



Project title	Functional characterization of factors influencing natural killer (NK) cell activity against therapy-induced senescent cells		
Study level(s)	<input type="checkbox"/> MSc	<input type="checkbox"/> PhD	<input checked="" type="checkbox"/> Postdoctorate
Principal investigator(s)	Christian Beauséjour & Elie Haddad		
Project duration	3 years		
Start date	April 2021		

Date of posting: 2021-02-23

Research laboratory presentation

This research project is a collaborative project between 2 research labs at the Research Center of the CHU Sainte-Justine (Beauséjour & Haddad) and the National Research Council of Canada (NRC – Dr. Marcotte). Christian Beauséjour’s lab is trying to decipher the role that senescence plays in immunosuppression and resistance to cancer treatments. Élie Haddad’s laboratory is studying various aspects of the human immune system, spanning from stem cells to immunotherapy, in both fundamental and translational research. Collaborative projects between their labs, aim at reconstituting a human immune system in mouse, testing iPSC immunogenicity, and deriving NK cells and CAR-NK cells from iPSCs. Dr. Marcotte is a Research Officer in the Applied Genomic team in the Human Health Therapeutics Centre at NRC. The Applied Genomics team is developing and implementing tools to functionally screen for genetic dependencies using bulk/single-cell whole-genome and targeted CRISPR approaches in several distinct cellular models, including immune cells. The project will be conducted in a multidisciplinary environment, the CHU Sainte-Justine will be the administrative center.

Research project description

Accumulating evidences suggest that senescent cells increase in tissues with time contributing to the development of age-related pathologies and cancer. Eliminating senescent cells is a promising therapeutic strategy. Yet, emerging data indicate that these cells employ diverse mechanisms to evade the immune system. Using whole-genome CRISPR screens, this project seeks to identify genes whose inhibition, either in senescent cells or natural killer (NK) cells, potentiate NK cell cytotoxicity. NK cells are lymphocytes responsible for innate immunity that demonstrate cytotoxic activity towards stressed-self and/or modified-self cells (i.e., cancer and senescent cells). These cells, as opposed to T cells, are not activated by specific cancer antigens but instead rely on changes in molecular pattern in the tumor cells. However, NK-cell mechanisms leading to tolerance, exhaustion, or prevention of full anti-tumor activity remain understudied.

This project combines molecular biology (CRISPR library, gene edition, cellular engineering), cellular biology (iPSC-derived NK cells, primary NK cell amplification, cytotoxic assays by flow cytometry) and bioinformatics. The candidate will have the opportunity to drive a project that could have a profound impact on our understanding of the NK cell function in pathological settings, thereby opening new therapeutic target. The candidate will benefit from the complementary



expertise of a multidisciplinary team and of a rich research environment. In addition, he/she will benefit from cutting-edge methods and technologies in the field. The candidate will be working in close collaboration with another a PDF within the research team, working on a similar but yet different project.

Required training and profile

- Hold an appropriate degree for the targeted level (PhD or M.Sc. with a MD degree without the right to practice for post-doctoral fellowship) and excellent academic record;
- Demonstrate motivation and autonomy to bring this project to term;
- Possess a strong knowledge in immunology, cellular biology and experimental techniques (eg. Flow cytometry, molecular biology);
- Have experience with cell culture (primary and cell lines).
- Have good communication and organization skills;
- Established publication records
- Speak and write in English.
- Although University of Montreal and the CHU Sainte-Justine are french-speaking institution, it is not required that the candidate speaks and/or understand French.

Conditions

The candidate must apply for admission at the University of Montreal as a postdoctoral fellow and will comply with all applicable eligibility conditions.

Postdoctoral fellows at the CHUSJ are Scholarship recipient postdoctoral fellows (stagiaires postdoctoraux boursiers (SPB)). They are considered as researchers in training and are not employees of the CHUSJ. They are paid in the form of a scholarship (stipend), not a salary. For this reason, CR-CHUSJ postdoctoral fellows are not eligible for employment insurance, parental insurance, pension plans and other benefits exclusive to employees. Taxes will be deducted at the source.

The CHU Sainte-Justine has a minimum remuneration policy for all its students and postdoctoral fellows. Remuneration may come from the researcher's funds or from an external nominal award. The candidate will have to apply for external scholarships to obtain a nominative award.

The duration of research development is conditional:

- On the availability of research funds;
- To the project's progress;
- Eligibility of the intern to renew its status as postdoctoral fellow at the university.

Submit your application

Interested candidates are invited to submit their application by email to **Dr Christian Beauséjour**: c.beausejour@umontreal.ca

Please provide:



✓ *Curriculum vitae*

✓ Cover letter

✓ References

Christian Beauséjour, Ph.D.

Full Professor, Department of Pharmacology and physiology, Faculty of Medicine, Université de Montréal
Director of the Reprogramming and Gene Editing platform, CHU Sainte-Justine Research Center

Elie Haddad, M.D. Ph.D.

Full Professor, Department of Pediatrics, Faculty of Medicine, Université de Montréal
Clinician, Clinical Immunology and Allergy, CHU Sainte-Justine

Equity, diversity and inclusion

The masculine gender is used without discrimination and for the sole purpose to facilitate reading. The CHU Sainte-Justine subscribes to the principle of equal access to opportunities and invites women, members of visible and ethnic minorities, persons with disabilities and Indigenous people to apply. We would appreciate it if you could inform us of any disabilities that would require technical and physical accommodation adapted to your situation during the selection process. Please be assured that we will treat this information as confidential.

Studies at the CHU Sainte-Justine Research Center

Pursue your [graduate or postdoctoral studies](#) at the **CHU Sainte-Justine Research Center**, and be one of the 500 students, fellows and interns involved in accelerating the development of knowledge in the field of maternal, child and adolescent health, whether in basic or clinical research. Under the supervision of prominent scientists, especially in leukemia, rare pediatric diseases, genetics, perinatology, obesity, neuropsychology and cognition, scoliosis and rehabilitation, you will have the opportunity to work with multidisciplinary scientific teams and collaborators from all over the world.

About the CHU Sainte-Justine Research Center

CHU Sainte-Justine Research Center is a leading mother-child research institution affiliated with Université de Montréal. It brings together more than 200 research investigators, including over 90 clinician-scientists, as well as 500 graduate and postgraduate students focused on finding innovative prevention means, faster and less invasive treatments, as well as personalized approaches to medicine. The Center is part of CHU Sainte-Justine, which is the largest mother-child center in Canada and the second most important pediatric center in North America. More on research.chusj.org

