BIOPHYSICAL LABORATORY

BIOMEDICAL CENTER

ABOUT US

Department focuses on issues of influencing, measurement and control of physical quantities, mainly of temperature and pressure. The domain of the workplace is applied research focused mainly on the development, design and prototype construction of instrumentation with focus on medical and laboratory applications.

This department focuses also on the issue of the effect of pressure on technical resources and medical applications. It has available a pressure chamber in which can be experimentally studied hyperbaric oxygen therapy as well as other pathophysiological processes under circumstances of higher pressure and in various composition of environments. Belonging to technical applications, it is possible to study the effect of (various) pressure on the instruments and equipment which size is limited by the chamber's inner space.

MEMBERS

- Jiří Beneš, M.D., Ph.D. – Research Group Leader
- Lukáš Bolek, M.D., Ph.D.
- Jiří Dejmek M.Sc.
- Jiří Růžička, M.D., Ph.D.

WE OFFER

- Consulting services in the development of instrumentation with a focus on medical and laboratory applications, especially in the area of temperature and pressure influencing.
- Consulting services in the field of measurement of temperature and pressure. In a limited range can be performed the measurement and calibration, including calibration of the thermo camera by black body simulator – without certification.
- The integrator for the development of a prototype design of selected instrumentation with a focus on medical and laboratory applications.
- Custom development and construction of prototypes of selected instrumentation with a focus on medical and laboratory applications – without certification.
- Testing, validation and instruments stress testing, testing of biological, food and other materials in a climatic chamber (a combination of changes in temperature, humidity and light – white and UV light) – without certification.
- Technical endoscopy within a distance of 3 meters and a diameter of 4 mm.
- Ultrasonic thickness gauge measurement.
- Measurement of material properties – tensile strength and pressure.

- Direct radiography – transillumination of small objects up to about 10 cm by RTG radiation in the range of 10–35 kV.
- Direct radiography – transillumination of small objects up to about 3 cm by 60 and 70 kV RTG radiation.
- Measurement of absolute and relative density of transparent materials with different gray levels (e.g., X-ray films, etc.).
- Loan of chosen instruments with expert operator.
- Experiment in a hyperbaric chamber – hyperbaric oxygen therapy
- Experiment in a hyperbaric chamber – various composition of environments (e.g. hyperbaric argon)
- Experiment (see above) on the animal model: a mouse, rat, rabbit or a pig
- Experiment (see above) on tissue cell cultures
- Technical services in an increased pressure environment
- Testing of diving instruments
- Testing of technical customizations/adjustments of hyperbaric chambers
- Consultant services

SELECTED PUBLICATIONS

- Růžička J, Štengl M, Bolek L, Beneš J, Matějovič M, Kroužecký A. Hypothermic anticoagulation: testing individual responses to graded severe hypothermia with thromboelastography. Blood Coagulation and Fibrinolysis,23,4,285-289
- Růžička J., Beneš J., Bolek L., Markvartová V.: Biological effects of nobel gasses: Phys Res 2007, 56, S39-44.

PATENTS

- National (CZ) patent. 31. 3. 2009, No. 300266: Method to suppress blood coagulation in the circuit of the device substituting the kidney function and apparatus realizing this method.
- National (CZ) patent. 12. 3. 2010, No. 301580: Ultrasonic probe for liquid temperature measurement.
- National (CZ) patent. 5. 4. 2012, No. 303190: Heat exchanger with a laminarizer.
- US patent. 10.9.2013, No. US 8529489 B2: Method to suppress blood coagulation in the circuit of the device substituting the kidney function and apparatus realizing this method

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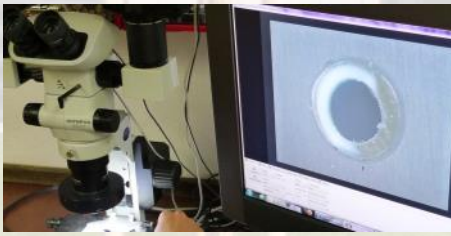

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