International Clinical Research Center
of St. Anne’s University Hospital in Brno

The International Clinical Research Centre (ICRC) is a research centre focusing on finding new methods, technologies and medicaments for prevention, diagnostics and treatment of cardiovascular, neurological and selected oncological diseases and disorders. These are among the most widespread diseases and causes of death in modern society. The Centre is an integral part of St. Anne’s University Hospital in Brno (FNUSA).

RESEARCH
Clinical research aims primarily at translational medicine - the development of new technologies, methods, processes and pharmaceuticals enabling effective prevention, early diagnostics and individualised treatment of selected diseases and disorders. It is based on co-operation among experts in international multidisciplinary teams. FNUSA-ICRC has 25 research teams:

Clinical Cardiology
*Development of Novel Strategies for Early Diagnostic and Advanced Treatment of Cardiovascular Diseases and Disorders*
- Acute Coronary Syndromes
- Interventional Cardiac Electrophysiology
- Sleep Medicine
- Kardiovize Brno 2030 (prevention of cardiovascular diseases)

Clinical Neurology
*Development of Novel Strategies for Early Diagnostic and Advanced Treatment of Neurological Diseases and Disorders*
- Stroke (Cerebral Infarction)
- Dementia / Alzheimer’s Disease

Biomolecular and Cellular Engineering
*Exploration of Key Processes for Elimination of Cancer Cells and Selective Manipulation of Stem Cells for Possible Use in Modern Medicine*
- Cancer Plasticity
- Cell and Tissue Regeneration
- Genome Integrity
Inflammation
Medical Chemistry
Protein Engineering
Stem Cells and Cell Signaling

Translational Medicine
*Translating Basic Mechanisms of Development of Disease into Clinical Practice and Vice Versa*
- Cardiovascular System - Mechanobiology
- Cellular and Molecular Immunoreglulation
- Epigenetics in Metabolism and Aging Processes
- Translational Neuroscience and Aging
- Pediatric Oncology Translational Research
- Laboratory Oncology Translational Research

Shared Research Facilities
*Advanced Laboratories for Experimental Medicine and Translational Research*
- Animal Center
- Biomedical Engineering
- Biostatistics
- Cell and Tissue Engineering – cGMP Unit
- Clinical Pharmacology Unit
- Mass Spectrometry

**RESEARCH INFRASTRUCTURE**
FNUSA-ICRC purchased approximately 1,000 new, often state-of-the art, pieces of equipment in 2012-2015 using EU and national grants. Infrastructure available for research includes for example:
- Angiographic line for interventional cardiology
- Optical coherence tomography
- Electrophysiology laboratory
- Stereotaxis magnetic catheter navigation technology for both preclinical and clinical research
- Sleep medicine laboratory
- Laboratories for measurement of highly sensitive biological signals
- Acquisition and monitoring system for synchronized recording of various biological signals
- Neurological “bi-plane” angiography unit
- Automatic cell imaging system with high throughput
- Cellular imaging laboratory
Laboratory of cellular separations and cultures
Laboratory for cytomics, proteomics and genomics
Flow cytometer and cell sorter, magnetic cell separator and automatic cell analyzer
Confocal laser scanning microscope and laser micro dissection microscope
Mass spectrometer and spectrophotometer
Magnetic resonance imaging technologies for preclinical and clinical research
Ultrasound systems for preclinical and clinical research
Clinical pharmacology unit equipped with fully-monitoring beds
CGMP facility for pharmaceutical and biopharmaceutical manufacturing

RESEARCH RESULTS
Research activities of ICRC started in mid-2011 and by early-2017 produced the following results:
- Nearly 1,300 scientific publications, mostly in renowned international scientific journals
- 5 patent applications, of which one patent has already been awarded
- 8 applications for utility model or industrial model, of which 5 have already been registered
- 12 international scientific awards such as the Young Investigator Award, the Best Innovation Award or the Novartis Discovery Award

INTERNATIONAL TEAM
FNUSA-ICRC has attracted researchers and students from Argentina, Austria, Germany, Hungary, Italy, Poland, Portugal, Slovakia, Slovenia and other countries to Brno with the aim to build international research teams. Currently some 30% of FNUSA-ICRC researchers come from abroad. Several international training projects for physicians, scientists, students and healthcare staff have run under FNUSA-ICRC. These include both short- and long-term study stays at prestigious foreign institutions and visits by foreign specialists to Brno to share their experience and participate in research projects. Foreign students of medicine, life sciences and biomedical engineering come to Brno for internships at ICRC.

ACADEMIC PARTNERS
ICRC co-operates with a number of renowned foreign institutions such as the Mayo Clinic, University of California San Diego, University of South Florida (all USA), Korea Brain Research Institute, University of Calgary (Canada), University of Trieste (Italy), Karolinska Institutet and Lund University (both Sweden), and others. Prominent Czech institutions are involved as well. They include Masaryk University, Brno University of Technology, University of Veterinary and
Pharmaceutical Sciences in Brno, the Institute of Biophysics and Institute of Scientific Instruments of the Academy of Sciences of the Czech Republic and others.

FNUSA-ICRC is a partner in several international Horizon 2020 projects, such as:
- CResPace: developing an intelligent pacemaker,
- RESSTORE: regenerative stem cell therapy for stroke,
- NANO-SUPREMI: tracking nano-bioprocesses using super-resolution microscopy techniques
- Rafts4Biotech: Synthetic bacterial lipid rafts to optimize industrial bioprocesses
- RIAT-CZ: stimulation of innovation through synergetic effects of sharing research infrastructures in Austria and the Czech Republic
- ES-Cat: directed protein evolution for synthetic biology and biocatalysis
- My-Health: models to engage migrants, refugees and ethnic minorities in their health, through community empowerment and learning alliance
- Czech-Austrian competence center for mechanobiology in regenerative medicine

FNUSA-ICRC is also a member of several European research networks, such as:
- CZECRIN/ECRIN: Czech national network for academic clinical trials – part of the European ECRIN network
- EATRIS: European infrastructure for translational medicine
- ELIXIR: a distributed infrastructure for life-science information
- ESO-EAST: East European program of the European Stroke Organisation
- European Sleep Apnoea Database
- HBM4EU: European human biomonitoring initiative
- RES-Q: registry of stroke care quality of the European Stroke Organisation

COLLABORATION WITH INDUSTRY
Collaboration with industrial partner including, in particular, pharmaceutical companies, contractual research organisations and manufacturers of medical technologies is also intense. FNUSA-ICRC performs clinical trials of new pharmaceuticals and medical devices and collaborates on joint research with large multinational companies as well as small local start-ups. The centre is also implementing several joint research grants with industrial partners. Furthermore, steps are being taken to commercialise the first results of FNUSA-ICRC research.