



Master Biologie Moléculaire et Cellulaire 'BMC',
Université de Paris - UFR Sciences du Vivant

Parcours : **Biologie et Développement Cellulaires 'BDC'**

<http://www.master2bdc.fr/>

Fiche de Projet de Stage M2, Année 2021-2022

Unité INSERM ou CNRS ou Université : INSERM U1225 – Institut Pasteur Intitulé Equipe : Pathogenesis of Vascular Infections ED d'appartenance : BioSPC Responsable de l'Equipe : Guillaume DUMÉNIL	Responsable du Stage : G. DUMÉNIL & Dorian OBINO Contacts Adresse : Institut Pasteur, 28 Rue du docteur Roux 75015 Paris Email : guillaume.dumenil@pasteur.fr Dorian.obino@pasteur.fr Tel : 01 44 38 93 83
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Titre du projet : Vessel-on-a-chip to study bacterial infection

Résumé du Projet de Stage (en 300 mots maximum, mots clés en gras)

The main goal of the project is to study the impact of **bacterial infection** on **blood vessel function** using an in-house designed microfluidic device. In collaboration with the Institut Pasteur Biomaterials and Microfluidics core facility (BMcf), the host lab has developed a **vessel-on-a chip device** mimicking 3D cellular architecture of blood vessels. These engineered 3D vessels are produced through in situ patterning within 3D cell-laden hydrogels using laser ablation.

The key biological question of the project will be to **understand how bacteria alter vessel physiology in the context of sepsis**. The Gram-negative bacterium *Neisseria meningitidis* will be used as a model. Spinning disk confocal microscopy will be the tool of choice to image the impact of infection on endothelial cells and their function. This project thus contains a strong component of cell biology and different imaging approaches.

This research will take place in a young and dynamic group with a strong background in biochemistry, microbiology, cell biology and animal models of infection. The Institut Pasteur microfluidics core facility will provide technical support and contribute with the rest of the campus to providing a stimulating environment for the project.

For this project (<https://research.pasteur.fr/en/job/vessel-on-a-chip-to-study-bacterial-infection/>), we are looking for a motivated young scientist with interest in multidisciplinary approaches including **organ-on-a-chip** and 3D cell culture systems, **cell biology**, **infectious diseases** and **fluorescence microscopy**. Prior notions in one or several of these fields would be a strong plus. This Master 2 project can open the way to a PhD.

Publications de l'équipe relatives au projet de stage (max 5)

- Kennouche P. *et al.*, Deep mutational scanning of the *Neisseria meningitidis* major pilin reveals the importance of pilus tip-mediated adhesion, **EMBO J.**, 2019
- Charles-Orszag A. *et al.*, Adhesion to nanofibers drives cell membrane remodeling through one-dimensional wetting, **Nat Commun**, 2018
- Bonazzi D. *et al.*, Intermittent Pili-Mediated Forces Fluidize *Neisseria meningitidis* Aggregates Promoting Vascular Colonization, **Cell**, 2018 S0092-8674(18)30463-X.
- Imhaus AF. & Duménil G., The number of *Neisseria meningitidis* type IV pili determines host cell interaction, **EMBO J.**, 2014, 33(16):1767-83.
- Soyer M. *et al.*, Early sequence of events triggered by the interaction of *Neisseria meningitidis* with endothelial cells, **Cell Microbiol.**, 2014, 16(6):878-95.

1 page maximum SVP !