



Faculty of Medicine in Hradec Králové Charles University and University Hospital Hradec Králové *Czech Republic*

Department of Pharmacology

The Department of Pharmacology was founded in 1945 and several distinguished Czech pharmacologists have served as its chairs in the past (e. g., Prof. V. Grossmann, M.D.). Research is an integral part of the mission of the Department of Pharmacology and is primarily aimed at cardiovascular pharmacology and drug-induced cardiotoxicity, drug transporting proteins, biomarkers, and modelling of pharmacokinetics and pharmacodynamics.

Teaching Activities

Teaching of Pharmacology is performed in all study programs organised at the Faculty of Medicine in Hradec Králové. Undergraduate students attend either two-term (medical degree study programs in General Medicine and in Dentistry) or one-term (clinical pharmacology in medical degree students and baccalaureates) courses. Postgraduate (doctoral) study at the department is carried out continuously.

Research Activities

Research is focused on the following main areas (for details see <http://www.lfhk.cuni.cz/farmakol/anglicka/research/research.htm>):

Drug-induced cardiotoxicity and pharmacological cardioprotection.

The research group is focused on the investigation of the cardiotoxic effects of clinically important anticancer drugs - anthracyclines. The particular interest is dedicated to the insight into the molecular and cellular events

responsible for cardiotoxicity onset and development as well as to cardiac remodelling. Furthermore, biomarkers of drug-induced cardiotoxicity (e.g., cardiac troponins) are also within the scope of the research. Strong emphasis is placed on the research of novel experimental cardioprotectants (e.g., iron chelators). Moreover, novel aspects of cardioprotection afforded by the clinically used agent dexrazoxane are also investigated. (Prof. V. Geršl, M.D., Ph.D. - gersl@lfhk.cuni.cz, M. Štěřba, Pharm.D., Ph.D. - sterbam@lfhk.cuni.cz)

Expression and function of drug transporting proteins in the liver and kidneys.

The scope of research includes the evaluation of the expression, regulation, and function of drug metabolizing and transporting proteins in the liver and kidneys and their involvement in the pharmacokinetics and drug interactions of selected clinically important drugs (e.g., azithromycin, amiodarone, methotrexate). The attention is focused mainly on apical ABC (ATP-binding cassette) proteins, MDR1 (multidrug resistance protein 1), and MRP2 (multidrug resistance-associated protein 2), the primary objective being to evaluate their physiology



Molecular pharmacology methods in the examination of tissue expression of drug transporters



Analysis of echocardiographic examination of cardiac function in small laboratory animals

and changes under different pathophysiological conditions (e.g., endotoxemia, cholestasis). (S. Mičuda M.D., Ph.D. - micuda@lfhk.cuni.cz, J. Cermanová, M.D, Ph.D. - cermanovaj@lfhk.cuni.cz)

Biomarkers of inflammation, oxidative and nitrosative stress.

The aim of the clinical research is to develop and optimize noninvasive techniques such as exhaled nitric oxide and the condensate of exhaled breath. The goal of preclinical experiments is the modelling of availability and effects of nitric oxide in selected models of pathological states with the help of methods evaluating enzyme expression and activity (arginases and nitric oxide synthases) and methods for quantification of particular substrates (arginine and derivatives) and products (biological forms of NO). (Assoc. Prof. Ing. J. Chládek, Ph.D. - chladekj@lfhk.cuni.cz)

Modelling of pharmacokinetics and pharmacodynamics in clinical pharmacology.

Research is focused on individual and population modelling of the pharmacokinetics and pharmacodynamics of methotrexate in the treatment of psoriasis and rheumatoid arthritis. A further goal is to increase the therapeutic efficacy and to reduce the toxicity of gentamicine, based on the individualized dosage regimen of the antibiotic indicated for suspected or proven sepsis in neonates. Estimation of a dosage regimen (the maintenance dose) is based on gentamicine (GE) pharmacokinetics established after the first dose. At the same time, covariates (both co-administered drugs and clinical state of neonates) predictive for interindividual differences in GE plasma concentration are being analysed. (Prof. J. Martínková, M.D., Ph.D. - martinko@lfhk.cuni.cz,

Assoc. Prof. Ing. J. Chládek, Ph.D. - chladekj@lfhk.cuni.cz, Ing. M. Hroch - hrochm@lfhk.cuni.cz)

Laboratories

Several highly specialized labs are established at the department. These include a cardiovascular lab (non-invasive – echocardiography, ECG, and invasive – left ventricular catheterization examination of cardiac function), molecular-biology lab (qPCR, cell experiments, Western blot), and an analytical lab (spectrometry, liquid and gas chromatography).

Co-operation

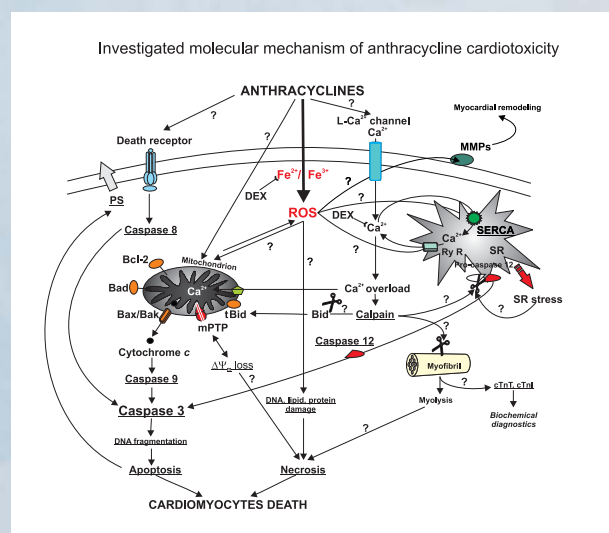
Many research projects and activities are performed in co-operation with other institutions in our country (e.g., Faculty of Pharmacy in Hradec Králové, Faculty of Military Health Sciences in Hradec Králové, The Motol University Hospital in Prague, Na Homolce Hospital in Prague, 1st Faculty of Medicine CU in Prague) and abroad (e.g., Department of Physiology, McGill University, Montreal; Department of Pathology, The University of Sydney, Australia; Division of Respiratory Medicine, University Children's Hospital Zurich, Switzerland).

Outstanding results

Research activities of the department's personnel are represented by the publication of 41 research articles in international journals with impact factors during the last 5 years. Five of these articles were awarded the First Prize by the Czech Society for Experimental and Clinical Pharmacology and Toxicology. The up-to date list of all published articles is available at <http://www.lfhk.cuni.cz/farmakol/anglicka/research/research.htm>.



Detection of exhaled nitric oxide using a chemiluminescence analyzer



Contacts:

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