An interview with Prof. Bénédicte MACHIELS,

Associate Professor of Immunology at the Faculty of Veterinary Medicine at ULiège and the Faculty of Gembloux,

FNRS Research Associate

Could you tell us about your background and your research specialization?



© Prof. Bénédicte Machiels

I am a Principal Investigator and Associate Professor at the FARAH Institute, University of Liège. Since January 2020, I have led my independent research group as an ERC Starting Grant awardee. I completed my PhD as an F.R.S.-FNRS fellow in Immunology-Vaccinology at the University of Liège, focusing on host-pathogen interactions. My work mainly used gammaherpesvirus (γHV) models to study viral immune evasion and the lasting imprint of infection on host immunity.

During my PhD, I investigated γHV entry mechanisms, focusing on the role of glycans in the viral lifecycle and immune evasion. I demonstrated that γHVs use alternative splicing to regulate their tropism and evade antibody neutralization. This research resulted in publications (J Virol 2010; PLoS Pathog 2011, 2013) and the EUGENE YOURASSOWSKY PRIZE.

My postdoctoral work began at the Centre d'Immunologie de Marseille-Luminy (Prof. Toby Lawrence), studying IκB kinase alpha signaling in monocyte-driven inflammation, then continued at the University of Liège, where I initiated a new line of research with Prof. Laurent Gillet on viral imprint on host immunity.

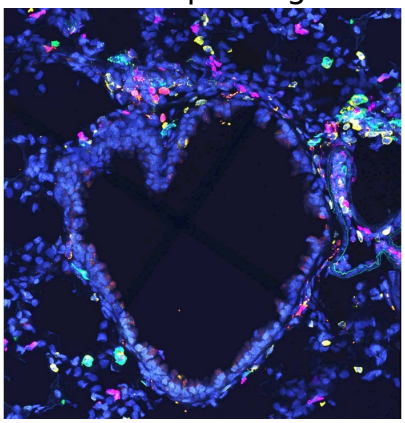
What are the main findings of your research?

Together with Laurent Gillet, we discovered that γHV infection inhibits airway allergy by altering lung innate immune cells. Specifically, we showed that γHV infection induces the replacement of resident alveolar macrophages by monocytes that are pre-educated in

the bone marrow to acquire regulatory functions. Published in ***Nature Immunology*** (2017) and ***Mucosal Immunology*** (2020), this work received the D and M JAUMAIN PRIZE.

Currently, my research focuses on how viruses educate monocytes that become tissue-resident macrophages. Key lines include: (1) how respiratory viruses reshape the alveolar niche; (2) how they induce central imprinting in the bone marrow; and (3) the long-term consequences for host immunity.

Crosstalk between monocyte-derived AMs and virus-imprinted ILC2s. © Pauline Loos
Viruses shape lung immunity. © Adeline Deward



In lung immunity, we showed that γHV reprograms the alveolar niche by dampening ILC2 properties (***Science Immunology***, 2023). We also identified a regulatory role for γHV-imprinted monocytes in controlling cytotoxic CD4+ T cells (***Science Immunology***, 2022). Additionally, we are investigating how past viral infections affect lung immune surveillance and anti-tumor immunity, with promising findings (awarded the GSK Basic Science Award, William MacNee Award, and WELBIO funding).

A second focus is central imprinting of myeloid progenitors by viruses, using murine γHV and Epstein-Barr virus in humanized mice. Lastly, we study the impact of monocyte imprinting on inflammation in distant tissues, revealing significant changes in intestinal immunity relevant to inflammatory disorders.

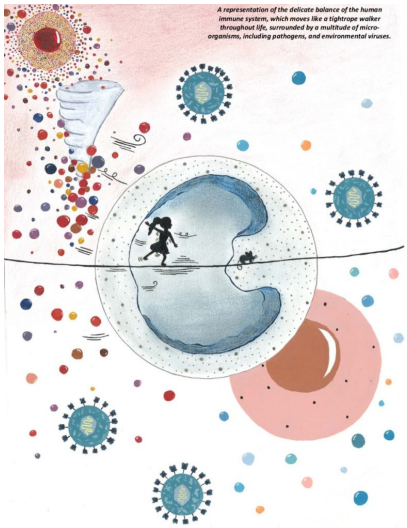
What are your main research collaborations?

My key collaborations include Profs. L. Gillet, B. Dewals, T. Marichal, D. Cataldo, Prof E. Louis, and Drs. M. Herfs and A. Blomme at the University of Liège, as well as Profs. Jo Van Ginderachter and Damya Laoui (VUB) and Prof. S. Goriely (ULB). In Europe, I collaborate with Profs. Erik Biessen and Pieter Goossens (Maastricht University) on

spectral microscopy.

What do you see as the main challenges in your field of research?

This is a highly complex research question. My aim is to translate findings from mouse models into a translational immunomodulation approach in humans, as part of my WELBIO funding. However, identifying causal factors linked to gammaherpesvirus infections is challenging due to numerous genetic and environmental confounding variables. ERC funding has already enabled me to establish a collaboration with Prof. Louis and the gastrointestinal department, providing access to biopsies and blood data. Through these collaborations and funding, I aim to further translate my research into clinical applications.



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