One year Post-Doctoral Position at the Laboratory of Mechanics and Acoustics - LMA (France) on the project:

Quantitative Ultrasound Techniques for monitoring tumor response to systemic anti-cancer therapies

A post-doctoral position is available for one year starting at the beginning of 2015 at the Laboratory of Mechanics and Acoustics LMA-CNRS UPR 7051, a CNRS laboratory based in Marseille in the South of France.

Description: Early detection and prediction of tumor response to therapy are major challenges in the fight against cancer. Current methods of assessing therapy effects during patient treatment are often invasive, requiring biopsied tissue or injection of radioactive substance using functional imaging modalities. The development of a noninvasive manner to early detect and monitor tumor response to therapy would be advantageous. Ultrasound imaging is non-invasive, low cost and now routinely applied in clinical cancer diagnosis. Conventional echographic images are constructed from envelope-detected radio frequency echo data that remove an important part of the tissue information. Quantitative ultrasound techniques analyze ultrasound radio frequency raw data in order to extract quantitative measurements describing acoustic characteristics of the scanned tissue, such as the cellular structure parameter. These techniques are able to quantify the extent of cell death, which is a biomarker of tumor response to therapy. In addition to quantitative ultrasound imaging, dynamic contrast enhanced ultrasound is also promising to monitor changes in vascularity and perfusion within tumors being treated with anti-angiogenic therapies. The aim of the present project is to provide novel quantitative ultrasound parameters (state of cells/cell death and vasculature) as biomarkers of treatment response.
The candidate will investigate the potential of quantitative ultrasound parameters as biomarkers of treatment response to monitor noninvasively the effects of cancer therapies in preclinical studies. In that aim, the candidate will characterize necrosis, apoptosis and angiogenesis processes by quantitative ultrasound methods using *in vitro* and *in vivo* models of prostate cancer exposed to systemic anti-cancer therapies. The candidate will work on a collaborative project between the Laboratory of Mechanics and Acoustics (LMA UPR 7051, Marseille), the Endothelium and vascular pathology laboratory (UMR-S1076, Marseille) and the Laboratory of Biomedical Imaging (LIB UMR S 1146/UMR 7371, Paris).

Profile: Candidates should have a PhD degree in acoustics, physics, biomedical engineering, medical physics or a closely related field. Experience with preclinical ultrasound systems and data as well as with small animal experiments, and knowledge of quantitative ultrasound techniques is also desirable. The position is funded for 1 years and the net salary is approximately 27 600 euros (34 776 US dollars) per year.
Starting date: between March and April 2015

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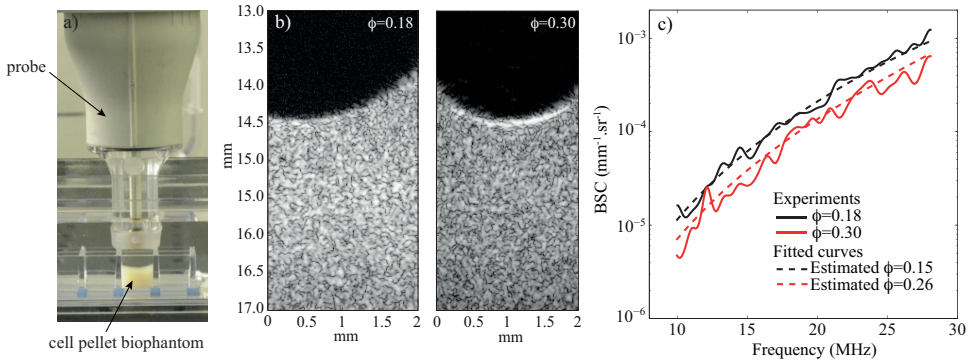

Figure 1: Example on an experimental set-up for the US characterization on concentrated cell pellet biophantoms. a) and b) Measurements on cell pellet biophantoms with a Visualsonics high-frequency US device. c) Measured backscatter coefficients and corresponding fitted curves with the Structure Factor Model to estimate cellular structures.

- Franceschini E., Guillermin R., Tourniaire F., Roffino S., Lamy E. and Landrier J.-F. 2014 Structure Factor Model for understanding the measured backscatter coefficients from concentrated cell pellet biophantoms. *J. Acoust. Soc. Amer.* **135**(6) 3620-3631.
- Franceschini E. and Guillermin R. 2012 Experimental assessment of four ultrasound scattering models for characterizing concentrated tissue-mimicking phantoms. *J. Acoust. Soc. Amer.* **132**, 3735-3747.