

## PhD proposal in Organs-on-Chips in Bordeaux

Development of an "Intestine-On-Chip" with advanced customized optical microscopy to study infections by opportunistic pathogenic yeast *Candida*

**Project description:** Organs-On-Chips (OOCs) offer a unique potential to get closer to the complex human physio-biology by combining microfluidics and 3D cell culture. In the last decade, Lung-On-Chips and Intestine-On-Chips have proven their potential in recapitulating human physiology or pathology as good or better than animal models. They have also been shown to be useful in studying the efficacy and safety of clinically relevant drugs. The current commercial design for Intestine on Chip has been proven to be operational but does not allow to observe real-time events at high spatial and temporal resolution.

The aim of the proposed interdisciplinary thesis project is (i) to develop a new generation of OOCs coupled to advanced optical microscopy optimized for live imaging, and (ii) to provide a functional "Intestine-On-Chip" as a proof of concept, with the investigation of gut infections by *Candida* yeasts. The fabrication of a new generation of chips that will (i) be compatible with cell culture and perfusion, and (ii) be coupled to advanced optical microscopy, will allow us to obtain a 3D epithelial structure of a functional unit of intestine. The live imaging module will allow to monitor the formation of the differentiated epithelium, and the full process of infection of epithelial cells by fungal cells. This project will enable an in-depth investigation of the mechanisms underlying intestinal infections by *Candida* with the perspective of identifying new routes for therapeutics treatments in the long term.

**Candidate profile:** The candidate must have a Master's or Engineering degree, preferentially in the fields of biophysics or biology. Due to the interdisciplinary nature of the project, the ideal profile is solid skills in cell and/or microbiology, microfluidics or optics. Given the improbability of such a multi-disciplinary profile, candidates with a solid training in biology and some specialization in microbiology, but with a strong motivation to develop physical tools, or with a solid physics background and some specialization in optical imaging and/or microfluidics, and a vivid interest for biological applications, are welcome. We expect the candidate to be truly motivated in pursuing multidisciplinary research, and to have good teamwork skills. The candidate should also have good communication skills and be comfortable with English.

**Working environment:** The PhD student will be co-supervised by Dr. Karine Dementhon (for the biological studies) and Dr. Pierre Nassoy (for the microfluidics and optics studies). The project will take place on different sites of the Université de Bordeaux that offer complementary cutting-edge technologies, and a stimulative collaborative environment: at the Institut d'Optique d'Aquitaine (Dr. P. Nassoy, Talence), in tight collaboration with the Laboratory Of Future (Dr. Jacques Leng, Pessac) and the CRPP (Pr. Jean-Christophe Baret, Pessac) for the microfluidics and optics work, and at the Microbiologie Fondamentale et Pathogénicité lab (Dr. K. Dementhon) for the biological applications.

**To apply:** please send by e-mail a CV with cover letter, with the transcript of marks and the names of referees familiar with your work.

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