M, Konrad D, Fontana A	Gene x „invironment“ interactions in chronic inflammatory disorders
01.01.2014-31.12.2015	Hennet T, Borsig L, Rogler G	Immune regulatory functions of milk oligo-saccharides
01.01.2014-31.12.2015	Seifritz E, Henning A, Quednow B	Glutamate homeostasis in brain's reward centers, its disturbances in cocaine addiction, and novel treatment strategies targeting at the restoration of the physiological state
01.07.2014-31.12.2015	Asarian L, Leeners B, Tobler P	Translational studies of endocrine and brain controls of eating in rats and pre and postmenopausal women
01.07.2014-31.12.2015	Gassmann M, Maggiorini M	Erythropoietin regulates erythroferron regulates hepcidin regulates iron uptake: testing this hypothesis in man and mouse
01.07.2014-31.12.2015	Lutz T, Hornemann T	Role of islet amyloid polypeptide (IAPP) derived deposits in vascular dysfunction in diabetes
01.07.2014-31.12.2015	Matter C, Hottiger M, Schüpbach R	A protective role of SIRT6 in arterial thrombosis? – From mice to men

The scientific output of these and in recent years completed cooperative projects resulted in 38 publications in 2014, see section 5. Publications.

Outstanding single publications that evolved from ZIHP-funded cooperative projects were honored with the *ZIHP Award*. The award ceremony took place at the 10th ZIHP Symposium on August 29, 2014. Awards were given to the following publications:

Schäfer N, Lohmann C, Winnik S, van Tits LJ, Miranda MX, Vergopoulos A, Ruschitzka F, Nussberger J, Berger S, Lüscher TF, Verrey F, Matter CM: Endothelial mineralocorticoid receptor activation mediates endothelial dysfunction in diet-induced obesity. *Eur Heart J* 34(45): 3515-24, 2013

The paper evolved from the ZIHP cooperative project *Pathways of aldosterone action in kidney and vasculature*.

Goetze O, Schmitt J, Spliethoff K, Theurl I, Weiss G, Swinkels DW, Tjalsma H, Maggiorini M, Krayenbühl P, Rau M, Wojtal K, Müllhaupt B, Fried M, Gassmann M, Lutz TA, Geier A: Adaptation of iron transport and metabolism to acute high altitude hypoxia in mountaineers. *Hepatology* 58(6): 2153-62, 2013

The paper evolved from the ZIHP cooperative project *Disturbed eating at high altitude*.

Bachmann V, Klaus F, Bodenmann S, Schäfer N, Brugger P, Huber S, Berger W, Landolt HP: Functional ADA polymorphism increases sleep depth and reduces vigilant attention in humans. *Cereb Cortex* 22(4): 962-970, 2012

The paper evolved from the ZIHP cooperative project *Sleep and cognition in children and adults in health and disease: a cooperative and integrative approach*.

Larger cooperations as a result of ZIHP cooperative projects

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

- NCCR Kidney.CH
- HDL: From biological understanding to clinical exploitation (COST Action)
- HypoxiaNet: Hypoxia sensing, signalling and adaptation (COST Action)
- High-density lipoprotein dysfunction in the development of cardiovascular disease and as a therapeutic target, a Transatlantic Network of Excellence funded by the Fondation Leducq
- Inflammation and acute coronary syndromes, a collaboration within the Special Programm University Medicine 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)

With its two assistant professors, Prof. Ian Frew and Prof. Carsten Lundby, the ZIHP is proud to promote translational research in the field of epithelial cancer and integrative human physiology from the molecule to the whole organism, respectively. Prof. Frew holds an SNSF professorship and an ERC Starting Grant. Prof. Lundby attracted considerable third party funding from the SNSF.

Since the ZIHP is one of the three stakeholders of the Zurich Integrative Rodent Physiology (ZIRP) Facility, a short report on its activities is given here. In 2014 ZIRP applied for its third investment credit resulting in financial support with a total volume of CHF 114'000. This allowed to further upgrade the telemetry platform with additional hardware for data acquisition. A second climate chamber will be installed and the equipment for surgery and anaesthesia will be further upgraded until summer 2015.

The ZIRP biochemical profiling platform performed a total of 54 projects in 2014. Its customers originate mostly from the UZH but also from other institutions in Switzerland, Europe and North America. These activities yielded in a positive financial balance covering the maintenance of the system.

The number of requests for ZIRP's implantation service for telemetric transmitters and the surgical services in general increased further: In 2014, 290 animals were operated compared to 180 in 2013 which corresponds to a workload of 20-25% of a full-time equivalent. ZIRP initiated its first rodent telemetry user meeting in June 2014 which was met with great interest.

The utilization of the ZIRP in-vivo imaging platform also increases. However, projects could be more fruitful and time saving if ZIRP were able to invest more time in supporting users during data acquisition and analysis. Furthermore, the guarantee period for the IVIS Spectrum and the micro CT has expired and ZIRP is not able to cover a service contract with the available resources at the moment. Offering "service packages" (e.g. for body fat distribution with micro CT) could help to increase the number of users and to promote customer loyalty – but establishing and validating such packages is time consuming.

The first ZIRP newsletter was released in July 2014 portraying ZIRP's mission, strategy and vision as well as the three platforms on imaging, telemetry and biochemical profiling («Zurich Integrative

Rodent Physiology (ZIRP): Bundled competences for research»,
http://www.physiol.uzh.ch/static/ZIRP/ZIRP_news.pdf)

In summary, ZIRP is faced with an increasing number of inquiries for technically demanding and time consuming services; hence, many users seem to appreciate service packages. However, ZIRP is run by one full-time equivalent (60 + 40%) at the moment. Consequently, ZIRP is not able to cover the growing request for services and the respective administrative effort. In addition, the financial support from the ZIHP will run out by the end of 2016. Thus, ZIRP is currently preparing the documents to apply for becoming a technical platform at the UZH.

3.2 Scientific activities: Congresses, symposia, seminars, trainings and other events organized by the URPP

The 10th **annual main symposium** took place on August 29, 2014 at the lecture hall Haldeliweg at the University of Zurich with about 200 participants and more than 60 poster contributions. It was – as in previous years – a well-frequented opportunity for a get-together of basic researchers and clinicians. Keynote lectures were given by renowned international experts.

Dr. Ton de Craen, Department of Internal Medicine, Leiden University Medical Center, the Netherlands

Fraud, plagiarism, and other “minor” problems in science

Prof. Heribert Schunkert, German Heart Center, Munich, Germany

A look into the genome of myocardial infarction

Prof. Bengt Kayser, Institute of Sports Sciences, University of Lausanne

Still the better polypill: exercise

A special session within the symposium was dedicated to the presentation of the ZIHP Awards. Three outstanding papers emerging from ZIHP supported cooperative projects were awarded (see 3.1).

Short presentations were given by junior researchers of the ZIHP. The award for the best presentation was given to Laura Tüshaus, Institute of Pharmacology and Toxicology, UZH. Awards for the best posters were given to Damir Perisa, Institute for Clinical Chemistry, USZ, Shalmali Patkar, Institute of Veterinary Physiology, UZH, Tito Borner, Institute of Veterinary Physiology, UZH and Elisabeth Unterleutner, Department of Obstetrics and Gynecology, USZ.

As in previous years, the plenary meeting was held within the symposium.

A report on the symposium appeared in the September 2014 issue of the ZIHP News («Lectures, posters and a lot of networking: the 10th ZIHP Symposium»,
http://www.zihp.uzh.ch/static/cms/newsletter/cms/ZIHP_News_Sep14.pdf). In addition, a photo gallery was published on the ZIHP website, see
<http://www.zihp.uzh.ch/services/pastEvents/symposium2014.html>.

The ZIHP **co-organized several national and international meetings.**

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
Monta Verità Conference Centre, Ascona

The bi-weekly **Seminar Series in Integrative Human Physiology** was continued. During the semester external speakers alternating with ZIHP members talk about their research. To keep attractiveness and easy accessibility also for clinicians high, the seminar series was continued as a lunch seminar at the University Hospital Zurich.

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

Apart from the regular seminar series, several **Special Seminars** were organized.

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

The *Wissen-schaf(f)t Wissen* series was continued in the 7th year of its existence. Within the series, ZIHP members and invited speakers present "hot" topics, followed by lively discussions with the audience. The aim is to present science performed within the ZIHP for the public and to attract the attention of potential sponsors. These talks usually have full-house attendance.

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 Entwicklungs pädiatrie 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

On each event a report was either published on the public online portal of the University of Zurich
UZH News

<http://www.uzh.ch/news/articles/2014/meh-draeck.html>

<http://www.uzh.ch/news/articles/2014/essen-ohne-risiko.html>

<http://www.uzh.ch/news/articles/2014/zeigt-her-eure-haende.html>

<http://www.uzh.ch/news/articles/2014/fruehe-geburt-spaete-folgen.html>

<http://www.uzh.ch/news/articles/2014/adhs-evolutionaerer-vorteil-oder-defizit.html>

or in an issue of the *ZIHP News*

http://www.zihp.uzh.ch/static/cms/news/cms/ZIHP_News_Feb15_page2-3.pdf

The 9th **retreat of the *imMed* PhD Program** was held on June 11/12, 2014 at the Swiss Federal Institute of Sports, Magglingen BE. The first day was dedicated to the PhD students' presentations of their ongoing thesis projects and rounded off with a BBQ in the forest. On the second day a team sports competition took place (see report "From theory to practice or from basic science to sports: the 9th *imMed* retreat" in the *ZIHP News* September 2014,

http://www.zihp.uzh.ch/static/cms/news/cms/ZIHP_News_Sep14_page3.pdf).

A variety of **graduate courses** of the *imMed* PhD Program were held with the involvement of many ZIHP members as lecturers or coordinators.

February 6/7, 2014

Electrophysiology

June 4/5, 2014

Introduction to human physiology: Regulation of cardiovascular function

June 16/17, 2014

Introduction to human physiology: Sensory systems: How we hear and see

July 10/11, 2014

Mouse physiology and pathophysiology

The **seminar series *Vision 2020 – a personal perspective*** organized by a committee of PhD students from the *imMed* PhD program was continued with the topics *Aging*, *Regenerative Medicine* and *Synthetic Biology*. Prominent speakers, national and international, share their «*Vision 2020*» on multidisciplinary topics of general interest through different perspectives, such as economic, ethical and social facets in this series. The seminar series is very well established within the Life Science events at UZH and ETHZ with 25-65 participants and is supported by the SUK program *Doktoratsprogramme* from 2012 to 2016.

Aging

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 Emmendorffer, 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

The series on *Synthetic Biology* will continue with two more talks in January and February 2015 and the new semester topic *A trillion microbes & me* from spring 2015 on.

Reports on the series on *Aging* and *Regenerative Medicine* were published in the *ZIHP News* March 2014 and September 2014, respectively.

Aging research: promises and realities (ZIHP News, March 2014):

http://www.zihp.uzh.ch/static/cms/newsletter_cms/ZIHP_News_Mar14.pdf

Emergence of regenerative medicine from bench research to bed side therapy (ZIHP News September 2014): http://www.zihp.uzh.ch/static/cms/news_cms/ZIHP_News_Sep14_page4.pdf

4 Academic Career Development

4.1 Activities in academic career development

To promote young researchers the PhD Program in Integrative Molecular Medicine (imMed) was established in 2005. The program offers students a scientific environment that combines basic and clinical research and offers a broad range of advanced training opportunities. In 2014, 30 new students were accepted to the program, resulting in a total of 128 (2013: 117) students participating in the program. 21 (2013: 20) students finished their theses during the reporting period, resulting in a total of 108 *imMed* alumni. A substantial number of students of the *imMed* PhD Program are involved in one of the ZIHP funded cooperative projects.

The PhD program commission attaches great importance to ensure the supervision of the students and to provide advice if necessary. The catalogue of graduate courses is constantly evaluated by both the PhD program commission and the students of the *imMed* PhD Program and adapted to the needs of the students. The annual retreats which are highly successful for both scientific and social exchange will be continued.

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.

Within the cooperative projects of the ZIHP (see 3 Research), 22 PhD positions were funded.

Two assistant professorships in Integrative Human Physiology are funded (Prof. Ian Frew, Prof. Carsten Lundby).

4.2 Documentation of activities in gender equality development

Within the students of the PhD Program in Integrative Molecular Medicine (*imMed*), the proportion of women is 66%. Within the funded PhD / MD-PhD positions of the cooperative projects the proportion of women is 64%.

5 Publications

List of publications that evolved from ZIHP-funded **cooperative projects**. The list contains only publications in which the URPP is mentioned in the acknowledgements.

Akhmedov A, Rozenberg I, Paneni F, Camici GG, Shi Y, Doerries C, Sledzinska A, Mocharla P, Breitenstein A, Lohmann C, Stein S, von Lukowicz T, Kurrer MO, Borén J, Becher B, Tanner FC, Landmesser U, Matter CM, Lüscher TF: Endothelial overexpression of LOX-1 increases plaque formation and promotes atherosclerosis in vivo. *Eur Heart J* 35(40): 2839-48, 2014

Ayers L, Stoewhas AC, Ferry B, Latshang TD, Lo Cascio CM, Sadler R, Stadelmann K, Tesler N, Huber R, Achermann P, Bloch KE, Kohler M: Circulating levels of cell-derived microparticles are reduced by mild hypobaric hypoxia: data from a randomised controlled trial. *Eur J Appl Physiol* 114(5): 1067-73, 2014

Baruffol C, Jordi J, Camargo S, Radovic T, Herzog B, Fried M, Schwizer W, Verrey F, Lutz TA, Steingoetter A: L-lysine dose dependently delays gastric emptying and increases intestinal fluid volume in humans and rats. *Neurogastroenterol Motil* 26(7): 999-1009, 2014

Boretti FS, Baek JH, Palmer AF, Schaer DJ, Buehler PW: Modeling hemoglobin and hemoglobin:haptoglobin complex clearance in a non-rodent species-pharmacokinetic and therapeutic implications. *Front Physiol* 5: 385, 2014

Burckhardt MA, Wellmann M, Fouzas S, Lapaire O, Burkhardt T, Benzing J, Bühler C, Szinnai G, Wellmann S: Sexual disparity of copeptin in healthy newborn infants. *J Clin Endocrinol Metab* 99(9): E1750-3, 2014

Chen CC, Bockisch CJ, Bertolini G, Olasagasti I, Neuhauss SC, Weber KP, Straumann D, Huang MY: Velocity storage mechanism in zebrafish larvae. *J Physiol* 592(Pt 1): 203-14, 2014

Chen CC, Bockisch CJ, Olasagasti I, Weber KP, Straumann D, Huang MY: Positive or negative feedback of optokinetic signals: Degree of the misrouted optic flow determines system dynamics of human ocular motor behavior. *Invest Ophthalmol Vis Sci* 55(4): 2297-306, 2014

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**Publications of the assistant professors funded by the URPP
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Non-scientific publications

ZIHP News / Jan. 2014

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See <http://www.zihp.uzh.ch/services/newsletter.html>

Reports on events of the *Wissen-schaff(f)t Wissen* series on the public online portal of the University of Zurich *UZH News*:

«Meh Dräck» (C. Giger)

Essen ohne Risiko? (C. Giger)

Zeigt her eure Hände (M. Seebauer)

Frühe Geburt, späte Folgen? (M. Seebauer)

Eine Schwäche mit Stärken (M. Seebauer)

See <http://www.zihp.uzh.ch/wissen-schafft-wissen/bisherige-veranstaltungen.html>

The portrait of Zurich Integrative Rodent Physiology (ZIRP) appeared in the first edition of the new magazine «Lifesciences plus» (page 20-22).

Bundled competences for research (P. Seebeck, M. Seebauer)

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