**Master 2 internship project**

**Year 2023-2024**

**Laboratory/Institute:** IAB UMR 5309 **Director:** Pierre Hainaut

**Team:** Epigenetics and Cell signaling **Head of the team:** Saadi Khochbin

**Name and status of the scientist in charge of the project:** David Laurin **HDR: yes ☐ no x**

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**Program of the Master’s degree in Biology:**

**x** Microbiology, Infectious Diseases and Immunology **x** Structural Biology of Pathogens

**☐** Physiology, Epigenetics, Differentiation, Cancer **☐** Neurosciences and Neurobiology

**Title of the project: Evolution of bacterial extracellular vesicles during synthesis and transcytosis**

Objectives (up to 3 lines):

All living organisms produce extracellular vesicles (EVs). They are involved in communication between cells and in the transport of biomolecules. Bacterial EVs play a role in microbiota, tolerance, bacterial colonization, transmission of virulence factors and disease pathogenesis. We will analyze the interactions of Escherichia coli outer membrane vesicles (OMVs) with human blood cells before and after intestinal transcytosis.

Abstract (up to 10 lines):

We postulate that transcytosis through the intestinal epithelium and the vascular endothelium modifies the lipopolysaccharides (LPS) and membrane proteins of OMV in order to modulate their inflammatory properties. We will study the consequence of these remodeling steps on the activation of monocytes in comparison to free LPS. This analysis of the established interactions between OMVs and monocytes will lay the foundation for the analysis of the role of OMVs in the microbiota-host relationship. In particular, we will focus on comparing the pro-inflammatory LPS/Monocyte relationship with that of OMV/Monocytes. Indeed, blood contains many OMVs tolerated by the immune system.

Methods (up to 3 lines):

We will produce and analyze OMVs from a characterized E coli strain using Western Blot, Dynamic Light Scattering (DLS), Nanoparticle Tracking Analysis (NTA), electronic microscopy, cell culture, cells sorting and flow cytometry.

Up to 3 relevant publications of the team:

- Extracellular Vesicles from 50,000 Generation Clones of the Escherichia coli Long-Term Evolution Experiment. Laurin D, Mercier C, Quansah N, Robert JS, Usson Y, Schneider D, Hindré T, Schaack B. Int J Mol Sci 2022, doi: 10.3390/ijms232314580.

- Microbiota-Derived Extracellular Vesicles Detected in Human Blood from Healthy Donors. Schaack B, Hindré T, Quansah N, Hannani D, Mercier C, Laurin D. Int J Mol Sci. 2022, doi: 10.3390/ijms232213787.

Requested domains of expertise (up to 5 keywords):

Microbiology, human health, microbiota-host interface, extracellular vesicles