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08 – Susceptibility Factors of Hyperinflammation

Accepted Academic Levels (in progress):

☐ College ☒ Bachelor's ☒ First-cycle PhD ☒ Master's

Research Team

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Research Project Description

Hyperinflammation is a devastating complication of unregulated inflammation disproportionate to the trigger. The umbrella terms cytokine storm syndrome and hemophagocytic lymphohistiocytosis (HLH) are commonly used. All are unregulated forms of inflammation that lead to multiorgan damage and potentially death. The lab aims to study why some children have a functional brake, turning off the inflammation, whereas others do not. To do so, we interrogate both environmental and genetic risk factors.

The team is recruiting for two sub-projects. Applicants are invited to indicate their preferred sub-project in their cover letter. Preference would be given to a student interested in pursuing both projects simultaneously.

Sub-project 1: Interrogation of genetic susceptibility factors

The proposed research project focuses on mechanisms of cytotoxicity. Homozygous pathogenic variants in genes involved in cytotoxic granule pathways lead to disease. The role of heterozygous variants is unclear with data demonstrating potential predisposition of impaired killing when combined with other susceptibility factors. This project aims to identify novel variants through genomic and cellular biology techniques.

Sub-project 2: Investigation of infectious triggers/pathways of hyperinflammation

As the COVID19 pandemic clearly indicated, certain pathogens can result in post-infectious hyperinflammation. This project aims to interrogate the mechanisms driving hyperinflammation in known murine models of hyperinflammation.

Role of the candidate during the internship

For project 1, the student will be performing in vitro cellular biology assays. The student will be helping isolate, amplify and perform functional analysis on cytotoxic lymphocytes.

For project 2, the applicant will be more involved in mouse models of hyperinflammation. The student will be involved in all aspects of the research project, from colony management, cell and molecular biology, and in vivo experiments.

Academic Programs

Students enrolled in one of the following academic programs, or in a related field, are invited to apply:

- Microbiology and immunology
- Pathology and cellular biology

Required Skills and Expertise

Required skills differ based on research project. Candidates must have/be:

- Proficiency in vitro cell culture
- Prior experience with flow cytometry and/or cytotoxic lymphocytes is preferred but not necessary
- Prior animal model experience. Familiarity with murine procedures is preferred.
- An excellent academic record with motivation and curiosity to learn
- A strong team player
- Strong organisation skills
- The ability to speak and write in English fluently

Internship Details

Schedule

- ☒ Full-time (35 hrs/week)
- ☒ Part-time

Duration (approximative)

- ☒ 4 months
- ☒ 3 months
- ☐ 2 months
- ☐ 1 months

Funding

Funding will vary depending on the type of internship:

- Internship recognized by the academic institution: A minimum stipend of **CAD \$550 per week** (based on a 35-hour schedule) will be provided from the supervisor's research funds or in combination with other funding sources.
- Internship outside the academic curriculum: An hourly wage ranging from **CAD \$16.10 to \$18.72** will be provided from the supervisor's research funds.

Keywords

Inflammation, Hyperinflammation. Macrophage activation syndrome (MAS), Hemophagocytic Lymphohistiocytosis (HLH), Systemic Juvenile Idiopathic Arthritis (sJIA), Kawasaki Disease, Cytotoxicity, Infection

Address

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