MEDICAL UNIVERSITY OF GDAŃSK

POLAND

Research and Development

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The Medical University of Gdańsk (MUG) focuses on research, which is the key activity of our institution. Innovative research gives us an excellent base for modern teaching. Scientifical excellence of MUG was confirmed by the Polish Ministry of Science and Higher Education in the year 2012 by considering the Faculty of Pharmacy with Subfaculty of Laboratory Medicine the Leading National Research Centre (KNOW) in the pharmaceutical sciences. Our institution is one of six research centers in Poland that received KNOW status in July 2012. The status is associated with funding of the value of over 10 mln EUR for five years. Money will be spent to strengthen scientific and research potential of the Faculty, creation of attractive conditions for research and building a strong, recognizable brand.

The research at MUG is carried out by almost 600 scientists. In years 2008-2012 they produced papers for the overall value of Impact Factor equaled more than 5 000. At the same time we received 74 Polish research grants for the amount of 10 mln EUR, 19 international research grants for overall value of 3 mln EUR and 12 projects financed by European structural funds for almost 8 mln EUR. The number of polish research grants in 2011-2012 classifies our University at 8 position among 121 polish scientific institutions.

Our cooperation with the business world is also developing constantly. Technology transfer is managed by Business Point, a unit established in cooperation with local technological parks (Gdańsk and Gdynia). Development of scientific projects is supported in order to implement the research results into the market. Innovation and

Technology Transfer Office is constantly developing, to enable our scientists protection of their knowledge. At that time the Medical University of Gdańsk owns 25 patents. Like other academic institutions, MUG's policy focuses on creating and disseminating knowledge and optimizing benefits from intellectual assets. The challenging issue is how to commercialize the IP arising from research in order to provide maximum value to the economy, society and the university itself. The key point for developing an effective IP policy was to establish clear internal regulations in regards to IP ownership and a sustainable commercialization process of research.

Since numerous studies shows the greatest creativity and innovation of younger people involved in research projects, the leading idea of our University is including students in the research projects. Cooperation of young open-minded scientists with experienced researchers results in wide range of research projects both national and with international partnership.

The main area of research in the Medical University of Gdańsk are innovative drugs and clinical treatments that would revolutionize current therapies of incurable diseases and improve existing treatments.

The greatest research teams of our University are presented below.

Facts and Figures

SCIENTIFIC-RESEaRCH WORKS AND PUBLICATIONS	research projects held in 2011 in result of grants awarded by National and Foreign Institutions	115
	number of publications in international magazines done by University workers	900
INTERNATIONAL COOPERATION	number of partnership agreements with foreign universities	74
	number of international exchange only agreements	57
LIBRARY	scientific books, including e-books	over 368 thousands
	printed magazines' volumes	over 103 thousands
	special collection units	11 581
	data bases	40
	e–magazines	7207

Department of Haematology and Transplantology

Head: Prof. Andrzej Hellmann, M.D., Ph.D.

Field of scientific activity:

Hematology, coagulation, transplantology. Among others, there are conducted molecular studies in myeloproliferative neoplasms which are applied for formulation of new standards in the targeted therapy for such disorders. The team is also engaged in studies of hematopoietic chimerysm after allogenic bone narrow transplantation.

Main achievements:

Hematopoietic stem cells transplantation (HSCT) mplemented into clinical practice.

The implementation of Treg lymphocytes for the treatment of graft-versus-host disease.

Scientific and service offer:

The Department takes part in clinical trials phase II and III aiming at optimization of the therapy of hematological disorders.

International Projects:

2004: Strengthen and develop scientific and technological excellence in research and therapy of leukemia (CML, AML, ALL, CLL, MDS, CMPD) by integration of the leading national leukemia networks and their interdisciplinary partner groups in Europe **– 6 FP – LeukemiaNet;**

2005: Creation of a multilingual web-based network for interactive continuing education for health professional performing basic haematological tests – **Leonardo da Vinci – e-HEMATimage;**

2008: European Treatment and Outcome Study for CML **– EUTOS.**

Department of Oncology and Radiotherapy

Head**:** Prof. Jacek Jassem, M.D., Ph.D.

Field of scientific activity:

The clinical activity of the department includes treatment of malignant diseases using anticancer agents and radiation. There is also a modern research unit focusing on clinical trials and translation research combining cancer molecular features with clinical behaviour.

Main achievements:

The team has developed and validated a few novel tumour biomarkers (prognostic signatures based on molecular techniques) in lung cancer and breast cancer. Long-term collaboration with University of Colorado resulted in numerous publications in the field of predictive assays for the benefit from targeted therapies in lung cancer.

Scientific and service offer:

The department has its own Clinical Research Unit. The offer includes a wide range of investigations on new anticancer substances and radiotherapy techniques. The unit focuses on the development and validation of prognostic and predictive molecular assays with a real possibility of their implementation into the clinics.

International Projects:

2004: Translating molecular knowledge into early breast cancer management building on the BIG (Breast International Group) network for improved treatment tailoring **– 6 FP – TRANSBIG;**

2006: Trans European Network for Clinical Trial Service **– e-TEN – TENALEA;**

2009: Developing vocational skills in oncology through e-learning **– Leonardo da Vinci – ONCOVIDEOS;**

2012: European Thoracic Oncology Platform **– ETOP: LUNGSCAPE.**

Commercialization and technology transfer:

I. Patent BP/72/09: "Determination of the risk of distant metastases in surgically treated patients with non-small cell lung cancer in stage I-IIIA" (issued by the Patent Office of the Republic of Poland on 18 June 2012; international, US and EU patent pending);

II. Patent: "New markers and the method of determination of the risk of distant metastases in patients with non-small cell lung cancer in stage I-IIIA" application at the Patent Office of the Republic of Poland (P. 394921) and USA Patent Office (serial no. US 13/474708.);

III. Patent #2011/0262,453 "Markers of assessing the susceptibility of cancer to IGF-1R treatment".

Department of Biopharmacy and Pharmacodynamics

Head: Prof. Roman Kaliszan, Ph.D., D.Sc.

Field of scientific activity:

- Pharmaceutical science and related with it biological-chemical science;
- Usage of statistically proceeded information (by QSRR methods), contained in chromatographical data, in medicinal chemistry, molecular pharmacology, analytical chemistry and bioanalysis;
- Theory and practice of chromatographic analysis (HPLC) with its innovative usage for determination of lipophilicity of "drug candidates" and for modeling of drug-receptor interactions.

Main achievements:

- Multivariate statistical analysis of large files of chromatographic data has been a base for proposing the method of predicting typology of chromatographed compounds of pharmacological activity;
- The team have implemented a method of improvement of HPLC separations by the use of ionic liquids;

- Proving abilities to bind beta amyloid by some natural substances can be used in rational guiding for agents search useful in Alzheimer's disease prevention. Furthermore, there has also been found a structural relationship that enables to foresee penetration by xenobiotics of the blood/brain barrier.

Scientific and service offer:

Advanced pharmaceutical analysis by use of UHPLC, HPLC, CE and GC hyphenated with mass spectrometry (MS). Metabolomic analysis in direction of discovery of new biomarkers of cancer and cardiovascular diseases.

International Projects:

- Poland-China cooperation "Development of boronate affinity functionalized materials and their applications in metabolomics" (project no. 35-15, 2013-2015);
- Polish-Flemish cooperation "Study of the prediction possibilities concerning membrane passage of candidate drug molecules from chromatographic retention data and computed molecular descriptors" (BWS/05/03, 2006-2007).

Commercialization and technology transfer:

Patent application no. P. 386218, entitled: "The method of diagnosing genitourinary cancer".

Arterial Hypertension Unit at the Department of Hypertension and Diabetology

Head: Prof. Krzysztof Narkiewicz, M.D., Ph.D.

Field of scientific activity:

Research activity has been focused on the role of the sympathetic nervous system and metabolic factors in regulation of cardiovascular function in physiological and pathological states, including hypertension, coronary artery disease, congestive heart failure, obstructive sleep apnea and chronic kidney disease. Current projects include large clinical trials in hypertension, management of resistant hypertension, genomics and novel biomarkers of cardiovascular risk stratification.

Main achievements:

Discovery of new mechanisms linking impaired autonomic circulatory regulation to high cardiovascular risk. These studies have led to better understanding of the role of sympathetic system in pathogenesis of cardiovascular disease and consequently, to its better prevention and treatment. It has been proved that smoking increases sympathetic system activity, especially in women. Acute myocardial ischemia, during coronary vessels angioplasty has been shown to have direct influence on sympathetic system

activity. All of the projects have used the microneurography method that is unique in enabling direct evaluation of sympathetic nervous system activity.

Scientific and service offer:

The unit takes part in clinical trials aiming at optimisation of hypertension and cardiovascular disease treatment.

International Projects:

2006: Integrating Genomics, Clinical Research and Care in Hypertension **– Ingenious Hypercare – 6 FP;**

2008: European Network for Genetic-Epidemiological Studies: building a method to dissect complex genetic traits, using essential hypertension as a disease model – **HYPERGENES – 7 FP;**

2009: Integrated measurement of arterial function and sympathetic nervous system activity: development, validation and application of a new method – Operational Program Innovative Economy;

2009: Novel biomarkers of cardiovascular risk stratification in hypertensive patients. The CArdiovascular Risk Evaluation In NORTHern Europe project – CARE NORTH – **NMF/MF EOG**;

2012: European Society of Hypertension (ESH) Stroke Survey.

Laboratory of Molecular Bacteriology

Head: Assoc. Prof. Michał Obuchowski, M.D., Ph.D.

Field of scientific activity:

Molecular biology of *Bacillus subtilis* spore development and germination. Use of the spore as universal carrier for peptides and proteins useful in biotechnology industry and medical sciences. Rapid detection of pathogenic bacteria in environmental and medical samples.

Main achievements:

Elucidation of the biological role of the protein phosphatase PrpE during spore formation in *Bacillus subtilis*. Successful use the spores as carriers for enzymes and antigens coming from *Helicobacter pylori* and *Clostridium difficile*. Development of rapid test based on Real-Time PCR for *Acinetobacter baumannii* detection.

Scientific and service offer:

We have some expertise in the variety of the methods useful for study microorganisms at the molecular level.

International Projects:

Spore-based oral vaccine against *Helicobacter pylori* carried on in collaboration with University of Frederic II in Naples, Italy.

Commercialization and technology transfer:

Patent applications:

- Oral vaccine based on the spores of *Bacillus subtilis* against *Helicobacter pylori;*
- Penta-peptide derivatives of the bensoxasol as new antimicrobial and antifungal agents;
- Oral vaccination against *Clostridium difficile* infections;
- Set of the probes for rapid detection of *Acinetobacter baumannii.*

Department of Pharmaceutical Technology

Head: Prof. Małgorzata Sznitowska, M.Pharm., Ph.D.

Field of scientific activity:

- Technology and analysis of various drug formulations;
- Biopharmacy;
- Pharmaceutical practice in community and hospital pharmacies

Main achievements:

- Technology of lipid disperse systems for parenteral and non-parenteral delivery;
- Multiparticulate oral drug formulations;
- Technology of minitablets;
- Taste masking technology;
- Research on mechanism of percutaneous penetration;
- Biopharmaceutical analysis of suppositories.

Scientific and service offer:

Technology of tablets, minitablets and pellets, coating, technology and analysis of parenteral emulsions, skin penetration studies, dissolution testing, lyophilized formulations, oral films.

Commercialization and technology transfer:

Parenteral emulsion with propofol, technology of amorphous paclitaxel, modified release oral formulations, lyophilized vaginal gels.

Clinical Immunology and Transplantology Unit at the Department of Immunology

Head: Prof. Piotr Trzonkowski, M.D., Ph.D.

Field of scientific activity:

Immunology and transplantology, cell therapy, modern methods of immunological system diagnosis among patients after kidney transplantation, search for innovative immunosuppressive drugs

Main achievements:

Implementation into treatment a cell therapy based on T regulatory cells (CD4+CD25+) and for the first time in the world with success, application of ex vivo expanded T regulatory cells in a human therapy. Effects of the flu vaccine on immunological system of the elderly people have been described and there have been proposed a procedural algorithm during mass vaccination.

Scientific and service offer:

Cell products: cell vaccine Tregs – used in immunosuppressive therapy among patients that suffer from graft versus host reaction and Tregs vaccination in diabetes type I.

There is possibility to prepare stem cells of epidermis for curing chronic ulcerations and wounds.

International Projects:

Tolerance induction "In pancreatic islet transplantation as a cure of diabetes type 1" – common project with the University of Chicago, US;
Action to Focus and Accelerate Cell-based Tolerance-inducing Therapies (A FACTT) – COST action.

Commercialization and technology transfer:

The vaccine for the treatment of type 1 diabetes for children – Patent No. 399,447 Polish Patent Office.

Chair and Department of Physiopathology

Head: Prof. Jacek M. Witkowski, M.D., Ph.D.

Field of scientific activity:

The team's main field of interest is research in participation of immunological system functionality disorders in chronic inflammatory diseases and aging processes. The group is one of few in Poland that deal with biogerontology issues – the study of the biological aspects of aging under good and bad health conditions. The newest methods within the range of experimental immunology, molecular and cell biology are used in searching for answers to questions about basic immunological aging mechanisms and pathomechanisms (potentially accelerating aging) of socially important diseases such as rheumatoid arthritis, systemic lupus, chronic kidney disease, Alzheimer's disease and some types of lymphocytic leukemias.

Main achievements:

Showing deficiency or lack of expression of some genes responsible for aging in the lymphocytes of people suffering from rheumatoid arthritis and of healthy elderly people (including the "anti-ageing hormone" Klotho) belongs to the latest internationally published discoveries of the scientific group.

They have also detected presence of receptors for erythropoietin (agent that stimulates red blood cell production) on immunological system cells and proved their important regulative function. Yet another discovery by the group concerns the participation of proteolytic enzymatic system calpaincalpastatin activity disorder in the pathomechanism of chronic and acute of lymphoblastic leukemias. Techniques enabling early diagnose of rheumatoid arthritis, even before typical clinical symptoms appearances, have been elaborated. The latter studies, potentially leading to earlier and more effective treatment, are being the subject of patent application.

Scientific and service offer:

Early, preclinical differential diagnosis of rheumatic diseases, especially rheumatoid arthritis;
Detection of modulatory effects of drugs etc. on lymphocyte proliferation.
Activity evaluation of calpain/calpastatin system in various cell settings.

International Projects:

2011: The possible participation of the activity of calpain-kalpastatyny system in the aging process in human T cells – a comparison of long-lived Polish (Pomeranian) and Italy (Sicily)– **HARMONIA – CALPACENT.**

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International Ph.D. in Medicine

The Medical University of Gdańsk, Faculty of Medicine announces Doctorate Studies in English for domestic and international students. This is a four-years-lasting Ph.D. course, which provides all necessary training to make participating postgraduate students leaders in the clinical and basic medicine. If you are medical doctor, veterinarian, biologist, biotechnologist or you keep equivalent life science graduate diploma, you are invited to take a part in this extraordinary adventure. Doctorate Studies in our university guarantees academic training in each and every branch of modern medicine. From neuroscience and genetics to oncology, surgery and psychiatry. You will join vibrant scientific community devoted to discover secrets of human body and to find new ways to help patients. We will support your efforts to go beyond the borders. Each Ph.D. student has individual tutor from experienced senior staff, who assists and advises throughout the whole Ph.D. studies.

Why come to Gdańsk?

The Medical University of Gdańsk is known from its high quality research. Every year we are ranked among the top research universities in Poland.

The Medical University of Gdańsk is famous from its high quality clinical work. Our new academic hospital is classified as one of the most advanced hospitals in Europe. The University

Clinical Centre offers full coverage of clinical disciplines. It is the most prestigious reference hospital in Northern Poland.

The Medical University of Gdańsk guarantees the best education. Since the introduction of the state medicine exam, our graduate students have been receiving the highest scores among the students from all Polish medicine schools.

The Medical University of Gdańsk supports community skills. Our Faculty offers medicine studies in two languages, Polish or English. Over 200 Polish and 100 international students (mostly from Europe and America) are admitted for medicine studies every year. Doctors from all over the world keep our medicine diplomas.

The Medical University of Gdańsk offers variety of sport and leisure activities supporting your holistic development.

The Medical University of Gdańsk is the place for your Ph.D. studies.

RECRUITMENT

Doctorate Studies are opened for domestic and international students (both EU and non-EU citizens may apply) holding M.D. or M.Sc. diploma or equivalent.

The following forms are required at entrance:

- ✓ Expression of will to be admitted to the Doctorate Studies of the Faculty of Medicine, Medical University of Gdańsk directed to the Rector of the Medical University of Gdańsk
- ✓ Curriculum Vitae (please include the following statement "The Medical University of Gdańsk has my permission to use the information included in this document for the purpose of recruitment to the Doctorate Studies of the Faculty of Medicine, Medical University of Gdańsk)
- ✓ Certified copy of M.D. or M.Sc. diploma or predicted day of your M.Sc. defense
- ✓ Student's book transcript
- ✓ Short description of the scientific project you would like to perform during your Ph.D. studies
- ✓ Copy of publications or other scientific achievements
- ✓ Certificates confirming English language skills
- ✓ Certificates confirming other languages skills
- ✓ Four passport photos

- ✓ **Optional**: if you consider performing full clinical activities together with your Ph.D. studies you must provide us with the official permission to undertake clinical activities as Medicine Doctor (for Polish citizens) or the proof of recognition of your M.D. diploma by Polish authorities (for foreign students)



PROGRAMME

Doctorate Studies last four years. There are around 160 hours of mandatory activities each year. Passing of the exam at the end of each of those activities is necessary to receive ECTS credits and finally Ph.D. degree. Nevertheless, for those with rapid progress in their research projects, there is a possibility to accomplish the course and receive the degree earlier.

The university provides research programmes in all major fields of modern medicine and biomedical studies. We take a part in many national and international scientific projects, which allows our students to realize at least part of their studies in partner universities from all over the world. The major activity of the students is focused on the field of medicine chosen by the student. The main aim of the studies is to deliver novel high quality research presented as your Ph.D. thesis and then as a research presentation during scientific congresses and original papers published in international peer-reviewed journals. This way, we build up your career and support your role as future leaders in your field of medicine. In order to help you achieving these goals, there are doctoral seminars where you can discuss your plans and results. Academic staff attends the seminars as well as takes a part in your daily activities providing you all necessary help.

There is an individual tutor for every Ph.D. student, usually a member of senior staff with Associate Professor degree or higher, who is directly responsible for the development of your research and didactic activities.

Apart from the research in your area of interest, the university provides uniform cluster of subjects for all Ph.D. students to support your interdisciplinary skills.

Having substantial level of education in your field already, you will be also trained to teach pregraduate students.

The details of the programme are as follows:

Ist year	Doctoral Seminars (in the chosen field of medicine)
	Methodology (in the chosen field of medicine)
	Philosophy/ history of medicine/ sociology
	Scientific English
	Medical Statistics
	Bibliographic and scientific information
	Teaching of pregraduate students – didactic training
IInd year	Doctoral Seminars (in the chosen field of medicine)
	Methodology (in the chosen field of medicine)
	Evidence Based Medicine
	Scientific English
	Ph.D. students scientific congress with presentation of your initial results
	Teaching of pregraduate students – didactic training
IIIrd year	Doctoral Seminars (in the chosen field of medicine)
	Ethics in medicine
	Scientific communication
	Scientific publishing
	Teaching of pregraduate students – didactic training
IVth year	Doctoral Seminars (in the chosen field of medicine)
	Current progress in medicine
	Clinical psychology
	Teaching of pregraduate students – didactic training
	Public defense of Ph.D. thesis

TOWARDS PH.D. DEGREE

In order to receive Ph.D. degree you must complete the course and receive necessary ECTS credits. At the end of the course, you must present to the Dean Office your original research results in the form of Ph.D. thesis written under the guidance of your tutor. The thesis is then scored by at least two external reviewers/ experts in your area of medicine. The major features of your work assessed by the experts are the originality, interest to the field and quality of the research presented in the thesis. It usually means that your results should be on the level allowing to publish them in the international peer-reviewed journal or register them as a patent. Having positive comments from the experts, you must pass three additional exams before public defense: on basic discipline related to the field of your research, on philosophy (or ethics or history of medicine) and on foreign language. The final step is the public defense of your Ph.D. thesis in a front of the Faculty Board of senior scientists who grants you the title of Philosophy Doctor.

FEES AND BENEFITS

Entrance exam 1.000 PLN (≈250 Euro)
Tuition fee 20.000 PLN/year (≈5000 Euro/year)
Benefits – health service, access to sport activities

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International Ph.D. in Pharmacy

The Ph.D. in Pharmaceutical Sciences prepare graduates for industrial or other positions based on extensive training in biopharmaceutics, applied pharmacy, hospital pharmacy, medicinal chemistry, pharmacokinetics, pharmacodynamics, molecular biology, toxicology, natural drugs, phytochemistry etc.

The Pharmaceutical Faculty of MUG consists of sixteen Departments and Institutes, the Library, the Medicinal Plant Garden. Among the Faculty's staff there are more than 100 university teachers, including 13 full professors and 19 associate professors. A dozen or so Ph.D. students perform their research within the full-time Ph.D. study program. In 2012 the Pharmaceutical Faculty of MUG was nominated a status of Leading National Research Center ("KNOW") by Polish Ministry of Science and Higher Education. Eligibility for the status included meeting the highest standards of scientific research, the right to award scientific degrees, conducting doctoral studies in the relevant research areas and ensuring a high quality of education.

The objectives of proposed Ph.D. studies program are to increase the in-depth knowledge inside a specific area of research related to drug discovery and development, and other pharmaceutically important fields. The expected benefits of this program is an increased competitiveness of the Ph.D. students on the international pharmaceutical job market.

RECRUITMENT

Doctorate Studies are opened for students (both EU and non-EU citizens may apply) holding M.Sc. diploma or equivalent.

The following forms are required at entrance:

- ✓ Curriculum Vitae (please include the following statement "The Medical University of Gdansk has my permission to use the information included in this document for the purpose of recruitment to the Doctorate Studies of the Faculty of Medicine, Medical University of Gdansk)
- ✓ Certified copy of M.Sc. diploma or predicted day of your M.Sc. defense
- ✓ Student's book transcript
- ✓ Short description of the scientific project you would like to perform during your Ph.D. studies
- ✓ Copy of publications or other scientific achievements
- ✓ Certificates confirming English language skills
- ✓ Four passport photos

PROGRAMME

Depending on individual progress, the Ph.D. degree is normally completed in 4 years (in special cases it can be further extended).

The study program includes compulsory and optional courses.

Total number of hours covered by the program throughout the course of study is equivalent to 45 ECTS including 23 ECTS elective courses within the framework of developing teaching skills or training of at least 15 hours.

Ph.D. students will receive 22 credits in the compulsory classes and 23 credits in the elective courses. Optional courses prepare students for the academic teaching profession, particularly in terms of teaching methods and new technologies in the education of students. Nevertheless, for those with rapid progress in their research projects, there is a possibility to accomplish the course and receive the degree earlier.

Apart from the research in your area of interest, the university provides uniform cluster of subjects for all Ph.D. students to support your interdisciplinary skills.

There is an individual tutor for every Ph.D. student, usually a member of senior staff with Associate Professor degree or higher, who is directly responsible for the development of your research and position academic career development.

Overview of the program of Ph.D. studies

Pharmaceutical Chemistry (10-30 hours; 2-6 ECTS)
Medicinal Chemistry (10-30 hours; 2-6 ECTS)
Biopharmacy (12-24 hours; 2-4 ECTS)
Pharmacokinetics (12-24 hours; 2-4 ECTS)
Pharmacognosy and phytochemistry (10-20 hours; 2-4 ECTS)
Pharmacology (20 hours; 4 ECTS)
Pharmaceutical Technology (10-60 hours; 2-12 ECTS)
Pharmaceutical Sciences (10-30 hours; 2-6 ECTS)
Toxicology (12-24 hours; 2-4 ECTS)
Computational methods used in pharmaceutical sciences (12-24 hours; 2-4 ECTS)

Fees and benefits

Entrance exam 1.000 PLN (≈250 Euro)

Tuition fee 20.000 PLN/year (≈5000 Euro/year)

Benefits – health service, access to sport activities

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