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# Center of Advanced Preclinical Imaging

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## Offer

- The Center of advanced preclinical imaging (CAPI) offers collaborations implementing high-end *in vivo* imaging technologies of with small laboratory animals in basic and applied research
- The center is equipped with anatomical and functional/molecular *in vivo* imaging techniques
- The center enables multimodal imaging by combining different imaging modalities
- We are open to collaborate with academic and scientific teams in the Czech Republic and European Union, as well as with commercial partners
- The center enables small laboratory animal housing during longitudinal studies in its own housing facility. Animals (laboratory mice or rats) are kept in individually ventilated cages (IVC)
- The center is able to provide housing for small laboratory animals during longitudinal studies. Animals (laboratory mice and rats) are kept in individually ventilated cages (IVC)
- Organizing of workshops, seminars
- Excursions, practical classes, study visits, research fellowships at our facility

## Know-how & Technologies

- Preclinical *in vivo* studies with small laboratory animals (rodents)
- Evaluation of effects, pharmacokinetics, and pharmacodynamics of applied drugs
- Development and testing of new multimodal contrast agents, fluorescent and radiologic probes
- Quantification of radiopharmaceutical distribution in particular organs and tissues
- Multimodal examination or imaging of small laboratory animals (mice, rats) by X-ray, CT, MRI, MPI, PET, SPECT, US, optical imaging, including photoacoustics, fluorescence, luminescence, and Cherenkov radiation optical methods. In vitro cell characterisation can be supplemented by immunophenotypisation with morphological cell determination by flow cytometry
- The investigated object can be measured by all the presented methods and achieved images can be coregistered to provide a final complex image
- All the instruments are equipped with anesthetic units and vital function monitoring systems (ECG, respiration rate, body temperature)
- Transplantation of labelled cells and their tracking in the tissue

## In Vivo Imaging

- *In vivo* imaging of small laboratory animals includes anatomical/ morphological as well as functional/molecular imaging techniques used for scientific and research purposes. Anatomical methods offer high resolution images of body structures (bones, soft tissues). They show morphology and structural changes of particular organs. On the contrary, molecular methods provide information about functional or metabolic activity of the tissue and image labelled molecules/ cells accumulation in the organism. - All the mentioned methods may be combined. Acquired images may be merged into a final one with a complex information about the tracked process.

## Magnetic Particle Imaging - MPI (Bruker)

The imager detects superparamagnetic nanoparticles using an oscillating magnetic field. Magnetic particle imaging is a quantitative tomographic 3D functional/molecular imaging technique with high acquisition speed (up to 46 images/s).

## MRI Imager ICON (Bruker)

ICON exploits a permanent magnet without the need of a cryogenic media for standard 3D MR imaging.

## CT/PET/SPECT Multimodální Zobrazovač Albira (Bruker)

Albira PET/SPECT/CT enables highly sensitive multimodal tomographic examination which combines standard CT examination with PET and SPECT imaging of radionuclides. It serves for non invasive pharmacological (pharmacokinetics, probe accumulation in the tissue and functional activity) and biological (blood flow, perfusion, metabolism) examinations.

## Optical Imager Xtreme (Bruker)

Xtreme is an *in vivo* imager combining 5 optical methods: bioluminescence, multispectral VIS-NIR fluorescence, direct radioisotope tracing, Cherenkov radiation and X-ray. 8 mice can be imaged simultaneously. The instrument is equipped with a module for 3D imaging.

## Imaging Flow Cytometer AMNIS (Millipore)

Imaging flow cytometer AMNIS ImageStreamX MkII combines multicolor flow cytometry with optical (microscopic) imaging. The device provides high speed, high capacity image cell analysis (hundreds of thousands in one sample).

## Ultrasound and Photoacoustic Imager Vevo Lazr-X (Visualsonics)

The device enables high frequency ultrasound *in vivo* examination with 30  $\mu$ m resolution. Photoacoustic pigments (oxygenated/ deoxygenated hemoglobin, melanin etc.) can be detected in the photoacoustic mode. The ultrasound and photoacoustic images can be corregistered. Photoacoustic examination is suitable for observation of tumour vascularisation, tissue perfusion, local hypoxia, detection of labelled probes, nanoparticles or cells. Measurements can be performed in 2D, 3D and 4D mode.

## Spectral X-ray Imager Color-x-scan (Radaltica)

Color-x-scan provides 2D and pseudo-3D *in vivo* and *in vivo* imaging by using single photon detection by TimePix detector. The spectrum of the detected radiation enables to distinguish tissues, which provide similar contrast on standard X-ray; thus a multicolor x-ray can be obtained. High-speed 2D and 3D imaging is also possible.

**The center has to its disposal other supplementary technologies, such as a relaxometer, autogamacouncer, portable X-ray imager, operational microscope, 3d printers (fdM, sla), shielded flow-box with ionisation chambre, ivC housing facility etc.**

## Collaboration

- The Institute of Macromolecular Chemistry of the Academy of Sciences, Prague
- The Regional Centre of Advanced Technologies and Materials (RCPTM), Faculty of Science, Palacký University, Olomouc
- Biotechnology and Biomedicine Center of the Academy of Sciences and Charles University in Vestec
- Department of Analytical Chemistry, UCT Prague
- Prague General University Hospital
- ESTHÉ – Plastic Surgery clinic, Prague
- ADVACAM s.r.o.

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## Are you interested in this expertise?

**Please contact CPPT UK**

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## Experts and their department

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