

Multiparametric 3D imaging

Advisors:

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Host Laboratory:

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Project description :

Breast cancer will affect one in every 10 woman in their lifetime, and efforts to improve breast cancer management are therefore a national priority. This project is part of MUSCAD, an ERC funded project aiming to provide a non-invasive alternative to biopsies, using 3D multiparametric ultrasound imaging. A clinical device has been built to capture volumetric images of tissue anatomy, elasticity, blood flow and tissue structure to provide characterization of breast tumors, with a single ultrasound probe.

This project aims to provide in depth quantitative characterization of the clinical device before it can be used in hospital. This will be done by acquiring multiparametric volumes in-vitro in a specifically made multiparametric phantom, following a technique previously published by our group. Then, the imaging will be validated in-vivo on a rat kidney and in a healthy human subject.

Main tasks

The trainee will be asked to:

- Build the multiparametric phantom using gel and metal particles, as well as 3D-printed moulds
- Assist in the acquisition of in-vitro and in-vivo data, using the readily built clinical device and custom code
- Quantitatively analyze the results of the different experiments using simple Matlab code and standard image processing techniques
- Write a thorough report of the quantitative results obtained, for publication in a scientific article.

Work environment

The trainee will be part of a dynamic team including two PhD students, one of which is involved in building the ultrasound device, and who will be helping with the data acquisition, phantom generation and analysis. The laboratory has extensive experience in preparing gel phantoms, as well as in acquiring in-vivo data, and all the equipment is readily available.

The trainee's work will provide the final validation of a novel clinical device scheduled to start acquiring in the clinic in spring 2027.

Required skills and knowledge

- Matlab programming
- Image processing
- Experimental work
- Proficient english and writing skills
- Initiative and teamwork

How to apply

Please send your CV and cover letter to beatrice.walker@inserm.fr