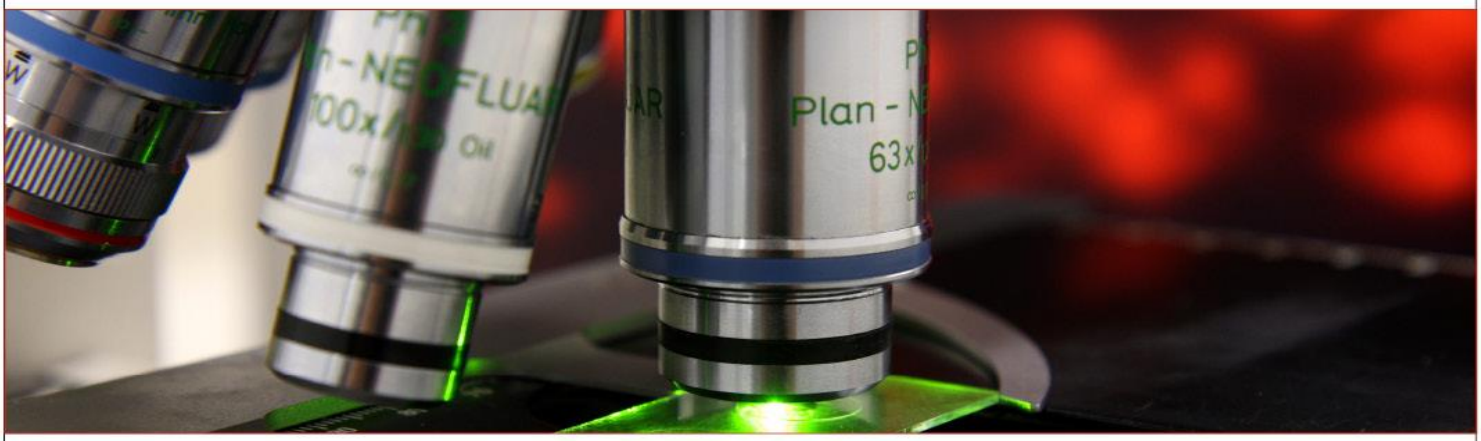
SÉMINAIRES ET CONFÉRENCES



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" Decoding Immune Repertoire Development: From Neonatal Origins to Clinical Applications "

The adaptive immune system's ability to distinguish self from non-self emerges early in life and is refined across development through intricate interactions between T cells, their receptors (TCRs), and the antigens they encounter. My recent work has revealed that human TCR repertoires comprise two functionally distinct layers: neonatal-like TCRs that are shared among individuals, cross-reactive, and persist throughout life, and adult-like TCRs that are individual-specific, antigen-restricted, and shaped by immune experience. Understanding how these layers develop and interact has profound implications for health across the lifespan. In this seminar, I will present work investigating how genetic factors and environmental exposures shape immune repertoire architecture through life. Using deep learning and probabilistic modeling, I developed metrics that quantify how individual repertoires balance genetic constraint versus environmental shaping. Our metric, the "HLA-TCR coherence", reveals that some individuals' repertoires are more genetically constrained while others are more environmentally shaped. In the context of hematopoietic stem cell transplantation (HSCT), we discovered that grafts enriched in neonatal-like TCRs confer protection against graft-versus-host disease, and that HLA-TCR coherence predicts disease severity. Moreover, cross-reactivity between T cell populations underlies many of these findings. Our recent work reveals that leukemia-specific T cells are enriched in BCG-vaccinated individuals, potentially explaining decades-old epidemiological observations linking BCG vaccination to reduced childhood leukemia mortality. This finding highlights cross-reactivity as a critical but poorly understood mechanism of cancer immunosurveillance—with both protective and pathogenic potential. Finally, I will outline my vision for building a unified program that reframes T-cell immunity not as a static adult system but as a lifelong developmental process beginning at birth. This program will generate mechanistic insights with direct translational relevance for child health: improved vaccines, better HSCT outcomes, and earlier detection of immune vulnerabilities. At the same time, it will clarify how early-life repertoire architecture shapes immunity in adulthood and aging.

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Le lundi 2 février, 13h00

Pavillon Joseph-Armand-Bombardier, Salle : 1035
et
Zoom

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