

RESEARCH GROUP CONTACT >>

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THEMATIC RESEARCH FOCUS >

RESEARCH AREA

- » Cytokinetics
- » Cellular Oncology
- » Cancer Cell Physiology
- » Cell Signalling
- » Lipid Nutrition
- » Cancer Therapy

EXCELLENCE

The group focuses on research in the field of cellular signalling and physiology relevant to cancer and developmental biology. High level quality results have been achieved especially in these areas: clarification of the mechanisms of the action of pharmaceuticals (NSAIDs, cytostatics), environmental pollutants (e.g. polycyclic aromatic hydrocarbons, dioxins) in cooperation with physiological regulators of cytokinetics, including tumor necrosis factor (TNF), tumor growth factor- β (TGF- β), fibroblast growth factor (FGF) and Wnt families of signalling proteins.

MISSION

The goal is to strive for greater application of knowledge based on research topics defined above, in the production programmes of pharmaceutical companies. To create an area proportional to the current options.

DEVELOPED TECHNOLOGIES >

CONTENT OF RESEARCH

- » Lipid dietary compounds in regulation of cytokinetics
- » Growth factors in cancer cell signalling
- » Interaction of lipids and cytokines

- » Effects of anticancer drugs
- » Molecular and cellular mechanisms of toxicity of organic compounds

MAIN CAPABILITIES

The group offers experience in methodologies such as advanced methods of analytical cytometry (flow cytometry, cell sorting, work at both in vitro and in vivo levels) etc. The main research areas are focussed on cancer development, prevention and therapy. We have experience in cooperation with pharmaceutical companies and clinics.

FIELDS OF RESEARCH RESULTS APPLICATION

- » Medicine - new medicaments, methods, products – such as new platinum complexes for effective cancer chemotherapy
- » Special nutritional (lipid) supplements

ALUMNI PROFILE

Our alumni are mostly specialized in cell physiology, molecular biology and biochemistry.

NUMBER OF RESEARCH POSITIONS >

SENIOR RESEARCH STAFF

8

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

14



KEY RESEARCH EQUIPMENT ↘

LIST OF DEVICES

The laboratory contains top quality equipment for cell culture and detection of the cytokinetic parameters at the cellular and molecular levels:

- Flow cytometer FACS CALIBUR Becton Dickinson (BD) with sorting option. Two lasers enable parallel detection of 8 parameters. It is possible to sort population parts of interest according to selected markers and to make further detailed analyses of these cells. CellQuest Pro and ModFit software is used to analyse the data. Together with top high resolution cytometry and confocal microscopy (equipment shared by several groups in the Institute) it creates a complex methodology not only for analyses of cell structure and morphology, but also for analyzing large cell populations especially with regard to parameters of proliferation, differentiation and cell death (including high-speed cell sorter FACS Aria II Sorp)
- Basic facilities for handling and cultivation of cells in vitro: Laminar biohazard boxes (Jouan, Nuaire, Gelaire); CO2 incubators (Jouan, Heraeus, Nuaire); sterilizers; centrifuges (Jouan, Boeco); Water bath (Julabo); Coulter Counter (models ZM, ZF); light microscopes (Zeiss, Jena, Olympus CK40), and fluorescent microscope IX-70 (Olympus) with image analysis software Analysis D and motorised stage (Marzhauser); ELISA reader (Asys Hitech); Absorbance and fluorescence reader Fluostar Galaxy (BMG); Ultralum (Ultralum Inc.) etc.
- Facilities for methods of molecular biology: Electroporator Biorad; Electrophoretic equipments (Biorad, Hoefer); Wet and semidry blotter (Hoefer) etc.
- Special laboratory equipment for radioactive methods
- Special laboratory for PCR-based and molecular cloning techniques Thermocycler (MJ Research); Biohazard box (Faster), Dry incubator (Shel Lab)

BUDGET ↘

TOTAL (MIL. CZK/ MIL. EUR)

8 / 0.32

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

0

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

5

MAIN PROJECTS ↘

2010–2014: New mechanisms of platinum-based drug action as a tool for anticancer therapeutic strategies (Project NT11201 financed by the Ministry of Health, Czech Republic)

2007–2010: Novel anticancer platinum complexes - mechanisms of their action and innovative chemotherapy strategies (Project GA301/07/1557 financed by the Czech Science Foundation)

2005–2009: Lipid nutrition compounds - modulation of their effects and possibilities of practical application (Project 1QS500040507 financed by the Academy of Sciences of the Czech Republic)

ACHIEVEMENTS ↘

- » Optimization of composition and stability of parenteral lipid nutrients in cooperation with Biomedica, Praha, s.r.o.
- » Development of highly efficient cytostatics - platinum (IV) complex with adamantylamine (LA-12) overcoming resistance to cisplatin (now - the first phase of clinical trials has been finished). In cooperation with Pliva-Lachema, a.s., where this compound was originally synthesized, our group contributed in the description of mechanisms of LA-12 action, i.e. the regulation of proliferation, apoptosis and mechanisms of resistance.

MAIN COLLABORATING PARTNERS ↘

COLLABORATION WITH ACADEMIC PARTNERS

- » University of Debrecen, Prof. Janos Szöllösi (Debrecen, HU)
- » Johannes Gutenberg University, Dr. Cornelia Dietrich (Mainz, DE)
- » Cedars Sinai Medical Center, Prof. William R. Wilcox (Los Angeles, US)
- » Max-Planck Institute for Medical Genetics (Berlin, DE)
- » German WNT Forschungsgruppe 1036 (Heidelberg, DE)
- » University of Tübingen (Tübingen, DE)
- » Pavel Jozef Šafárik University in Košice, Prof. Peter Fedoročko (Košice, SK)
- » Faculty of Science, Masaryk University, Prof. Jan Šmarda (Brno, CZ)
- » Veterinary Research Institute, Dr. Miroslav Machala (Brno, CZ)
- » Faculty of Medicine, Palacky University Olomouc, Prof. Zdeněk Kolář (Olomouc, CZ)

COLLABORATION WITH COMPANIES

- » Infusia - Hořátev (CZ)
- » Pliva Lachema (CZ)
- » Biomedica Praha (CZ)

EXPECTATIONS ↘

REQUIREMENTS

Serious interest and cooperation with applicants – producers (from the field of pharmacology, nutrition, dietetics, clinics etc.), preparation and realization of common projects.

OFFERS

Deep knowledge and methodology (in vitro in vivo) in the field of environmental toxicology, lipid nutrition, the effects of platinum cytostatics focused on cancer prevention and therapy.