
Department of Medical Biophysics

The Institute of Medical Biophysics of the Faculty of Medicine of the Czech Republic has long focused on applied research in several areas close to biomedical engineering and neuroscience. The subject of our interest is the study of the physical properties of new so-called "smart" materials (shape memory materials, biodegradable materials, nanomaterials) in connection with their possible applications in medicine (tissue reinforcements, tissue substitutes, medical devices, etc.). We are also engaged in the development of new diagnostic or therapeutic devices or aids using the latest technologies (3D printing, bed control by vision, orbitoplethysmography, etc.). The research activities of the Institute include the objectification of visual perception and the search for biomarkers for diagnostic use in neuro-ophthalmology. This activity is carried out in a joint team with the staff of the Institute of Pathological Physiology. Research in all the above-mentioned areas is carried out at the level of basic research supported by university Cooperatio grant projects or OPIE projects at national or regional level (ITI Nanobio, Nanomat). In the field of applied research, we use TAČR funds (Gama projects) or direct cooperation with the application sphere (e.g. Ella-CS, Linet, Deymed). In the field of statistics, we deal with the use of statistical methods in medicine, especially in epidemiological studies. A number of projects have international reach and outputs see international cooperation.

Main research topics

- Study of physical properties of new "smart" materials (shape memory materials, biodegradable materials, nanomaterials) for medical applications (tissue reinforcements, tissue substitutes, medical devices, etc.). We use physical, imaging and statistical methods.
- Development of new diagnostic or therapeutic devices or aids using state-of-the-art technologies (3D printing, vision-guided bed control, orbitoplethysmography, etc.).
- Study of the neurophysiology of visual perception using electrophysiology (spontaneous and evoked sensory and cognitive activity), non-invasive current or magnetic stimulation and advanced visual stimulation schemes. The results are applied to applied clinical research.

Scientific research groups

- **Materials:** doc. RNDr. Aleš Bezrouk, PhD. , doc. Ing. Josef Hanuš, CSc., MUDr. Vladimír Mašín, PhD., RNDr. Jiří Záhora, PhD., Mgr. Petr Voda, Ing. Martin Kopeček, MEng, Mgr. Iva Selke Krulichová, PhD.
- **Instrumentation:** prof. Ing. Jan Kremláček , doc. RNDr. Aleš Bezrouk, PhD., Mgr. Petr Voda, Eng. Martin Kopeček, MEng.
- **Neurosciences** (together with the Institute of Pathological Physiology): prof. Ing. Jan Kremláček PhD. , prof. MUDr. Miroslav Kuba , prof. MUDr. Zuzana Kubová, CSc., MUDr. Jana Langrová, PhD., MUDr. Jana Szanyi, PhD., MUDr. Marie Chutná, PhD., MUDr. Lenka Ramešová, MUDr. Jakub Bochnička, RNDr. David Kordek, PhD., Mgr. Petr Voda, Ing. Martin Kopeček, MEng, Ms. Ladislava Kolková, Ms. Jitka Kotlandová.

Achievements

- System for controlling a positioning bed patent (CZ 309229) and utility model (CZ 30188)
- Marmor Award for Clinical Innovation in Visual Electrophysiology