



The most versatile NMR spectrometer set in the region.

- An 800 MHz spectrometer with a helium-cooled cryoprobe (a state-of-the-art instrument for solving biological problems).
- A 600 MHz spectrometer for studying organic and inorganic solids.
- A 500 MHz NMR spectrometer for fully automated routine analysis.
- A 300 MHz spectrometer for automated routine analysis.
- 200 MHz and 360 MHz solid-state NMR spectrometers for materials research.
- Unique accessories enable NMR studies across an extensive temperature range (10 K to 1100 K).
- Capability to work with highly sensitive substances and samples (e.g., light-sensitive materials, air- and moisture-sensitive compounds).



High-resolution respirometer – a contemporary oxygraphy method for the exact measurement of oxygen consumption rates in samples.



Co-funded by
the European Union



Investing
in your future



NICPB Bioanalysis Center services

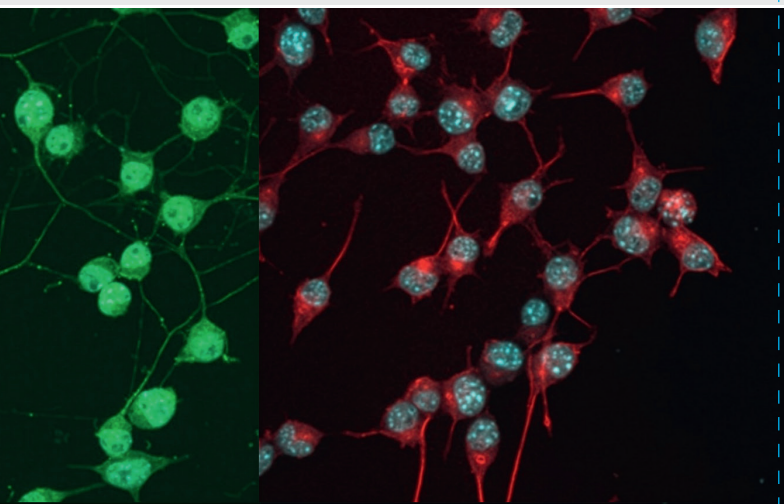




The Bioanalysis Center provides high-level bioanalytical services for Estonian and international clients, based on the NICPB's long-standing international research.

NICPB Bioanalysis Center services

- Assessment of the functional state of tissues and cells (using high-resolution respirometry)
- Evaluation of the effects of various additives and supplements on the health and function of tissues and cells
- Structural analysis of substances and molecules (using NMR)
- Analysis of the composition of biological mixtures and metabolomics (using NMR)



Functional Studies of Tissues and Cells

- Precise investigation of tissue and cell metabolism using **high-resolution respirometry (HRR)**.
- HRR accurately measures even minute rates of oxygen consumption in samples, serving as a direct indicator of mitochondrial health and, consequently, **cellular health**.
- Functional studies of muscle samples, post-operative tissue, and biopsies enable the investigation of protein-protein interactions that are preserved and active within cells.

We determine how the following affect the health of cells and tissues:

- **Administration of drugs**, assessing both their effects and side effects.
- **Polluted environment**, tracking the presence of toxins and microplastics in metabolic processes.
- **Antibodies and drug carriers**: their effect on cellular metabolism.
- **Extracellular vesicles**: their impact on cellular energy pathways.
- **Using HRR and confocal microscopy**, we identify the underlying causes of declines in muscle performance and monitor treatment effectiveness.
- **We conduct experiments on cell cultures at different oxygen concentrations in the physiological cell culture workstation.** We study the effects of hypoxia, physoxia, and hyperoxia in the context of various pathologies.
- These experimental conditions better reflect the processes actually occurring in tissue.

NMR Analysis

- Chemical analysis at the largest and most versatile **nuclear magnetic resonance (NMR)** spectroscopy laboratory in the Baltics.
- Leading expertise and experience in NMR analysis in the region. We routinely conduct qualitative and quantitative NMR analysis of the **composition of substances, including elucidation of molecular structures** and overall material composition.

Typical **application areas** for NMR services of the Bioanalysis Center:

- Identification of organic substances, structural analysis of molecules.
- Qualitative and quantitative chemical analysis of mixtures.
- Investigation of active ingredients and composition of pharmaceuticals.
- Study of fuel quality and composition.
- Verification of food and raw material authenticity and quality.
- Metabolomics of biological samples (e.g., plant and animal tissue extracts, biofluids) – e.g., for biomarker discovery.
- Development and implementation of NMR methods, e.g., to monitor and optimize chemical processes.

The advantage of NMR over other analytical techniques is its **inherently quantitative nature** – the relationship between the quantity of any substance and its NMR signal is constant. Therefore, NMR delivers precise quantitative analysis without the need for reference standards.