Measurement and Data Processing in Medicine

/ Magnetic Resonance and Bioinformatics
/ Institute of Scientific Instruments / Academy of Sciences of the Czech Republic

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

Measurement and data processing in the area of cardiology and neurology

EXCELLENCE

Analysis of repolarization dynamicity, multi-channel digital transmitter/receiver for non-invasive monitoring of hemodynamic parameters. New methods including experimental devices, protocols and mathematical tools for effective non-invasive diagnostics in cardiology and neurology.

MISSION

We want to maintain our position among the world leaders and have research themes in which we are ranked among the top in the world.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

» Cardiovascular diagnostics (the evaluation of variability of blood pressure and pulse frequency, the development of methods for non-invasive diagnostics of cardiovascular diseases with assessment of the extent of risk of acute heart incidents)
» EEG, epilepsy and Parkinson's disease (measurement and analysis of patients suffering pharmaco-resistent epilepsy and Parkinson's disease, the development of methods for analysis of event-related potentials ERP by synchronizing and de-synchronizing)
» Construction of devices and development of software for the above-mentioned topics

MAIN CAPABILITIES

Basic research

» Analysis of repolarization dynamicity (submitted international patent)
» Multi-channel digital transmitter/receiver for noninvasive monitoring of the hemodynamic parameters

Application research + protection forms

» Method of prediction of sudden cardiac death (internationally patented - US, EU)
» Method of measuring the depth of anesthesia (original non-invasive methodology)
» Whole-body impedance cardiography (submitted international patent)

FIELDS OF RESEARCH RESULTS APPLICATION

» Medicine
» Biotechnology
» Scientific instruments

ALUMNI PROFILE

Our alumni are experts in measurement and data processing of biosignals, noise and artifact elimination, coupling analysis and significant parameter definition and construction of electronic devices with high dynamic range.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

5

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

3

KEY RESEARCH EQUIPMENT ↘

LIST OF DEVICES

Experimental medical instruments:

» ECG monitors
» amplifiers of biological signals with high ratio signal/noise,
» acquisition systems
» software for data recording and evaluation in neurology and cardiology
» devices for non-invasive monitoring of the hemodynamic parameters
» whole body multichannel impedance cardiography

BUDGET ↘

TOTAL (MIL. CZK/ MIL. EUR)

20 / 0.8

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

20

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

3

MAIN PROJECTS ↘

2008–2010: Ventricular depolarization and repolarization analysis (project GA102/08/1129 financed by the Czech Science Foundation)

2005–2007: Methods of measurement and evaluation of properties in the regulation of blood circulation (project GA102/05/0402 financed by the Czech Science Foundation)

Analysis of EEG signals scanned at high frequencies from deep brain structures

MAIN COLLABORATING PARTNERS ↘

COLLABORATION WITH ACADEMIC PARTNERS

» St. Anne's University Hospital Brno, ICRC Brno (CZ)
» The University Hospital Brno (CZ)
» Department of Biomedical Engineering, Brno University of Technology (CZ)
» Faculty of Veterinary Medicine, University of Veterinary and Pharmaceutical Science Brno (CZ)
» MAYO Clinic (Rochester, MN, US)
» THEW, University of Rochester (Rochester, MN, US)

COLLABORATION WITH COMPANIES

» M&I Praha (CZ)

EXPECTATIONS ↘

REQUIREMENTS

» Development of cooperation in the framework of established biomedical platforms (network around ICRC),
» Development of contacts with foreign firms,

OFFERS

» Experience and methodology of measurement and data analysis in cardiology and neurology
» Multichannel high dynamic range transmitter/receiver (usable for non-invasive monitoring of hemodynamic parameters)
» New, patented methodology to test the proarrhythmic influence of drugs

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