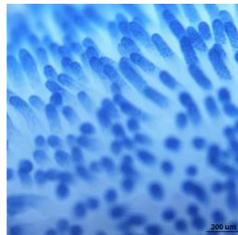




Master research project Possible extension to a 3 years PhD project



Fluid mechanics of intestinal mucosa at micro-scales

Understanding the dispersion of microparticles in the gastrointestinal (GI) tract is of prime importance to develop new oral therapeutic strategies by microencapsulation of drugs or bacteria. The specificity of the GI tract is to have mechanically active boundaries with a 3D microstructure (see images) that have strong consequences on flow and mixing at macro- and micro-scales. Our objective is to elucidate and model the mechanisms of transport of microparticles at microscopic scale at the vicinity of intestinal mucosa.

We will explore several strategies. (i) We will develop experiments with living segments of intestinal mucosa to study flow patterns at microscopic scales with imaging and microscopic techniques. We will quantify the thickness of the micro-mixing layer according to the geometry of the 3D microstructure (villi, Peyer's patches, krypts), the mechanical activity of these structures and the external flow conditions. (ii) Biomimetic experiments based on techniques of microfluidics and soft lithography will be used to make parametric study of transport phenomena in the vicinity of mechanically active microstructures. (iii) Numerical models that have been developed in our group, will be extended to study different kinds of microstructures on the transport of particles by flow.

The work will be performed within the Laboratoire Rhéologie et Procédés and TIMC, Grenoble, France, and supervised by Clément de Loubens and Stéphane Tanguy. The team gathers competencies in biomechanics, physiology, fluid mechanics, microfluidics. See: www.clementdeloubens.fr www-timc.imag.fr/preta

The Master research project will be supported by CNRS and could be extended to a three-years PhD project. We are looking for a motivated candidate (Engineering school (3A) / Master 2) with a solid background in **fluid mechanics, rheology, soft matter and / or biomechanics**.

To apply, send your CV, your cover letter (French or English) and M1(2A) academic results at Clément de Loubens (clement.de-loubens@univ-grenoble-alpes.fr).

Expected starting date: January – April 2019