PostDoc position

Development of quantitative multimodal PET-MRI at ultrahigh field and innovative application to follow-up of self-expand biomaterial expansion and tissue colonisation

Dr Bernard Lanz from the CIBM MRI EPFL Animal Imaging and Technology Section is looking for a highly motivated PostDoc in the area of preclinical multimodal PET-MRI imaging, combining cutting-edge quantitative FDG-PET metabolic imaging with high resolution soft-tissue contrast abdominal MRI at 9.4T, enabling the tracking and characterisation of biomaterial expansion and novel biological tissue colonisation.

Project description:

The developments in this project are part of an Innosuisse collaboration research with Volumina Medical, a start-up, spin-off of the Swiss Federal Institute of Technology (EPFL), active in the field of medical devices. The company develops breakthrough innovations for plastic and reconstructive surgery. The first product is an implantable biomaterial and targets the regeneration of soft parts of the human body which are damaged due to ageing, tumour excision, genetic malformation, or trauma.

This project aims at developing and optimizing the simultaneous multimodal 9.4T MRI and FDG-PET measurements to characterize longitudinally the morphological expansion of the implants and their transition to biological tissue. The combined MRI/PET can follow the morphological evolution of the implant using optimal MRI soft-tissue contrast together with the high sensitivity measurement of tissue metabolic activity with FDG-PET. The colocalization of the metabolic and morphologic properties of the implant will provide unique insight into their development properties.

The study will take place at the CIBM MRI EPFL and take advantage of the first preclinical MR/PET system available in Switzerland with the enhanced sensitivity of the ultra-high field 9.4T. The PostDoc candidate will actively participate to the setup and optimization of this novel modalities and implement cutting-edge measurements approaches, including optimized T1, T2 and T2* MR contrast for the abdominal imaging of biomaterial implants, which will also take advantage of the CIBM preclinical 14.1T system. The work includes setup and optimization of the FDG-PET imaging scanning protocol and image reconstruction in the novel MRI/PET-insert as standalone system and as multimodal PET-MR system, development of the FDG-PET injection protocol with adapted tracer dose and injection route for the metabolic viability measurement of the biomaterial implant, with quantitative measurement of image-derived input function from the vena cava, multimodal image colocalization, test of different kinetic models for the analysis of glucose energy metabolism and selection of the model providing the best precision and the shortest scanning time. The PostDoc candidate's background should be (biomedical) physics, bioengineering. He/She will collaborate also in a broader research scope with the CIBM MRI EPFL researchers on the development of new ultrahigh field imaging and spectroscopy approaches.

Supervisors: Dr Bernard Lanz, CIBM MRI EPFL, https://cibm.ch/community/bernard-lanz/, bernard.lanz@epfl.ch

Collaborators: Dr Amélie Béduer, Volumina Medical, Switzerland; Dr Thomas Di Mattia, Volumina Medical, Switzerland; Dr Cristina Cudalbu, CIBM MRI EPFL, Switzerland. The PostDoc will work with a specialist and a technician developing and implanting the self-expanding biomaterial implants. He/She will also closely work on the imaging methods developments with the PhD students and researchers active on preclinical imaging at the CIBM MRI EPFL section.

Skills: PhD degree in (biomedical) physics, bioengineering, neuroscience or similar. Very good experimental skills for multimodal *in vivo* experiments, natural taste for problem solving, scientific curiosity, motivation to elaborate reproducible quantitative approaches in a cutting-edge research field. Experience in MRS, MRSI, Bruker scanner environment and Bruker sequence programming is an advantage as well as experience in general programming (i.e. Matlab, Python). Ready to work in a multidisciplinary research field requiring extension of his/her own expertise and

collaboration with researchers from various backgrounds. Open to work on animal and translational biomedical research. Proficient in English, both verbal and in writing.

We offer: A dynamic, interdisciplinary, and international team of very motivated people. A stimulating working environment based at CIBM in Lausanne, Switzerland; Participation in one of the world's leading transitional brain ultra-high field MRS efforts; Access to cutting-edge technology and state-of-the-art resources.

How to apply: Applications will be considered until the position is filled, so interested candidates are encouraged to apply early. Please send your CV and motivation letter to bernard.lanz@epfl.ch

About CIBM

The CIBM Center for Biomedical Imaging was founded in 2004 and is the result of a major research and teaching initiative of the partners in the Science-Vie-Société (SVS) project between the Ecole Polytechnique Fédérale de Lausanne (EPFL), the Université de Lausanne (UNIL), Université de Genève (UNIGE), the Hôpitaux Universitaires de Genève (HUG) and the Centre Hospitalier Universitaire Vaudois (CHUV), with the generous support from the Fondation Leenaards and Fondation Louis-Jeantet.
CIBM brings together highly qualified, diverse, complementary and multidisciplinary groups of people with common interest in biomedical imaging.

We welcome you in joining the CIBM Community.

About Volumina Medical

Volumina Medical is a start-up, spin-off of EPFL. Since 2018, the company is developing a platform of highly innovative biomaterials for regenerative medicine. It was sparked by the interaction with surgeons who were looking for minimally invasive solutions to reconstruct soft tissue volumes with durable results. Our platform of solutions addresses high unmet needs for the markets of reconstructive and plastic surgery and aesthetic medicine.

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