

**Master 2 internship project
Year 2026-2027**

Laboratory/Institute: TIMC UMR5525 CNRS/UGA **Director:** Pr. Alexandre Moreau-Gaudry
Team: T-RAIG **Head of the team:** Pr. Bertrand Huard and Dr. Dalil Hannani

Name and status of the scientist in charge of the project:
Dr. Dalil Hannani, CNRS researcher

HDR: yes ☒ no ☐

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Program of the Master's degree in Biology:

☒ Microbiology, Infectious Diseases and Immunology ☐ Biochemistry & Structure
☐ Physiology, Epigenetics, Differentiation, Cancer ☐ Neurosciences and Neurobiology

Title of the project: Identification of microbiota-derived metabolites with immunomodulatory properties – Implication in Cancer Immunotherapy

Objectives (up to 3 lines):

The objective is to validate via in vitro model (and potentially be initiated to in vivo mouse models) the immunomodulatory properties of metabolites deriving from gut microbiota. These metabolites could be used as postbiotic therapy to improve response to cancer immunotherapy

Abstract (up to 10 lines):

Gut Microbiota is an important modulator of host immunity. Some microbiota signature predicts the ability of cancer patients to respond to immunotherapy. Positively modulating gut microbiota can thus improve anti-cancer responses. In line with this, we demonstrated that prebiotic supplementation (dietary fiber inulin) modulate microbiota and in turn boos anti-cancer immune responses in a $\gamma\delta$ T cell dependent manner. We now aim at identifying the metabolites that are produced by the microbiota under inulin fermentation, in order to identify novel $\gamma\delta$ T cell activators, that can be proposed as complementary therapy in cancer patient in order to maximize their chance of response to immunotherapy. Our approach relies on metabolomics analyses, coupled with in vitro and in vivo immunoassay.

Methods (up to 3 lines):

Co-culture of healthy donors' $\gamma\delta$ T cells (purified or among PBMCs) with fecal water generated via an artificial colon system, or with purified metabolites. Administration of these metabolites in mice to assess their therapeutic potential. Characterize immunomodulation via by Flow Cytometry.

Up to 3 relevant publications of the team:

1 - Inulin Prebiotic Protects against Lethal Pseudomonas aeruginosa Acute Infection via $\gamma\delta$ T Cell

Activation.

Boucher E, Plazy C, Le Gouellec A, Toussaint B, **Hannani D**

Nutrients. 2023

2 - Inulin prebiotic reinforces host cancer immunosurveillance via $\gamma\delta$ T cell activation

Boucher E, Plazy C, Richard ML, Suau A, Mangin I, Cornet M, Aldebert D, Toussaint T and **Hannani D**

Frontiers in Immunology 2023

3- Identification of a predictive metabolic signature of response to immune checkpoint inhibitors in non-small cell lung cancer: METABO-ICI clinical study protocol

Sannicolo S*, Giaj Levrac M,d, Le Gouellec A, Aspod C, Boccard J, Chaperot L, Toussaint B, Moro-sibilot D, **Hannani D****, Anne-Claire Toffart AC **

Respir Med and Res 2021

Requested domains of expertise (up to 5 keywords):

Immunology, Immunotherapy, Oncology