2022-23 REPORT

Canadian MPS Society
for Mucopolysaccharide & Related Diseases

GENTLE FAMILY

RESEARCH FUND

PRESENTED TO:

Cassidy Gentle and the
Gentle Family

YOUR IMPACT

Dear Cassidy Gentle and the Gentle Family

We wish to extend our deepest gratitude to you and your family for your generous support of the Canadian MPS Society Summer Studentship Research Grants.

This funding has been invaluable in empowering passionate students to drive innovative projects that are helping unlock a better future for those living with mucopolysaccharidosis and related diseases.

It is our pleasure to present this report giving an overview of the projects your funding has enabled over the past two years.

Canadian MPS Society

2022 RECIPIENT

SHEDDING LIGHT ON THE ROLE OF FATS IN MPS

YENIAY ERDEM

Supervised by Dr. Farah ElTurk Research Institute of the McGill University Health Centre - CHHD Program; Montreal Children's Hospital

Research Title

Development of an Extraction Liquid Chromatography-Tandem Mass Spectrometry Technique to Quantitate the Level of Dihydroceramide Species in Plasma of MPS III Patients

The research team developed a new testing method to measure fats called dihydroceramides in the blood of patients with the rare genetic disease, MPS III. These fats likely play a role in inflammation and other problems in MPS. The team developed methods to accurately extract and quantify the fats from blood and tissue. By comparing dihydroceramide and ceramide levels, they hoped to understand whether: (1) ceramide increases in MPS patients due to activation of the synthesis pathway that makes dihydroceramides first or recycling of more complex fats (2) dihydroceramide could be a helpful biomarker or contributing factor in MPS.

The findings suggested that dihydroceramide levels were not altered in MPS III patients' blood compared to normal. So, these fats likely cannot be used as a marker of MPS III. The researchers were limited to analysing a small number of MPS III blood samples and a larger patient sample is needed to confirm the results since MPS disorders are so rare. In future work, the team could investigate whether dihydroceramide levels change within cells of MPS patients even if blood levels stay normal. The testing approach they created could also be helpful for studying other rare diseases like Parkinson's and Alzheimer's disease.

2023 RECIPIENT

RAPID BLOOD TESTS TO ACCELERATE MPS RESEARCH

SAMAAN ABIAD

Supervised by Dr. John Mitchell at McGill University Health Center Research Institute

Research Title

Sphingolipidomics Extraction and Targeted Omics From Dried Blood Spots To Enable a Study on MPS Across Three Canadian Sites

This study was to evaluate a drug that may have the potential to address inflammation and pain in MPS disorders. The drug proposed is an inhibitor of the tumour necrosis factor–alpha (TNF-alpha), a cytokine that is produced by macrophages and monocytes during acute inflammation. TNF-alpha has been demonstrated to contribute to inflammatory joint disease, and medications that inhibit its activity were approved to address inflammation and pain among individuals with arthritis. An ongoing clinical trial is underway in the United States to evaluate the efficacy, safety and pharmacokinetics of the medication in children and adults with MPS patients. Three Canadian sites are looking to be added to the existing trial to investigate the drug among the Canadian population of MPS patients.

As part of the study that evaluates the safety and efficacy of the drug, several metabolites, including GAGs, cytokines and sphingolipids, will be assessed. Student Samaan Abiad's research created a straightforward way to extract and measure these fats called sphingolipids from dried blood spot samples. Their method holds potential for clinical labs adoption because of its quickness and low margin of error. By incorporating this new screening method they could potentially increase the effectiveness of the researched pain reliever medication and eventually mark a significant step towards improving the quality of life for individuals with MPS and other diseases.

2023 RECIPIENT

UNMASKING MPS DISEASE MECHANISMS

HANINE BAHSOUN

Supervised by Dr. John Mitchell and Dr. Farah ElT at Dr. John Mitchell's Laboratory at McGill University Health Center Research Institute

Research Title

Developing a Targeted Sphingolipidomics Method To Quantify 1-Deoxysphingolipids From Plasma of Mucopolysaccharidoses Patients

The primary aim of Hanine Bahsoun's summer research project was to establish a methodology for quantifying pro-inflammatory fats, 1-deoxysphinganine and 1-deoxysphingosine levels in the bloodstream of individuals afflicted with Mucopolysaccharidoses. Their goal was to investigate whether these fats play a role in MPS, particularly in neurological problems seen in some patients. After thorough testing and validation, the key findings demonstrate the method can reliably recover and quantify the fats from blood samples. The researchers applied the technique to a small number of MPS patients' samples as an initial step, but more research is needed with larger sample sizes to draw definitive conclusions about whether the fats are involved in MPS. Overall, this work establishes a foundation for larger studies to increase understanding of MPS and related rare diseases.

2023 RECIPIENT

CONNECTING CANADIAN MPS PATIENTS TO CUTTING-EDGE TRIALS

CRISTINA FODER

Supervised by Heather Barnes at M.A.G.I.C. Clinic (Metabolics and Genetics in Calgary).

Research Title

Connecting MPS patients to Clinical Trials: A Survey-Based Study

Gene therapies are promising alternatives to current MPS treatments and may drastically improve quality of life for MPS patients. Unfortunately, gene therapies are only available through clinical trials. MPS is among the rarest of diseases, with an incidence of 0.98 per 100,000 live births in the United States This rarity contributes to the lack of awareness that impedes access to life-saving clinical trials. Connecting Canadian MPS patients with information about clinical trials is a difficult problem. There are currently 75 clinical trials for MPS, including 7 with sites in Canada. However, recruitment is difficult because there is no national MPS registry. The study population includes individuals formally diagnosed with MPS. Participants were recruited nationally under supervision of Dr. Aneal Khan at M.A.G.I.C. Clinic (Metabolics and Genetics in Calgary). The objective of this research was to develop a survey to determine awareness of treatment options and clinical trial availability among Canadian MPS patients. This study will inform future efforts to create equitable access to care for Canadians with MPS, where early treatment is critical for improving long-term outcomes.

Thank You

The opportunities provided by the Gentle Family Research Fund are tremendously meaningful. Whether focused on disease mechanisms, biomarkers, or potential therapies, these projects represent hope to children and families fighting rare disorders without a cure.

And while MPS disorders are complex, the optimism within the research community remains strong thanks to dedicated funders like you who make these studies possible.

Your family's research fund enable young, curious minds to tap into their potential and encourage careers toward lysosomal storage disorders and rare diseases.

Thank you for your impact.

With gratitude,
Canadian MPS Society

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