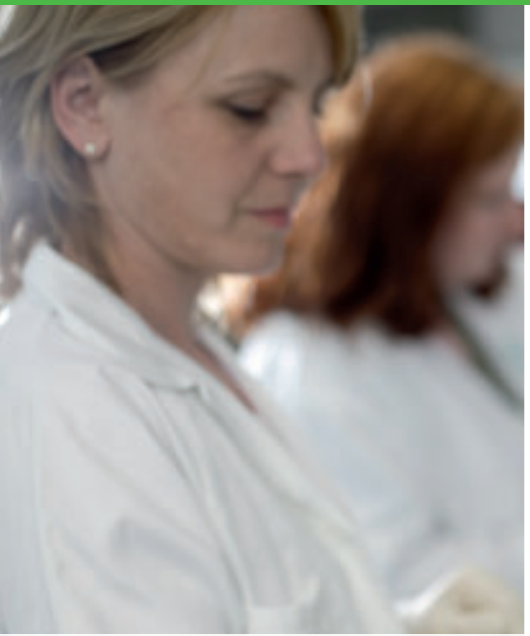
Medical University of Graz



Research at the Medical University of Graz

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Next to providing medical education and first-class medical treatment, research is the core task and competency of medical schools. Medical universities and clinics continually endeavour to gain new insights into diseases and theirs causes and to develop preventive measures and therapies. Scientific research provides the basis for any progress in medicine – be it by exploring physiological processes, decoding genes and their functions, developing new operation techniques or testing new ingredients for pharmaceutical products.

Tradition of successful and internationally renowned research.

The Medical University of Graz has a long tradition of successful and internationally renowned research, which is shown by the fact that three Nobel Prize winners conducted research in its institutes and clinics:

1. **Fritz Pregl**
   1923 Nobel Prize in Chemistry
2. **Julius Wagner von Jauregg**
   1927 Nobel Prize in Medicine
3. **Otto Loewi**
   1936 Nobel Prize in Medicine

The Medical University of Graz is highly committed to scientific medical research – and has been so throughout its long history. In its university clinics and preclinical institutes and centres, researchers employ state-of-the-art scientific methods to search for answers and new approaches, thus contributing continuously to the progress in medicine and biotechnology.

Facts & Figures

- 20 University Clinics, 3 Clinical Facilities, 16 Institutes and 4 centers in the pre-clinical sector
- more than 700 researchers
- more than 100 externally funded research projects ongoing
- approx. 130 clinical trials per year
- more than 1000 publications in scientific journals per year
- cooperation agreements with more than 30 research institutions from the USA to New Zealand

National and international Cooperation

The Medical University of Graz cooperates closely with partners of different fields to optimize research results and to make sure they are implemented for the benefit of society in the shortest possible time.

The staff of the Medical University of Graz publish together with renowned experts from all over the world. More than 100 ongoing research projects are carried out in cooperation with partners and institutions from more than 30 different countries, among them institutions in the USA and in China just as well as many European universities. More than 20 projects are funded within the Framework Programs of the European Union.

A Variety of Research Fields

The Medical University of Graz has a wide spectrum of competencies and research activities ranging from basic to applied to clinical/near-patient research. Researchers are active in a wide variety of different fields which include, among many others:

- Metabolic research with emphasis on diabetes, lipid- and adiposity research
- Neurosciences
- Neoplasia research (cancer research)
- Pregnancy and fertility
- Skin diseases
- Pediatrics and adolescence medicine
- Cardiovascular diseases

Some examples of internationally successful research projects at the Medical University of Graz:

Basic Research

From biological function to diagnosis

The EU-project PEROXISOMES deciphers the biological function of peroxisomes for human health. Although peroxisomes are essential for life, the various functions and dynamics of this organelle in health and disease are only poorly understood. Most inherited peroxisomal disorders in humans have a low incidence but they represent an enormous burden on affected individuals, families and society. A detailed understanding of biogenesis and function of this organelle is required for developing therapeutic strategies. The research within the project should enable the researchers to decipher the molecular mechanism of so far uncharacterized peroxisomal disorders and open up novel diagnostic and therapeutic opportunities. Genome-wide gene expression and biochemical analyses of 14 different mouse models of peroxisomal deficiencies are expected to reveal why differing phenotypes occur even when the same metabolic pathway is disturbed. Mouse genetics are used to evaluate the role of peroxisomes in different cell types during development and in adulthood. Tissue micro array analysis, cDNA chip and quantitative RT-PCR analysis are used to verify the results with the final goal to develop diagnostic tools. The role of peroxisomes in Alzheimer's disease and in chronic metabolic liver diseases is analyzed and the biogenesis and dynamics of this organelle deciphered.

Clinical Research with patients

Quicker diagnosis with multianalyte system

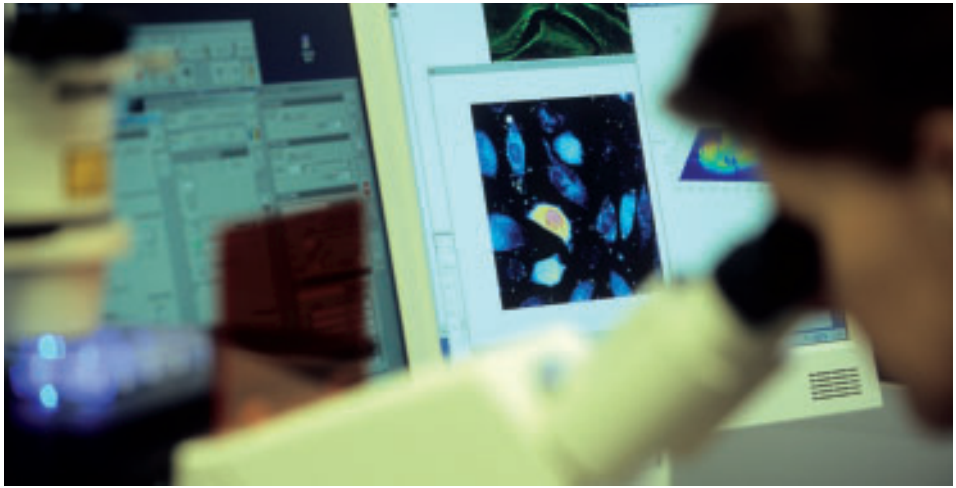
The EU-project Care-Man (Health CARE by Biosensor Measurements And Networking) intends to provide an intelligent diagnostic system based on biosensor technology. New detection capabilities and an integrated sample-handling will address the most common diagnostic problems.

The aim of the project is to improve patient care by introducing a multianalyte system which substitutes sequential measurements of key analytes with a parallel setup. This multianalyte approach will simplify and speed up the diagnostic process. The system is designed for use in hospitals and, in the future, also in doctors' practices or for postoperative home surveillance. Major activities of the project will be related to diagnostic improvements in cardiovascular diseases, cancer, inflammation and sepsis, coagulation disorders, and thyroid disorders.

Clinical studies: Systematic evaluation of results

EBM Review Center: Scientific evaluation of the efficacy of pharmaceuticals

EBM – Evidence Based Medicine – is the well-grounded and judicious use of the current evidence in making decisions about the care of individual patients. The EBM Review Center at the Medical University of Graz is the only EBM Review Center in Austria which carries out extensive independent scientific evaluations of pharmaceuticals. The results serve as basis for decision making in the area of health, support general practitioners in diagnostic and therapeutic decisions and work as „consumer protection tests" in the field of health care. The fact that the EBM Review Center conducts tests for institutions in Austria and abroad shows the high demand for independent scientific evaluations of pharmaceutical drugs.



Study of the effectiveness of conventional blood pressure-lowering drugs:

Although hypertension is a widespread disease in industrialized countries, it is still often treated inadequately. In Austria, one fourth of the population suffers from high blood pressure – reason enough for the EBM Review Center to test and compare the most commonly used medications against hypertension. The efficacy of five pharmaceutical ingredients was analyzed – but not primarily with regard to lowering blood pressure. Instead, their effectiveness was evaluated with respect to those complications of high blood pressure which most strongly affect patients' lives: shortening of life, incidence of heart disease, stroke, cardiovascular diseases and kidney damage, quality of life, therapy satisfaction, frequency of hospitalization and unwanted side-effects.

Research Infrastructure and Research Management

Successful and efficient research needs a supporting and stimulating environment. The Medical University of Graz has established first-class infrastructures and services to support researchers in a targeted and professional way.

Research Infrastructure

In addition to well-equipped university clinics and institutes, the Medical University of Graz has established a **Center for Medical Research (ZMF)** for its clinical sector to provide first-class biomedical infrastructure for both near-patient and basic researchers. Housed within an imposing, purpose-built state-of-the-art building located at the heart of the university hospital campus, the ZMF comprises more than 4000 m2 of well equipped laboratories, office space and excellent core facilities. To ensure their efficient use, access to the infrastructure is granted on a merit basis and for limited periods of time. This flexible and quality-oriented system ensures that excellent working conditions can be guaranteed to researchers.

Core Facilities and Services at the Center for Medical Research:

- CF Molecular Biology
- CF Mass Spectrometry
- CF Microscopy
- CF Flow Cytometry
- Structural Biology
- General and Special Laboratory Facilities
- Clinical Research Center
- Biostatistics
- Audio Visual Unit
- Seminar Rooms

The Medical University of Graz is setting up a biobank which already includes approximately 2.8 million samples and which allows for a huge variety of scientific analyses. In accordance with the aims and principles of the European Research Area it is continuously extended and interlinked with similar institutions in Europe.

Research Management

The Research Management Office offers researchers information, advice and services in all issues related to research funding, technology transfer and IPR management (e.g. patenting). Activities in research management also include fundraising for research projects, support services for international research cooperation, and training programs for researchers and students.

The Medical University of Graz is also a significant player in socially and economically oriented regional initiatives. It is an active member of *Science Park Graz,* a business incubator for university staff and graduates, and of *human.technology.styria,* a cluster of academic institutions and enterprises which aims to back up and develop the excellent results and framework conditions of human technology in the region.

INSTITUTES, UNIVERSITY CLINICS AND CENTERS

Pre-Clinical Sector

- Center for Physiological Medicine
  - Institute of Physiology
  - Institute of Biophysics
  - Institute of Physiological Chemistry
- Center for Molecular Medicine
  - Institute of Molecular Biology and Biochemistry
  - Institute of Pathophysiology and Immunology
  - Institute of Cell Biology, Histology and Embryology
- Center for Theoretical-Clinical Medicine I
  - Institute of Anatomy
  - Institute of Forensic Medicine
  - Institute of Pathology
- Center for Theoretical-Clinical Medicine II
  - Institute of Human Genetics
  - Institute of Experimental and Clinical Pharmacology
  - Institute of Hygiene, Microbiology and Environmental Medicine
- Institute of Social Medicine and Epidemiology
- Institute for Biomedical Research
- Institute for Medical Informatics, Statistics and Documentation
- Institute of Nursing Science

Clinical Sector

- University Clinic of Anesthesiology and Intensive Care Medicine
- University Clinic of Ophthalmology
- University Clinic of Blood Group Serology and Transfusion Medicine
- University Clinic of Surgery
- University Clinic of Dermatology and Venerology
- University Clinic of Obstetrics and Gynecology
- University Clinic of Otorhinolaryngology
- University Clinic of Internal Medicine
- University Clinic of Pediatrics and Adolescence Medicine
- University Clinic of Pediatric Surgery
- University Clinic of Medical Psychology and Psychotherapy
- University Clinic of Neurosurgery
- University Clinic of Neurology
- University Clinic of Orthopedic Surgery
- University Clinic of Psychiatry
- University Clinic of Radiology
- University Clinic of Therapeutic Radiology and Oncology
- University Clinic of Trauma Surgery
- University Clinic of Urology
- University Clinic of Dentistry and Maxillofacial Surgery

Clinical Institutes

- Clinical Institute of Medical and Chemical Laboratory Diagnostics

Joint Facilities

- Clinical Immunology
- Clinical Psychosomatics
- Center for Medical Research

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People – Projects – Publications

Research Information Online, the research portal of the Medical University of Graz, includes a wide spectrum of information about researchers, their know-how and research fields. This information – including also projects, publications, patents and partners – is available at **http://research.meduni-graz.at**