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Employee:
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Katharina JANDL

Daniela KLEINSCHEK
Katharina LEITHNER assoc. MUG
Chandran NAGARAJ
Bence NAGY
Lisa OBERREITER
Balazs ODLER
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Susanne PFEIFFER
Michael PIENN
Sabrina REINISCH (Maternity leave)
Danijel SABIC
Anita SAHU-OSEN
Maria SCHLOFFER assoc. MUG
Bettina SCHRENK
Davor SKOFIC-MAURER assoc. MUG
Neha SHARMA assoc. MUG
Elvira STACHER-PRIEHESE assoc. MUG
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Simone TISCHLER assoc. MUG
Adrienn TORYOS
Alexandra Nina TREITLER
Diana ZABINI

Management:
Stefanie KAINZ
Claudia JAKOB-PELIKAN
Gudrun WAKONIGG

Management:
Stefanie KAINZ
Claudia JAKOB-PELIKAN
Gudrun WAKONIGG
Partners

We thank our partners, the Ludwig Boltzmann Society as well as the Government of Austria for their continuous support.

Ludwig Boltzmann Society (http://www.lbg.ac.at/en)

The Ludwig Boltzmann Gesellschaft (LBG) is a non-profit organisation establishing non-university research institutes in Austria. It is named after the Austrian physicist, mathematician and philosopher Ludwig Boltzmann, whose broad scientific interests still remain the basis for the interdisciplinary of the Ludwig Boltzmann Gesellschaft today. The LBG, which is financed from public and private resources, manages institutes and clusters and currently employs more than 550 people.

Medical University of Graz (http://www.medunigraz.at/)

Research activities of the Medical University of Graz (MUG) cover a broad range of clinical as well as pre-clinical fields. The MUG applies a pro-active approach in research management to involve and integrate researchers in international research initiatives. The LBI for Lung Vascular Research fits excellently in this concept and will be an important core for promotion of lung vascular research, diagnostic and innovative therapy of lung vascular diseases at the MUG.

Bayer Health Care (http://www.bayerhealthcare.com/scripts/pages/en/)

Cardiovascular diseases are in the main focus of Bayer Health Care (BHC). BHC is currently developing new therapeutic options for the treatment of cardiovascular and lung diseases. The novel treatment for pulmonary hypertension (PH), the soluble guanylate cyclase stimulator Riociguat has recently been launched for pulmonary arterial hypertension (PAH) and chronic thromboembolic pulmonary hypertension (CTEPH) worldwide. BHC has a broad experience in pulmonary hypertension associated research and in the transfer of results from “bench to bedside”. The interest of BHC is to further understand the underlying pathophysiology of pulmonary vascular diseases.
Prof. Wolfgang Kübler – University of Toronto, Canada
Heart Institute of Berlin, DE
Link: http://www.stmichaelshospital.com/research/profile.php?id=kuebler&

Prof. Steve Abman – University of Colorado, US
Link: http://www.cudoctors.com/Find_A_Doctor/Profile/5902

Prof. Nick Morrell – University of Cambridge, UK
Link: http://www.med.cam.ac.uk/morrell/

Prof. Jose Lopez-Barneo – University of Sevilla, ES

Prof. Dean Sheppard – University of California, US
Link: http://profiles.ucsf.edu/dean.sheppard
Advisory Board of the Partners (Board) – chaired by Mag. Caroline Schober-Trummler

Mag. Caroline Schober-Trummler, Medical University of Graz
https://forschung.medunigraz.at/fodok/suchen.person_uebersicht?sprache_in=de&menue_id_in=101&id_in=2007633

Dr. Peter Mayrhofer, Ludwig Boltzmann Gesellschaft
http://www.lbg.ac.at/de/team/dr-peter-mayrhofer

Dr. Heidrun Dorsch, Bayer Health Care
1 The Institute in Overview

The Ludwig Boltzmann Institute for Lung Vascular Research (LBI-LVR) is a non-profit research institute founded in July 2010 by the Ludwig Boltzmann society (LBG) - an Austrian non-profit organisation who acts as carrier institution for Ludwig Boltzmann Institutes. The institutes conduct research in the field of Medicine & Life Sciences and in the field of Humanities. The LBI for Lung Vascular Research was established after a demanding two-stage evaluation by international peers who strongly recommended the founding of the institute.

The LBI-LVR, like the other Ludwig Boltzmann Institutes, is established on a partnership between organisations and institutes that traditionally carry out research and organisations that traditionally apply research. The LBI-LVR Consortium currently comprises the Ludwig Boltzmann society as carrier institution in partnership with the Medical University of Graz (MUG) and Bayer HealthCare. The Advisory Board of the LBI-LVR, composed of the representatives of the partner organisations (LBG, MUG, and Bayer Austria) supervises the progress of the LBI-LVR. The Scientific Advisory Board (SAB) of the LBI-LVR is an independent, world-wide recognised group of experts in pulmonary vascular biology and in pulmonary hypertension monitoring the scientific activities of the institute.

The budget of the institute is approx. 14.9 million Euro cash and in kind for the first seven years. The Ludwig Boltzmann Society covers 56% of the total costs. The remaining 44% of the costs are shared by the consortium of our partners.

The LBI for Lung Vascular Research is predominantly located at the Center for Medical Research (ZMF) at the MUG, which supports the LBI with cutting-edge research facilities guaranteeing high-yield development in this field. The clinical research group is hosted next to the Center for Pulmonary Hypertension of the Division for Pulmonology / Department of Internal Medicine of the MUG.

For contact please visit our website: http://lvr.lbg.ac.at
1.1 What you should know about Lung Vascular Diseases: Facts, Diagnostics, and Therapy

In recent years, the area of lung vascular diseases has emerged as a leading field of medical research. Over the past 20 years, the diagnostics and therapy of the prototype disease pulmonary hypertension (PH) have made tremendous progress. This continued in 2014, as landmark studies led to the introduction of novel drugs and therapy concepts. However, PH remains in many cases a notoriously under-diagnosed chronic and fatal disease. That is why early recognition of the disease is still one of the major challenges. As the diagnosis of PH is done by the invasive right heart catheterisation, the development of reliable non-invasive methods to assess increased pulmonary arterial pressure values may represent an opportunity to promote an early detection. An additional actual challenge is PH in heart and lung diseases: large patient populations with severe heart failure and chronic obstructive lung disease may develop PH during the course of their disease. At the moment effective treatment is still missing for these conditions.
Progressive loss of exercise capacity and worsening dyspnoea represent the most common symptoms of the disease. Clinical care for pulmonary vascular diseases is currently extremely costly; therefore, this condition poses a large burden on the Austrian as well as on the European healthcare system. Current therapies improve exercise capacity and may prolong survival of the affected individuals, but are unfortunately still far away from curing the disease or providing a substantially prolonged lifespan or a good quality of life.
1.2 Mission Statement/Aims of the Institute

The LBI for Lung Vascular Research has substantial expertise in the basic mechanisms of pulmonary vasoconstriction and remodelling, combined with a broad and profound clinical background. We aim to provide a significant contribution to early recognition of pulmonary vascular diseases, including pulmonary hypertension, via novel and non-invasive methods and to develop innovative therapeutic strategies for an improved prognosis and better quality of life for the victims of this serious disease. The integrative, multidisciplinary and translational structure of the LBI-LVR allows it to uncover underlying molecular pathways, identify distinct targets for reverse-remodelling therapy, foster drug development based on these targets, and prove these new treatment options in preclinical and clinical proof-of-concept trials.

All our actions, both in research and implementation, will be based on mutual respect and esteem with regard to the patients, our partners, and our staff.

The main objectives of the LBI for Lung Vascular Research are:

- Exploring mechanisms of pulmonary vascular diseases enabling the identification of both novel therapeutic targets and new disease biomarkers that could enable specific diagnosis and therapy monitoring
- Developing new diagnostic tools for non-invasive screening for pulmonary vascular diseases
- Implementing the achieved results into preclinical as well as clinical pilot studies
- Increasing awareness for pulmonary vascular diseases in the society and for healthcare providers
1.3 Personal and Human Resources Development

1.3.1 Development of the LBI-LVR Staff

The LBI-LVR staff consists of the director, the program line leaders, senior and junior researchers (PhD students) and master students, technicians, study nurses and administrative assistants. Every PhD or postdoctoral fellow has an individual project and each group has scientific independence in generating their individual progress.

Key Researcher:

Zoltán BALINT
Gabor KOVACS
Grazyna KWAPISZEWSKA-MARSH
Leigh MARSH

Scientific Stuff:

Alexander AVIAN assoc. MUG
Valentina BIASIN
Elisabeth BLANZ assoc. MUG
Verena BRAUNSCHMID
Visnja BUBALO
Slaven CRNKOVIC
Philipp DOUSCHAN
Bakytbek EGEMNAZAROV
Vasile FORIS
Thomas FUCHS
Bahil GHANIM assoc. MUW
Nicola GIULIANI
Eva GRASMAN
Fabian GRUBER
Anna GUNGL assoc. MUG
Sabine HALSEGGER assoc. MUG
Julia HOFFMANN
Andelko HRZENJAK assoc. MUG
Claudia JAKOB-PELIKAN
Katharina JANDL

Stefanie KAINZ
Daniela KLEINSCHEK
Katharina LEITHNER assoc. MUG
Chandran NAGARAJ
Bence NAGY
Lisa OBERREITER
Balazs ODLER
Horst OLSCHEWSKI
Rita PAPP
Susanne PFEIFFER
Michael PIENN
Sabrina REINISCH (Maternity leave)
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Neha SHARMA assoc. MUG
Elvira STACHER-PRIEHSE assoc. MUG
Helene THEKKEKARA PUTHENPARAMPIL
Simone TISCHLER assoc. MUG
Adrienn TORMYOS
Alexandra Nina TREITLER
Gudrun WAKONIGG
Diana ZABINI
1.3.2 Graduations at the LBI-LVR in 2016

In 2016, three colleagues did their habilitation and one Master student graduated:

<table>
<thead>
<tr>
<th>Name</th>
<th>Master/Diploma Theses 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISCHKULNIG Lena</td>
<td>Master Thesis: PDGF-BB induced proliferation of parenchymal fibroblasts is Angptl4 dependent</td>
</tr>
<tr>
<td></td>
<td>Final exam on 18 MAR 2016</td>
</tr>
<tr>
<td></td>
<td>Current status: PhD Student</td>
</tr>
<tr>
<td>FORIS Vasile</td>
<td>PhD Thesis: Screening for PAH and analysis of prognostic markers in pulmonary hypertension</td>
</tr>
<tr>
<td></td>
<td>Final exam on 4 AUG 2016</td>
</tr>
<tr>
<td></td>
<td>Current status: Physician in the Division of Pulmonology at the Medical University Graz, Austria</td>
</tr>
</tbody>
</table>
JANDL Katharina  | PhD Thesis: Role of prostaglandin D2 receptors in monocyte/macrophage function in pulmonary inflammation
Final exam on 8 SEP 2016
Current status: Post Doc at the Ludwig Boltzmann Institute of Lung Vascular Research

1.3.3 Awards and prizes

<table>
<thead>
<tr>
<th>Name</th>
<th>Awards 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOUSCHAN Philipp</td>
<td>ATS Travel Grant of the ASP in San Francisco, US</td>
</tr>
<tr>
<td>DOUSCHAN Philipp</td>
<td>2nd Poster Award of 13th PneumoUpdate, Igls, Austria</td>
</tr>
<tr>
<td>DOUSCHAN Philipp</td>
<td>2nd Poster Award, PH DACH Symposium Heidelberg, Germany</td>
</tr>
<tr>
<td>FORIS Vasile</td>
<td>Michael Neumann Gedächtnispreis 2016, Vienna, Austria</td>
</tr>
<tr>
<td>GUNGL Anna</td>
<td>ERS Short Term Research Travel Fellowship</td>
</tr>
<tr>
<td>JANDL Katharina</td>
<td>ÖGP Short Term Fellowship 2016, Graz, Austria</td>
</tr>
<tr>
<td>JANDL Katharina</td>
<td>Sanofi-Aventis Preis 2016, Graz, Austria</td>
</tr>
<tr>
<td>JANDL Katharina</td>
<td>2nd ÖGP Poster Award</td>
</tr>
<tr>
<td>NAGARAJ Chandran</td>
<td>Michael Neumann Gedächtnispreis 2016, Vienna, Austria</td>
</tr>
<tr>
<td>NAGY Bence</td>
<td>ÖGP Poster Award for Basic Research, Wien, Austria</td>
</tr>
<tr>
<td>NAGY Bence</td>
<td>ATS Travel Grant of the ASP in San Francisco, US</td>
</tr>
<tr>
<td>OLSCHEWSKI Horst</td>
<td>Honorary Member of the Hungarian Respiratory Society, Debrecen, Hungary</td>
</tr>
</tbody>
</table>
### Training of the LBI-LVR Staff

The following advanced training courses were offered in 2016:

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Title of the Lecture/ Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTELION Pharmaceuticals Austria GmbH</td>
<td>Leonard-Bernstein-Strasse 10, Vienna, Austria</td>
<td>Advanced Training Course: Is PAH female?</td>
</tr>
<tr>
<td>AVIAN Alexander, Dr.</td>
<td>Medical University Graz, Austria</td>
<td>Descriptive Statistics Course</td>
</tr>
<tr>
<td>LBG</td>
<td>Markus Weißkopf (<a href="http://www.wissenschaft-im-dialog.de">www.wissenschaft-im-dialog.de</a>)</td>
<td>Summer School “Wissenschaft kommunizieren!”</td>
</tr>
<tr>
<td>LBI-LVR</td>
<td>Klugbauer, Reinischkogel, Austria</td>
<td>Team Building Seminar</td>
</tr>
<tr>
<td>MOTSCH Elisabeth</td>
<td>Buchach 1, Michaelbeuern/ Salzburg, Austria</td>
<td>Professional Etiquette for the Working Environment</td>
</tr>
<tr>
<td>SIEGLING Angela, Dr.</td>
<td>IPR Market Research, Walcherstrasse 11A, Vienna, Austria</td>
<td>Career Development Workshop</td>
</tr>
<tr>
<td>TIEDE Katherine, Dr.</td>
<td>Scientific Communication Seminars and Consulting, Graz, Austria</td>
<td>Effective Scientific Writing</td>
</tr>
<tr>
<td>TRATTNER Elisabeth, Mag.</td>
<td>Medical University Graz, Austria</td>
<td>Conflict Management</td>
</tr>
<tr>
<td>HLEBIC Dagmar</td>
<td>Haufe Akademie GmbH &amp; Co. KG</td>
<td>Kritikgespräche und schwierige Gespräche konstruktiv führen Critical discussions and difficult conversations</td>
</tr>
</tbody>
</table>

### Patents of the LBI-LVR

The following patents were filed:

<table>
<thead>
<tr>
<th>Patents 2016</th>
<th>Inventors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomarker for the diagnosis of pulmonary hypertension (PH) Patent File No. 16159415.5</td>
<td>H. Olschewski (LBI-LVR), A. Olschewski (LBI-LVR), CH. Magnes (Joanneum Research), N. Bordag, S. Narath (CBmed GmbH), E. Gander (Joanneum Research) and B. Nagy (LBI-LVR)</td>
</tr>
<tr>
<td>Method for non-invasive diagnosis of pulmonary hypertension using impedance cardiography Patent File No. is A 50719/2016.</td>
<td>M. Pienn (LBI-LVR), H. Olschewski (LBI-LVR), G. Kovacs (LBI-LVR) and Z. Bálint (LBI-LVR)</td>
</tr>
</tbody>
</table>
1.4 Highlights 2016

Symposium of the Austrian Society of Pneumology (ÖGP): 5 awards of our institute!
The Annual Meeting of the Austrian Society for Pneumology that took place on October 6th -8th, 2016 in Vienna, was a very successful event for our LBI institute. Indeed, five of our colleagues were rewarded during a social evening in the Hofburg in Vienna, Austria:

- JANDL Katharina (LBI for Lung Vascular Research): 2. Award and ÖGP Short Term Fellowship
- NAGY Bence (Institute for Physiology, MUG and LBI for Lung Vascular Research): 1. Award and ATS Travel Grant
- DOUSCHAN Phillip (Div. Pulmonology, UKIM and LBI for Lung Vascular Research): ATS Travel Grant
Vasile FORIS received the Michael Neumann Gedächtnispreis for his European Respiratory Journal (ERJ) Paper „CD133+ cells in pulmonary arterial hypertension (PAH)“. He examined circulating mononuclear cells in patients with PAH and found that those humans have a reduced number of lymphocytes in their blood. Lymphocytes are the so-called immune-defence cells of the body. In addition, the amount of other cell types, such as CD133+ cells, is altered. The interesting point is a future application option of this knowledge: the different circulating cell populations could be used as biomarkers for PAH.

Chandran NAGARAJ got his Michael Neumann Gedächtnispreis 2016 for his ERJ paper titled “Docosahexaenoic acid causes rapid pulmonary arterial relaxation via KCa channel-mediated hyperpolarisation in pulmonary hypertension”. “In this paper we show for the very first time, using laser micro dissection, that remodelled pulmonary arteries of patients with idiopathic PAH (this is a PAH with unknown pathogenesis or apparently spontaneous origin) have high levels of calcium activated potassium channels” explains Chandran.

Katharina JANDL was happy to receive two awards for her work, the 2nd Award of the Austrian Society of Pneumology for her work about „Disturbances in composition, structure and function of the vascular basement membrane in pulmonary hypertension“. She discovered that in different forms of pulmonary hypertension, all characterised through vascular remodelling and deposition of extracellular matrix proteins, the basal membranes are structurally and functionally different. In addition, she has received a short term research fellowship of the Austrian Society of Pneumology. She has used her short term fellowship to learn the method “pulldown assay” in the laboratory of Dr. Matthias Brock at the Zurich University.

Bence NAGY received the 1st Award of the Austrian Society of Pneumology as well as an ATS Travel Grant for his publication “Kynurenine is a predictive metabolite for pulmonary hypertension.” Kynurenine is a metabolite of the amino acid tryptophan and enhanced in blood samples of patients suffering from the already mentioned idiopathic PAH which seems to be an indicator for this disease.

The second ATS Travel Grant went to Philipp DOUSCHAN and his poster entitled: “Borderline pulmonary pressure is associated with worse survival in patients at risk for pulmonary hypertension – a retrospective single center analysis.”
Symposium of the Austrian Physiological Society 2016

The Symposium of the Austrian Physiological Society (ÖGP), organized by the Institute of Physiology, Medical University Graz and the LBI for Lung Vascular Research, took place on October 6th to 7th, 2016 in Graz. A number of international speakers were welcomed.
ERS Short-Term Fellowship for Anna Gungl
We are pleased to announce that the application of our colleague Anna Gungl for an ESR short-term fellowship has been approved by the Science Council and Executive Committee of the European Respiratory Society (ERS). ERS Science Council emphasises that the applied project by Anna Gungl entitled “The role of infections in acute respiratory worsening in lung fibrosis” was selected upon the recommendation of expert peer-review after a very competitive round.

Thus, Anna Gungl is going to spend two months in the laboratory of Prof. Martin Witzenrath in the Department of Infectious Diseases and Pulmonary Medicine, Charité - Berlin, Germany starting in September 2016. She is very much looking forward to her stay in Berlin because the ESR short-term fellowship gives her the important possibility to learn new methods in the field of infection models and experience how another well-established working group solves scientific questions such as which impact do infections have in a serious disease like lung fibrosis. We wish her the best scientific outcomes for this promising collaboration!

Honorary membership of the Hungarian Society for Pulmonology to Horst Olschewski
Horst Olschewski was bestowed with an honorary membership in the frame of the Annual Meeting of the Hungarian Society for Pulmonology (09.06.2016-11.06.2016).
Cologne Consensus Conference: June 16th-18th, 2016

The Cologne Consensus Conference focuses on the new guidelines of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS) on pulmonary hypertension and their practical implementation in the German-speaking region. In Austria, the results of this conference are also of great importance. Thus, the researchers of the Ludwig Boltzmann Institute for Lung Vascular Research were strongly represented at this meeting. Prof. Horst Olschewski is one of the six scientific organisers of the event. This year, the members of our institute collaborated in the task forces „Pathobiology, pathology and genetics“ (chair A. Olschewski, members G. Kwapiszewska and E. Stacher-Priehse), „Classification of PH and initial diagnostics“ (chair G. Kovacs) and „Pulmonary hypertension in lung diseases“ (chair H. Olschewski, member P. Douschan).

Researcher of the year 2016

Grazyna Kwapiszewska-Marsh was awarded as “Researcher of the year 2016” by Rector Helmut Samonigg and Vicerector Caroline Schober-Trummler.
At the advanced training course “DESPERATE PAH-WIVES: Is PAH female?” for physicians in Linz, Austria, on April 6th, 2016, that was organized by the company Actelion, our director Prof. Dr. Andrea Olschewski and our colleague PD OA Dr. Gabor Kovacs were invited to give lectures. Andrea Olschewski talked about drug induced PAH with a special focus on anorectics and Gabor Kovacs about the male PAH risk groups. The participants were very interested into these topics and asked many questions.
A total of 50 patients from Styria, Vienna and Lower Austria came to us in order to listen to the exciting talks in the frame of the patient meeting. We have chosen this location because the Ludwig Boltzmann Institute for Lung Vascular Research (LBI-LVR) in Graz actively investigates different lung diseases such as lung fibrosis. The institute works closely together with the Division of Pulmonology of the Medical University of Graz (MUG).

The director of the institute, Andrea Olschewski, introduced the LBI-LVR which exists since 2010 and its research groups and explained the pathomechanisms of lung fibrosis. Her major concern was that also patients without medical background are able to understand the latest research developments. Horst Olschewski, the Chair of the Division of Pulmonology of the MUG, explained important changes in the recent therapy of lung fibrosis. Finally, after many years of research, two drugs which can slow down the processes of lung fibrosis are available. Gabor Kovacs informed about the origin and effects of pulmonary hypertension in COPD patients.

After the interesting talks, the patients could visit the Ludwig Boltzmann Institute for Lung Vascular Research and see where and how the different lung diseases are investigated. Then, a small lunchtime snack for all participants and speakers was organized.
Patient-Meeting: from pulmonary hypertension 14th October 2016

The Annual Meeting of patients suffering took place on 14th October, 2016 in the Austria Trend Hotel Graz and focused on the topics of the Cologne Consensus Conference (Kölner Konsensus Konferenz). Gabor Kovacs presented the start of a long-term international training study for pulmonary hypertensive patients and talked about the Cologne Consensus Conference. There, he was leading a working group focusing on the classification and early diagnosis of pulmonary hypertension. Besides, two other working groups were led by our colleagues in Graz: Andrea Olschewski was the leader of the
working group “Pathology and Pathophysiology” and Horst Olschewski led the group “Pulmonary Hypertension in Lung Diseases”. The summary of the conference was published in October 2016. Finally, a presentation was given by Horst Olschewski who talked about the general and supportive therapies in pulmonary arterial hypertension as well as about targeted pharmacological therapies.

**Newsletter**

In addition, the Newsletter of the Pulmo-Outpatient Clinic of the Hospital Graz and the Ludwig Boltzmann Institute for Lung Vascular Research for patients with pulmonary hypertension or a high risk for this disease is available via email by Daniela Kleinschek: daniela.kleinschek@lvr.lbg.ac.at.
Last but not least, our LBI for Lung Vascular Research has received several invitations to present the research work and aims of the institute to the broad public. A list of the press appearances in 2016 is given here:

- Highlights vom ERS 2016 - Universum Innere Medizin September 2016
- Pulmonalembolie: akut vs. chronisch - CliniCum pneumo July 2016
- Bahil Ghanim gets Margaretha Hehberger Grant - science.apa.at July 2016
- Bahil Ghanim gets Margaretha Hehberger Grant - meduniwien.ac.at July 2016
- Research in Austria - the Ludwig Boltzmann Institute for Lung Vascular Research Interim Results - Pneumologie June 2016
- Pulmonalarterieller Hypertonus bei Sklerodermie - Universum Innere Medizin March 2016
- Highlights der neuen ESC-Leitlinie für pulmonale Hypertonie - Universum Innere Medizin January 2016
2.1 Pathomechanisms of Pulmonary Vascular Remodelling

The research activities of the group focus on:

1) the pathomechanisms of vascular remodelling that lead to right ventricular failure
2) chronic vasoconstriction as well as impaired vasodilation in pulmonary arteries

Elevated myocardial fibrosis is one of the main pathological features associated with diastolic heart failure. Prolonged exposure of mice to hypoxia did not lead to collagen deposition in the right ventricle (RV). Our experimental setup revealed that hypoxia leads to PH with excellent RV adaptation and no overt failure (Crnkovic et al. AJP lung 2016). Knock-out of ABCG2 in hypoxia-exposed mice led to accumulation of collagen fibers in the RV indicating that additional cues are necessary to induce a worsened outcome (Nagy et al. Front Physiol.in revision).
Cardioprotective benefits of ω-3 fatty acids such as docosahexaenoic acid (DHA) are well established, but the regulatory effect of DHA on vascular tone and pressure in pulmonary hypertension is understudied. Using hypoxia mouse model of PH, combined with investigations on laser microdissected remodelled pulmonary arteries and patch-clamp studies on isolated PASMCs from IPAH patients we provided molecular insights into the DHA-induced vasodilation. In this study we have shown that DHA exhibits a rapid decrease in elevated pulmonary vascular tone and pressure. This decrease is achieved by KCa channel activation in PASMCs via directly modulating the membrane potential leading to vasorelaxation. We also demonstrated that activation of KCa channels by DHA is beneficial in the established pulmonary hypertension model and, more importantly, that DHA hyperpolarises only PASMCs obtained from IPAH patients but not control PASMCs. BKCa channel expression was elevated in human IPAH, pointing to the utility of KCa as potential therapeutic option in pulmonary hypertension (Nagaraj et al. ERJ 2016).
Figure 2. Docosahexaenoic acid (DHA) causes hyperpolarisation in pulmonary artery smooth muscle cells (PASMCs) obtained from idiopathic pulmonary arterial hypertension (IPAH) patients. a) Double immunofluorescence staining showing the localisation of large-conductance KCa (BKCa) channels (red) and α-smooth muscle actin (α-SMA; green) in the pulmonary arteries of donor and IPAH human lungs. DAPI: 4′,6-diamidino-2-phenylindole. Scale bar: 50 µM. b) Expression of BKCa channels with α-subunits (Kcnma) and their β-subunits (Kcnmb1–4) in the laser microdissected pulmonary arteries of donor (n=7 or 8) and IPAH (n=6 or 8) patients. c) Representative membrane potential (Em) tracing from donor and IPAH PASMCs upon acute DHA exposure. d) Summarised membrane potential changes with increasing concentrations of DHA, and without DHA, in donor and IPAH PASMCs. Data in b, d) are presented as individual points with mean±sem. *: p<0.05; **: p<0.01; ***: p<0.001.

Scientific Cooperations

COGOLLUDO Angel Prof., Universidad Complutense de Madrid, Spain
EFERL Robert Dr., Medical University of Vienna, Austria
HAITCHI Hans Michael Prof., University Southampton, UK
HEINEMANN Akos Prof., Medical University of Graz, Austria
HOEFLER Gerald Prof., Medical University of Graz, Austria
KLEPETKO Walter Prof., Medical University of Vienna, Austria
KUEBLER Wolfgang Prof., St. Michael’s Hospital, Toronto, Canada
SCHMIDT Albrecht Dr., Medical University of Graz, Austria
WEIR E. Kenneth Prof., University of Minneapolis, Minnesota, US
WEISSMANN Norbert Prof., ECCPS, University Giessen Lung Centre, Giessen, Germany
WILHELM Jochen Dr., University Giessen Lung Centre, Giessen, Germany
WITZENRATH Martin Prof., Charité –University Medical Department, Berlin, Germany
WYGRECKA Malgorzata Prof., University Giessen Lung Centre, Giessen, Germany
2.2 Translation Platform of the LBI-LVR

The Translational Platform bridges the gap between the basic and clinical arms of the LBI for Lung Vascular Research. Pre-clinical models of lung diseases permit the in vivo investigation of specific genes or molecules and how they contribute to disease pathogenesis. The translational platform provides crucial resources in the implementation of these models by unifying the planning, coordination and experimental implementation. Furthermore, it centralises all stages of experimental planning; from preparing the mandatory ethic permissions, design and conduction of experiments to data analysis. All experiments and analyses are performed according to established SOPs. An overview of available techniques and readouts are shown in Figure 1.

![Figure 1. Overview of techniques available in the translation platform](image)

Here we have made extensive use of flow cytometry to quantify the changes in inflammatory cell populations. Recent developments include the implementation of computational flow (e.g. t-SNE, PCA) to gain the most from the wealth of flow cytometry data (Figure 2). Quantification of tissue remodelling utilises whole slide tissue scanning in combination with immunohistochemistry or immunofluorescence staining, tissue slides are analysed by specifically tailored analysis protocols (Figure 3). Physiological changes in the cardio-pulmonary system can be measured in vivo and ex vivo by pulmonary haemodynamics, echocardiography or lung function measurements. These diverse in
vivo and ex vivo techniques that are provided by this platform are available to both internal and external collaborators.

Figure 2. Computational flow cytometry. The use of t-Distributed Stochastic Neighbour Embedding (t-SNE) identifies unique eosinophil and neutrophil populations in naïve and treated samples.

Figure 3. Semiautomated quantification of bronchial collagen deposition using image analysis in combination with Sirius-Red staining

Research cooperations

GRUNIG Gabriele Dr., New York University School of Medicine, New York, USA
HAITCHI Hans-Micheal Dr., University Hospital Southampton, UK
HEINEMANN Akos Prof., Medical University of Graz, Austria
STROBL Herbert Prof., Medical University of Graz, Austria
2.3 Non-invasive Diagnostics of Pulmonary Hypertension

Project Overview
The primary goal of this program line is to develop innovative novel non-invasive methods capable of identifying patients with pulmonary hypertension to facilitate an earlier diagnosis and onset of treatment.

Research Results and Future Outlook
We previously developed an automatic algorithm for lung vessel identification and classification from thoracic computed tomography (CT) images. In 2016 we further improved this algorithm for the identification and characterisation of arteries and veins. The algorithm performs the artery-vein separation without manual intervention using two optimisation functions. In addition, we improved the performance of the algorithms regarding accuracy and calculation time. The results were presented at international conferences and invited to be published in the Medical Image Analysis journal. The goal of this project remains to provide a fully-automatic, imaging based software for the non-invasive diagnosis of pulmonary hypertension.

In order to establish reference values for lung vessel morphology, in 2016 we analysed a large cohort of healthy subjects and found gender- and age-dependent differences. This project is being performed in cooperation with the Institute for Clinical Radiology of the LMU Hospital, Munich, Germany. The first results were presented at international conferences. Further analysis of these data on the quantitative parameters of lung vessels is planned for 2017.

The prospective, blinded validation of our previous results from dynamic acquisitions of the contrast material bolus passage through the lung vasculature by computed tomography is ongoing. The data acquisition was completed in 2016 and evaluation of the data is planned for 2017.
Besides computed tomography other diagnostic tools were also investigated for their potential role in the diagnosis of pulmonary hypertension. In this regard, we analysed the signal from impedance cardiography of patients with and without pulmonary hypertension. We identified several readouts indicative for the disease and developed a software algorithm to quantify them. The method to determine these readouts was patented in 2016.

As a core facility for image acquisition and medical signal processing, the program line participated in projects of the molecular research group of our institute as well as in external projects resulting in 2 publications in 2016.

**Scientific Cooperations**

BOGAARD Harm-Jan, VU University Amsterdam, The Netherlands
BURGARD Caroline Dr., University Hospital Grosshadern, Ludwig Maximilians-University, Munich, Germany
BREDIES Kristian Prof., Karl-Franzens University of Graz, Austria
FUCHSJÄGER Michael Prof., Medical University of Graz, Austria
JOHNSON Thorsten PD Dr., University Hospital Grosshadern, Ludwig Maximilians-University, Munich, Germany
KULLNIG Peter Univ.-Doz. Dr., DiagnostikZentrum Graz, Austria
MEINEL Felix Dr., University Hospital Grosshadern, Ludwig Maximilians-University, Munich, Germany
ROBBEN David, iMINDS - Medical Image Computing, KU Leuven, Belgium
SLEZAK PAUL Dr., LBI Experimental and Clinical Traumatology, Vienna, Austria
SORANTIN Erich Prof., Medical University of Graz, Austria
STOLLBERGER Rudolf Prof., Graz University of Technology, Austria
URSCHLER Martin Dr., LBI for Clinic Forensic Imaging & Graz University of Technology, Austria
2.4 Clinical Database and Clinical Studies

**Project Overview**

The major goal of our research group is the promotion of early diagnosis of pulmonary hypertension (PH) and the appropriate integration of non-invasive tools into the diagnostic algorithm of PH. An important tool is an integrative clinical database of patients with pulmonary vascular diseases, regularly maintained by our group. The databank includes a biobank, in which serum and plasma samples of well characterized patients are stored. A further special task of our group is the integration of physiological aspects in clinical science in the field of pulmonary hemodynamics.

**Research Results and Future Outlook**

Integrative Database, Biobank, Biomarkers

The maintenance of an integrative database as important research tool remained one of the most important tasks of our research group. This provides easily accessible data from all patients, including complete diagnostic data at all important time points. Until now, we included approx. 2000 patients with PH or at risk for the disease into the database and its further extension will be planned for 2017.

In 2016, we finished and published a study (Kovacs et al. Use of ECG and Other Simple Non-Invasive Tools to Assess Pulmonary Hypertension. PlosONE 2016) which analyzed the role of simple non-invasive diagnostic tools in the diagnostic work-up of PH and found that easily recognizable changes (right axis deviation) in the electrocardiogram (ECG) allow the recognition of PH with a very high positive predictive value. With the further consideration of specific laboratory tests (N-terminal pro brain natriuretic peptide), blood gas analysis (arterial oxygen saturation) and the presence of clinical symptoms (WHO functional class III-IV) the reliable exclusion of PH was possible in a high number of patients. These results suggest an important role for these variables in the work-up of patients at risk for PH.
In another study which was finished and published in 2016 (Foris et al. CD133+ cells in pulmonary arterial hypertension. ERJ 2016) we analyzed the role of specific circulating bone marrow derived progenitor cells in PH. We found an elevation of the so called circulating CD133+ progenitor cells in PAH and described phenotypically different subpopulations that may be up- or downregulated. This finding may explain the inconsistent results in the literature in this field. In the future we plan the further investigation of the role of bone marrow derived cells in PH.

International cooperations in biomarker research were continued in 2016 with established european PAH centers (Zurich and Regensburg). Currently we focus on biomarkers indicating specific pulmonary pathologies in collagen vascular diseases.

Early diagnosis of PH in specific patient groups

Within the frame of cooperation with the Rehabilitation Clinic Bad Gleichenberg, we assessed the clinical characteristics and the potential pulmonary vascular abnormalities in over 400 patients with hypersensitivity pneumonitis. We found that patients presenting with both an increased estimated pulmonary arterial pressure and right heart dilatation in the echocardiography had decreased survival. In addition also patients with specific changes in their ECG indicating the presence of PH had decreased survival. These findings suggest that the presence of PH is an important determinant for prognosis in these patients. Currently our prognostic study is running in order to confirm these results.

A study aiming the early recognition of PH in patients with liver cirrhosis recruited successfully in 2016 and was finished after reaching 200 study patients. Currently the analysis and interpretation of the data are ongoing.

Our study investigating hemodynamics during exercise and the frequency of pulmonary complications in patients with Sjögren’s syndrome also recruited successfully; we altogether included 60 patients building one of the largest cohorts in this field. The study will be continued in 2017 until the planned number of patients (n=100) is reached.

Diagnostic approaches in PH and physiological approaches

In 2015, several larger clinical projects were continued. The prospective evaluation of MRI based hemodynamic assessment of PH patients and its comparison with other non-invasive methods was initiated in 2014 as part of an ÖNB Grant. The main objective is to compare hemodynamic variables of right heart catheterization, MRI and novel echocardiography techniques for the evaluation of patients with PH. In the echocardiography arm of the study we included almost 200 patients; the number of
The total MRI investigations is above 250. The study will be continued in 2017, the analysis and presentation of the data are expected for the second half of 2017.

The investigation of exercise pulmonary physiology remained one of the major goals of our group. In 2015 we initiated an ERS Task Force with the participation of 21 international experts to provide an expert statement on pulmonary hemodynamics during exercise. The submission of the statement is planned for 2017. As an additional project, the initiation of a clinical research collaboration with the support of the ERS to investigate further relevant questions on the field is planned for 2017.

**Scientific Cooperations**

ABERER Elisabeth Prof., Medical University of Graz, Austria  
BERGHOLD Andrea Prof., Medical University of Graz, Austria  
BRODMANN Marianne Prof., Medical University of Graz, Austria  
GRANINGER Winfried Prof., Medical University of Graz, Austria  
HORWATH-WINTER Jutta Priv.-Doz. Dr., Medical University of Graz, Austria  
LANGE Tobias Dr., University Hospital Regensburg, Germany  
MAIER Robert Ass-Prof. Dr., Medical University of Graz, Austria  
NINABER Maarten Dr., University Leiden Medical Centre, Leiden, Netherlands  
PEACOCK Andrew Prof., University of Glasgow, Scotland,  
UK RAGGAM Reinhard Dr., Medical University of Graz, Austria  
ROSENKRANZ Stephan Prof., University Hospital Köln, Germany 72  
SARGSYAN Karine Dr., Medical University of Graz, Austria  
SCHLENKE Peter Prof., Medical University of Graz, Austria  
SILL Heinz Prof., Medical University of Graz, Austria  
STAUBER Rudolf Prof., Medical University of Graz, Austria  
TAUBE Christian Prof., University Leiden Medical Centre, Leiden, Netherlands  
TRINKER Martin Dr., Klinikum Bad Gleichenberg, Austria  
ULRICH Silvia Priv.Doz., University of Zurich, Switzerland
2.5 Publications of the LBI-LVR 2016

Starting in 2010 when our institute was founded, the cumulative impact factor, an indicator for the quality of our scientific publications with LBI-LVR affiliation, reached the remarkable value of 656 at the end of the year 2016.

![Cumulative Impact Factor Chart]

2.5.1 Original scientific publications


Olschewski H. Why we should care about the mysteries of pulmonary hypertension. Pulm Circ. 2016; 6(3):249-50.


2.5.2 Presentations at national and international conferences: oral communications


Jandl, K; Hoffmann, J; Bloch, W; Ghanim, B; Klepetko, W; Kovacs, G; Olschewski, H; Olschewski, A; Kwapiszewska, G. Disturbances in composition, structure and function of the vascular basement membrane in pulmonary hypertension. ÖGP Annual Meeting, Oct 2016; Vienna, Austria


Pienn M, Kovacs G, Tscherner M, Olschewski A, Olschewski H, Bálint Z. Non-invasive determination of pulmonary hypertension with impedance cardiography. LBG Meeting for Health Sciences, Nov 2016; Vienna, Austria


2.5.3 Presentations at national and international conferences: posters


Douschan P, Kovacs G, Foris V, Avian A, Olschewski A, Olschewski H. Borderline PAP elevation is associated with worse prognosis in patients at risk for pulmonary hypertension. ESC Conference, August 2016; Rome Italy.

Douschan P, Kovacs G, Foris V, Avian A, Olschewski A, Olschewski H. Borderline pulmonary pressure is associated with worse survival in patients at risk for pulmonary hypertension – a retrospective single center analysis. ATS Conference, May 2016; San Francisco, US.


Egemannaroz B, Crnkovic S, Olschewski H, Olschewski A, Marsh LM, Kwapiszewska G. Cartilage oligomeric matrix protein (COMP) is a potential adaptive mechanism to the pressure overload in the right ventricle. Heart Failure Congress, 21–24 May 2016, Florence, Italy.


Jandl, K; Hoffmann, J; Bloch, Thekkekara Puthenparampil, H; W; Ghanim, B; Klepetko, W; Kovacs, G; Olschewski, H; Olschewski, A; Kwapiszewska, G. Endostatin – a biomarker for idiopathic pulmonary arterial hypertension? DACH Herbstsymposium für Pulmonale Hypertonie; NOV 24-26, 2016; Heidelberg, GERMANY. 2016.


Nagy B, Nagaraj C, Olschewski H, Olschewski A. The role of p22phox-dependent NADPH oxidases in bleomycin-induced interstitial lung disease. ATS Conference, May 2016; San Francisco, US.


Pienn M. PH Diagnostics – Analysis of Lung Vessels with CT. PH - DACH – Herbstsymposium, Nov 2016; Heidelberg, Germany


2.5.4 Other papers


Kovacs G. Pulmonalerterieller Hypertonus bei Sklerodermie. Universum Innere Medizin 01/16.


Douschan P. PAH bei Kollagenose. Universum Innere Medizin 08/16.


3 Research made in Austria

3.1 Inside LBI-LVR: Daniela Kleinschek

Daniela Kleinschek has started her work in the LBI-LVR in December 2012. She works as a study coordinator for the clinical program line of the LBI-LVR. Before coming to the LBI-LVR she worked in the Center for Medical Research (ZMF) at the Medical University of Graz as a consultant, responsible for organisatory tasks. Daniela Kleinschek has also studied Ethnology Europaea and Global Studies at the Karl-Franzens-University of Graz.

Why did you apply for a study coordinator at LBI for Lung Vascular Research in 2012? What experiences were necessary to get this job? What expectations did you have?

After 7 years at ZMF I was interested in a new position in the research field. Before that time I had many cooperations with Andrea Olschewski, the leader of the LBI-LVR, so we knew each other very well. I also knew some of my future colleagues before, so it was easy for me to change to LBI-LVR. The position of a study coordinator needs expertise with databases, containing the clinical data of patients. In addition one should also like to work with sick people and take part in their clinical management.

Why did you decide to do more than a “usual” study coordinator?

During my whole career before I enjoyed it very much to have a broad palette of tasks. My main task as study coordinator is to cooperate with the patients, the clinical colleagues and the research colleagues and organize all imaginable details of clinical studies. It is also very important to keep our clinical database always updated. During lessons for poetic writing in my spare time I heard that it is possible to write with patients. I asked my group leader if our patients with pulmonary hypertension may benefit of my writing classes, and we started this project. Now a group of patients meet with me regularly and we form a “Pulmonary Hypertension poetic writing group”. In addition we also started a Newsletter for our patients suffering from pulmonary hypertension or systemic sclerosis. This is something they really appreciate in addition. We have a very close cooperation with patient organizations in Austria, like the “Patientenvereinigung Lungenhochdruck” and “Lungenfibroseforum Austria”.

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Thinking about your work in the LBI for Lung Vascular Research within the last three years, what makes you particularly proud of? What was most challenging? What was the most impressive situation for you?

There are some patient meetings periodically where I help in the organization and solve special challenges. For example, when we had such a meeting for the patients with lung fibrosis, most challenging for me was to find a parking space for a bus nearby, because the patients could not go longer pathways, and it was a Saturday morning. I am proud of the meetings I co-organized with my colleagues and the patients appreciated them too. It is a pleasure doing such challenging things with these wonderful people around. And it is an honour to do such events also with the patient organizations.

What do you wish the LBI for Lung Vascular Research for the future?

The first 7 years at the LBI together with young people of different countries were very nice, especially with my kind boss, and my friendly colleagues which I really like. I enjoy working with them together in different projects in our clinical arm. For the next 7 years I wish the LBI for Lung Vascular Research also such a good mood for the running projects and for the new ones, with so much enthusiasm and love like now.

3.2 Inside LBI-LVR: Lisa Maria Oberreiter

Lisa Maria Oberreiter started her work in research when she decided to do her Bachelor in Molecular Biology at the Karl-Franzens-University in Graz. After the Bachelor studies she continued with her Masters in Biochemistry and molecular Biomedicine at the same University, which she successfully completed in February 2014. She directly afterwards started her work in the LBI-LVR in the group of Grazyna Kwapiszewska as a Lab Technician. In this interview, she talks about her life and work at the LBI-LVR and her motivation to do more for the institute as what was expected from herself.

Why did you apply for the position of a MTA in the LBI for Lung Vascular Research in 2014? What experiences were necessary to get this job? What expectations did you have?

I really like to work in the Laboratory with all its different molecular methods but I was also interested in research and the LBI-LVR gives me both. The field of Lung Vascular Remodelling also seemed very interesting and it really is! Here I am able to work with very good researchers and I am also challenged to give my own thoughts and opinion. I already knew a lot of methods which are needed in a
molecular biology lab, but still, many methods were new for me which offered the possibility to further develop my skills. This was also one of the reasons why I applied for this position.

**Thinking about your work in the LBI for Lung Vascular Research within the last years, what makes you particularly proud of? What was most challenging?**

When I started I was responsible for the isolation of the cells, the preparation of paraffin blocks and the storage of tissue samples from human lungs which we receive through cooperation with the Medical University of Vienna. When then the possibility came to overtake the organisation, monitoring and updating of all the information from the explanted human material, I was really proud and happy to get this chance. I overtook the responsibility from a former researcher and then realised how much material and data we already have and how difficult it was to find special information out of them. Therefore, the establishment of an integrative Database to collect and combine all the information became my major task. Now the Database comprises data from more than 280 explanted lungs. The direct link to collected paraffin blocks, cell types and anonymised blood samples is an excellent aid for designing scientific investigations. All the corresponding histological and cellular staining, which detail the structure and characteristics of each lung will also be a part of the database. To review the correctness of all the data we also cooperate with the Pulmonologists from our institute.

What I find most challenging is to be sometimes in the “sandwich position” between researchers and physicians, which ensures the lungs are correctly diagnosed and the specific parameters are taken for the database. To participate in this discussion makes me proud but it was also sometimes difficult for me to follow because the field of pulmonology was totally new for me.

**What makes it so special to work in your institute?**

I worked already in a lot of different companies but I never saw such a good working atmosphere. This depends really a lot on the people who are working here. It is a very young and dynamical team of ambitious researchers and lab technicians who are not only working together but also became good friends. A very important and special task is also that the group leaders recognize the talents of everybody and encourage them to get more out of them, to realise higher-level aims than they would expect they are able to. And of course the chance to learn everyday something new.
# 4 Teaching and Training Activities of the Institute

## 4.1 Training in the LBI for Lung Vascular Research

### 4.1.1 Invited Speakers 2016

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>HÖFLER Gerald, Prof.</td>
<td>Medical University Graz, Austria</td>
<td>26 JAN 16</td>
<td>The role of metabolic lipases in cancer development and progression</td>
</tr>
<tr>
<td>BROCK Matthias, PhD</td>
<td>Pulmonology Lab, University Hospital Zurich, Switzerland</td>
<td>22 FEB 16</td>
<td>A new sight on gene regulation: noncoding RNAs in pulmonary diseases</td>
</tr>
<tr>
<td>BUTROUS Ghazwan, Prof.</td>
<td>School of Pharmacy, University of Kent and Pulmonary Vascular Research Institute, Canterbury, UK</td>
<td>15 MAR 16</td>
<td>The role of infection and inflammation on PVD</td>
</tr>
<tr>
<td>UHLIG Stefan, Prof.</td>
<td>FERS, Fakultät für Medizin, RWTH Aachen, Germany</td>
<td>16 MAR 16</td>
<td>Mechanisms of pulmonary vascular permeability: the link between prostaglandin E2 and TRPC6 receptors</td>
</tr>
<tr>
<td>KÖNIG Peter, Prof.</td>
<td>Institute of Anatomy, University of Luebeck, Germany</td>
<td>05 APR 16</td>
<td>Watching the lung work - new approaches in microscopic lung imaging</td>
</tr>
<tr>
<td>KUNOWSKA Natalia, Dr.</td>
<td>MRC Clinical Sciences Centre, Sanger Institute, UK</td>
<td>24 OCT 16</td>
<td>Leveraging epigenetics to understand human genetic variation</td>
</tr>
<tr>
<td>MULLER Veronika, Prof.</td>
<td>Department of Pulmonology, Semmelweis University, Budapest, Hungary</td>
<td>22 NOV 16</td>
<td>IPF: clinical aspects and own experiences</td>
</tr>
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</table>
Photos: Prof. Gerald Höfler during his lecture in the LBI-LVR. Copyright: LBI-LVR.

Photos: Dr. Matthias Brock during his lecture in the LBI-LVR. Copyright: LBI-LVR.

Photos: Prof. Stefan Uhlig during his lecture in the LBI-LVR. Copyright: LBI-LVR.
Get together of the LBI-LVR and the Institute of Physiology, MUG

On May 31st, 2016 Prof. Andrea Olschewski opened the event introducing the Ludwig Boltzmann Institute for Lung Vascular Research to the audience followed by a presentation of the research groups of the Institute of Physiology of the Medical University of Graz (MUG). After refreshment, a guided tour through the Institute of Physiology in the Harrachgasse was offered which led to scientific discussions between the colleagues of both institutions. Then, the participants moved to the Division of Pulmonology at the MUG where PD Dr. Gabor Kovacs talked about the clinical research of the LBI-LVR. Finally, the participants walked to the Center for Medical Research in which the laboratory areas of the LBI-LVR are located and the meeting was successfully closed.
Management Workshop of the LBG

This year, the Management Workshop of the Ludwig Boltzmann Society (LBG) took place at Semmering from 13th to 15th June. The LBG management, Mag. Claudia Lingner and Mag. Marisa Radatz, supervised the event. Participants of our institute were Prof. Dr. Andrea Olschewski and PD Dr. Grazyna Kwapiszewska. The meeting focused on the maintenance and various aspects of a common LBG culture. The participants started their interesting discussions with the topics scientific excellence, social relevance, and personal development which were refined during the three meeting days. Besides, this special workshop provides an excellent platform for an exchange of experience between the directors of the different LBG institutes.
SAB Retreat on Reinischkogel

The SAB-Retreat took place on August 26th, 2016 in the Klugbauer on the mountain Reinischkogel in Styria, Austria. Our young colleagues presented their current projects and discussed their findings with Prof. Norbert Voelkel, Faculty Molecular Biology and Genetics at the Virginia Commonwealth University, US and Prof. Jose Lopez-Barneo, University of Sevilla, Spain.