Institute of Biostatistics and Analyses

/ Faculty of Medicine and the Faculty of Science
/ Masaryk University

RESEARCH GROUP CONTACT

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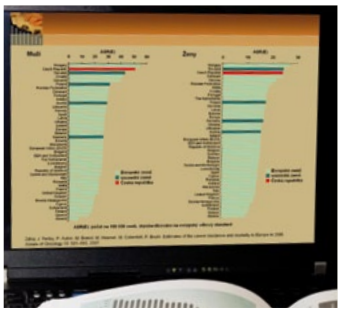

THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Data analysis (clinical data, environmental and ecological data, modern data analysis)
- Information technologies (medical informatics, environmental informatics)
- Clinical trials (development, teaching and application of technologies in the field of clinical trials)

EXCELLENCE

- IBA MU is among the top institutions dealing with data analysis and ICT in medicine within Central Europe
- IBA MU excels in the field of biological and clinical data analysis, organization and management of clinical trials, medical informatics, software development and ICT applications

MISSION

The main mission of IBA, as an academic institution, is performing research in the area of:

- Data analysis – providing data analysis in research maintenance of cross-field focus on both natural science and medicine, achieving publication activities on international level, contributing to the development of modern data analysis
- ICT and software development – development of software for key environmental and clinical projects
- Medical informatics – processing medical registries, information support of nationwide health prevention programmes with reference to serious diseases, especially cancer, cooperation with international institutions
- Clinical trials – development, teaching and application of technologies in the field of clinical trials
- Environmental informatics and modelling - research, teaching and realization of projects in the field of environmental information systems, human and ecological risk assessment
- Teaching activities – application of modern information technologies and data analysis methods in biological and medical study programmes

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

Data analysis
Research is focused on modelling and application of modern information technologies in the analysis of extensive and complex data sets. In particular, we process:

a) Environmental and ecological data- analysis of biodiversity, networks analysis for biological and chemical monitoring

b) Clinical data – especially data from clinical registries, its complex data processing from descriptive statistical analysis to risk factor assessment and multidimensional prognostics models

c) Modern methods of data analysis such as multidimensional data analysis, modelling, data and knowledge mining with the application on biological and clinical data

d) Development, teaching and application of technologies in the field of clinical trials and medical devices as a specific area of medicine

Information and communication technologies
Research in the area of the design, development implementation and administration of software, especially in the medical informatics area The research activities focus on:

a) Methods of data mining in medical databases

b) Artificial intelligence methods

c) Expert systems in medicine and their development

d) Development of a multi-centric solution for data collection (registry)

e) Methods of data mining and subsequent processing of data (data storage)

f) Algorithms for digital signal and image processing.

g) Telemedicine in teaching, telehaematology, development of multimedia and electronic teaching tools

Environmental informatics and modelling
Research, teaching and realization of projects in the field of environmental information systems, human and ecological risk assessment.
These are mainly systems for the collection, aggregation, processing and visualization of data and information about the environment, and systems of environmental management and communication. The division is also concerned with modelling and prediction of environmental issues and their relation to other fields of human activity, such as industry, means of transport or health care. A significant part of the division's research work is the analysis of environmental data and modelling of processes in this area, diversity assessment of biological communities and general analysis of data from environmental biomonitoring. The division is also concerned with the application of geographic information systems in ecological risk assessment.

Clinical trials
Activities are focused on the development, teaching and application of technologies in the field of clinical trials and medical devices as a specific area of medicine Due to the cross-disciplinary nature of all clinical trials projects, the division cooperates with the best clinical centres in the Czech Republic and abroad, and with experts on the respective legislation. As the legal definition of clinical trials projects is very narrow, the division also solves projects which do not meet the legislative definition but require a similar approach (multi-centre data collection, quality assurance and quality control – QA/QC), such as the national preventive (screening) programmes and others.

MAIN CAPABILITIES

The Institute of Biostatistics and Analysis of the Masaryk University provides:

- Data analysis – collection and validation of data from other subjects and performing the role of a service partner. We create automated procedures for specific types of software, research reports and publications, graphical presentations and posters. Our staff also offer consultation services and training in the area of analysis of biological and clinical data
- Development and implementation of medical registries. IBA has developed complex systems for collection, validation and analysis of clinical data using local or web oriented technologies
- Knowledge and background in the areas of environmental modelling, simulation and evolution analysis design and development of models
- Development of information systems – specialists work within the IBA team certified for software development compliant with the methodologies SELECT Perspective, Rational Unified Process and Feature Driven Development
- Looking up information in complex data – complex services in the area of knowledge mining, which include data analysis and design of a suitable algorithm for their processing
- Support of clinical trials with the aim of covering all phases of the project with clinical assessment of treatments and health technologies. We hire a professional team for data management control and monitoring of clinical projects

FIELDS OF RESEARCH RESULTS APPLICATION

- Medicine
- Biology
- Pharmacy
- Environmentalism

ALUMNI PROFILE

All teaching activities converge on the application of medical informatics and of data analysis methods in biological and medical study programmes. Our alumni are specialized in statistical processing, analysis, and interpretation of data from clinical, biological, and environmental studies and experiments. They are also educated in the appropriate field (medicine, biology, environmental sciences) and, therefore, they are capable of full cooperation with experts in designing experiments and data interpretation.

NUMBER OF RESEARCH POSITIONS ↘

SENIOR RESEARCH STAFF

9

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

48

KEY RESEARCH EQUIPMENT ↘

LIST OF DEVICES

- 3 Screw driven testing machine (ZWICK, Instron) for loadings up to 200 kN, temperatures from -198 to +1200 °C, fixtures for tensile, three/four point bend test, compact tension, compression etc. for steels, ceramics, intermetalics and their composites, selection of different extensometers and strain gauges
- 1 hydraulic test machine for loading rates up to 6 m/s
- 3 instrumented impact pendulums with different impact energy and devices for testing different materials
- Instrumented indentation tester (including ball indentation test)
- MTS microtester for loadings from mN to 200 N
- Measuring work-station, universal test and evaluation software, both commercial and developed by laboratory
- Image analysis and digital image correlation techniques for local deformation determinations
- Confocal microscope with built-in atomic force microscope
- For details see http://www.ipm.cz/brittle-fracture-group-facilities.html

BUDGET

TOTAL (MIL. CZK/ MIL. EUR)

66 / 2.64

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

45

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

2.5

MAIN PROJECTS

2007-2013: Tatoo (the FP7 Project sharing the vision of a Single European Information Space for Environment – SISE)

2009-2012: MEFANET – Medical Faculty Network (CZ.1.07/2.4.00/12.0050 funding by ESF and SB)

2010-2012: IKTA partnership and network (CZ 1.07/2.4.00/12.0046, funding by ESF and SB)

2002- : Mamo.cz: Information background, data collection and analysis for the Czech Breast Cancer Screening Programme (Avon Cosmetics)

2009- : Kolorektum.cz (Information background, data collection and analysis Colorectal Cancer Screening Programme in the Czech Republic, Roche Ltd.)

ACHIEVEMENTS

Articles in international journals:

- Kašpárek, T., Mareček, R., Schwarz, D. Source-Based Morphometry of Gray Matter Volume in Men with First-Episode Schizophrenia. Human Brain Mapping, USA, 31, 2, 300-310, 11 p. ISSN 1065-9471. 2010.
- Mikulík, R., Dušek, L., Hill, M.D., Fulep, E., Grotta, J.C., Ribo, M., Molina, C., Alexandrov, A. Pattern of Response of National Institutes of Health Stroke Scale Components to Early Recanalization in the CLOTBUST Trial. Stroke, 41, 3, 466-470, 5 p. ISSN 0039-2499. 2010.
- Budinská, E., Gelnarová, E., Schimek, M.G. MSMAD: a computationally efficient method for the analysis of noisy array CGH data. Bioinformatics, Oxford University Press, 25, 6, 703-713, 11 p., ISSN 1367-4803. 2009.
- Kubosova K, Komprda J, Jarkovsky J, Sanka M, Hajek O, Dusek L., Holoubek I, Klanova J. Spatially Resolved Distribution Models of POP Concentrations in Soil: A Stochastic Approach Using Regression Trees . Environmental Science & Technology 43, 24, 9230-9236. 2009.
- Pavelka, K., Jarosova, K., Suchy, D., Senolt, L., Chroust, K., Dusek, L., Vencovsky, J. Increasing the infliximab dose in rheumatoid arthritis patients: a randomised, double blind study failed to confirm its efficacy. Annals of the Rheumatic Diseases, 68, 8, 1285 – 1289. ISSN: 0003-4967. 2009.

Publications – books and monographies:

- Dušek, L., et al. Czech Cancer Care in Numbers 2008–2009, Prague, Grada Publishing, a.s., 496 p., ISBN 978-80-247-3244-2. 2009.

Software:

- Schwarz, D., Šnábl, I., Komenda, M., Dusek, L. A single portal platform for sharing and offer of electronic educational content in a network of medical faculties MEFANET ver July 1st 2010. central gateway to MEFANET network

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Charles University in Prague (CZ)
- Palacký University Olomouc (CZ)
- University of West Bohemia (CZ)
- Czech Society for Oncology (CZ)
- Czech Myeloma Group (CZ)
- Czech Society of Cardiology (CZ)
- Czech Rheumatological Society (CZ)
- Czech Hematology Society (CZ)
- University Hospital Brno (CZ)
- Czech Neurosurgical Society (CZ)
- International Society on Thrombosis and Haemostasis (US)

COLLABORATION WITH COMPANIES

- Roche (CH)
- Astra Zeneca (SE, US)
- GSK (GB)
- Novartis (CH)
- Pfizer (US)
- Novo Nordisk (DK)
- Eli Lilly (US)
- IPSEN Pharma (FR)
- Orion Diagnostica (FI)

EXPECTATIONS

REQUIREMENTS

The offer of services by external subjects conforms to the IBA's published offer, its organizational rules and the superior directives of the Masaryk University.

OFFERS

Our institution provides related services, especially in the field of biological and clinical data analysis, organization and management of clinical trials, software development and ICT applications.