CURRENT IMTM RESEARCH PROGRAMS :

The Institute of Molecular and Translational Medicine, Faculty of Medicine and Dentistry, Palacky University in Olomouc – The modern, State-of-the-Art, research institution for drug and biomarker discovery, research and development in the Czech Republic.

The Institute of Molecular and Translational Medicine (IMTM, www.imtm.cz), Faculty of Medicine and Dentistry, Palacký University in Olomouc is one of the most influential research infrastructures in the Czech Republic. The IMTM's mission is basic and translational biomedical research with the goal to understand the underlying causes of cancer and infectious diseases and to develop future human medicines and diagnostics. The initiator of the formation was The Palacký University in Olomouc in close partnership with the University Hospital in Olomouc, the Institute of Chemical Technology in Prague and the Institute of Organic Chemistry and Biochemistry, Academy of Sciences of the Czech Republic. Formation of the IMTM was funded via infrastructural project Biomedicine for Regional Development and Human Resources (BIOMEDREG) financed by the European Regional Development Fund and the national budget of the Czech Republic through the Operational Program Research and Development for Innovation.

Unique capabilities

- The flexibility of our drug and biomarker discovery engine components to dynamically accommodate the project needs and create an optimal configuration is one of the greatest assets of the Institute. Strategically, it allows us as well as our academic and industrial partners to maximize drug and biomarker discovery resources for both exploratory and developmental projects. Industrial partners, especially large pharma can capitalize on such a flexible and adaptive research model that may be more difficult to practice in a large organization.
- Cancer research expertise with cutting-edge technology platforms complemented with clinical oncology programs at the University Hospital in Olomouc and other collaborating hospitals.
- Unique tissue/fluid biobanking complemented with clinical data.
- IMTM is the national node for EATRIS (European Advance Translational Medicine Infrastructure).

MOLECULAR BASIS OF DISEASES AND MOLECULAR TARGET

Leaders of the research program:

- Jiří Bártek, MD., PhD.
- Martin Petřek, MD., PhD.

MEDICINAL CHEMISTRY

Leaders of the research program:

- Vladimír Král, PhD., DSc.
- Jan Hlaváč, PhD.

CHEMICAL BIOLOGY AND EXPERIMENTAL THERAPEUTICS

Leaders of the research program:

- Marián Hajdúch, MD., PhD.
- Petr Džubák, MD., PhD.

BIOMARKERS - IDENTIFICATION AND VALIDATION

Leaders of the research program:

- Zdeněk Kolář, MD., PhD.
- Jiří Drábek, PhD.

PHARMACOLOGY AND TOXICOLOGY

Leaders of the research program:

- Pavel Anzenbacher, PhD., DSc.
- Jitka Ulrichová, PhD.,

TRANSLATIONAL MEDICINE

Leaders of the research program:

- Jiří Ehrmann, MD., PhD.
- Vladimír Mihál, MD., PhD.

Research program aims at identification and description of metabolic pathways, signaling athways, genetic and epigenetic changes causing human diseases, particularly focusing cancer, inflammatory and infectious diseases. Results obtained help in selecting a target molecule, most frequently a gene or protein, through which it is possible to design a drug or biomarker and thus influence the disease outcome. Strong expertise is in regulation of DNA damage and repair in normal, inflammatory and cancer cells.

This research program involves synthesis and/or isolation of new organic compounds with potential biological activity with aim to identify new hits, designate new lead compounds and achieve its subsequent optimization. Activities are focused on a synthesis of the specific classes of new organic compounds, derivatization of biologically active compounds for the affinity chromatography applications and on structures modification based on the results of biological testing. Chemical reactions are carried out both in solution and solid-phase. Synthesis of chemical libraries using combinatorial chemistry plays crucial role for effective searching of new hit and lead compounds.

Research program provides high throughput (HTS) screening on a broad diversity of assays and detection platforms. A comprehensive program is responsible for all operational stages in the lead generation pipeline - assay development, modification and validation, optimization of chemical structure of potent and selective hit compounds identified by HTS, and interactive chemistry to optimize a drug development lead. Our HTS platform is designed as an industry strength, highly flexible modular HTS and uHTS. It is one of the largest academic installation of HTS and HCA technologies, including screening in BSL3 and BSL2+ environments, in combination with ionizing irradiation (screening of DNA damage/repair interfering compounds), mass spectrometry based screening, etc. The platform enables screening of entire or cherry-picked parts of our compound bank as well as the screening of collaborator's compounds and libraries.

This program focuses mainly on identification, verification and implementation of new biomarkers for diagnostic, prognostic and predictive purposes. These biomarkers can be applied in situations directly linked to patient care, drug development and research. The ultimate goal is to strengthen the knowledge base in identification and validation of biomarkers on the molecular level. Researchers involved in this program are capable of performing complex genomic, metabolomic and proteomic analyses, complex analysis of biomolecules modulating signal and regulation pathways in normal and tumor/diseased cells. The research program generates a substantial portfolio of candidate biomarkers and further validates their medical relevance in various clinical situations.

Pharmacology and Toxicology research program focuses on elucidation of how and if a biologically active substance is absorbed into the organism, transformed by the organism and whether it is not toxic within the range of therapeutic concentrations and no negative interactions with other concurrently administered substances are observed. Initial step in the research plan is usually identification and optimization of administration route into the body, next is verification of pharmacokinetics linearity by testing dose and time dependence in series with various doses and finding the basic pharmacokinetic parameters using a suitable experimental model. Further, the substance distribution pattern is investigated in order to detect its presence or absence in the most important tissues and organs of experimental model organisms or in clinical trials.

Translational Medicine research program is removing barriers to multi-disciplinary collaboration, attracts attention of researchers to clinically relevant problems and validates discoveries from molecular target, biomarker and drug discovery pipelines to proof-of concept clinical trials. By enabling physicians, chemistries, and pharmacologists to leverage biology technologies, translation medicine program facilitates early detection of cancer and other diseases, increases efficiency in drug development, improves drug efficacy and enables personalized medicine. The program collects and comparatively analyzes clinical information, including data contained in hospital and/or national registries and medical records, laboratory and imaging reports, etc. The research program supports for clinical trials phase I-III in specific patient populations, including healthy volunteers, pediatric population, disease specific populations, etc. The primary interest is put on proof-of-concept clinical trials phase I-IIa, pharmacokinetics and biomarker oriented clinical trials. However we perform also bioequivalence clinical trials in generics and biosimilars.