

Project title	Mathematical modelling and virtual clinical trials of shingles vaccination		
Study level(s)	<input type="checkbox"/> MSc	<input type="checkbox"/> PhD	<input checked="" type="checkbox"/> Postdoctorate
Principal investigator(s)	Morgan CRAIG		
Project duration	3 years		
Start date	January 1, 2024 or ASAP thereafter		

Date of posting: 2023-12-11

### Research laboratory presentation

**Dr. Morgan Craig** is a Researcher at the Centre de recherche du CHU Sainte-Justine and an Associate Professor in the Department of Mathematics and Statistics at the Université de Montréal. Her lab (*Quantitative and Translational Medicine Laboratory*) studies how the immune system responds to threats and how differences between individuals affect these responses. For this, she develops predictive, mechanistic mathematical and computational models to study the progression and treatment of cancer and viral infectious diseases through the lens of immunity. In her work and through highly multidisciplinary research conducted in close collaboration with experimentalists and clinicians, Dr. Craig uses virtual clinical trials and virtual patient cohorts to concretely improve therapeutic regimens and patient outcomes.

### Research project description

Understanding age-related immunity to vaccination is critical to providing effective population-level protection. Herpes zoster virus (HZV) or shingles is caused by the reactivation of dormant varicella (i.e., chickenpox). Shingles causes painfully itchy rashes, generally on the trunk or face, in addition to other symptoms like e.g., headaches. These rashes can cause permanent scarring, and herpes zoster can also have serious complications like neuralgia and vision loss.

Vaccination against shingles has been shown to be effective and is recommended for people over 50. However, responses to vaccination decline with age. Based on clinical trial data from new vaccine candidates, this project will use mathematical models and virtual clinical trials to understand age-related correlates of immune protection and establish effective dosages/timings to improve immune protection in older adults.

### Required training and profile

The ideal candidate will have strong academic and publication records in mechanistic mathematical/computational modelling, ideally with experience in immunology, a high degree of autonomy, and excellent communication skills. They will also work well with their peers and collaborators, be detailed-oriented and well-organized. The candidate will participate in lab activities, help with the supervision of students and/or interns, and collaborate on grant applications.

Training: PhD in applied mathematics, pharmaceutical sciences, computational biology, or a related discipline.



Specific expertise: Demonstrated mathematical modelling skills using data-driven quantitative analyses, differential equations, and/or quantitative systems pharmacology; programming skills; prior knowledge of immunology is an asset.

### Conditions

One year contract with possibility of renewal.

The candidate must register at the Université de Montréal as a postdoctoral fellow and must meet the eligibility requirements of the program. 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 the research project is conditional to:

- The availability of research funds;
- The progress of the project;
- The candidate's eligibility to maintain a postdoctoral fellowship status at the university.

### Submit your application

Candidates should send the required documents before **1/2024** to **Morgan Craig** at [morgan.craig@umontreal.ca](mailto:morgan.craig@umontreal.ca). Applications will be reviewed on a rolling basis until the position is filled.

Please provide:

- ✓ *Curriculum vitae*
- ✓ Cover letter
- ✓ References

Morgan Craig  
Sainte-Justine University Hospital Research Centre  
3175 Chem. de la Côte-Sainte-Catherine  
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Canada



### Equity, diversity and inclusion

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.

### Studying at the Centre de recherche du CHU Sainte-Justine

Pursue your [graduate or postdoctoral studies](#) at the **Centre de recherche du CHU Sainte-Justine**, and be one of the 580 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 Centre de recherche du CHU Sainte-Justine

The **Centre de recherche du CHU Sainte-Justine** is a leading mother-child research institution affiliated with Université de Montréal. It brings together more than 270 research investigators, including over 160 clinician-scientists, as well as 580 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](https://research.chusj.org)

