

2016 Annual Report



Serious illnesses no longer mean the end.

Serious illnesses no longer mean the end



he thought-provoking cover of our freshly printed 2016 annual report is sure to raise few eyebrows: "January, February, Cancer, April." What is it that we want to say?

I would like to explain, because with this message and a similar, broad-based campaign, we want to show that MedUni Vienna has committed itself to taking a pioneering role in the introduction of precision medicine (largely synonymous with personalised medicine and digital medicine). The concept of precision medicine is set to establish itself in all areas of our work very soon, and will lead to a paradigm shift in routine medical practice.

Tailored prevention and therapy using innovative, molecular diagnostic and therapeutic procedures is a futuristic vision that MedUni Vienna has already begun to implement in a range of disciplines. This vision will be a lasting one, following construction of a new Center for Precision Medicine, providing new facilities for research and patient care and due to be completed in 2022 at the university's Vienna General Hospital campus.

But it will also hopefully be a future in which the fear of fatal, chronic and rare diseases will decline, thanks to innovations in medicine and in molecular biology. This is what "January, February, Cancer, April" is meant to signal. A future of precision medicine, which is the recurring theme of this year's annual report.



Prof. Markus Müller Rector, Medical University of Vienna

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Serious illnesses no longer mean the end.

Make the incurable curable by helping us to establish the Center for Precision Medicine.

» PRECISION MEDICINE

New research centre at university's Vienna General Hospital campus

Scheduled completion: 2022

Total investment: EUR 160 million

Floor space: 24,700m²

»

center for precision medicine The new Center for Precision Medicine will put an even closer focus on the individual patient.

>>> The future is within reach

The first steps towards realising the vision of an integrated MedUni campus as a catalyst to establishing Vienna as a top location for the medicine of the future in Europe have now been taken. The new centres at the MedUni's Vienna General Hospital campus will be integrated with the preclinical facilities which are relocating to the Mariannengasse campus by 2024.

n all, three new research centres will be created at the Vienna General Hospital site as part of the drive towards creating a leading European programme for personalised medicine: the Center for Precision Medicine, the Center for Translational Medicine and Therapeutics, and the Technology Transfer Center, where businesses will take up residence to benefit from the opportunity to directly interact with MedUni Vienna. These facilities are part of a vision which sets out the creation of a contiguous MedUni campus extending to Mariannengasse with its preclinical departments. The aim is that this single-site campus will foster interaction between employees, and bring fundamental research, translational research, clinical research and teaching closer together.

MAJOR INVESTMENTS ON THE HORIZON AT MEDUNI

Within the project – the largest investment programme in the MedUni Vienna's history – around EUR 500 million will be invested in replacement and new buildings by 2024. EUR 100 million of this amount is earmarked for the Center for Translational Medicine and Therapeutics alone. Not only intended as a motor for research and medicine, these investments will also elevate teaching to a higher level for students and give them an opportunity to start building up experience of clinical practice at an earlier stage.

ILT TTY Y'S

IMPORTANT SIGNAL FOR THE FUTURE

"The new cooperation agreement with Vienna General Hospital, signed at the start of 2016, puts in place the necessary foundations for the future for medicine and research in Vienna, particularly when it comes to caring for our patients. This includes the infrastructure offensive at the MedUni's Vienna General Hospital campus," explained Markus Müller, Rector of MedUni Vienna. "It will enable us to establish the ability of Austria's leading medical institutions to operate at the very highest international standards for the long term." ●



66 The new Center for Precision Medicine and Center for Translational Medicine and Therapeutics at MedUni's Vienna General Hospital campus are intended to provide a bridge to preclinical facilities at the planned Mariannengasse campus, while promoting collaboration between preclinical and clinical researchers on the development of new therapies. **99**

Oswald Wagner Vice Rector for Clinical Affairs

Serious illnesses no longer mean the end

Precision medicine is already in a position to significantly improve people's chances of being cured of various conditions, such as cancer and rare diseases. But it also has the potential to bring about major advances in the treatment in many other areas such as coronary heart disease, one of the most common causes of death. DNA analysis shows that genetic variances are responsible for an increased risk of heart attack. In such cases patients can be prescribed medication or be given pacemakers to significantly reduce risk. Overall, precision medicine marks the dawn of a new age in which life-threatening, chronic and rare diseases no longer pose the same kind of threat that they do today.

EUR 160 investment in the Center for Precision Medicine and Center for Translational Medicine and

Therapeutics

24,700 m² additional usable space

at the Center for Precision Medicine and Center for Translational Medicine and Therapeutics



66 We are going to continue to strengthen our scientific focus areas hanks to state-of-theart research infrastructure. The opportunity for more intensive cooperation between the individual disciplines and between theoretical and clinical specialisms will give major impetus to translational research. As a result, patients in Vienna and elsewhere in the world will very soon start to feel the benefits of our advances in precision medicine. **99**

Michaela Fritz Vice Rector for Research and Innovation

>>> Financing through fundraising

The Center for Precision Medicine and the construction of two additional research centres marks a new direction for MedUni Vienna, including when it comes to financing.

ne of the three new research centres, the Center for Precision Medicine, was presented at a kick-off event at MedUni Vienna on 11 June 2016. A wide range of technologies are to be brought together at the centre, where research will continuously identify new precision medicine approaches which will feed into clinical treatment – and new insights from clinical practice can directly be fed back into research.

PERSONALISED THERAPIES

"Each person has a different, highly individual genetic disposition and is potentially at risk from various diseases owing to their genetic make-up. This means that they require personalised therapy or a prevention strategy that is exactly aligned to them," explained Suzanne Rödler from the MedUni Vienna Division of Cardiac Surgery. Rödler is also in charge of fundraising for the Center for Precision Medicine project – the EUR 60 million to complete it will be funded by sponsors, in line with the American model.

Precision medicine – also known as personalised medicine – represents a paradigm shift in medicine. Contemporary diagnostic techniques including genome sequencing and molecular imaging are the foundation of precision medicine. Each patient is given individual, targeted treatment, according to the characterisation of the diseased tissue or metabolism.

A FIRST FOR MEDUNI VIENNA

This is the first time that a project of this magnitude will be financed via fundraising at MedUni Vienna. "If 600,000 people each invest 100 euros in research and the medicine of the future, we will have the money we need," Rödler confirmed, adding: "Anyone could be affected. Investing in the medicine of the future should be worth the sacrifice."

Become a patron

MedUni Vienna welcomes all donations towards the construction of the Center for Precision Medicine. Account number: IBAN: AT46 2011 1404 1007 0714 BIC: GIBAATWWXXX

If you have any questions or require additional information about donations please contact the MedUni Vienna fundraising team: E-mail: fundraising@meduniwien.ac.at Tel. +43 (0)1 40160 11 504

Important: Donations for the Center for Precision Medicine are tax-deductible for taxpayers in Austria.



66 Innovation and translational research need space. We are delighted that new contemporary research buildings will provide lots of space for researchers and their ideas to flourish, thanks to the support of the Republic of Austria and the City of Vienna as well as private backers. Together with the Mariannengasse campus and renovation of clinical department buildings, we are well set for the future. **??**

Michael Gnant Chair of the Senate



66 We have a duty to society to ensure that the next generation of doctors and scientists is trained to such a level that they are in a position to make a significant contribution towards addressing all of the major healthcare themes of our time. We want to give them the very best start and will always be there as a university to mentor them. Outstanding training and education has an enormous influence on the return on investment for society. **99**

Anita Rieder Vice Rector for Education



66 The construction activities scheduled for the next few years represent the most significant changes at Vienna General Hospital since it opened at its current location. Around EUR 1.4 billion has been earmarked for building, remodelling, renovation and restructuring at the site between now and 2030. The construction of additional research facilities as part of the expansion of the Medical University of Vienna is an integral part of the Construction Framework Agreement. **29**

Herwig Wetzlinger Director of the General Hospital



66 The world is changing and the issues facing us are too, demands are increasing but so are the possibilities, which we must seize for the good of all people and further developments in future. Personally, I would like to give the Medical University of Vienna top marks, because it really does feel like people here are far less likely to talk about any possible difficulties than they are to discuss the chances and opportunities that they want to make the most of **99**

Erhard Busek Chair of the University Council

» Leading technologies

he latest technologies play a major role in the success of research and patient care at MedUni Vienna and Vienna General Hospital, particularly in the field of personalised medicine. Sophisticated technologies such as genome sequencing, proteomics and high-resolution flow cytometry have been established in central high-tech facilities. PET-MR and 7-Tesla whole body MRT at the High Field Magnetic Resonance Centre of Excellence are both examples of the latest generation of imaging technologies coordinated at the Medical Imaging Cluster. MedUni Vienna is a leader when it comes to developing clinical applications of a number of these technologies. •



66 The investments and scheduled infrastructure projects that have been initiated amount to a total investment of EUR 500 million. They are fundamental to long-term strategic development and securing MedUni Vienna's capabilities and performance going forward. Although implementation of all of these projects in parallel across a timeframe spanning several years represents a major test, it also puts us in a position to experience and actively shape the transformation of MedUni Vienna.**99**

Volkan Talazoglu Vice Rector for Finance

66 2016 was an era-defining year for our university. Signing the cooperation agreement, the Construction Framework Agreement and the Finance and Target Control Agreement puts the necessary structure in place for the next decade. This framework will allow MedUni Vienna to continue to build on the success of recent years. **??**

Markus Müller Rector

Planned scientific facilities at the Center for Precision Medicine

- Genome Center
- Biobank and technology platforms
- New technologies
- Systems medicine, biomedical informatics and statistics
- High-performance computer centre links
- Project-related research laboratories

ach individual's DNA is unique. Despite the differences between individuals, traditional medicine treats "average patients". The consequences of adopting this approach to treatment include side effects which can be considerable in some cases, and below-average outcomes for some patients.

cc Precision medicine, in contrast, uses different methods of analysis at a molecular level which enables far more pre-

cise prevention, diagnosis and treatment of illness. This reduces side effects, and thanks to identification of the exact genome variation opens the door to treatment of diseases previously believed to be incurable.

As a result, precision medicine is regarded by the medical community as one of the most exciting therapeutic and research approaches.

How precision medicine works



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Serious illnesses no longer mean the end.

Make the incurable curable by helping us to establish the Center for Precision Medicine.

» UPDATE

Key info

Cooperation agreements, projects and awards

Teaching

Alumni Club

New professors and outstanding researchers

>>



cpm. center for precision medicine MedUni Vienna pursues the triple track of research, teaching and patient care.

>>> Working together for health

wo outstanding institutions are located on the same site – the Medical University of Vienna (MedUni Vienna) and Vienna General Hospital. In 2016, MedUni Vienna was placed 34th in the Times Higher Education "150 Under 50" Young University Ranking, meaning it is recognised as one of the best medical universities in the world. And with 2,000 beds, Vienna General Hospital is one of the biggest hospitals in Europe.

HUMAN RESOURCES

With 5,419 employees in 2016, Med-Uni Vienna is one of the largest centres of medical education and research in the German-speaking world. The number of administrative staff as a proportion of total employees remained low at 19.8%.





Academic staff

3,581 academic staff (1,614 women and 1,967 men) work as researchers, lecturers and doctors at MedUni Vienna. Five professors (three women and two men) were appointed in 2016 and 46 post-doctoral lecturing qualifications were awarded (to 9 women and 37 men).

Students at MedUni Vienna

Students by nationality	Women	Men	Total
Austria	2,741	2,608	5,349
EU	856	805	1,661
Other countries	491	413	904
Total	4,088	3,826	7,914

Students in mobility programmes (outgoing/incoming)	Women	Men	Total
EU host country/country of origin	130/112	145/77	275/189
Non-EU host country/ country of origin	27/40	33/31	60/71
Total	157/152	178/108	335/260

Students in doctoral/			
PhD programmes	Women	Men	Total
Austria	434	456	890
EU	140	95	235
Other countries	129	126	255
Total	703	677	1,380

Knowledge for tomorrow

Founded in 1365 as the medical faculty of the University of Vienna, today the Medical University of Vienna (MedUni Vienna) is among the world's largest and most highly respected medical schools. As one of Europe's oldest medical education and research institutions, MedUni Vienna has a long history and rich tradition. It is the largest medical education institution in the German speaking world, with almost 8,000 students. And with a total of 30 university clinical departments and clinical institutes, as well as 12 medical research centres and numerous highly specialised laboratories, it is also one of Europe's leading biomedical research institutions.



Promoting development

MedUni Vienna is a workplace that provides its employees with opportunities for individual development and realisation, advice on career development and other aspects of their current life situation, and a motivational working atmosphere. Creating a culture at the university that is in accordance with this means addressing the topic of work-life and workload-balance, the development of the collaboration and conflict culture, raising awareness as part of diversity management, and supporting staff in their own further development.

Embracing diversity

The principle of equal opportunities is an integral component of MedUni Vienna's culture, and a central concern in human resource development. The university is determined that the diversity of its employees is respected, and creates conditions that support a collaborative diverse environment. Breaking down barriers, raising awareness and combating discrimination are the top priorities in this regard. Women's advancement, gender mainstreaming and gender medicine form a strategic focus for the university.

High impact

Scientific output and the quality of research are a true success story at MedUni Vienna, having risen consistently. Impact factor of scientific publications, 2005-2015





Wide-ranging curriculum

- Medicine degree programme
- Dentistry degree programme
- Medical Informatics master's programme
- PhD programmes (16 research themes)
- Applied Medical Science doctoral programme (10 research themes)
- 18 postgraduate continuing education courses

Over 100 teaching hospitals and 47 general medical practices are accredited for clinical practice training. Further information can be found on pages 28 and 87-88.

An academic institution built on three pillars

The triple track of research, teaching and patient care underpins MedUni Vienna's position as a leading international medical school, scientific centre and a driver of innovation.

PUTTING KNOWLEDGE TO USE

MedUni Vienna is the employer of the entire medical staff for Europe's largest hospital, Vienna General Hospital, and integrates them comprehensively into everyday teaching and research. In terms of inpatient cases and case severity, the performance of university hospital care in Vienna is impressive both regionally and nationally. More than 20% of all inpatient admissions in Vienna are to Vienna General Hospital, and for severe cases this figure is as much as a quarter. The university campus fully deserves its reputation for providing comprehensive, high quality tertiary medical care. In addition, MedUni Vienna doctors working at Vienna General Hospital are responsible for an above-average proportion of primary (minor inpatient cases) and secondary (outpatient cases) compared with other university hospitals.



» Package of measures for the future of Vienna as a healthcare and research location

At the beginning of 2016, a new cooperation agreement between Vienna General Hospital and MedUni Vienna paved the way for even greater exploitation of synergies between the two institutions.

> » The signed contracts represent a milestone in the history of the Medical University of Vienna and Vienna General Hospital. « Markus Müller, Rector of the MedUni Vienna



From left to right: Hans Jörg Schelling, Renate Brauner, Sonja Wehsely, Reinhold Mitterlehner, Markus Müller, Herwig Wetzlinger

he cornerstones of the new agreement are found in the Finance and Target Control Agreement, and in the Construction Framework Agreement. The cooperation agreement between MedUni Vienna and Vienna General Hospital establishes joint governance and defines principles of cooperation for dayto-day operations. The agreement is supplemented by the Performance Agreement concluded between MedUni Vienna and the Federal Ministry for Science, Research and Economy at the end of December 2015, which defines the university's academic remit and medium-term funding.

The central topics in discussions on future cooperation were the long-term vision for the healthcare and research location, and strategic development of medical care facilities.

FINANCE AND TARGET CONTROL AGREEMENT

The Finance and Target Control Agreement is the central contract governing joint management and the financial framework for the Vienna General Hospital/MedUni Vienna site, and it was implemented immediately on the basis of the cooperation agreement between MedUni Vienna and Vienna General Hospital.



» To strengthen and build on our leading position in patient care, research and teaching, there are still great challenges to be overcome. These agreements have laid the foundations for this.«

Herwig Wetzlinger, Director of the Vienna General Hospital

CONSTRUCTION FRAMEWORK AGREEMENT

Supplementary to the Finance and Target Control Agreement, the Construction Framework Agreement governs the most important investments in physical structures at Vienna General Hospital/MedUni Vienna. Together, the federal government and the City of Vienna will invest approximately EUR 1.4 billion up to 2030 in key infrastructure projects, including a parent and child centre, operating theatres, accident and emergency, nursing care and research infrastructure projects. The federal government will provide 40% of the total investment, and the City of Vienna 60%.

TRANSLATIONAL MEDICINE PROJECT

The Translational Medicine construction project, with total investment of EUR 100 million, will contribute to the development of medical research at the university, further advancing Vienna as a location for basic research and the implementation of new prevention and treatment approaches. ●

Closer collaboration with CeMM

The Medical University of Vienna and the Austrian Academy of Sciences' Research Center for Molecular Medicine (CeMM) have been working together even more closely since 2016, and will intensify use of joint structures and resources in future.

Since the establishment of CeMM, both MedUni Vienna and CeMM have invested resources in joint projects in medicine-focused basic research. At the same time, CeMM's world-class research, successful acquisition of ERC grants, training for young medical researchers and its creation of a state-of-the-art molecular and cell biology research and development laboratory have made it an internationally competitive institution and an important partner for MedUni Vienna and Vienna General Hospital. Following this successful start-up phase, the partnership between CeMM and the Medical University of Vienna will now be cemented and strategically developed.

There have already been successful research collaborations between the two partners within a range of strategic projects. For example, the Biomedical Sequencing Facility (BSF) is part of the partners' joint Genomics Core Facility, and is the first technology platform in Austria for next generation sequencing for biomedical research. Resources from MedUni Vienna and CeMM are bundled in the joint Center for Rare and Undiagnosed Diseases (CeRUD), established in 2014, facilitating interdisciplinary research into rare diseases and optimal clinical care for patients. ●

> Changes in the microbiome have already been linked to a range of diseases.

These include

inflammatory bowel disease, overweight, diabetes, cancer and autism.

Microbiome: new research network

Bacteria, fungi, viruses – billions of microorganisms live in and on people and animals, in symbiosis with their hosts – for whom these microscopically small life forms perform important functions. They strengthen the immune system, supply essential vitamins and other nutrients, and protect against pathogens. Modern DNA sequencing processes have opened up insights into the complex make-up and genomic capabilities of the microbial community – or the microbiome.

Fully understanding the role of microorganisms in the health of their host requires close collaboration between physicians and researchers from a variety of disciplines. The Austrian Microbiome Initiative (AMICI) brings together Austrian experts and specialised organisations in order to boost research in this area in Austria. "We are proud to have been able to motivate a range of Austrian expert organisations to get involved in our initiative, in order to further stimulate microbiome research in Austria," said Christoph Steininger, virologist and infectious disease specialist at MedUni Vienna, and President of AMICI.



Sugar-coated cells

MedUni Vienna has initiated a joint project with industry partner Antibody Lab, funded by the Austrian Research Promotion Agency (FFG), with the aim of giving new and improved properties to antibodies by means of an innovative approach using glycosylation. Cells receive a "sugar coating" that alters the qualities of proteins on their surface. This sugar coating on the proteins significantly affects functioning – in particular, determining the other cells that surface molecules interact with. Antibodies are proteins that identify and bind foreign substances in the body, and their specific properties are significantly changed by glycosylation. "We use cell cultures that we have genetically adapted so that they can perform various glycosylations," explained Emilio Casanova from MedUni Vienna's Institute of Pharmacology. The project aims to make a contribution to the optimisation of new therapeutic antibodies.

WWTF funding for precision medicine

At the end of September, the Vienna Science and Technology Fund (WWTF) announced the five winning projects from its 2016 Life Science Call for precision (or personalised) medicine. The Medical University of Vienna is significantly involved in all of the selected projects.

"The fact that all five of the selected projects either have a direct connection with MedUni Vienna or are being run at the university is a great achievement and shows that the Medical University of Vienna is taking a leading role in precision medicine in particular. This will be supported by the new Center for Precision Medicine at MedUni Vienna's Vienna General Hospital campus, which is scheduled for completion in 2022 and will ensure that the outcomes of basic research can benefit patients as quickly as possible, in the form of personalised treatment," explained Michaela Fritz, Vice Rector for Research and Innovation at MedUni Vienna. ●

Well-placed in international rankings

NTU Ranking: placed 65th among the best medical schools worldwide U-Multirank: top scores for research and international orientation QS World University Rankings: ranked in the 51-100 grouping of medical schools worldwide

The WWTF Life

Science Call was conducted for the ninth time, focusing on precision medicine for the first time.

Precision medicine and genome research are believed to be the future of medicine.

They are currently the most important trend in medicine in the 21st century.

Applicationorientated basic research

In Christian Doppler Laboratories, high-level, application-orientated basic research is carried out, and outstanding scientists collaborate with innovative commercial enterprises. The Christian Doppler Research Association is internationally regarded as an example of best practice for facilitating this kind of cooperation. Christian Doppler Laboratories are jointly funded by the government and the participating companies from the private sector. The main provider of public funding is the Austrian Federal Ministry of Science, Research and Economy.

» See page 84 for more on the Christian Doppler Laboratories

>>> The business factor

Cooperations with businesses stimulate universities. Among other activities, companies may be partners for clinical trials, help facilitate the rapid transfer of scientific discoveries into practice, or act as sponsors.

eritoneal dialysis allows patients to stay mobile and independent. But the peritoneum can become fatigued after a short period of time if the body's own important protection mechanisms against the dialysis fluids are not effective. To investigate this and find new therapy approaches, the Christian Doppler Laboratory (CDL) for Molecular Stress Research in Peritoneal Dialysis was opened in 2016.

The head of the new CDL, which is supported by the Federal Ministry for Science, Research and Economy, is Klaus Kratochwill from the university's Department of Pediatrics and Adolescent Medicine. This department makes extensive use of peritoneal dialysis, so that children and teenagers do not have to undergo haemodialysis, which is much more draining.

BIOMARKERS FOR COPD: PATENTS SOLD

The mission of Transgenion (full name International Institute for Regenerative and Trans-



"Paul" provides training for emergencies

Convincing child simulators allow medical teams to train for critical situations in paediatric emergency medicine under highly realistic conditions. In cooperation with the Center for Medical Physics and Biomedical Engineering at the Medical University of Vienna, Viennese start-up SIMCharacters – a MedUni Vienna spin-off – developed a child simulator with a degree of realism that was previously unheard of. When launched in October 2016, "Paul", a premature baby simulator, was the smallest and most advanced high-end patient simulator in the world.

» One aim of research at the new Christian Doppler Laboratory at MedUni Vienna is that in future it will be possible to clearly define what form of dialysis is suitable for each patient, in the context of personalised medicine. But research will also look into why the body's natural defence mechanisms against dialysis fluid are not stimulated, resulting in damage to the peritoneum – and how we can improve this situation.«

Klaus Kratochwill

lational Medicine GmbH), a MedUni Vienna spin-off company, is to quickly and successfully implement translational medicine research outcomes into pharmaceutical and diagnostic developments. Rolf Ziesche's team, in collaboration with the Austrian Workers' Compensation Board (AUVA), MedUni Vienna, the Austrian Institute of Technology (AIT) and international partners, successfully identified markers relevant to chronic obstructive pulmonary disease (COPD) that open up new diagnosis and treatment approaches. With the support of Claudia Ballaun from MedUni Vienna's Technology Transfer Office (TTO), patents were filed for the biomarkers, and following negotiations they were sold to Transgenion.

"We were able to identify highly relevant markers and their expression depending on the functional and time context of the disorder, that open up a completely new approach to diagnosis and treatment of COPD," explained Rolf Ziesche of the Department of Medicine II at MedUni Vienna. The innovation makes the transition from a healthy condition to stable chronic bronchitis and from stable bronchitis to unstable COPD traceable for the first time.

OPENING OF THE EMANUEL MERCK AUDITORIUM

The Emanuel Merck Auditorium was officially opened in a ceremony held on 9 November 2016. It is the university's first lecture theatre to be named after a corporate sponsor. "Support for research from industry is extremely important today, and the right path to ensure that world-class research continues to be carried out in future. At the same time, the independence of research at universities must always be maintained," commented Markus Müller, Rector of MedUni Vienna. Prof. Müller opened the auditorium with a lecture on the importance of external funding for research in Austria, as part of a joint event hosted by MedUni Vienna and Merck. ●

The patents

describe a new combination of biomarkers to be used in diagnosis of the development of COPD.

If it is successfully marketed MedUni Vienna will participate in the technology's commercial success.

» RELENT, OCTCHIP, MOON, INSPIRED and CaSR

MedUni Vienna leading the way with European research projects.

Cause of rare auto-immune diseases discovered

The INTRICATE multi-centre EU project, headed by Renate Kain at MedUni Vienna's Department of Pathology, carried out research into the effects of infections on the development of rare auto-immune disorders such as granulomatosis with polyangiitis (GPA), a systemic disorder that attacks the blood vessels. The project's key finding was that an abnormal immune response plays a significant role in these illnesses.

INTRICATE is a multicentre EU project

11 international partners, including Max Planck Gesellschaft München, the University of Cambridge, Mayo Clinic and Stanford University.

he RELENT project, funded by the EU as part of the Horizon 2020 programme, is devoted to research into chronic autoimmune diseases such as rheumatoid arthritis and vasculitis. and the development of personalised treatment. A consortium of several European, American and Australian universities and companies plans to examine shared mechanisms of these diseases that determine their duration and life-threatening progression. The aim is to apply the findings in practice as quickly as possible, in order to provide patients with support more promptly. The international project is being coordinated by MedUni Vienna, with Renate Kain from the Department of Pathology at the helm.

Citizen science on the rise

Citizen science is one of the latest trends in scientific research. The approach involves enlisting significant help from interested and affected members of the public to carry out research. The Austrian pollen warning service, at MedUni Vienna's Department of Ear, Nose and Throat Diseases, is a textbook example of how this can work. Since 2013, its pollen app has been downloaded 320,000 times worldwide. The service's website has been accessed by a total of 1.3 million people since March 2012.

INEXPENSIVE CHIP TO AID MEDICAL DIAGNOSIS

Also coordinated by MedUni Vienna, engineers and researchers are developing an inexpensive, miniaturised technology that will allow improved medical diagnosis – for example in ophthalmology – in the OCTCHIP European research project. The integrated optical technology could pave the way for wider application of optical coherence tomography (OCT) in medical care. Wolfgang Drexler, Head of the Center for Medical Physics and Biomedical Engineering, is managing the Horizon 2020 project, with a consortium comprising MedUni Vienna, three research institutes and three companies from four European countries.

ALLERGY RESEARCH FOCUSING ON RAGWEED

Together with OncoGen, Romania's first centre for gene therapy research, MedUni Vienna initiated an EU research project focused on allergy research. As well as establishing an allergy research centre to international standards, the project will investigate pollen from ragweed – a plant that is widespread in Romania. Immunologist Kuan-Wei Chen from the university's Institute of Pathophysiology and Allergy Research will manage the threeyear project for MedUni Vienna. The Scientific Advisory Board is made up of Rudolf Valenta (MedUni Vienna), Marianne van Hage and Hans Grönlund (both from the Karolinska Institutet).

RETINA RESEARCH NETWORK

The eye is a window to the brain – Rainer Leitgeb from MedUni Vienna's Center for Medical Physics and Biomedical Engineering is researching this possibility together with international partners in the EU-funded Horizon 2020 project, MOON. Leitgeb explained: "We want to find ways to reliably diagnose, as early as possible, diseases such as age-related macular degeneration and Alzheimer's using a combination of spectroscopy methods and optical coherence tomography (OCT). Neurodegenerative diseases do not only damage the brain – they also cause changes in the retina. With our methods, we no longer need to look into the brain. The goal is that a patient will be able to sit in front of a machine, the eye will be scanned without any direct contact, and within a few minutes there will be a reliable diagnosis."

CASR BIOMEDICINE

The calcium-sensing receptor (CaSR), the central focus of the "CaSR Biomedicine" Marie Sklodowska-Curie European Training Network (ETN), opened in 2016, is not only the main regulator of calcium homeostasis, but according to discoveries in recent research also plays an important role in disorders including Alzheimer's and dementia. cardiovascular disease, diabetes, cancer and sarcopenia. In addition to generating new research insights, a key aspect of the ETN is training for young researchers within a broad-based international doctoral research programme with the participation of numerous universities in different countries, as well as start-up founders and senior management from leading global companies. The ETN is run by Enikö Kallay of MedUni Vienna's Institute of Pathophysiology and Allergy Research.

>>> Quality accreditation for the medical curriculum

edUni Vienna is one of a handful of European universities whose medicine degree programmes have been evaluated and accredited by an international external assessment board. Accreditation was carried out by agency AQUIN last year.

The group of external assessors identified the structure and composition of the curriculum as worthy of particular mention, in addition to the large proportion of practical clinical training including the logbook and portfolio in the clinical practical year. The Viennese medical curriculum focuses on small-group teaching and clinical practice, giving students integrated specialist knowledge. Research outcomes and their practical application feed directly into undergraduate teaching, thanks to the triple track of teaching, research and patient care.

740 STUDY PLACES AWARDED TO 413 WOMEN AND 327 MEN

A total of 12,160 applicants for new study places in the 2016-17 academic year sat the MedAT tests at the medical universities in Vienna, Innsbruck and Graz and the Faculty of Medicine at Johannes Kepler University Linz (JKU Linz) on 8 July 2016. Of the 740 places available at MedUni Vienna, 413 (55.8%) were awarded to women and 327 (44.2%) to men. A further 400 study places were awarded at the Medical University of Innsbruck, 360 at the Medical University of Graz and 120 at JKU Linz's Faculty of Medicine.

COMPONENTS OF THE MEDICINE ENTRANCE TEST (MEDAT-H)

- Test of biology, chemistry, physics and mathematics knowledge
- Test of reading competence and text comprehension



- Five groups of tasks covering basic cognitive skills (numerical series, memory and retention of information, assembling shapes, language proficiency and recognising implications)
- Social decision-making: this part of the test was further developed for 2016, and assesses the priority given to various considerations in decision-making.

Europe's number one

MedUni Vienna is leading the way internationally when it comes to the ratio of students to staff. With 2.9 students per member of teaching staff, Austria's biggest medical school was placed sixth overall in the 2016 Times Higher Education Ranking and first in its category in Europe.

Top performance in Paul Ehrlich Contest

A team of students from the Medical University of Vienna took second place from among the 15 participating teams in the Paul Ehrlich Contest in Berlin in June 2016. This international benchmark test for medical students from a range of universities is an indicator of ability as well as the quality of academic medical education.

Comprising a mixture of an oral test and quiz show for students, the Paul Ehrlich Contest provides insights into the quality of academic education. Anita Rieder, MedUni Vienna's Vice Rector for Education: "The fact that our students did so well in this competition without any special preparation underlines the quality of education received at MedUni Vienna."





Opportunity for refugees

As part of the More initiative by Universities Austria, and leveraging the university's mentoring programme, in 2016 MedUni Vienna enabled more than a dozen refugees from Iran and Syria to acquire all of the necessary preconditions to sit the MedAT admissions process for studying medicine in Vienna in July 2017. This involves numerous tests – for instance in the subjects of chemistry and physics – and excellent knowledge of German, so that candidates can understand the questions in the MedAT tests.



Studying at MedUni Vienna

The university's degree programmes in medicine and dentistry offer an excellent foundation for a career as a doctor, dentist or researcher. The curricula give students integrated specialist knowledge and focus on research-led teaching in small groups, and clinical practice. Most students complete their studies within the regulation timeframe and over 85% of those who start courses go on to graduate. A large number of students participate in international mobility programmes, expanding their professional horizons. The final year of study at MedUni Vienna is a clinical practical year with training in accredited teaching hospitals and medical practices, preparing them for professional life and postgraduate education.

In addition to the medicine and dentistry degree programmes, the university has a wide selection of doctorate programmes for physicians and other academics in the sciences. Medical informatics specialists are trained in a project-oriented master's programme, and MedUni Vienna also offers academic and practice-orientated postgraduate continuing education programmes and certificate courses covering a broad spectrum of medical, health science and health management focuses.

» For more information on doctorate programmes and postgraduate continuing education courses see pages 87-88

>>> UNESCO Chair of Bioethics established

Together with UNESCO, the Medical University of Vienna established a Chair of Bioethics at the beginning of 2016 – the first academic institution of its kind at an Austrian university.

n line with UNESCO's goals, the Chair will collaborate closely with other universities and non-university institutions in Austria and across Europe on bioethics. It will be managed by Christiane Druml, Head of Historical Collections at MedUni Vienna and Chair of the Austrian Bioethics Commission at the Austrian Federal Chancellery.

ETHICS AS A BENCHMARK

Science and research have led to enormous advances in medicine and life sciences in recent decades, and raised many new questions for society. Bioethics is concerned with discussing these questions and finding answers. As Christiane Druml pointed out, "Research that is conducted to high ethical standards can reduce the suffering of patients through rapid utilisation of new therapies, is an indicator of modernity and supports the economy by securing jobs and prosperity in times of crisis."

LEADING PROGRESS FOR 650 YEARS

The chair will be located at the Josephinum, part of MedUni Vienna. The foundation of the Josephinum in 1785 marked a major milestone in the history of medical progress, especially thanks to its world-famous collections of wax anatomical models – available for anyone to view even then. Today, the Josephinum reminds of the illustrious history of the Medical University of Vienna – the medical faculty was one of the founding faculties when the University of Vienna was established 1365 – and is an important location for exchanging ideas and for teaching and research. ●

» UNESCO, a global organisation, is exemplary in promoting internationalisation of bioethical debate, and supports this with programmes of its own. Science and research are not pursued for their own sake – people and their wellbeing are the central focus.«

Christiane Druml

Vienna Health Prize

The City of Vienna awarded the Wiener Gesundheitspreis (Vienna Health Prize) to MedUni Vienna's Transcultural Medicine and Diversity Care continuing education course in 2016. This postgraduate course was created for doctors and healthcare professionals, to provide them with additional expertise for professional clinical care and healthcare provision in view of growing social, ethnic and cultural diversity.



>>> Research-led teaching makes the difference

The Medical University of Vienna has spoken out clearly against the establishment of further medical schools that do not focus on research-led teaching – with good reason, since a "light" medical degree cannot be the goal.

ith regard to plans for a private medical school in Tyrol and a private university in Baden, Lower Austria, in April 2016 MedUni Vienna Rector Markus Müller warned of the prospect of "two-tier education" and a "light" medical degree.

ACADEMIC APPROACH

"These two additional schools would take the number of institutions offering medicine degrees in Austria to ten, which would be somewhat unusual and another peculiar way of doing things. This is an attempt to exploit a structural problem in healthcare with the ultimate goal of making money." It could lead to "two-tier education": "On the one hand, you would have medicine degrees at research universities with international outlooks and an academic approach, and on the other a "light" medical degree with highly localised positioning and an educational approached primarily based on vocational qualifications."

TOP UNIVERSITIES WELCOME

Müller fears that "medicine will be de-academicised and downgraded to apprentice training college level." This would also represent a departure from international trends. The medical universities' understanding of their role means that their graduates "need to be able to understand what's written in the New England Journal of Medicine, and not have to have it explained to them by a pharmaceutical representative. We wouldn't object if Johns Hopkins wanted to open a location here," said the Rector. It would always be a question of the standards aspired to. "The bar to accreditation is so low here that it is not respectable internationally." ●

In Austria there

are public medical universities in Vienna, Graz and Innsbruck, and a medical faculty at the Johannes Kepler University Linz.



A special reading of Schnitzler's Dream Story for MedUni Vienna's Alumni Club

» Alumni Club

MedUni Vienna's Alumni Club allows graduates to maintain close ties with their alma mater after completing their studies. Regular events of various kinds provide former students with opportunities to keep in touch with existing contacts and make new ones.

On 6 September 2016, the Alumni Club invited members to a jazz concert given by Benny Sharoni and his band. The tenor saxophonist wowed the audience with his characteristic mix of classic dance and Latin rhythms. And at the Alumni Club cultural gathering on 17 October, literature fans came together in the university's Van Swieten Saal events space for an enchanting reading of Arthur Schnitzler's Dream Story, read by Joseph Laurenz, a holder of the honorary title of Chamber Actor.

REUNION WITH PRESENTATION OF GOLDEN MEDICAL DIPLOMAS

On 23 November 2016, the Alumni Club held a large reunion event for graduates from the years 1956, 1966, 1976, 1986, 1996 and 2006. In a formal ceremony, Rector Markus Müller, Club President Harald Sitte and Thomas Holzgruber, representing the Vienna Medical Chamber, presented jubilee certificates to alumni who graduated from the medical faculty of the University of Vienna 50 and 60 years ago.

CULTURAL AND PROFESSIONAL EVENTS

Other highlights of the year for the Alumni Club included a themed tour of Vienna's Kunsthistorisches Museum in January focusing on Inkarnat in der Malerei (Skin Tones in Painting), as well as a podium discussion in March entitled "Neurocognitive Enhancement: Improving Performance with Brain Doping – Curse or Opportunity?" and exclusive tours of the office of the President of Austria and the state archives in November.

Knowledge community for graduates

The Alumni Club is the postgraduate knowledge, dialogue and career platform for all graduates of MedUni Vienna – a network that is committed to the principle of academic community and works as both a career and communication network. Its main purpose is to connect professional practice and academic dialogue. All graduates, as well as students in the final phase of the medical curriculum, are warmly invited to join the Alumni Club and actively help to shape it.

A varied programme of events gives members the chance to maintain ties with 'their' university: podium discussions, interdisciplinary symposia and academic seminars, dialogues with industry and political decision-makers – as well as communication and social interaction for its own sake. Members of the Alumni Club have an opportunity to share experience and form networks.

MedUni Vienna's Alumni Club is open to all graduates of MedUni Vienna and the former Faculty of Medicine of the University of Vienna, as well as students in the third, final phase of their medical degree.



Golden medical diplomas were presented at the 2016 reunion

>>> MedUni Vienna meets the public

Vaccines and diabetes

About 600,000 people in Austria have diabetes. A preventive vaccine for this dangerous disease would be a blessing. However, despite the benefits of the many immunisations that are available, the number of people declining or neglecting to take advantage of them is on the rise. To raise awareness, share tips, clear up misconceptions and provide information based on current scientific knowledge to the general public on both of these important medical issues, two new guides were published as part of



a series issued by the MedUni Vienna imprint – a cooperation between MedUni Vienna and the Manz publishing house, initiated in 2015. The titles are Diabetes – vorsorgen, rechtzeitig erkennen und richtig behandeln (Diabetes: precautions, early identification and correct treatment) and Impfen – Wann. Wogegen. Warum. (Vaccinations: when, against what, and why).

2,000 students at the Children's Medical University

Around 2,000 students aged between seven and 12 attended a total of 102 classes at MedUni Vienna in July 2016, with most of the lectures, seminars and workshops for kids with an interest in medicine booked to capacity. Altogether, 5,000 of the maximum 5,600 study places were filled. "It's never too early to start learning about health and medical research. The Children's Medical University is an ideal opportunity," explained Anita Rieder, Vice Rector for Education at MedUni Vienna.

Running for cancer research

At the end of October 2016, it was time for the annual cancer research run – its tenth edition – at the University of Vienna's Altes AKH campus. Every completed lap and the donations collected helped to enable and support promising research projects being carried out by ambitious young scientists at MedUni Vienna. A total of 42 research projects have been given the green light thanks to funding support from the cancer research run in recent years, and have contributed significant advances in cancer diagnosis and treatment. The unique charity initiative received a 2016 Fundraising Award at the Austrian Fundraising Congress in Vienna, winning Partnership of the Year.



The Cancer Research Run was the winner of the 2016 Fundraising Award



Medical research trail draws the crowds

A live heart operation and bionics were the big draws at MedUni Vienna in April 2016, when more than a thousand curious members of the public visited the university for the Long Night of Research event. The 50 stations – most of which were interactive – on the medical research trail in Vienna's ninth district were packed with visitors on the night.

Hundreds of children attend teddy bear hospital

At the end of December teddy bears of all sizes, dolls and a wide variety of soft toys and their owners populated the headquarters of the Vienna Medical Chamber. On the first day of the teddy bear hospital – a joint initiative between MedUni Vienna, the Austrian Medical Students' Association (AMSA), the Vienna Medical Chamber and the Academic Student Association of Austrian Pharmacists – a hundred kids brought their little patients.



Health Talks, Minimed and Cancer School

MedUni Vienna experts ran over 40 events in 2016 on a wide range of themes for people interested in learning more about health. The main venue for these events is the university's Van Swieten Saal, which hosts two major event series – Minimed (in partnership with the *Wiener Bezirkszeitung* local newspaper) and the Health Talks (in partnership with the *Kurier* newspaper and Novartis). The Cancer School is unique, informing patients, their relatives and all who are interested about the prevention, development, diagnosis and treatment of cancer in a structured programme made up of basic and advanced modules.

A new look

As part of the brand development project, MedUni Vienna's visual identity got a complete makeover. The new logo, which expresses the university's aims and values, is at the centre of the new identity. The original symbol is unchanged, but the new, elegant dark blue colour conveys the high standards of this academic institution. In addition, the enclosing circle makes the logo into a contemporary university seal.



de oculis and *Lifesaving Machines* at the Josephinum

From March 2016, the Josephinum exhibited items from the extensive collection of ophthalmologist Hermann Aichmayr in a show entitled "*de oculis* – the Aichmair Collection at the Josephinum". As part of the exhibition, interventions were presented by six contemporary artists, whose works deal in variety of ways with the eye and seeing in a broader sense. In October, this was followed by "WILL – The Lifesaving Machines", a cycle by photographer Reiner Riedler that puts the spotlight on a large number of objects that are used in day-to-day contemporary medical practice.

>>> Leading lights

Three of the five professors appointed in 2016 were women.



Renate Kain, the new Professor of Pathology, has been back at MedUni Vienna's Department of Pathology since 2006. After studying medicine in Vienna until 1986, she worked at the University of Aberdeen's Department of Pathology for a number of years. MedUni Vienna is an international leader in clinical application of specialist areas of pathology with a translational aspect, and Professor Kain aims to position these even more strongly, as well as foster development of the pathology of nonneoplastic diseases of organs including the heart, lungs, liver and kidneys – for which, for example, postgraduate continuing education courses are planned.

» We have top scores in diagnosis and the number of cases we handle. «

Renate Kain



Daniela D. Pollak, the new Professor of Behavioural Biology, returned to MedUni Vienna (where she completed her doctorate degree in 2005) in 2009, after a three-year post-doctoral placement with Nobel laureate Erich Kandel at Columbia University, New York. Her research focus is the use of specific animal models to investigate the neurobiological mechanisms of psychiatric disorders, with a particular focus on depression. The aim is to find out whether an illness of this type can be identified at the cellular level, and whether there are suitable biomarkers that would enable the development of new therapy interventions.

» There is a major need for new therapy approaches for psychiatric disorders. « Daniela D. Pollak



Christine Radtke was appointed Professor of Plastic and Reconstructive Surgery. Formerly at the Hannover Medical School, she is regarded as a leading expert in plastic and reconstructive surgery, with a focus on peripheral nerve surgery, nerve reconstruction and tissue engineering. Another focus is the development of new treatment options for malignant soft tissue tumors.

» With the aid of international partnerships, I want to further expand research in our discipline and establish an international network with close collaboration between research, patient care and teaching.«

Christine Radtke


Javier Martinez studied biology in Argentina and was Junior Group Leader at the Austrian Academy of Sciences' Institute for Molecular Biotechnology (IMBA) from May 2004, before moving to the Department of Medical Biochemistry at Max F. Perutz Laboratories. His working group investigates RNA metabolism in mammalian cells biochemically in vitro, as well as conducting phenotype and pathological studies in vivo. The discovery of new enzymatic activities that play a role in RBA metabolism helps to increase understanding of disease mechanisms in patients, so that new treatment approaches can be developed.

»MedUni Vienna has an excellent reputation in the research community – and it's an excellent fit for me. as increasingly my research is focused on medicine.«

Javier Martinez



Scientist of the Year 2016

Women's health means a lot more than gynaecology and obstetrics, since many disorders develop differently in women than in men - but for a long time, this was not recognised in medical practice. Much has now changed in this regard – not only in medical science, but in terms of public perceptions. It comes as no great surprise that Alexandra Kautzky-Willer, who was appointed to Austria's first chair in gender medicine at MedUni Vienna in 2010, was named Scientist of the Year 2016. The award, conferred by Austria's Klub der Bildungs- und Wissenschaftsjournalisten (Association of Education and Science Journalists), honours the researcher's outreach work. As a University Professor, Kautzky-Willer believes she has an obligation to share her knowledge not only with her colleagues, but also with the wider public, and emphasises how important it is to work together with other disciplines - such as the social sciences - when it comes to personalised medicine.



Michael Fischer took up the post of Professor of Molecular Physiology at MedUni Vienna. The pain expert was working at the University of Erlangen-Nürnberg, where he led a research group at the Institute of Physiology and Pathophysiology, before making the move to Vienna. Fischer carries out research into the pain functions of the peripheral nerve system, with a basic research focus. He concentrates on transient receptor potential (TRP) channels - pore-forming transmembrane proteins that enable electrically charged particles, ions, to pass through biological membranes. These cellular ion channels play an important role in the perception of pain.

» It's important that the research I do results in clinical applications.

Michael Fischer

» Leading lights



Award for Rudolf Valenta

Rudolf Valenta, Head of the Division of Immunopathology at MedUni Vienna's Institute of Pathophysiology and Allergy Research, was granted the International Distinguished Fellow Award from the American College of Allergy, Asthma & Immunology (ACAAI). The award is conferred on a maximum of two researchers based outside the USA and Canada each year, recognising outstanding contributions in the fields of allergy, asthma and immunology. Rudolf Valenta currently has around 550 publications and over 20,000 citations to his name, with an h-index of 78. He is the author or co-author of 132 international patents.





Inventor of the Year

Christian Gruber, a group leader at the Center for Physiology and Pharmacology, was voted MedUni Vienna Inventor of the Year in February 2016. Together with his team, he developed circular synthetic peptides, or cyclotides, for which MedUni Vienna's Technology Transfer Office registered patents in multiple territories. In May 2015, MedUni Vienna signed a licence agreement with Swedish investment group Accequa AB for development and use of cyclotides for the prevention and treatment of autoimmune diseases, leading to the establishment of a company for this specific purpose, Cyxone. A goal for the future is to develop a peptide to treat multiple sclerosis.

High-value ERC Advanced Grants

The EU is funding three projects by researchers at MedUni Vienna. Maria Sibilia, Head of the Institute for Cancer Research, Tibor Harkany, Head of the Division of Molecular Neurosciences at the Center for Brain Research, and Giulio Superti-Furga, Scientific Director of the Austrian Academy of Sciences' CeMM Research Center for Molecular Medicine and Professor of Medical Systems Biology at MedUni Vienna, each received a high-value Advanced Grant from the European Research Council (ERC). Each grant will support a research project with approximately EUR 2.5 million over five years.



Hornykiewicz and Stingl honoured

In September, Georg Stingl was presented with the Grand Decoration of Honour in Silver for Services to the Republic of Austria. Over the course of his career, the Head of MedUni Vienna's and Vienna General Hospital's Department of Dermatology has made fundamental contributions to the understanding of the skin as an immune organ, and the pathogenesis of skin disorders with immunological causes. Oleh Hornykiewicz, from the university's Center for Brain Research, was awarded the Gold Medal of the City of Vienna in June. The Emeritus Professor of Brain Research was honoured for his pioneering work in Parkinson's research. He has also been touted as a candidate for the Nobel Prize in Medicine.

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MedUni Vienna celebrates graduates

In front of their families, friends and others, at the end of November 356 graduates of MedUni Vienna took their academic oaths. The degree certificates were presented by Rector Markus Müller and Vice Rectors Anita Rieder, Michaela Fritz and Oswald Wagner.

A total of 577 next-generation scientists and doctors completed their medical studies in Vienna at the end of the academic year.



Researcher of the Month

Each month, MedUni Vienna highlights the work of one or more young scientists who have conducted outstanding research by nominating its Researchers of the Month.

Prize winners

Marie Spies and Thomas Vanicek, Maximilian Marhold, Simon Danner, Franz Ratzinger, Thomas Pezawas, Patrick Sulzgruber, Guido Gualdoni, Andras Jakab, Nicolas Kozakowski, Stéphane Ciocchi, Matthias Unseld, Jakob Paur, Andreas Hanslik, Elisabeth Maritschnegg with Rector Markus Müller, Vice Rector Michaela Fritz and jury members Klaus Markstaller, Bruno Podesser and Gerhard Lechner.



STRAWBERRY, STRAWBERRY, CHOCOLATE, ABETES. DI VANIL

Serious illnesses no longer mean the end.

Make the incurable curable by helping us to establish the Center for Precision Medicine.

» RESEARCH FOCUSES

Medical neuroscience

Medical imaging

Cancer research/oncology

Cardiovascular medicine

Immunology

>>

center for precision medicine The overriding goal of MedUni Vienna: improving diagnosis and treatment for patients

Medical Neuroscience

The research groups working in this cluster cover a broad spectrum of neuroscience and clinical disciplines, comprising anatomy, physiology, immunology, cell biology, pathology, pharmacology and molecular genetics, as well as neurology, paediatric neurology, neuroradiology, neurosurgery, ophthalmology, psychiatry and psychotherapy.

The principle goal is advancing understanding of the pathophysiology of nervous system disorders.

Research findings lead to improved diagnosis and treatment for patients with these conditions.



The education of doctoral candidates and other young employees at the participating departments and institutes is particularly important.

THE CLUSTER'S NEUROSCIENCE DISCIPLINES





PHYSIOLOGY



IMMUNOLOGY









MOLECULAR GENETICS





NEUROLOGY

NEURORADIOLOGY

NEUROSURGERY













Personalised treatment

Explaining the disease mechanisms of neurological and psychiatric diseases and developing new therapies for their treatment are important goals of the Medical Neuroscience Research Cluster. These activities focus, for example, on inflammatory diseases of the nervous system such as multiple sclerosis and other autoimmune disorders. The discovery of new autoantibody-mediated diseases and new mechanisms of immune-mediated damage to the nervous system, and the development of new therapy strategies, mean we are now able to offer personalised medical treatment to patients suffering from these conditions. Hans Lassmann, Speaker of the Medical Neuroscience Research Cluster

"

dentifying what triggers a patient's migraines is an important stage in the treatment process, but it's difficult," explained Christian Wöber, head of the specialised headache unit at MedUni Vienna's Department of Neurology. For doctors to reach valid conclusions, they need more than just the answers to questions they ask patients. Detailed notes recorded in a diary and sophisticated statistical analysis are much more important for personalised treatment of migraine, as has been shown in a recent study.

The research was conducted in collaboration with US start-up Curelator, and used data from MedUni Vienna to investigate a totally new approach to the analysis of migraine triggers. It was the first time that triggers had been studied on an individual patient instead of collectively.

For the vast majority of patients, there were individual triggers that were not identified in the aggregated data. "This new type of analysis means that we can now see the links between migraine attacks and a wide range of possible triggers for each patient separately – a step on the way to personalised migraine treatment," said Wöber. ●

Study first published in Cephalalgia: Towards improved migraine management: determining potential trigger factors in individual patients. Migraine is placed number six in a ranking of the burden of over 300 diseases.

The Headache Working Group at MedUni Vienna is one of the world's leading research groups investigating migraine triggers. » By analysing cases on an individual basis, we are able to provide personalised medicine tailored to the individual circumstances of each patient. The need for this approach was also recently highlighted in leading journal Nature. « Christian Wöber

Dozens of new hypothalamic neuron types catalogued

The human brain consists of billions of cells – and there are countless numbers of them that have never been catalogued, and whose function is unknown. Research on these cells to identify new cell functions that play significant roles in many disorders is a priority in brain research worldwide. Numerous previously unknown neuron types in the hypothalamus have been identified and catalogued in the Division of Molecular Neurosciences at MedUni Vienna's Center for Brain Research – and the function of a previously unknown dopamine cell was determined. This frontline research was carried out in a study funded (among other studies in the Division of Molecular Neurosciences) by the European Research Council and the European Molecular Biology Organisation (EMBO).

Study first published in Nature Neuroscience: Molecular interrogation of hypothalamic organization reveals distinct dopamine neuronal subtypes

Pain is not just a matter of nerves

Researchers at MedUni Vienna have shown for the first time that pain involves more than just the nerves, by proving that glial cells are also an aspect of clinically relevant pain phenomena, and function independently to intensify pain.

he activation of glial cells brings about a painintensifying effect and often enables pain to spread to areas of the body that were previously unaffected. "Our study came up with the first explanation for this and other puzzling pain phenomena in medicine," said Jürgen Sandkühler, Head of the Division of Neurophysiology at MedUni Vienna's Center for Brain Research.

HEALTHY LIFESTYLE CAN HAVE A BENEFICIAL IMPACT ON THE GLIAL CELL SYSTEM

According to Sandkühler, inflammatory diseases of the brain, environmental factors and lifestyle can activate glial cells. Depression, anxiety disorders, chronic stress, multiple sclerosis, Alzheimer's and diabetes can all have an effect, as can a sedentary lifestyle and a poor diet. The results of the study have given rise to speculation about improvements to lifestyle that could have a beneficial impact on the neuroinflammatory system and help to reduce suffering from pain in general as well as from minor ailments.

Study first published in Science: Gliogenic LTP Spreads Widely in Nociceptive Pathways.

Genetic cause of polyneuropathy uncovered

Polyneuropathy is a disease caused by a congenital gene mutation which leads to severe nerve damage in old age, with symptoms including paralysis, loss of sensation and pain. It can progress very quickly, and at an advanced stage patients may be left wheelchair-dependent. An international research team led by MedUni Vienna and the University of Munich has now identified the relevant gene. "The gene mutation leads to an enzyme deficiency which probably triggers the nerve damage. Compensating for the impaired enzymatic activity could form the basis of a future therapy approach aimed at halting progress of the disease," explained Michaela Auer-Grumbach from MedUni Vienna's Department of Orthopedics. This groundbreaking research was made possible thanks to an Austrian Science Fund project.

Study first published in The American Journal of Human Genetics: Rare variants in MME, encoding metalloprotease neprilysin, are linked to late-onset autosomal dominant axonal polyneuropathies.

Medical Imaging

Imaging procedures are used for diagnosis and individual risk stratification, as well as therapy planning and monitoring for personalised diagnosis and treatment plans.

> The complexity of imaging research necessitates the integration of a range of methods from its various specialist fields.

The goals of the Medical Imaging Cluster are to enable earlier diagnosis and improved characterisation of diseases and to develop new therapy approaches.





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Where medicine meets natural science

Medical imaging has always been a field operating at the interface between medicine and the natural sciences; in recent years we have seen how far modern molecular imaging techniques cross over into day-to-day clinical practice. The Medical Imaging Cluster is tasked with fostering first-class applied research at the medical, biochemical and physical or technical level at our university. Our strength lies in the combined efforts of clinical practitioners and academics, and our goal is to take the methods being studied at a theoretical level in the laboratory today, and turn them into the applied techniques of tomorrow. Wolfgang Birkfellner, Speaker of the Medical Imaging Cluster

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Gender and precision medicine

The results of this study will aid clinical research aimed at advancing understanding of which hormonal diseases are associated with conditions such as anxiety disorders, and why women are two to three times more likely to suffer from them than men. Acquiring more knowledge of gender differences will help to drive forward personalised medicine, enabling development of more specifically targeted treatments. Marked differences can often be observed between women and men with respect to mental illness. The causes of these differences were the subject of a MedUni Vienna project supported by the Austrian Science Fund, which investigated the effects of gender reassignment hormone therapy on the brains of transgender individuals with the aid of imaging techniques.

n psychiatry, we treat many conditions that are more prevalent in either women or men. For instance anxiety disorders and depression are more common among women, and addictive disorders and autism are more common among men," explained project leader Rupert Lanzenberger from the Department of Psychiatry and Psychotherapy at MedUni Vienna, who reported on to explain the aims of the research: "We wanted to investigate the causes of these diseases from a gender perspective, and were looking for a model which would show us effects on the brain connected with the hormone system." Over a period of five years, an interdisciplinary team studied transgender individuals who intended to undergo hormone therapy as

part of their gender reassignment and were seeking medical help.

HORMONAL EFFECTS: TESTOSTERONE THE KEY ELEMENT

The researchers used magnetic resonance tomography to observe what happens in the brain when opposite-sex hormones are taken over long periods to achieve the blood hormone levels of the target gender. "We were able to show a hormonal effect on language processing, on functions such as risk-taking behaviour, on spatial cognition and impulsiveness, as well as on the structure of the brain connections among females and males," reports Lanzenberger.

New method of breast density measurement

High breast density is an independent risk factor for breast cancer. The most reliable method of diagnosing breast cancer is magnetic resonance imaging (MRI), which is now also used for early detection. MedUni Vienna researchers from the Department of Biomedical Imaging and Image-guided Therapy have developed a way of precisely measuring breast density in MRI examinations using the Dixon method. The new technique will enable improved breast cancer diagnosis and risk assessment.

At present, the new method is at the prototype stage. "It works almost at the touch of a button, and only takes a few minutes. Patients also don't have to take any contrast agent," explained Georg Wengert from MedUni Vienna's Department of Biomedical Imaging and Image-guided Therapy, who presented the results of the research at » Not all carcinomas can be detected using just mammography and ultrasound. MRI really is the method we should be recommending. «

Georg Wengert

the European Congress of Radiology, which took place in Vienna in March 2016. The study was carried out by the Molecular and Gender Imaging Working Group under the direction of Thomas Helbich from the Department of Biomedical Imaging and Image-guided Therapy, with the Computational Imaging Research Lab undertaking the software development, managed by Georg Langs, also from the Department of Biomedical Imaging and Image-guided Therapy. ●

Sharper images, less contrast agent and a lower radiation dose

The new CT scanner

will primarily be used to examine inpatients at Vienna General Hospital being treated in one of the university departments, but will also be available for outpatients who require very specific forms of CT examination that are not offered elsewhere.



latest-generation computed tomogra-Apphy (CT) scanner was installed at Med-Uni Vienna and Vienna General Hospital's Department of Biomedical Imaging and Image-guided Therapy. The equipment produces improved, sharper images than machines of the previous generation and is suitable for scanning all of the body's organs. Its main applications are lung, heart and abdominal cavity imaging. The state-of-the-art 4D scanner has two sets of X-ray tubes and detectors, and produces precise cross-sectional images in shorter times than were previously possible. Patients benefit because they are not reguired to take as much contrast agent and are exposed to less radiation, as procedures take less time. The scanner's high speed means that rapid movements such as heartbeats do not affect the quality of the images.

Cancer research/oncology



The Comprehensive Cancer Center Vienna (CCC) is a joint facility of MedUni Vienna and Vienna General Hospital (AKH).

The CCC combines expert interdisciplinary patient care with clinical and basic research, and research-led academic teaching.



The result is innovative diagnostic and treatment methods that the CCC makes available to patients.

The CCC offers a broad range of training and education programmes focusing on cancer, for all qualification levels.

THE CCC'S THREE PILLARS OF RESEARCH







Research enables precision medicine

Research has brought about a massive improvement in outlooks for cancer patients in the past decade. In the past, it was like using cannon to hunt sparrows; today we can analyse tumours at a microbiological level and administer effective medication that targets individual patient needs. We expect precision medicine to deliver further major advances in the near future, because we are not simply waiting for the development of new medicines – in many cases we can use substances that have already been approved, in a more targeted way. **Christoph Zielinski, Head of the Comprehensive Cancer Center**



» Cancer therapy: improving life expectancy and quality of life

Tumour therapy has progressed in leaps and bounds in recent years. Thanks to innovative approaches in diagnosis and treatment, patients with different types of cancer at different stages are now benefitting from significant improvements, both in terms of life expectancy and quality of life.

ne of the biggest trends that MedUni Vienna is pursuing in cancer treatment is immunological therapy. The first medicines to be approved are already proving themselves in clinical applications, particularly in advanced stages of melanoma, non-small-cell bronchial carcinoma and kidney cell carcinoma. And a host of new substances are on the cusp of market readiness. In addition to being highly effective, the new immunotherapy treatments are well-tolerated.

PERSONALISED MEDICINE – THE NEXT MEGATREND

At MedUni Vienna intensive research activities in the field of personalised medicine are playing out in parallel with the work being done on cancer immunotherapy. A major advantage of these targeted therapies is that they are very well-tolerated, generally speaking. Pioneering advances have been made in various areas including leukaemia, lymphomas and multiple myeloma.

Lung cancer and chemo resistance

Small cell lung carcinoma is often not discovered until it has reached an advanced stage, when metastases have already formed. Initially chemotherapy is very effective, but the cancer recurs within a year and this time no longer responds to chemotherapy. A research group at the Department of Surgery made a pioneering breakthrough when they showed that resistance to chemotherapy and radiotherapy occurs due to the circulating tumour cells forming clusters. Completely new therapeutic approaches must be developed to prevent the formation of these clusters or to break them up.

First published in Cell Adhesion & Migration and Trends in Cancer: Small cell lung cancer: circulating tumour cells of extended stage patients express a mesenchymal-epithelial transition phenotype



» New methods for targeted, personalised cancer treatment

Interdisciplinary concepts are an important driver of development of effective personalised treatments.

umours and metastases, as well as the receptors in cells, are different in each type of cancer and each individual patient. As a result, it is important to link together different diagnostic methods such as molecular imaging and pathology, data analysis and ultimately clinical pharmacology, in order to forge a path to developing medicines - with the aim of increasing response rates to personalised and effective cancer therapies. This was confirmed by a group of experts from MedUni Vienna at the first Danube Symposium - a three-day forum on the interdisciplinary development of cancer treatments, which took place at MedUni Vienna in September 2016.

IMPROVING IDENTIFICATION OF SPECIFIC FEATURES

A wide range of interdisciplinary working methods are part of daily life at MedUni Vi-

enna – including for identifying targets in cancer diagnosis and treatment. At the Division of Nuclear Medicine

molecular imaging can be used, for example, to mark medicinal substances so that they "glow" in the cell, showing whether a drug is really working and if it has reached its target. Liquid biopsies also enable precise characterisation of tumour cells from blood samples.



BETWEEN RESEARCH AND INDUSTRY

CLOSE COLLABORATION

the first time, aims to promote interdisciplinary concepts at an international level. This close collaboration between research and industry is also enshrined in the plans for the MedUni's Vienna General Hospital campus up to 2025. It is hoped that businesses will establish locations at the university's planned

» Diagnostics will become more closely targeted than ever before. « Markus Zeitlinger Technology Transfer Center – from startups, to innovative SMEs, all the way to large Austrian and international com-

panies. Markus Zeitlinger from the Department of Clinical Pharmacology commented: "Everyone will benefit from this proximity: the companies themselves, MedUni Vienna, and especially patients, as it will facilitate and speed up joint research and development."

Ratings scale for oncological medicines proves its worth

Medical treatment of cancer is becoming more effective, and more complicated, all the time. In response to the changing landscape, the European Society for Molecular Oncology (ESMO) has developed a rating scale for medication based on its benefits to patients. A study conducted by Barbara Kiesewetter from the university's Department of Medicine I monitored whether the new system devised by the European cancer specialists is a practicable method of objectively evaluating new therapies. The tool's full name is the ESMO Magnitude of Clinical Benefit, or ESMO-MCBS for short.

According to the study authors, the results were positive in two ways: "The scale is an excellent tool for day-to-day operations in a specialist cancer treatment centre." It helps doctors to make the right therapy choices and provides a good benchmark guide for new therapies.

> In Austria just under 5,000 men are diagnosed with prostate cancer each year.

In the same period around 1,150 patients die of the disease.

Prostate cancer is the third most common cancer in men worldwide.

Recurring carcinoma after prostate operation

A round 10% of all patients that undergo successful surgery for prostate cancer have a higher risk of developing a recurring tumour afterwards. However, it is possible to identify lymphovascular invasion (LVI) – spread of the tumour into lymphatic and blood vessels – in the excised tumour tissue under the microscope. This tumour behaviour can be used as a factor in prognosis, as has now been demonstrated by Harun Fajkovic from MedUni Vienna's Department of Urology, in a study involving 7,000 patients. Fajkovic gave a talk on the latest research findings at PROSCA, the world's largest prostate cancer conference, which took place in Vienna between 29 June and 1 July 2016. ●



» Revolutionary potential

In Austria around 5,200 patients are newly diagnosed with breast cancer each year.

The overwhelming majority are women, but men are affected too. A new large-scale international study, ABCSG 42/PALLAS, is investigating the potential of a medicine that is already showing great promise in the treatment of metastasised breast cancer to also improve therapeutic outcomes for the most common form of the disease – early-stage hormone receptor positive, HER2-negative breast cancer.

"Scrub" as cancer therapy

Researchers at the Comprehensive Cancer Center have developed a new therapy to treat precursors of cervical cancer, which is caused by a human papillomavirus (HPV) infection. The procedure involves the use of 85% trichloracetic acid, which is traditionally used for medical and cosmetic peels, similar to an exfoliating scrub. The team working on the project showed that 82% of patients went into complete remission after just one treatment. The new therapy is easy for experts to administer and highly cost-effective.

First published in Obstetrics & Gynecology: Short-Term Efficacy of Trichloroacetic Acid in the Treatment of Cervical Intraepithelial Neoplasia esearchers are looking into whether standard endocrine therapy can be improved by the additional administration of the drug palbociclib. Michael Gnant explained: "Palbociclib has already been licensed to treat metastasised breast cancer, where it is proving to be very successful. The drug has the potential to revolutionise the treatment of early-stage, hormone receptor positive breast cancer. Our aim is to extend progression-free survival and, in the long term, to achieve a permanent cure in the majority of patients."

GLOBAL PROJECT

In total 4,600 patients from 25 countries worldwide are expected to be included in this largest ever international Phase III trial for patients with hormone receptor positive early-stage breast cancer. The head of the study for all countries (excluding the USA) is Michael Gnant, Deputy Head of the Comprehensive Cancer Center (CCC) and Head of the Department of Surgery. Gnant commented: "Since the trial is being led by us here in Austria, with the focal point at the CCC, we might manage to include up to 500 Austrian patients in the study, thereby giving them access to this new therapy." ●

Cardiovascular medicine

Numerous factors play a part in the development of cardiovascular conditions, which affect all of the body's organ systems.

> The Cardiovascular Medicine Cluster has a multidisciplinary organisational structure, since diagnosing, treating and researching cardiovascular disease calls for close collaboration between a diverse range of different medical specialisms.

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In addition to cardiovascular disease, the cluster focuses on research into diagnosis as well as epidemiological and genetic questions.

> The cluster provides an excellent cardiovascular medicine PhD programme and attractive careers in cardiovascular disciplines.







Safe procedures and innovative technologies

Extensive basic research and closely targeted clinical research have helped cardiovascular medicine on its way to becoming the most successful medical discipline, with a reduction in death rates by a fifth over the course of the past four decades. 2016 brought a continuation of this trend for the cardiovascular specialists at MedUni Vienna, with many publications, successful and internationalaward-winning young doctors, and closer cooperation between heart surgeons and cardiologists – towards joint interventions in the future in an ultra-modern, hybrid operating theatre that will give patients with complex conditions access to safe surgical intervention and innovative cardiovascular technologies. **Irene Lang, Speaker of the Cardiovascular Medicine Research Cluster**



» New discoveries in cardiology

At the European Society of Cardiology (ESC) international congress in Rome, a group of researchers from MedUni Vienna presented their latest research findings on the use of extracorporeal membrane oxygenation (ECMO) in post-operative cardiogenic shock, and on hypoxic hepatitis as a risk marker for long-term survival.



60+

Most patients are over 60 years old

he probability of cardiac arrest in the phase following cardiac surgery is 8%, making it a common and serious complication associated with a high mortality rate. In their study, Klaus Distelmaier and Georg Goliasch from MedUni Vi-

enna's Division of Cardiology evaluated the effect of cardiac arrest at the time of ECMO implantation on short and long-term survival.

» Hypoxic hepatitis is a significant and independent predictor for 30-day and long-term survival.«

Klaus Distelmaier and Georg Goliasch

HYPOXIC HEPATITIS AS A RISK MARKER

Mechanical circulatory support via ECMO therapy is often the only viable option to stabilise patients with heart and lung failure. The 30-day survival rate for these critically ill patients is between 31% and 42% and risk

> assessment is difficult. Researchers at MedUni Vienna have now discovered that the development of shock liver (hypoxic hepatitis) following connection to a heart-lung machine is

200,000 patients

in Austria are affected by chronic myocardial insufficiency

a significant risk marker in post-operative cardiovascular surgery patients. Improved risk assessment could have a significant influence on therapeutic strategies and the accuracy of prognosis in future.

Women's hearts react more sensitively to stress

While the number of men dying from heart attacks has been steadily decreasing over the past twenty years, the fatal risk in young women in particular has increased significantly. Gender medicine has already shown that women exhibit different symptoms. A more recent discovery is that stress in the daily routine has particularly adverse effects on the female heart. Alexandra Kautzky-Willer, Professor for Gender Medicine at MedUni Vienna, explained the implications on International Women's Day, 8 March 2016. The influence of psychosocial stress on female cardiac health has been underestimated, with the strain of factors such as career, household and caring for relatives having the potential to manifest organically in the heart.

First published in EUGenMed Cardiovascular Clinical Study Group: Gender in cardiovascular diseases: Impact on clinical manifestations, management, and outcomes

Kick-off for the Center for Cardiovascular Medicine

In September 2016 MedUni Vienna and Vienna General Hospital began work on a research and treatment centre for cardiovascular diseases. It follows in the footsteps of the highly successful Comprehensive Cancer Center (CCC) and builds on the existing cluster for cardiovascular medicine.

The newly founded Center for Cardiovascular Medicine (CCVM) will link treatment of patients with clinical research and basic research. It is hoped that patients will benefit from improved diagnostic and therapeutic processes and closer interdisciplinary collaboration. The Department of Medicine II and Division of Cardiac Surgery are playing a leading role in the development of the new centre.

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Chronic cardiac insufficiency: a step towards personalised cardiology

A MedUni Vienna research group has successfully managed to analyse the mechanism of a pharmaceutical treatment combination used to treat heart failure that targets specific hormones,

providing insights into the hormonal changes it brings about. "The results, some of which were unexpected, will continue to stimulate research in this area to improve treatments in future," explained the study's co-author, Raphael Wurm of the Department of Medicine II. "Our findings could also help to further personalise the treatment of chronic heart failure. The aim is to ensure that a drug is only given to those people who would benefit most from it and suffer the fewest side effects."

Source: Pavo, Wurm, et al: Fingerprint of the renin-angiotensin-system during ARNI therapy in patients with systolic heart failure

Immunology

Vienna has a strong tradition when it comes to basic research in immunology, and work done here is highly respected internationally.

> The Viennese paediatrician Clemens von Pirquet was the first to coin the term "allergy".

Research is currently being pursued in the Christian Doppler Laboratory for the Development of Allergy Chips, as well as in the SFB46 special research programme (Strategies for the Prevention and Treatment of Allergies) and in doctoral programme W1248 (Molecular, Cellular and Clinical Allergology) – both supported by Austrian Science Fund (FWF) grants.







Targeted diagnosis and treatment

Rapid development of modern molecular biology techniques will make it possible to perform detailed characterisation of immune cells in a healthy state, and in the case of immunological disease – and to investigate how the immune system responds to different treatment methods and environmental influences during an infection. This will not only support more precise and improved characterisation and diagnosis of immunological disease, but will also open the door to targeting medicines and newly developed therapeutic strategies to the precise needs of individual patients, in application of a precision medicine approach. Wilfried Ellmeier, Speaker of the Immunology Research Cluster



Climate change could trigger a massive surge in hay fever

Climate-related proliferation of ragweed could double the number of hay fever sufferers. Early identification and a new generation of allergy medicines give grounds for hope.

ccording to the EU's Atopica project, in which MedUni Vienna plays a major role, climate change could trigger a new surge in hay fever affecting millions of people in Europe. Research data from the pioneering study – the first to look at climate change and pollen allergies – show that the number of people suffering from a ragweed (also known as ambrosia or bursage) pollen allergy has more than doubled in just 35 years, from 33 million to 77 million. Researchers believe that climate change could be responsible for two thirds of this increase. Higher concentrations of ragweed pollen and a longer ragweed pollen season could also make symptoms more severe.

EARLY DETECTION PREVENTS MORE SERIOUS CASES

One thing that will not change in the future is that allergic sensitisation can start right after birth. As a result, say allergy researchers at MedUni Vienna, very early screening is paramount, so that measures can be introduced in time to stop more serious conditions from developing. Rudolf Valenta from MedUni Vienna's Institute of Pathophysiology and Allergy Research at the Center for Pathophysiology, Infectiology and Immunology played a significant role in the development of what is currently the best and most effective way of identifying allergies at an early stage: the allergy chip.

ON THE WAY TO AN ALLERGY PROPHYLACTIC

Prophylactics are another approach. MedUni Vienna has successful-

ly managed to bind allergens to the body's own white blood cells to trigger a tolerance reaction in the event of future contact with the allergens involved. In animal models the results are promising, giving reason to hope that it will be possible to prevent allergies before they arise – whether by means of a vaccination using the body's own cells or other immunisation strategies. The study was conducted in partnership between the Department of Surgery (Thomas Wekerle, Ulrike Baranyi) and Institute of Pathophysiology and Allergy Research (Rudolf Valenta). ●

First published in Environmental Health Perspectives: Climate change and future pollen allergy in Europe

EBioMedicine: Cell Therapy for Prophylactic Tolerance in Immunoglobulin E-mediated Allergy 40 percent of Europeans suffer from hay fever at some point in their lives





Increasing pollen concentrations will cause even higher costs

Grass pollen allergy vaccine also effective in combating hepatitis B infection



new type of vaccine against Agrass pollen allergies (BM32) might also offer an effective treatment option for hepatitis B. The findings of a study conducted at MedUni Vienna's Institute for Pathophysiology and Allergy Research have now been published in leading medical journal EBioMedicine. "We were able to show that, in people who had not previously been immunised with a conventional hepatitis B vaccine, vaccination with BM32 achieved average prevention of hepatitis B virus infection of 80%," explained Carolin Cornelius, the author of the study.

The BM32 vaccination

is based on an innovative recombinant peptide carrier technology.

The technology was developed at the Christian Doppler Laboratory for Allergy Research, at MedUni Vienna.

BM32 is a joint development with commercial partner Biomay AG.



>>> Test for early diagnosis of Lyme disease

Researchers at the Medical University of Vienna are working on development of a new rapid antibody test for the early diagnosis of Lyme borreliosis, as part of the EU's ID-LYME project.

he new test will greatly improve detection of infection, so that healthy people with borreliosis in their bloodstream do not have to be treated with antibiotics unnecessarily. It also enables the necessary treatment measures to be implemented at the earliest possible stage. Currently available antibody tests only give actionable readings after a minimum of three to four weeks following possible infection.

PIONEERING BORRELIOSIS RESEARCH

"The current standard laboratory test is often unable to determine existing infection with borreliosis at an early stage," explained Hannes Stockinger, Head of the Institute of

Lyme borreliosis – at present there is no vaccine for borreliosis.

Each year around 70,000 people in Austria develop Lyme disease after being bitten by a tick.

Borreliosis can lead to serious illness. Hygiene and Applied Immunology and the Center for Pathophysiology, Infectiology and Immunology at MedUni Vienna. His colleague Gerold Stanek commented: "Not every tick bite necessarily results in an infection, and not every positive Borrelia test means that infection is present. That's the tricky thing."

PRECISE AND EARLY DIAGNOSIS

Current tests only support analysis of part of the human immune system. The MedUni Vienna immunology experts are therefore helping to develop the world's first point-of-care test that could be used to detect an active infection, so that patients can start appropriate treatment.

» New therapy strategies for incurable liver disease

New therapy strategies for primary sclerosing cholangitis – which is currently incurable – indicate initial measurable success with nor-ursodeoxycholic acid (norUrso).

multi-centre phase II study involving 45 centres throughout Europe was led by MedUni Vienna. It demonstrated that "there were significant improvements in liver function test results for all tested doses" when norUrso was administered to 161 patients for the first time, according to Michael Trauner, Head of the university's Department for Gastroenterology and Hepatology. The results were presented at the world's largest liver congress in Barcelona, which attracted 10,000 participants. Trauner's presentation was one of just four lectures from among many talks to be singled out by the European Association of the Study of the Liver (EASL) for particular mention.

Multi-centre phase Il study with 161 patients

45 centres involved from all over Europe, led by MedUni

MedUni Vienna is one of the world's

leading centres for the research of cholangitis and other liver and gall bladder diseases

KICK-OFF, DENALTY, STROKE GOAL

Serious illnesses no longer mean the end.

Make the incurable curable by helping us to establish the Center for Precision Medicine.

» FOCUS

Precision medicine the key trend

Important findings from basic research

New and improved treatment methods

Pioneering role in the field of rare diseases

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center for precision medicine Attracting the attention of the scientific community and the general public

>>> Precision medicine: the key trend in rheumatoid arthritis treatment

MedUni Vienna is recognised as Europe's top rheumatology centre thanks to its high level of expertise and international research network. New medicines and a paradigm shift in the treatment of conditions such as rheumatoid arthritis are showing what the future has in store.

he treatment of rheumatoid arthritis is another area in which the most important trend at present is precision medicine. This was the key finding to emerge from a review of the cur-

rent status of the disease, its treatment and its diagnosis, which Med-Uni Vienna researchers Josef Smolen and Daniel Aletaha were invited to carry out by The Lancet. "This confirms our international standing, and shows that at

MedUni Vienna we have an excellent understanding of how rheumatoid arthritis 'works' – from both a clinical and scientific perspective – and how it can be rapidly diagnosed, evaluated and best treated," said Josef Smolen, rheumatologist and Head of MedUni Vienna's Department of Medicine III at Vienna General Hospital, who was delighted with this recognition. Personalised medical treatment of rheumatism means that the best and most rapidly effective therapy options for each patient can be determined more precisely than in the past, as can treatments that are

» Vienna is seen as Europe's leading rheumatology centre. «

unsuitable. According to Smolen – who is MedUni Vienna's joint most widely cited researcher alongside brain researcher Hans Lassmann – future trends in rheumatism treatment will include a move away from the currently widespread

practice of injecting biologics, and a return to administering oral medicines, which will be individually tailored to inhibit specific molecules within a cell. » The treatment of rheumatoid arthritis is another area in which precision medicine is currently the key strategy. «

NEW DRUG PROVES SUCCESSFUL

In 2016, Smolen's team also showed that the drug baricitinib can be used with significant success for the treatment of rheumatoid arthritis in a phase 3 clinical trial. Baricitinib is an orally administered Janus kinase 1 and 2 inhibitor. The trial's key finding: subjects who received the drug showed significant improvements in their symptoms. "Baricitinib is a new substance which is effective even when other currently available medicines are inadequate," explained Smolen. "A new medicine - a new basis for the treatment of rheumatoid arthritis - may soon be available to us." The decision on its approval is due to be made soon. Smolen: "Realistically, it could be in clinical use from 2017. But we will also have to determine with precision which patients this treatment is suitable for, and which patients would benefit more from biologics and we will be able to." The trial was the result of cooperation between an international pharmaceuticals company and MedUni Vienna, with Stanford University in the US and other partners.

BENEFITS OF SWITCHING "ON THE FLY"

Two rheumatism medicines of the same class have been compared for the first time in a multicentre trial led by MedUni Vienna. The study demonstrated that switching to a new medicine "on the fly" if the initial treatment fails can produce positive effects for the patient. 40 percent

Cortisone-free rheumatism treatment also works for uveitis

An established rheumatism medicine containing the active ingredient adalimumab – a therapeutic human monoclonal antibody – is also effective in the treatment of a rare eye disease, non-infectious uveitis. The discovery was made by an international research group in which MedUni Vienna played a decisive role with contributions from Talin Barisani-Asenbauer of the Center for Pathophysiology, Infectiology and Immunology as well as members of the Laura Bassi Center of Ocular Inflammation and Infection.

For a long time, the biological agent adalimumab has been used to treat rheumatic conditions by injecting it under the skin every 14 days. The new cortisone-free option means fewer side effects for patients so it can be administered for longer periods.

Study first published in The New England Journal of Medicine: Adalimumab in Patients with Active Noninfectious Uveitis

» This was a worldwide first as we were able to demonstrate in a prospective study that non-infectious uveitis can also be successfully treated with a cortisone-free drug.«

Talin Barisani-Asenbauer

of patients responded positively to the new medicine. The findings could bring about a paradigm shift in the treatment of rheumatoid arthritis.

"If treatment isn't effective, we can switch to a drug of the same class," explained lead author Josef Smolen, "which in many cases has a positive effect." If there is no improvement after three months of treatment with one of the drugs, patients can immediately switch to another. "This improves the patient's quality of life and reduces costs because we can stop administering an ineffective biologic drug at any time and start treatment with a new one," said the Vienna-based rheumatism expert.

Study first published in The Lancet: Head-to-head comparison of certolizumab pegol versus adalimumab in rheumatoid arthritis

Reliable pre-eclampsia test for pregnant women

Pre-eclampsia is a serious condition affecting pregnant women from 20 weeks into pregnancy, in which the placenta attaches abnormally to the uterine wall. It is the second most frequent cause of death among pregnant women and can also lead to dangerous complications for both mother and baby – particularly if the birth is premature. Women are benefiting from a new blood test developed by a team led by Harald Zeisler at MedUni Vienna's Department of Obstetrics and Gynecology, as part of an international research group.

» From an emotional standpoint, the new test is of great benefit for affected women.« Harald Zeisler Doctors can use the biomarker test to rule out the development of pre-eclampsia for a period of seven days in patients with suspected pre-eclampsia. It will help to provide women with suspected pre-eclampsia with appropriate care and avoid unnecessary hospital stays. The test is already being used by MedUni Vienna's Department of Obstetrics and Gynecology at Vienna General Hospital.

Study first published in The New England Journal of Medicine: Predictive Value of the sFlt-1:PlGF Ratio in Women with Suspected Preeclampsia.

New treatment option for rare disease



Thrombotic thrombocytopenic purpura (TTP) is a rare disease caused by an enzyme deficiency. It can occur as a congenital condition or be acquired as an autoimmune disorder. Excessive activity of a specific protein leads to the formation of blood clots enriched with platelets which block the smallest blood vessels. TTP is a life-threatening disease and is especially difficult to treat at the acute stage.

MedUni Vienna researchers from the university's Division of Hematology and Hemostaseology and Department of

» Vienna's doctors and researchers are internationally renowned for their groundbreaking clinical testing of new TTP therapies. «

Clinical Pharmacology have developed a treatment strategy to stop this clotting in the blood vessels using the biotechnologically produced, antibody-like drug caplacizumab. It is administered by injection under the skin, in a similar way to injections given to prevent or treat thrombosis.

Study first published in The New England Journal of Medicine: Caplacizumab for Acquired Thrombotic Thrombocytopenic Purpura

>>> Important insights into the immune system

The discovery of a gene defect enabled an international team of researchers to investigate a key molecule in the development of immune cells.

he starting point for the research was the case of a 12-year-old child who had been battling with life-threatening respiratory infections his whole life. The results of immunological tests showed an abnormal composition of lymphocytes - a type of white blood cell - meaning the patient's immune system was too weak to effectively fight off pathogens. Three of the child's six siblings had died within their first two years of life, most probably due to similar complications. The cause of the immune deficiency was a mystery, but there was a clear lead: four seriously ill children from the same family pointed to a genetic condition.

GENOME-BASED ANALYSIS LEADS TO CLEARER UNDERSTANDING

"The analyses of the patient's genome confirmed our suspicion that the cause of the disease was genetic," explained Elisabeth Salzer, postdoctoral fellow at the Center for Molecular Medicine (CeMM) and the study's lead author. As well as discovering the cause of the disease, the researchers also identified an approved drug which could potentially be used to treat the condition.

TEXTBOOK EXAMPLE OF PERSONALISED TREATMENT

The research is therefore a prime example of how studies into even extremely rare diseases – such as those carried out at the Ludwig Boltzmann Institute for Rare and Undiagnosed Diseases (LBI-RUD) – have a significance which goes beyond the directly affected patients. Kaan Boztug, Director of LBI-RUD: "From the discovery of a genetic defect as the origin of a rare disease, then investigating the disease-causing mechanisms, through to the development of a personalised treatment – the process doesn't just benefit the patients in question. We virtually always gain fundamental new insights into the functioning of the human body, which opens up new possibilities for precision medicine."

Study first published in Nature Immunology: RAS-GRP1 deficiency causes immunodeficiency with impaired cytoskeletal dynamics responsive to lenalidomide

International pioneer in the field of rare diseases

The Ludwig Boltzmann Institute for Rare and Undiagnosed Diseases (LBI-RUD) was founded by the Ludwig Boltzmann Institute in collaboration with the Center for Molecular Medicine (CeMM) and St. Anna Kinderkrebsforschung, and started work in 2016. "The expertise that has been bundled together here is unique," said Kaan Boztug, Director of LBI-RUD. "Our institute provides the ideal environment for uncovering the molecular causes of rare diseases – which are mostly genetic – and developing potential targeted therapies based on the findings."

Discovery of new link between Zika and dengue

An international partnership between researchers from MedUni Vienna's Department of Virology, the Institut Pasteur in Paris and Imperial College London has resulted in the discovery of new connections between the Zika and dengue viruses. The groundbreaking research was published in Nature.

he researchers discovered a new antigenic relationship between the dengue and Zika viruses. By analysing crystallographic structures, they identified antibody binding sites which neutralise both viruses very effectively and differ from the binding sites of infection-enhancing antibodies. Franz Xaver Heinz from MedUni Vienna's Department of Virology explained why this is a big step forward: "This opens an unexpected door for the application of new technologies in the development of a universal Zika/dengue vaccine."

OVERLAPPING GEOGRAPHICAL DISTRIBUTIONS

"The current geographical areas affected by the Zika and dengue viruses, which are closely related, overlap considerably. Both viruses are transmitted from person to person by the Aedes aegypti mosquito, although sexual transmission of Zika has also been observed," explained Heinz.

According to the World Health Organization, About 40 percent of the world's population are at risk from the dengue virus.

There are approximately 390 million infections a year, and roughly 96 million of these require medical treatment.

The Zika virus has spread to more than 60 countries and territories.

University Clinic of Dentistry: bioactivation of vitamin D in dental tissue

Oleh Andrukhov from MedUni Vienna's University Clinic of Dentistry has been awarded an Austrian Science Fund (FWF) grant for a stand-alone project titled Vitamin D and immunomodulation by mesenchymal stem cells. Several studies have shown that oral tissues are rich sources of mesenchymal stem cells (MSCs). An important characteristic of these cells is their ability to modulate the immune response. Andrukhov is the Deputy Team Leader of the Competence Center for Periodontal Research and in his project – together with the centre's Team Leader and co-author Xiaohui Rausch Fan – he aims to discover whether vitamin D has an influence on the interaction between MSCs and immune cells, and clarify the possible role of MSCs and vitamin D in the progression of periodontitis, which is one of the world's most common diseases. "Recent studies and our data show that bioactivation of vitamin D might occur in tissue located outside of the kidneys, and particularly in dental tissue," said Andrukhov. "Our preliminary data also shows that vitamin D influences the response of MSCs derived from dental tissue to bacterial components."
World map showing the distribution of the genetic mutations responsible for the artemisinin resistance in malaria parasites. The colours indicate the geographical distribution and strength of resistance: from dark red for regions with a very high proportion of potentially resistant parasites, to dark green, where resistance is yet to be observed.

» Malaria: mapping artemisinin resistance

irtually all currently available malaria treatments are based on a derivative of the drug artemisinin in some way. However, an increasing number of malaria parasites are becoming resistant to artemisinin, particularly in Southeast Asia. An international research group headed by the Pasteur Institute in Cambodia in Phnom Penh, with members in over 50 countries, has drawn up a world resistance map in order to accurately reveal the distribution of resistance. MedUni Vienna and Vetmeduni Vienna both made contributions to the study, which was one of the largest cross-border interdisciplinary projects in the history of malaria research.

A total of around 14,000 samples were examined, with about 700 of these provided by Michael Ramharter (De-

partment of Medicine I and Division of Infectious Diseases and Tropical Medicine) and Harald Noedl (Institute of Specific Prophylaxis and Tropical Medicine), who carry out research focused on Gabon, and on Bangladesh and Ethiopia, respectively. The central finding was that artemisinin resistance is currently concentrated exclusively in Southeast Asia. This new map makes it possible to precisely monitor future developments, identify shifts more rapidly and exercise more control over one of world's most deadly diseases.

Study first published in The New England Journal of Medicine: A Worldwide Map of Plasmodium falciparum K13-Propeller Polymorphisms.



The key to providing the right breast cancer treatment

"Our results clearly show that the key to successful treatment lies in implementing precision medicine approaches. Decisions on treatment should always be made by interdisciplinary expert teams and take the molecular subtype of the disease into account," said Michael Gnant. In other

The Comprehensive Cancer Center (CCC) and Vienna General Hospital received recognition for their excellence in breast

cancer research when top journal The Lancet commissioned Michael Gnant (Head of the Department of Surgery, Head of the Breast Health Center and Deputy Director of the CCC) and Nadia Harbeck (Director of LMU Munich's Breast Center) to write a review of current standards in breast cancer treatment. Their central finding was that breast cancer treat-

ment is one of the areas that is leading the way in personalised treatment of illnesses.

words, personalised or precision medicine has become essential in the treatment of breast cancer. Gnant continued: "It was a great honour that Europe's most influential medical journal asked us to write this paper together with

Nadia Harbeck's team, and shows that our expertise is recognised and in demand on the international stage."

Sights set on lethal fungal infections

Anetwork of researchers from the Institute of Molecular Biotechnology and MedUni Vienna and the University of Vienna's Max F. Perutz Laboratories have discovered a totally new mechanism which could lead to a treatment for life-threatening fungal infections. Blocking the Cbl-b enzyme boosts the immune response to the pathogenic fungus Candida albicans. When Cbl-b was switched off in an animal model, endogenous defence mechanisms were activated which successfully fended off an invasive, and often lethal infection.

"Our research represents the first milestone in the development of a completely new type of treatment for Candida albicans. We succeeded in directing the immune response modulated by Cbl-b for the first time. This innovative treatment method could turn out to be very effective clinically, especially in combination with other currently available methods, which are only able to block the growth of the fungus," said MedUni Vienna's Karl Kuchler, commenting on the research findings. ●

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Fungal infections are among the commonest infections worldwide.

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One in four people suffer from infections of the skin or mucous membrane sometime in their lives.

$\left|\right\rangle$

Infections of the single-celled yeastlike fungus Candida albicans are usually harmless.

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» In breast cancer

treatment, everything's

already revolving around

precision medicine. «

However, fungal infections claim the lives of about 1.5 million people every year.

>>

Fungal infections are becoming an increasingly important part of everyday clinical practice.

» Bacterial diseases: new gel and vaccine

New type of antibiotic gel to prevent contraction of Lyme disease following a tick bite. And: the world's first toxic shock syndrome vaccine tested in a phase I trial. n antibiotic gel containing azithromycin helps to protect against Lyme disease after being bitten by a tick. This was the result of an international multicentre phase II/III trial in which MedUni Vienna's Department of Clinical Pharmacology was heavily involved.

The antibiotic gel was developed by a Swiss pharmaceutical company. Its major benefit is that it has no side effects and could therefore be used to treat children. It is also an extremely simple treatment applied every 12 hours for three days to kill off the Borrelia bacteria. ●

24,000 **Cases** of Lyme disease in Austria every year

200,000 new infections

with the world's most common tick-borne disease in Western Europe every year

If left untreated **the disease**

can lead to serious complications

World's first toxic shock syndrome vaccine

Toxic shock syndrome (TSS) is caused by toxin-releasing bacteria – usually of the Staphylococcus group – and can lead to severe circulatory and organ failure. Researchers from a team led by Bernd Jilma at MedUni Vienna's Department of Clinical Pharmacology, together with the Biomedizinische Forschungsgesellschaft in Vienna, have developed the world's first safe and effective vaccine against the disease and successfully tested it in a phase I trial.

> » Patients are normally immunised for over five years with vaccines like these « Bernd Jilma

The new vaccine was developed from a detoxified Staphylococcus toxin, is injected into the upper arm and works in a similar way to a tetanus vaccine. It will still be years until a vaccine against TSS – a serious illness – can be used in clinical practice, but the researchers are certainly heading in the right direction.

Studies first published in The Lancet Infectious Diseases: Topical azithromycin treatment for the prevention of Lyme borreliosis: a randomised, placebo-controlled, phase 3 efficacy trial

Safety, tolerability, and immunogenicity of a recombinant toxic shock syndrome toxin (rTSST)-1 variant vaccine: a randomised, double-blind, adjuvant-controlled, dose escalation first-in-man trial



Gardens hold greater restorative potential than living rooms

It is no surprise that people say they find their gardens very relaxing. However, in a survey for a MedUni Vienna study, respondents rated gardens as having a significantly greater recuperative effect than their living rooms, balconies or patios. The research group, led by Renate Cervinka from Med-Uni Vienna's Center for Public Health, found that a user's relationship to their garden was very important.

The personal relationship was the crucial factor. People who experience joy in their gardens, appreciate and are satisfied with them are able to use their private green spaces for relaxation and recuperation. The study put forward proposals for measures in the fields of public health, green care and garden therapy. A follow-up study is planned to investigate these findings on the beneficial health effects of gardens in more depth.

Study first published in Urban Forestry and Urban Greening: My garden—my mate? Perceived restorativeness of private gardens and its predictors

Research into relaxation and recuperation has long been concerned with the beneficial health effects of outdoor activities in the natural environment. This recent study carried out by MedUni Vienna's Center for Public Health looked at the factors involved in the restorative effects of private gardens.



The woodland factor

90% of people in Austria visit woodlands in their spare time, half take walks in woods and one in five use them to go on hikes, run or ride their bicycles. Regular trips to the woods contribute to better physical recovery and regeneration, stress relief, a healthy immune system, improved quality of sleep and harmonisation of the central nervous system. Daniela Haluza from MedUni Vienna's Institute of Environmental Hygiene - part of the Center for Public Health - summarises the current state of research into woodlands as recreational spaces: "Satisfying essential physical, spiritual and social needs by spending time in woods generally leads to very positive health effects." Woodlands are also very important spaces for experiential activities and learning, especially for the elderly, young adults and children.

» Vienna is a major world city that is green because it's achievable here. It's much more difficult for mega cities such as Shanghai or Mexico City. « Daniela Haluza



Addiction detectable even after death

In the brains of people with chronic addictive disorders such as heroin addiction, a protein called FosB trans-



forms into DeltaFosB in the reward centre. The change means that owing to the stimulus of the drug, the protein becomes more stable and therefore remains in this region of the brain for longer than it would in its original form – perhaps for many weeks after withdrawal from the drug.

As a result, craving for the stimuli persists; stored in a type of memory function and amazingly detectable even after death. These were the findings of researchers from the Department of Forensic Medicine.

A follow-up project is planned, in collaboration with MedUni Vienna's Institute of Pharmacology and Center for Addiction Research and Science – headed by Harald Sitte – to investigate if and how the activation of Delta-FosB can be prevented to use the findings as a starting point for the development of a treatment which targets the onset of addictive behaviour.

Study first published in Journal of Addiction Research and Therapy: Accumulation of Highly Stable ΔFosB-Isoforms and Its Targets inside the Reward System of Chronic Drug Abusers – A Source of Dependence-Memory and High Relapse Rate?

Greater protection for non-smokers could result in 30% fewer cancer deaths

Lung cancer is responsible for about 1.6 million deaths every year worldwide. Roughly 70% of the world's lung cancer patients are smokers or ex-smokers, and the figure for central Europe is in excess of 80%. Smoking is therefore the disease's key risk factor. On World No Tobacco Day (31 May) Robert Pirker, a cancer expert from MedUni Vienna's and Vienna General Hospital's Comprehensive Cancer Center,

» In the last century, smoking-related illnesses caused over 100 million deaths. That's more people than perished in all of the wars fought during the same period. « Robert Pirker called for increased protection for non-smokers and a redoubling of efforts in the area of smoking prevention. Pirker warned: "If there is no significant change in smoking behaviour across the world, there will be more than a billion deaths this century."

Cigarette consumption can

be controlled relatively easily by means of five key measures, which include raising prices, cracking down on smuggling and increasing the availability of therapy. This was highlighted by MedUni Vienna experts on World No Tobacco Day. "Raising the price of a packet of cigarettes by just one percent above the inflation rate results in a half a percent decrease in cigarette consumption. It is the most effective method of reducing consumption permanently and across the board. This is demonstrated scientifically in research carried out by MedUni Vienna," explained Michael Kunze from the Center for Public Health's Institute of Social Medicine at MedUni Vienna. The other two key measures in controlling cigarette consumption are quickly implementing and strictly enforcing smoking restrictions in eating and drinking establishments and companies, and licensing much safer alternative products for use as nicotine replacement treatments.

Strict avoidance of plastics

A family of five from Styria radically reduced their use of plastics at home for several months. MedUni Vienna environmental medicine experts provided support and analysed urine samples taken at the beginning of the project and then after two months.



»Just switching to mineral water in glass bottles instead of plastic ones results in less environmental damage, for instance.« Hans-Peter Hutter

he study's key finding was that even if you refrain from using plastic products at home as far as possible, a certain degree of exposure to chemicals from the environment is unavoidable. The family started to banish plastics from their home in November 2009, the first experiment of its kind in the world. As far as possible, they replaced their everyday plastic products with plastic-free alternatives – right down to wooden toothbrushes and pig hair brushes. They were also very strict about only eating foods which had not – or only briefly – come into contact with plastics.

A COMPLEX ISSUE

"There are many aspects to the plastics problem: it involves additives such as plasticisers (phthalates) as well as flame retardants, fragrances and dyes. Even tiny concentrations of phthalates can have an impact on essential biological processes like enzyme activity and the hormone system," according to Hans-Peter Hutter from MedUni Vienna's Institute of Environmental Hygiene. "The aim of this human biomonitoring study was to investigate whether strict avoidance would alter internal exposure."

INTERNAL EXPOSURE STILL DETECTABLE

Even if contact with plastics is avoided to the greatest possible extent at home, a certain level of internal exposure remains – which has a minimal impact on health. Hutter commented: "The experiment and study show that there is no way of avoiding this exposure."

CALL FOR TIGHTER CHEMICAL RESTRICTIONS

The environmental medicine experts therefore emphasise that increasing efforts to introduce more restrictive chemicals policies in order to help people avoid plastics in their everyday lives is essential – not only to limit exposure to the various potentially harmful substances, but also to avoid waste and environmental pollution, including microplastic pollution.

Study first published in Environmental Research: Life without plastic: A family experiment and biomonitoring study



A physical training programme implemented by MedUni Vienna to get elderly and frail people moving again produced remarkable results. A study of the intervention was presented at the EPH Conference, Europe's largest public health conference, in November 2016. The event was titled All for Health, Health for All.

he Gesund fürs Leben (Fit for Life) project was initiated by MedUni Vienna's Institute of Social Medicine, together with Wiener Hilfswerk and Sportunion Österreich. It was financed by the Vienna Science and Technology Fund. Trained volunteers regularly visited frail elderly people with impaired nutritional status in their homes, exercising with them and discussing nutrition-related topics. Participants belonging to an active control group received visits which did not incorporate the nutritional or physical interventions.

ACTIVE SOCIAL LIFE IMPORTANT FOR THE PHYSICAL WELLBEING OF ELDERLY PEOPLE

"An active social life and contact with other people are important factors in remaining independent for as long as possible," explained Thomas E. Dorner from the Institute of Social Medicine, who led the study. "We also found that trained volunteers can achieve similar results to healthcare professionals with programmes like this." Since many people suffering from frailty live alone and rarely leave their homes, nutrition and exercise programmes that focus on social support are an effective tool in the prevention and reduction of frailty syndrome.

30 MEDUNI VIENNA PROJECTS SHOWCASED

Altogether, MedUni Vienna presented 30 successful public health projects at the international conference, which was held at the Austria Center Vienna. ●

Public health: a central topic

"At MedUni Vienna we've built up a Center for Public Health, a large centre with very successful interdisciplinary research focuses that is involved in many strong international partnerships. Public health is also an important aspect of the curriculum, starting with several weeks of small-group teaching on the subject in the first year of the medicine degree programme. There are also lectures on public health in year four, and part of the clinical practical year is completed at the Center for Public Health. What's more, MedUni Vienna has been offering its Public Health master's programme, a specialist continuing education course in prevention and health promotion, for over a decade now, as well as a doctoral programme," said Anita Rieder, MedUni Vienna's Vice Rector for Education.

Changing the clocks induces "jetlag"

The clocks go forward by an hour at the end of March every year, marking the beginning of European Summer Time. However, this lost hour can be problematic: it can result in a form of partial jetlag, lasting for six to eight days, for people with an 'evening person' chronobiology, the elderly, and children and adolescents. This is something that MedUni sleep researcher Gerhard Klösch from the Department of Neurology is keen to highlight. From a chronobiological perspective, changing the clocks makes no sense, for winter or summer time. Chronobiology is a field which examines the temporal organisation of physiological processes and repetitive behavioural patterns. Rhythms play a central role in these systems. The MedUni Vienna expert therefore thinks it would be best to stick to a single clock time, and ideally summer time.

» From a chronobiological perspective, changing the clocks is unnecessary. «



Diabetes and gender

International guidelines for the management of type 2 diabetes do not currently take gender into account. This is despite differences between men and women in terms of risk and how they develop and suffer from the disease. Treatment should therefore be gender-specific, as part of a personalised approach. This was the most important finding of a review of gender-specific differences which, in a world first, took a fully holistic approach. The authors were MedUni Vienna researchers Alexandra Kautzky-Willer (2016 Scientist of the Year) and Jürgen Harreiter – both from the Gender Medicine Unit of the Department of Medicine III.

MedUni Vienna plays a leading role in European diabetes research. Crucial to this are its internal interdisciplinary networks and strong international partnerships.

Tick bite treatment

Ticks carry dangerous diseases such as tick-borne encephalitis and Lyme disease. Researchers involved in an ongoing study at MedUni Vienna therefore carry out analyses of the creatures themselves, in addition to examining and treating affected patients. MedUni Vienna's Mateusz Markowicz, who leads the study, explained: "We test the ticks for a variety of pathogens including Borrelia, Rickettsia, Anaplasma and Babesia, as well as other rare. recently discovered pathogens. We also take blood samples from patients to determine whether they have been infected or not." According to the experts from MedUni Vienna's Institute of Hygiene and Applied Immunology and its Center for Pathophysiology, Infectiology and Immunology, the examinations and research will contribute to the process of improving diagnosis and treatment.

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Treating multiple sclerosis with a plant peptide

MedUni Vienna has made a potentially groundbreaking advance in the treatment of multiple sclerosis (MS). Christian Gruber, Research Manager at the Center for Physiology and Pharmacology, and his team, together with a research group led by Gernot Schabbauer and international partners from Australia, Germany and Sweden, demonstrated in an animal model that no further progression of typical clinical signs of MS occurs after treatment with the synthetic plant peptide cyclotide. Gruber commented: "A single dose of the drug, administered orally, brought about a strong improvement in symptoms. No further attacks of the disease were observed. This could significantly slow down the progression of the disease in general."

» The discovery was patented and commercialised by MedUni Vienna's Technology Transfer Office. «

A few months after the study was published, the Swedish company Cyxone was successfully floated on the stock market. The company is developing the discovery made by Christian Gruber – who received the MedUni Vienna Inventor of the Year award for his role in discovering this use of cyclotides as immunosuppressive agents – and Carsten Gründemann of the University



of Freiburg's Medical Center. The discovery was patented and commercialised by MedUni Vienna's Technology Transfer Office (TTO). "We are delighted to achieve such success by licensing a MedUni Vienna patent in this way. It once again proves that the outstanding scientific achievements of our staff can lead to innovative start-ups," explained Michaela Fritz, MedUni Vienna's Vice Rector for Research and Innovation.

Study first published in PNAS: Oral activity of a nature-derived cyclic peptide for the treatment of multiple sclerosis

More TV, more misconception

People who consume a lot of television succumb to popular misconceptions more often and more easily – regardless of their age, educational background or gender. This was the principle finding of a study carried out by MedUni Vienna's Center for Public Health and led by Benedikt Till and Thomas Niederkrotenthaler. 322 people were interviewed about their television consumption, asked if Austria still has the death penalty, and how many people there are on death row in the country. 11.6 percent of those questioned falsely believed that capital punishment was still practiced, and the higher a person's TV consumption, the higher the probability that he or she thought this.

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Study first published in Death Studies: Blurred world view: A study on the relationship between television viewing and the perception of the justice system



Serious illnesses no longer mean the end.

Make the incurable curable by helping us to establish the Center for Precision Medicine.

» FACTS AND FIGURES

27 university hospital departments, three clinical institutes, 12 centres of medical science

5,400 staff

7,900 students

More than 110,000 inpatients

>>>



cpm. center for precision medicine High-performance medicine – how MedUni Vienna is organised

Basic research funding

The major funding bodies in Austrian basic medical research are the Austrian Science Fund (FWF), the Vienna Science and Technology Fund (WWTF), the Medical-Scientific Fund of the Mayor of Vienna, the Anniversary Fund of the Oesterreichische Nationalbank and the EU Commission.

Exploiting the potential of innova-tions

30 patents and 63 ■ technologies were registered by inventors and developers



in 2016. Six patents were granted to MedUni Vienna, and a further eight to partner companies. The Technology Transfer Office (TTO) supports inventors at the Medical University of Vienna with applying for patents and commercialisation of their research outcomes.

Christian Doppler Laboratories

As joint institutions of MedUni Vienna, partners in industry and the Christian Doppler Research Association, Christian Doppler Laboratories form a bridge between basic research and commercial application. In 2016, there were laboratories conducting research in the following areas.

- Molecular Stress Research in Peritoneal Dialysis (head: Klaus Kratochwill; commercial partner: Zytoprotec GmbH)
- Clinical Molecular MR Imaging (head: Siegfried Trattnig; commercial partner: Siemens AG Österreich)
- Innovative Optical Imaging and its Translation to Medicine (head: Rainer Leitgeb; commercial partners: Carl Zeiss Meditec Inc., Exalos AG)
- Complement Research (head: Peter Steinberger; commercial partner: Alexion Pharmaceuticals, Inc.)
- Development of Allergen Chips (head: Susanne Vrtala; commercial partners: Phadia AB, BIOMAY AG, Phadia Multiplexing Diagnostics GmbH)
- Cardiac and Thoracic Diagnosis and Regeneration (head: Hendrik Jan Ankersmit; commercial partner: Aposcience AG)

- Cardio-Metabolic Immunotherapy (head: Thomas Stulnig; commercial partner: Affiris AG)
- Recovery of Extremity Function (head: Oscar Aszmann; commercial partner: Otto Bock Healthcare Products GmbH)
- Medical Radiation Research for Radiation Oncology (head: Dietmar Georg, commercial partners: EBG MedAustron GmbH, PEG MedAustron GmbH, Siemens AG Österreich - Sector Healthcare, Elekta GmbH)
- Ophthalmic Image Analysis (head: Ursula Schmidt-Erfurth, commercial partner: Novartis Pharma AG)
- Ocular Effects of Thiomers (head: Leopold Schmetterer, commercial partner: Croma-Pharma Gesellschaft m.b.H.)

Austrian Science Fund Special Research Programmes (SFB)

MedUni Vienna currently coordinates the following special research programmes that are financed by the Austrian Science Fund (FWF). The university is participating in three further programmes of this kind.

Inflammation and Thrombosis

Project leader: Johannes Schmid, Center for Physiology and Pharmacology

- Myeloproliferative Neoplasms Project leader: Peter Valent, Department of Medicine I
- Strategies for the Prevention and Treatment of Allergies Project leader: Rudolf Valenta, Institute of Pathophysiology and Allergy Research
- RNA Regulation of the Transcriptome Project leader: Michael F. Jantsch
- Transmembrane Transporters in Health and Disease Project leader: Harald H. Sitte, Institute of Pharmacology

External funding revenue from R&D projects

Following a period in which it remained stable, external research funding increased to more than EUR 89.7 million.

Current European Research Council (ERC) grants

ERC starting grants

- Alwin Köhler, NPC GENEXPRESS
- Division of Molecular Biology/Center for Medical Biochemistry, 2011-2016
- Bernhard Baumann, OPTIMALZ Center for Medical Physics and Biomedical Engineering, 2015-2020
- Stephane Ciocchi, ventralHippocampus Division of Cognitive Neurobiology/Center for Brain Research and University of Bern

Consolidator grant

• Igor Adameyko, STEMMING-FROM-NERVE Division of Molecular Neurosciences/Center for Brain Research, 2015-2020

Advanced grants

- Maria Sibilia, TNT-TUMORS
 Institute of Cancer Research, 2016-2021
- Tibor Harkany, Secret-Cells Division of Molecular Neurosciences/Center for Brain Research, 2016-2021
- Giulio Superti-Furga, Game of Gates CeMM and MedUni Vienna

EU projects

In 2016, 57 projects funded under EU framework projects for research were running at MedUni Vienna, of which 18 started that year. A further nine projects funded under other programmes (such as the Innovative Medicines Initiative) were in progress. MedUni Vienna researchers are involved in 15 new EU projects in the highly competitive Horizon 2020 framework programme; one consortium is coordinated by MedUni Vienna.



Successful cooperations

Cooperation agreements with 1,420 partner institutions are at the heart of the global scientific and research network that plays a vital role in MedUni Vienna's success. Almost 60% of all publications by MedUni Vienna researchers are the result of international partnerships, and roughly a fifth of all funding for research and teaching activities comes from sources of independent (external) finance.



At the centre of life sciences research in Austria

MEDAUSTRON

CANCER THERAPY CENTRE

MedUni Vienna plays a central role in life sciences research in Austria. Various research consortiums have links to the university, or are headed or managed by MedUni Vienna experts.

FWF SPECIAL RESEARCH PROGRAMMES (SFB) AND DOCTORAL PROGRAMMES (DK)

CENTER FOR

BIOMARKER

RESEARCH IN MEDICINE

(CBMED)

MESSERLI RESEARCH INSTITUTE OPERATED IN

COOPERATION WITH

VETMEDUNI VIENNA

AND UNIVERSITY

OF VIENNA

CHRISTIAN DOPPLER LABORATORIES OPERATED IN COOPERATION WITH **INDUSTRY PARTNERS**

MAX F. PERUTZ LABORATORIES OPERATED BY UNIVERSITY OF VIENNA AND MEDUNI VIENNA

MEDICAL UNIVERSITY **OF VIENNA**

COLLABORATION IN LUDWIG BOLTZMANN (LB) GESELLSCHAFT CLUSTERS

RESEARCH CENTER FOR MOLECULAR MEDICINE (CEMM)

AND INSTITUTES

COMPLEXITY SCIENCE HUB VIENNA

PhD, doctoral programmes and doctoral research programmes

About 1,400 early stage researchers are currently completing PhD or other doctoral studies at MedUni Vienna, and most are employed by the university on temporary contracts. PhD students are fully integrated into research groups. Their studies lay the foundations for their subsequent research specialisation. On receiving their PhD they already have numerous publications to their name. Admissions to the doctoral research programmes funded by the Austrian Science Fund (FWF) are subject to a two-stage selection process that incorporates international review. The applied medical sciences doctoral programmes provide in-depth training in applied biomedical research.

Thematic PhD programmes

- Cell Communication in Health and Disease (doctoral research programme)
- Endocrinology and Metabolism
- Immunology
- Inflammation and Immunity (doctoral research programme)
- Integrative Structural Biology (doctoral research programme)
- Malignant Diseases
- Medical Informatics, Biostatistics and Complex Systems
- Medical Physics
- Molecular, Cellular and Clinical Allergology (doctoral research programme)
- Molecular Drug Targets (doctoral research programme)
- Molecular Mechanisms of Cell Biology
- Molecular Mechanisms of Cell Signaling
- Molecular Signal Transduction
- Neuroscience
- RNA Biology (doctoral research programme)
- Vascular Biology

Thematic programmes in the Applied Medical Science doctoral programme

- Biomedical Engineering
- Cardiovascular and Pulmonary Disease
- Clinical Experimental Oncology
- Clinical Endocrinology, Metabolism and Nutrition
- Clinical Neurosciences (CLINS)
- Mental Health and Behavioural Medicine
- POeT Program for Organ Failure, Replacement and Transplantation
- Preclinical and Clinical Research for Drug Development
- Public Health
- Regeneration of Bones and Joints

Ludwig Boltzmann Institutes

The Ludwig Boltzmann Gesellschaft is an important partner of MedUni Vienna for externally financed research. Currently, the following Ludwig Boltzmann Institutes (LBI) and Ludwig Boltzmann Clusters (LB Cluster) are located at the university.

- LBI for Rare and Undiagnosed Diseases (Head: Kaan Botztug)
- LBI for Applied Diagnostics (Head: Markus Mitterhauser)
- LBI for Cancer Research (Head: Richard Moriggl)
- LB Cluster for Cardiovascular Research (Head: Johann Wojta)
- LB Cluster for Oncology (Head: Peter Valent)
- LB Cluster for Arthritis and Rehabilitation (Head: Günter Steiner)

Postgraduate continuing education courses and certificate courses

With master's programmes resulting in an MSc, MAS or MBA, as well as certificate courses – and continuing education courses providing certification to practise in a particular field – the parttime postgraduate courses offered by MedUni Vienna cover a wide range of disciplines. Lecturers who are national and international experts as well as partnerships with other top universities and educational institutions guarantee excellent postgraduate training.

Master of Science (MSc)

- Ergonomics and Fitness for Work
- Clinical Research
- Forensic Sciences
- Gender Medicine
- Interdisciplinary Pain Medicine (ISMED)
- Periodontology
- Patient Safety and Health Care Quality
- Prosthodontics
- Psychotherapy Research
- Toxicology
- Traditional Chinese Medicine (TCM)
- Transcultural Medicine and Diversity Care

Master of Public Health (MPH)

• Public Health

Master of Business Administration (MBA)

• Health Care Management (HCM)

Master of Advanced Studies (MAS)

Insurance Medicine

Continuing education courses with certification

- Clinical Trials Assistant
- Medical Hypnosis
- Medical Physics
- Medical Hypnosis for Dental Care

Certificate courses

- Ethical and Legal Aspects of Clinical Research
- Sleep Coaching

Medical Informatics master's programme

The aim of the master's programme in Medical Informatics is to provide students with the professional academic basis needed to design and implement informatics projects in the diverse fields of biomedical research, medicine and health care. Students can choose to specialise in bioinformatics, neuroinformatics, clinical informatics, informatics for assistive technology or public health informatics.

The curriculum focuses on practical, research-related, medical and clinical scenarios, as required. Learning the communication skills needed to tackle such issues in collaboration with scientists from other disciplines and doctors forms a key part of the programme. The Medical University of Vienna offers an ideal environment for this.

Spin-offs and investments

Alumni Club

The Alumni Club is the postgraduate knowledge, dialogue and career platform for all graduates of MedUni Vienna, and junior members in the third phase of the curriculum.

CB Med GmbH – Center for Biomarker Research in Medicine

As well as MedUni Vienna and Graz's three universities, CBmed's shareholders include the Austrian Institute of Technology (AIT) and Joanneum Research, as well as numerous partners in science and industry.

Forensisches DNA-Zentrallabor Wien GmbH (DNA Central Laboratory)

Services include trace analysis and forensic DNA analysis in relation to criminal and parentage investigations.

Josephinum – Medizinische Sammlungen GmbH

The Josephinum is the historic entrance to the Medical University of Vienna. It houses and maintains the university's medical history collections, and operates a museum and exhibitions to make them accessible to the public.

Max F. Perutz Laboratories Support GmbH (MFPL)

Researchers at MFPL work in various areas of life sciences: they investigate the structure of essential cell molecules, as well as these molecules' role in developmental biology and in disease. MFPL is a joint facility with the University of Vienna.

Medical University of Vienna International GmbH (MUVI)

MUVI is an international healthcare consultancy that provides management, knowledge transfer and academic medicine solutions in emerging markets.

Karl Landsteiner Privatuniversität für Gesundheitswissenschaften GmbH

MedUni Vienna is one of the four maintaining bodies of the new Karl Landsteiner University of Health Sciences in Krems.

Universitätszahnklinik Wien GmbH

The University Clinic of Dentistry, a subsidiary of the Medical University of Vienna, has around 400 employees and is one of the largest and most advanced university dental hospitals in Europe.

» Organisational structure

as at 31 December 2016



- 3 clinical institutes
- Laboratory
- Medicine
- Pathology
- Neurology

UNIVERSITY MANAGEMENT • Rectorate

The Rectorate is the university's executive management body.

Prof. Markus Müller, Rector

Dr. Michaela Fritz, Vice Rector for Research and Innovation

Prof. Anita Rieder, Vice Rector for Education Dr. Volkan Talazoglu, Vice Rector for Finance Prof. Oswald Wagner, Vice Rector for Clinical Affairs

www.meduniwien.ac.at/rectorate

• University Council

The University Council is one of the University's three most senior management bodies, alongside the Rectorate and the Senate. Two of the Council's members are appointed by the Senate of the Medical University of Vienna, and two by the federal government. A fifth member is elected by these four members.

Dr. Erhard Busek (Chair) Dr. Elisabeth Hagen Prof. Veronika Sexl Dr. Walter Dorner Prof. Robert Schwarcz www.meduniwien.ac.at/university-council

Senate

The Senate is made up of 13 representatives from among the university's full professors, six representatives of teaching and research staff, one representative of the general university staff and six student representatives, appointed by election or, in the case of student representatives, by delegation in accordance with section 25 Universities Act 2002.

Senate until 30 September 2016

PROFESSORS:

Prof. Michael Gnant (Chair) Prof. Wolfgang Gstöttner Prof. Alexandra Kautzky-Willer Prof. Sylvia Knapp Prof. Renate Koppensteiner Prof. Hubert Pehamberger Prof. Eva Piehslinger Prof. Elisabeth Presterl Prof. Ursula Schmidt-Erfurth Prof. Harald Sitte Prof. Siegfried Trattnig Prof. Rudolf Valenta Prof. Ursula Wiedermann-Schmidt

TEACHING AND RESEARCH STAFF:

Prof. Ivo Volf (First Deputy) Dr. Martin Andreas Prof. Diana Bonderman Dr. Martin Frossard Dr. Regina Patricia Schukro Prof. Rotraud Wieser

STUDENTS:

Johanna Zechmeister Sarah Schober (Second Deputy) Mag. Florian Berndl (until 17 June 2016) Lukas Scheinost (from 17 June 2016) Eren Eryilmaz Carina Borst (until 17 June 2016) Julia Bischof (from 17 June 2016) Florian Pinterits

GENERAL UNIVERSITY STAFF: Gerda Bernhard

CO-OPTED MEMBER – WORKING GROUP ON EQUAL OPPORTUNITIES: Prof. Ulrike Willinger

Senate from 1 October 2016

PROFESSORS. Prof. Michael Gnant (Chair) Prof. Ursula Wiedermann-Schmidt Prof Rudolf Valenta Prof. Elisabeth Presterl (Fourth Deputy) Prof. Klaus Markstaller Prof. Hannes Stockinger Prof. Renate Koppensteiner Prof. Barbara Bohle Prof. Michael Trauner Prof. Angelika Berger Prof. Maria Sibilia Prof. Harald Sitte Prof. Irene Lang* *Currently deputy curriculum director for the Doctoral Programme in Applied Medical Science (N790), PhD programme (N094) and the Medical Informatics master's programme (N066 936), and therefore unable to exercise her mandate due to the regulation on conflicts

Helbich.

TEACHING AND RESEARCH STAFF:

Prof. Diana Bonderman Prof. Ivo Volf Prof. Birgit Willinger Dr. Martin Andreas Dr. Regina Patricia Schukro (First Deputy) Prof. René Wenzl

of interest. The mandate is currently exercised by Prof. Thomas

STUDENTS: Carina Borst Johanna Zechmeister (Second Deputy) Leon Fierek Serkan Asilkan Julia Wunsch Markus Seibt

GENERAL UNIVERSITY STAFF: Gerda Bernhard (Third Deputy)

CO-OPTED MEMBER – WORKING GROUP ON EQUAL OPPORTUNITIES: Prof. Alexandra Kautzky-Willer www.meduniwien.ac.at/senate

COMMITTEES • Arbitration Committee

Chair: Prof. Herbert Watzke (until 14 November 2016, then Deputy Chair), Dr.Anna Sporrer (from 14 November 2016, previously Deputy Chair) www.meduniwien.ac.at/arbitrationcommittee

• Ethics Committee

Chair: Prof. Ernst Singer (until 31 March 2016) Prof. Jürgen Zezula and Dr. Martin Brunner (both from 1 April 2016) www.meduniwien.ac.at/ethics

• Works Council for General University Staff

Chair: Gabriele Waidringer First Deputy Chair: Gerda Bernhard Second Deputy Chair: Helga Kalser www.meduniwien.ac.at/wc-gus

Works Council for Academic Staff Until 6 December 2016

Chair: Dr. Martin Andreas Deputy: Prof. Anita Holzinger Deputy: Dr. Ingwald Strasser

From 6 December 2016

Chair: Dr. Ingwald Strasser Deputy: Dr. Stefan Konrad Deputy: Prof. Michael Holzer Deputy: Prof. Harald Leitich www.meduniwien.ac.at/wc-sus

• Working Group on Equal Opportunities

Chair: Prof. Alexandra Kautzky-Willer First Deputy Chair: Prof. Ulrike Willinger Second Deputy Chair: Irene Bednar www.meduniwien.ac.at/equalopportunities

• Student Union (ÖH Med Wien)

Chair: Johanna Zechmeister First Deputy: Eren Eryilmaz Second Deputy: Lukas Wedrich www.oehmedwien.at (German only)

• Advisory Board for People with Disabilities

Chair: Prof. Richard Crevenna Deputy Chair: Prof. Johannes Wancata www.meduniwien.ac.at/disabilities

Intra-university Data Protection

Commission Chair: Ernst Eigenbauer Deputy Chair: Dr. Markus Grimm www.meduniwien.ac.at/dbc

Medicine Curriculum Director

Prof. Gerhard-Johann Zlabinger Deputy: Prof. Franz Kainberger Deputy: Prof. Werner Horn Deputy: Prof. Anahit Anvari-Pirsch

Dentistry Curriculum Director

Prof. Anita Holzinger Deputy: Prof. Andrea Nell

PhD Programmes Curriculum Director

Prof. Stefan Böhm Deputy: Prof. Irene Lang Deputy: Prof. Harald Trost

• Continuing Education Curriculum Director

Prof. Michael Hiesmayr Deputy: Prof. Henriette Löffler-Stastka

SCIENTIFIC ADVISORY BOARD

This external body advises the MedUni Vienna Rectorate on all matters related to research, with the aim of safeguarding the University's strategic positioning for the long term.

- Frederica Salusto Institute for Research in Biomedicine Bellinzona, Switzerland
- Hedvig Hricak Chair, Department of Radiology Memorial Sloan Kettering Cancer Center New York City, USA
- Joseph Thomas Coyle Professor of Psychiatry and Neuroscience Harvard Medical School
- Fortunato Ciardiello Professor of Medical Oncology Second University of Naples
- Jeroen J. Bax
 Professor of Cardiology, Leiden University

UNIVERSITY DEPARTMENTS

MedUni Vienna's clinical division consists of 27 departments, including three clinical institutes. 12 of these comprise a number of different divisions (in accordance with section 31(4) Universities Act). Departments, institutes and divisions also serve as patient care departments (pursuant to section 7(4) Hospitals Act).

Department of Medicine I

- Head: Prof. Christoph Zielinski
- Division of Oncology
- Division of Hematology and Hemostaseology
- Division of Palliative Medicine
- Division of Infectious Diseases and Tropical Medicine
- Division of Cancer Research (not a patient care department pursuant to section 7(4) Hospitals Act)

Department of Medicine II

Head: Prof. Gerald Maurer (until 30 September 2016) Interim Head: Prof. Irene Lang (from 1 October 2016)

- Division of Cardiology
- Division of Angiology
- Division of Pulmonology

Department of Medicine III

Head: Prof. Josef Smolen

- Division of Endocrinology and Metabolism
- Division of Nephrology and Dialysis
- Division of Rheumatology
- Division of Gastroenterology and Hepatology

Department of Surgery

- Head: Prof. Dr. Michael Gnant
- Division of General Surgery
- Division of Cardiac Surgery
- Division of Thoracic Surgery
- Division of Vascular Surgery
- Division of Transplantation
- Division of Plastic and Reconstructive Surgery
- Division of Pediatric Surgery

Department of Obstetrics and Gynecology

Head: Prof. Peter Wolf Husslein

- Division of Obstetrics and Feto-Maternal medicine
- Division of General Gynecology and Gynecologic Oncology
- Division of Gynecological Endocrinology and Reproductive Medicine

Department of Ear, Nose and Throat Diseases

Head: Prof. Wolfgang Gstöttner

- Division of General Ear, Nose and Throat Diseases
- Division of Speech and Language Therapy

Department of Anesthesia, Critical Care and Pain Medicine

Head: Prof. Klaus Markstaller

- Division of General Anesthesia and Intensive Care Medicine
- Division of Specialist Anesthesia and Pain Medicine
- Division of Cardiothoracic and Vascular Anesthesia and Intensive Care Medicine

Department of Psychiatry and Psychotherapy

Head: Prof. Siegfried Kasper

- Division of Biological Psychiatry
- Division of Social Psychiatry

Department of Pediatrics and Adolescent Medicine

Head: Prof. Susanne Greber-Platzer

- Division of Neonatalogy, Intensive Care Medicine and Neuropediatrics
- Division of Pediatric Cardiology
- Division of Pediatric Pulmonology, Allergology and Endocrinology
- Division of Pediatric Nephrology and Gastroenterology
- Division of Pediatrics with special focus on Pediatric Hemotology-Oncology (St. Anna Children's Hospital)

Department of Dermatology

Head: Prof. Hubert Pehamberger

- (until 1 April 2016)
- Head: Prof. Georg Stingl (from 1 April 2016) • Division of General Dermatology and
- Division of General Dermatology and Dermato-Oncology
- Division of Immundermatology and Infectious Diseases of the Skin

Department of Biomedical Imaging and Image-guided Therapy

- Head: Prof. Christian Herold
- Division of General and Paediatric Radiology
- Division of Cardiovascular and Interventional Radiology
- Division of Neuroradiology and Musculoskeletal Radiology
- Division of Nuclear Medicine

Department of Radiotherapy

Head: Prof. Richard Pötter (until 30 September 2016) Head: Prof. Joachim Widder (from 1 October 2016)

Department of Trauma-Surgery Head: Prof. Stefan Haidu

nead: Prof. Steran hajou

Department of Orthopedics Head: Prof. Reinhard Windhager

Department of Urology

Head: Prof. Shahrokh Shariat

Department of Neurosurgery Head: Prof. Engelbert Knosp

Department of Oral, Maxillary and Facial Surgery Head: Prof. Emeka Nkenke

Department of Emergency Medicine Head: Prof. Anton Laggner

Department of Neurology Head: Prof. Eduard Auff

Department of Physical Medicine and Rehabilitation Interim Head: Prof. Richard Crevenna

Department of Child and Adolescent Psychiatry Head: Prof. Luise Poustka

Department of Psychoanalysis and Psychotherapy Head: Prof. Stephan Doering

Department of Ophthalmology and Optometrics Head: Prof. Ursula Schmidt-Erfurth

Department of Blood Group Serology and Transfusion Medicine Interim Head: Prof. Simon Panzer

Department of Clinical Pharmacology

Interim Head: Prof. Markus Zeitlinger

University Clinic of Dentistry Vienna

(Hospital in the meaning of section 2(1)(7) Hospitals Act) Head: Prof. Andreas Moritz

Department of Hospital Epidemiology and Infection Control

Head: Prof. Elisabeth Presterl

Department of Laboratory Medicine

Head: Prof. Oswald Wagner

- Division of Medical-Chemical Laboratory Diagnostics
- Division of Clinical Microbiology
- Division of Clinical Virology

Institute of Neurology

Interim Head: Prof. Johann Hainfellner

Department of Pathology

Head: Prof. Peter Birner (until 30 September 2016) Head: Prof. Renate Kain (from 1 October 2016)

CENTRES OF MEDICAL SCIENCE

The medical science division is organised into centres and departments. While the departments – like university clinical departments – generally cover a single scientific discipline, the centres are tasked with efficiently combining the priorities of research and teaching, with various disciplines clustered in accordance with international practice

Center for Anatomy and Cell Biology

Head: Prof. Franz-Michael Jantsch

- General Division of the Center for Anatomy and Cell Biology
- Division of Anatomy
- Division of Cell and Developmental Biology

Center for Physiology and Pharmacology

Head: Prof. Michael Freissmuth

- Institute of Vascular Biology and Thrombosis Research
- Institute of Pharmacology
- Institute of Physiology
- Division of Neurophysiology and Neuropharmacology

Center for Public Health

Head: Prof. Anita Rieder

- Division of General and Family Medicine
- Institute of Social Medicine
- Institute of Environmental Hygiene
- Division of Epidemiology
- Institute of Medical Psychology
- Division of Health Economics

Center for Brain Research

Head: Prof. Jürgen Sandkühler

- Division of Neuroimmunology
- Division of Neurophysiology
- Division of Molecular Neurosciences
- Division of Neuronal Cell Biology
- Division of Cognitive Neurobiology
- Division of Pathobiology of the Nervous System

Center for Pathobiochemistry and Genetics

- Head: Prof. Markus Hengstschläger
- Institute of Medical Genetics
- Institute of Medical Chemistry and Pathobiochemistry

Center for Pathophysiology, Infectiology and Immunology

Head: Prof. Hannes Stockinger

- Institute of Pathophysiology and Allergy Research
- Institute of Immunology
- Institute of Specific Prophylaxis and Tropical Medicine
- Institute of Hygiene and Applied Immunology

Center for Medical Physics and Biomedical Engineering Head: Prof. Wolfgang Drexler

Center for Medical Statistics, Informatics and Intelligent Systems Head: Prof. Martin Posch

- General Division of the Center for Medical
- Statistics, Informatics and Intelligent Systems
 Institute of Medical Statistics
- Institute of Medical Statistics
- Institute of Clinical Biometrics
- Institute of Biosimulation and Bioinformatics
- Institute of Medical Information Management
- Institute of the Science of Complex Systems
- Institute of Artificial Intelligence and Decision Support
- Institute of Outcomes Research (from 12 February 2016)

Department of Medical Biochemistry

Part of Max F. Perutz Laboratories, a joint venture of MedUni Vienna and the University of Vienna for research in the field of molecular biosciences. Head: Prof. Graham Warren

- Division of Molecular Biology
- Division of Molecular Genetics

Department of Virology

Deputy Head: Prof. Elisabeth Puchhammer • Division of Applied Medical Virology

Department of Forensic Medicine

Head: Prof. Daniele Risser

Department of Biomedical Research

Head: Prof. Bruno Podesser

- Division of Laboratory Animal Science and Genetics
- Division of Decentralized Biomedical Facilities
- Division of Biomedical Research

ORGANISATIONAL UNITS WITH SPECIAL SERVICE FUNCTIONS

Comprehensive Cancer Center

Head: Prof. Christoph Zielinski

Core Facilities

Head: Prof. Johann Wojta

- Genomics: DNA analysis
- Genomics: genome analysis
- Imaging
- Proteomics
- Cell Sorting

Library

Head: Bruno Bauer

History of Medicine and Historical Collections

Head: Dr. Christiane Druml

Teaching Center

Head: Prof. Gerhard Zlabinger (until 31 March 2016 the Department of Medical Education, headed by Prof. Anita Holzinger)

CENTRAL SERVICES

Biomedical Engineering

Corporate Communications

• Studies and Examinations Department

• Clinical Trials Coordination Centre

• IT Systems and Communications

• Evaluation and Quality Management

Medical University of Vienna | Facts and Annual Report 2016 | Figures

- University Management Office
- Human Resources
- Legal Department

Research Service

• Finance Department

• Facility Management

Gender Mainstreaming

Staff units

Controlling

• Internal Audit

>> Financial statements

I. Statement of financial position as at 31 December 2016

A55E15								
		31 Dece	ember 2016 EUR			31 Decer EUI	mber 2015 R ,000	
A. Fixed assets								
I. Intangible assets								
1. Concessions and similar rights, and licences thereto		940,107.74				1,154		
of which acquired by purchase	940,107.74				1,154			
2. Rights of use		20,000,000.00	20,940,107.74			20,000	21,155	
II. Property, plant and equipment							-	
1. Land, leasehold rights and buildings including buildings on third-party land		15,870,780.69				14,307		
a) of which land value	587,155.00				587			
b) of which building value	959,779.10				1,015			
c) of which investments in third-party buildings and land	14,323,846.59				12,704			
2. Plant and machinery		10,551,997.29				10,595		
3. Scientific literature and other scientific data media		6,918,864.91				6,851		
 Other fixtures and fittings, operating and business equipment 		2,783,898.73				3,079		
5. Advance payments and assets under construction	_	5,609,291.65	41,734,833.27			3,138	37,970	
III. Financial assets							-	
1. Investments in subsidiaries and associates		3,383,650.18				2,884		
2. Loans to subsidiaries and associates		918,727.77				1,722		
 Securities and similar instruments held as fixed assets 		50,000,000.00	54,302,377.95	116,977,318.96		50,000	54,606	113,731
3. Securities and similar instruments held as fixed assets		50,000,000.00	54,302,377.95	116,977,318.96		50,000	54,606	113,73

B.Current assets

AOOETO

	404 84,197 7,912 1,105	84,601	
	84,197 7,912	84,601	
	7,912		
	7,912		
	1 105		
	1,100		
	18,718	27,735	
		6,292	
249,021,907.59		104,422	223,050
1,481,268.31			1,422
	249,021,907.59 1,481,268.31	249,021,907.59	249,021,907.59 104,422 1,481,268.31 1,481,268.31

367,480,494.86

Total Assets

338,203

The 2016 financial statements were given an unqualified audit certificate by auditors Leitgeb, Leonhard und Partner Wirtschaftsprüfung Steuerprüfung GmbH.

LIABILITIES

		31 December 2016 EUR		31 December 2015 EUR ,000	
A. Negative equity					
1. Equity		-8,334,166.31		-8,3	34
2. Net loss		-7,958,078.58	-16,292,244.89	-8,5	65 -16,899
of which loss/profit brought forward	-8,565,474.01			-10,732	
B.Investment grants			31,599,031.96		32,037
C. Provisions					
1. Provisions for severance payments		14,018,007.59		14,1	33
2. Other provisions		142,679,484.97	156,697,492.56	136,3	28 150,461
D. Liabilities					
1. Advances received		124,814,776.77		129,1	09
of which deductible from inventories	78,001,779.22			81,512	
2. Trade payables		10,735,199.75		7,1	98
3. Payables to associates		288,121.19		1,8	60
4. Other liabilities		17,339,763.98	153,177,861.69	17,8	67 156,034
E. Deferred income			42,298,353.54		16,570
Total liabilities			367,480,494.86		338,203

Note regarding equity:

The university's negative equity figure results from the separation of the Medical University of Vienna from the University of Vienna on 1 January 2004 in accordance with the Universities Act 2002. In respect of Austria's constitutional guarantee for institutions and its incorporation into the Universities Act 2002, the federal government's resulting obligations to guarantee the continued existence of universities and to finance MedUni Vienna mean that, in all events, a positive going concern forecast may be given for the Medical University of Vienna. Equity including investment grants was positive as at 31 December 2016.

II. Statement of profit or loss 2016

Nervenue a) Revenue from Rederal Government global budget allocation 990,848,317,97 394,542 b) Revenue from tukion fees 014,723,230 840 c) Rowaue from tukion fees 014,723,230 840 c) Rowaue from tukion fees 047,232,430 47,733 Rowaue from tukion fees 014,65,780,78 1,320 Rowaue from tukion fees comparations by Foderal Government 0,406,780,78 1,320 B) Revenues pursuant section 22 Universities Act 08027,550,202 7,325,60 c) Bornburgements 0,7,43,121,81 1,5,811 of which memories from feetror memories 7,307,274,00 460,556 C) Charge in services rendered to third parties not yet invoiced -3,080,070,07 2,170 C) Charge in services rendered to third parties not yet invoiced 14,982,02 642 C) Charge in services rendered to third parties not yet invoiced 14,982,02 642 c) Charge in services rendered to find assess 14,982,02 10,317 c) Charge in services rendered to find assess 14,982,02 10,317 c) Charge in services rendered to find assess 1,03178,802,057 10,317			2016 EUR	2015 EUR,000
a Revenue from fueland Government global budget allocation 990,944.317,97 984,942 91 Perserue from tuition fees 00,944.317,97 984,942 91 Perserue from tuition fees 00,944.317,97 984,942 91 Perserue from tuition fees 00,944.317,97 91 914,923,83 940 07,773 01,978 01,188 02,773 01,986,992 01,188,982,922,982,922 01,188,982,922,982,922 01,188,982,922,982,922 01,188,982,944,922 01,188,982,944,923,982,982 01,188,982,944,923,982,982 01,188,982,944,923,982,982 01,188,982,944,923,982,982 01,188,982,944,923,982,982 01,188,982,944,923,982,982 01,188,982,944,923,982,982 01,188,982,944,923,982,982 01,188,982,944,923,982,982,92 01,188,982,944,923,982,982 01,188,982,942,942	1 Proven			
a new from resonance of the second se	a) Devenue		200 9/9 217 07	284.042
One of the function free one persistion by Federal Covernment 4.77.233 400 Of Revenue from postgraduate training programmes 1.465,760.78 1.268 Of Revenue from postgraduate training programmes 1.465,760.78 1.268 If Revenue from postgraduate training programmes 1.465,760.78 1.268 If Revenue from footing 2U Iniversities Act 10.380.025.11 11.464.93 If Revenue from footing training programmes 17.743.121.61 15.811 If which revenue and reimbursements 17.743.121.61 15.811 If which revenue from footing income 7.307.294.00 496.356 If change in services rendered to third parties not yet involced -3.669.070.07 2.170 If change in services rendered to third parties not yet involced -14.952.20 542 I income from risposal and revaluation of fixed assets 10.318,802.57 10.312 I income from reversal of investment grootts 10.318,802.57 10.312 I income from reversal of investment grootts 10.318,802.57 10.312 I income from reversal of investment grootts 10.318,802.57 10.312 I invite from materials and consumables -12.881,070.30			014 722 62	
C reserve pursuant output number of programmes 1.49, 77, 79, 840 2, 77, 79, 840 C Revenue pursuant to sanctin 27 Universities Act 80, 875, 502, 24 73, 258 C Revenue pursuant to sanctin 27 Universities Act 17, 79, 840, 785 73, 258 C Revenue pursuant to sanctin 27 Universities Act 17, 79, 98, 90, 785 73, 258 C Revenue pursuant to sanctin 27 Universities Act 17, 79, 98, 90, 785 73, 258 C Revenue pursuant to sanctin 27 Universities Act 17, 79, 98, 90, 785 73, 258 C Revenue pursuant to sanctin 27 Universities Act 17, 79, 98, 90, 785 73, 258 C Revenue pursuant to sanctin 28 Universities Act 17, 79, 98, 90 496, 356 C Revenue from federal ministrike 73, 201, 204, 00 496, 356 C Revenue from federal ministrike 73, 201, 204, 00 496, 356 C Revenue from disposal and revuluation of fixed assets 10, 318, 902, 57 10, 312 C Revenue from disposal and revuluation of fixed assets 10, 318, 902, 57 10, 312 10, 312 C Revenue from meterial of provisions 10, 318, 902, 57 10, 312 10, 312 10, 312 10, 312 10, 312 10, 312 10, 312 10, 312 10, 312 10, 312 11, 737 <td>Di Revenue from tuition fees</td> <td></td> <td>914,723.03</td> <td></td>	Di Revenue from tuition fees		914,723.03	
an reservation run pologination to setting 20 prime reservation to setting 20 prime reservation and resolution of fixed assets 1,269, 002, 78 73,259 Preinfoursements of costs pursuant section 28 Universities Act 16,396,025,11 15,811 of which revenue and reinfoursements 17,769,121,61 15,811 of which revenue from federal ministries 7,301,294,00 496,356 2. Change in services rendered to third parties not yet invoiced -3,669,070,07 2,170 3. Other operating income 14,952,20 542 a) Income from revensus of fine dassets 14,952,20 542 b) Income from revensus of investment grants 10,318,802,677 10,312 of which fram revensus of investment grants 10,318,802,677 10,312 a) Expenditure for materials and consumables and purchased services -4,668,759,727 -3,811 a) Expenditure for materials and consumables -11,737 10,318,802,875 11,326 b) Expenditure for external teaching staff -14,251,070,30 -11,737 c) Cota of averance payments and payments to employee benefits funds -14,251,070,30 -11,737 c) Cota of averance payments and payments to employee benefits funds -14,251,070,30 -11,738 c) Cota of averance paym	c) Revenue from tuition lee compensation by Federal Government		4,721,229.40	4,773
In Prediction pursuant to section 22 Universities Act 0.007/30/2.24 23.29 If Reimbursements of costs pursuant section 28 Universities Act 16,555.052.11 115,459 If Reimbursements of costs pursuant section 28 Universities Act 7,301,294.00	a) Revenue nom postgraduate training programmes		1,405,780.78	
() reminue and enhousements 10,360/26,11 15,360/26,11 15,483 () Other rewrue and enhousements 17,743,121,81 15,811 15,811 of which rewrue from federol ministries 7,301,294.00 96,356 496,356 2. Other coverus and enhousements 11,492.00 96,356 496,356 2. Other coverus of from federol ministries 14,902.00 562,200 662,200 2. Other coveral of provisions 14,902.00 564,200 6,066 () Other reversal of provisions 14,902.03 10,312 10,312 of which from reversal of provisions 10,318,802.57 10,312 10,312 () Expenditure for materials, consumables and purchased services 11,268,709,30 -11,737 () Expenditure for materials, and consumables -12,581,070,30 -11,737 () Expenditure for materials, and consumables -12,581,070,30 -11,737 () Expenditure for materials and consumables -12,581,070,30 -11,737 () Expenditure for materials and yages -12,681,070,30 -11,737 () Expenditure for materials and payments for afficials assigned to the university 73,327,458,75 77,208 () Expenditure for external tasking staff <td>e) Revenue pursuant to section 27 Universities Act</td> <td></td> <td>10.050.005.11</td> <td></td>	e) Revenue pursuant to section 27 Universities Act		10.050.005.11	
g) Uther revenue and reimoursements 17,743,121,61 15,811 of which revenue from federal ministries 7,301,284,00 496,356 2. Change in services rendered to third parties not yet invoiced -3,689,070,07 2,170 2. Other operating income -3,689,070,07 2,170 2. Other operating income -3,689,070,07 2,170 2. Other operating income -4,044,720,39 6,066 2) Other -14,952,20 542 b) Income from reversal of investment grants 10,318,802,57 10,312 of which from reversal of investment grants 10,318,802,57 10,312 2. Expenditure for materials, consumables and purchased services -12,581,070,30 -11,737 a) Expenditure for materials and consumables -12,581,070,30 -11,737 b) Expenditure for materials and consumables -12,581,070,30 -11,737 a) Staff costs -17,239,330,02 -18,648 c) Cost of severance payments for officials assigned to the university 73,327,458,75 71,208 b) Expenditure for external teaching staff -144,171,26 -123 c) Cost of severance payments and payments to employee benefit			17,300,020,11	15,459
or which revenue train reversal of investment grants 7.307,294.00 512,924,700.80 496,356 2. Change in services rendered to third parties not yet invoiced -3,669,070.07 2,170 2. Other operating income 14,952.20 542 a) Income from disposal and revaluation of fixed assets 14,952.20 542 b) income from reversal of provisions 4,044,720.39 6,066 c) Other 10,318,802.57 10,312 12,247 of which from reversal of investment grants 10,318,802.57 10,312 19,395 A. Expenditure for materials, consumables and purchased services -12,581,070.20 -11,727 a) Expenditure for materials and consumables -12,581,070.20 -11,727 b) Expenditure for materials and consumables -4,658,259.72 -3,911 c) Cost of severance gayments for officials assigned to the university 73,327,458.75 71,208 b) Expenditure for external teaching staff -4,458,756 71,208 c) Otost of severance gayments to employee benefits funds -4,271,081.18 -5,770 of which refunds to the Foderal Government for officials assigned to the university 136,962.64 98 c) Otost of severance gayments to employee benefits funds <td< td=""><td>g) Other revenue and reimbursements</td><td>7.001.00/.00</td><td>17,743,121.61</td><td></td></td<>	g) Other revenue and reimbursements	7.001.00/.00	17,743,121.61	
A Begediture for materials and consumables and purchased services 10,318,802,57 11,581,270,30 a) Income from disposal and revaluation of fixed assets 14,952,20 542 b) Income from disposal and revaluation of fixed assets 14,952,20 542 b) Income from reversal of provisions 0,044,720,39 6,068 of which from reversal of investment grants 10,318,802,57 10,312 of which from reversal of investment grants 10,318,802,57 10,312 a) Expenditure for materials, consumables and purchased services 11,2581,070,30 -11,737 b) Expenditure for materials and consumables 112,581,070,30 -11,737 b) Expenditure for purchased services -4,658,259,72 -3,911 c) The foot services -112,581,070,30 -11,737 b) Expenditure for materials, consumables -12,581,070,30 -11,737 b) Expenditure for purchased services -12,581,070,30 -11,737 c) Cost of severance payments and payments to employee benefits funds -14,271,081,18 -12,570 of which refunds to the Federal Government for officials assigned to the university 136,962,64 98 c) Cost of severance payments and payments to employee benefits funds -4,658,754,72 -7,653 of which refunds to the Federal Government for officials assigned to the university 136,962,64 98	of which revenue from federal ministries	7,301,294.00		
2. Change in services rendered to third parties not yet invoiced -3,680,070.07 2,170 3. Other operating income			512,924,700.80	496,356
A Other operating income a) Income from disposal and revaluation of fixed assets 4,4,4952.20 542 b) Income from reversal of provisions 4,044,720.39 6,066 c) Other 14,582,70.93 12,787 of which from reversal of investment grants 10,318,802.57 70,312 is Expenditure for materials, consumables and purchased services 11,2581,070.30 -11,737 a) Expenditure for materials, consumables and purchased services -12,581,070.30 -11,737 b) Expenditure for materials and consumables -12,581,070.30 -11,737 c) Expenditure for materials and consument for officials assigned to the university 73,327,458,75 71,208 c) Clost of severance payments and payments to employee benefits funds -4,271,061,18 -5,770 of which refunds to the Federal Government for officials assigned to the university 136,962,64 98 -64,216 of which refunds to the Federal Gover	2. Change in services rendered to third parties not yet invoiced		-3,669,070.07	2,170
a) Income from disposal and revaluation of fixed assets a) Income from disposal and revaluation of fixed assets a) Income from reversal of provisions c) Other of which from reversal of provisions c) Other of which from reversal of investment grants a) Expenditure for materials, consumables and purchased services a) Expenditure for materials, and consumables b) Expenditure for materials and consumables b) Expenditure for materials and consumables b) Expenditure for materials and consumables c) -12,581,070.30 c) -11,737 c) -11,64 c)				
a) Income from reversal of provisions 0.062 b) Income from reversal of provisions 0.066 c) Other 14,582,570.33 12,787 of which from reversal of investment grants 10,318,802.57 10,312 a) Expenditure for materials, consumables and purchased services 11,737 -3,911 a) Expenditure for materials, consumables -12,581,070.30 -11,737 b) Expenditure for materials and consumables -4,658,259.72 -3,911 b) Expenditure for materials and consumables -17,239,330.02 -15,648 c) Staff costs -117,239,330.02 -15,648 a) Staff costs -296,250,125.83 -280,660 of which refunds to the Federal Government for officials assigned to the university 73,327,458.75 71,208 b) Expenditure for external teaching staff -144,171.26 -123 c) Cost of severance payments and payments to employee benefits funds -4,658,7344.72 -7,853 of which refunds to the Federal Government for officials assigned to the university 138,962.64 98 d) Ocst of pensions -8,887,344.72 -7,853 of which refunds to the Federal Government for officials assigned to the university 138,962.64 98 <t< td=""><td>a) Income from disposal and revaluation of fixed assets</td><td></td><td>1/, 952 20</td><td>5/12</td></t<>	a) Income from disposal and revaluation of fixed assets		1/, 952 20	5/12
Control revealed of provisions Control revealed of provisions <thcontent provisions<="" th=""> Control revealed of</thcontent>	h) Income from reversal of provisions		4 044 720 39	6.066
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of which refunds to the Federal Government for officials assigned to the university73,327,458.7571,208b) Expenditure for external teaching staff-144,171.26-123c) Cost of severance payments and payments to employee benefits funds-4,271,061.18-5,770of which refunds to the Federal Government for officials assigned to the university136,962.6498d) Cost of pensions-8,687,344.72-7,853of which refunds to the Federal Government for officials assigned to the university403,036.84404e) Social security contributions and other pay-related contributions-69,379,249.93-64,216of which refunds to the Federal Government for officials assigned to the university17,382,298.3117,598f) Other employee benefits-3,002,982.62-11,684security contributions-3,002,985.54-370,306	a) Salaries and wages		-296,250,125.83	-280,660
b) Expenditure for external teaching staff123c) Cost of severance payments and payments to employee benefits funds4,271,061.18123of which refunds to the Federal Government for officials assigned to the university136,962.6498d) Cost of pensions8,687,344.72-7,853of which refunds to the Federal Government for officials assigned to the university403,036.84404e) Social security contributions and other pay-related contributions-69,379,249.93-64,216of which refunds to the Federal Government for officials assigned to the university17,382,298.3117,598f) Other employee benefits-3,002,982.62-11,684-370,306-381,734,935.54-370,306	of which refunds to the Federal Government for officials assigned to the university	73,327,458.75		71,208
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of which refunds to the Federal Government for officials assigned to the university136,962.6498d) Cost of pensions-8,687,344.72-7,853of which refunds to the Federal Government for officials assigned to the university403,036.84404e) Social security contributions and other pay-related contributions-69,379,249.93-64,216of which refunds to the Federal Government for officials assigned to the university17,382,298.3117,598f) Other employee benefits-3,002,982.62-11,684-381,734,935.54-370,306	c) Cost of severance payments and payments to employee benefits funds		-4,271,061.18	-5,770
d) Cost of pensions8,687,344.727,853of which refunds to the Federal Government for officials assigned to the university403,036.84404e) Social security contributions and other pay-related contributions69,379,249.9364,216of which refunds to the Federal Government for officials assigned to the university17,382,298.3117,598f) Other employee benefits3,002,982.6211,684370,306	of which refunds to the Federal Government for officials assigned to the university	136,962.64		98
of which refunds to the Federal Government for officials assigned to the university 403,036.84 404 e) Social security contributions and other pay-related contributions -69,379,249.93 -64,216 of which refunds to the Federal Government for officials assigned to the university 17,382,298.31 17,598 f) Other employee benefits -3,002,982.62 -11,684 -381,734,935.54	d) Cost of pensions		-8,687,344.72	-7,853
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of which refunds to the Federal Government for officials assigned to the university 17,382,298.31 17,598 f) Other employee benefits -3,002,982.62 -11,684 -381,734,935.54 -370,306	e) Social security contributions and other pay-related contributions		-69,379,249.93	-64,216
f) Other employee benefits -3,002,982.62 -11,684 -381,734,935.54 -370,306	of which refunds to the Federal Government for officials assigned to the university	17,382,298.31		17,598
-381,734,935.54 -370,306	f) Other employee benefits		-3,002,982.62	-11,684
			-381,734,935.54	-370,306

		2016 EUR	2015 EUR,000
6. Depreciation and amortisation		-19,308,306.39	-19,067
7. Other operating expenses			
a) Taxes other than those under item 13		-796,297.28	-659
b) Reimbursements to hospital operator pursuant section 33 Universities Act		-50,098,130.85	-51,526
c) Other		-43,341,097.21	-43,676
		-94,235,525.34	-95,861
8. Subtotal items 1 to 7		15,379,776.96	17,040
9. Income from financial resources and investments		615,181.04	769
a) of which from write-ups	28,422.44		136
10. Expenditure arising from financial resources and equity holdings		-15,251,886.01	-15,523
a) of which from write-downs	8,917.95		86
b) of which expenditure arising from subsidiaries and associates	15,204,999.01		15,437
11. Subtotal items 9 to 10		-14,636,704.97	-14,754
12. Earnings before tax (sum of items 8 and 11)		743,071.99	2,286
13. Taxes on income and profit		-135,676.56	-119
14. Loss/profit after tax		607,395.43	2,167
15. Loss/profit brought forward		-8,565,474.01	-10,732
16. Net loss		-7,958,078.58	-8,565

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