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Spring/Summer 2015



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@Dr_KarenLee

In Canada, you're more likely to receive a diagnosis of multiple sclerosis than in any other country in the world. I am not alone in wondering why Canadians are at such high risk of developing MS. Research suggests that genetic, environmental, biological and lifestyle factors all play a role in the development of MS, and we are committed to funding high-quality research that will tell us more about the combination of factors needed for MS to arise. From there we will be able to tease out which factors are more prominent in Canada, and explore potential strategies for prevention.

For the treatment of MS, Canadian researchers are leaving no stone unturned. Earlier this year we announced an exciting new clinical trial that will test stem cells' potential ability to treat MS. The MESCAMS study will explore the ability for mesenchymal stem cells — adult stem cells that give rise to bone, cartilage and fat — to suppress inflammation and promote repair in people with all forms of MS. MESCAMS, the Canadian arm of an international collaboration on stem cells, is perched to make a significant contribution in terms of data, knowledge and expertise to the stem cell field.

We are also seeing movement with the Progressive MS Alliance, an international collaborative funding research in progressive MS, with its first round of funding for 22 research grants in nine countries. People who live with progressive MS are currently without disease-modifying treatment options, and their need for answers is urgent. As an active member of the Alliance, the MS Society of Canada is leveraging resources with organizations around the world to advance our knowledge of progressive MS and expedite the development of viable therapies for this form of the disease. In this issue of *MS Research*, we feature McGill University's Dr. David Haegert, one of the Alliance's grant recipients, whose study on biomarkers may one day help predict disease progression in people with MS.

MS is Canada's disease, and this May we are asking you to take the pledge and do whatever it takes to end MS. Visit endMS.ca and choose the option to "fight" to find out how you can contribute to our \$75 million capital campaign for MS research.

Our work is possible because of support from you: our donors, fundraisers and volunteers. I thank all of you for being champions of groundbreaking research and doing whatever it takes to end MS.

For more stories on MS research, visit my blog at DrKarenLee.ca or follow me on Twitter @Dr_KarenLee

Sincerely,

Dr. Karen Lee

Vice-president, research

Managing director, endMS Research and Training Network



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Progressive MS Alliance

Dr. David Haegert contributes to international effort



“Bringing together diverse groups of people with diverse expertise is needed to really come to grips with progressive MS. This kind of research can’t be done in a bubble.”

For Dr. David Haegert, unravelling the mystery of progressive multiple sclerosis is one of the most important challenges facing MS researchers today. A professor of pathology at McGill University in Montreal, Dr. Haegert boasts a long and illustrious research career devoted to understanding the immunological basis of MS — but he admits that progressive MS remains an enigma. “In progressive MS, there are very few accepted treatments,” says Dr. Haegert, “and almost all of the first-line drugs [for relapsing-remitting MS] either don’t seem to work or give conflicting results.”

Dr. Haegert joins 21 researchers from nine countries around the globe as a recipient of the Progressive Multiple Sclerosis Alliance (PMSA)

Challenge Award, the first step of an ambitious initiative to forge international research networks and accelerate the development of treatments for progressive MS. The Challenge Awards are the first projects that will identify knowledge and infrastructure gaps in progressive MS research. The PMSA will use the combined efforts of leading international progressive MS experts to deliver important insights into understanding this debilitating form of MS.

Unlike relapsing-remitting MS, which is characterized by “flare-ups” of symptoms followed by periods of recovery, people with progressive MS experience a sustained build-up of neurological damage and disability. People



Listen in: Bob McDonald, host of CBC's Quirks and Quarks, will host our new MS Research Town Hall on Wednesday, May 27 — World MS Day. Visit mssociety.ca/msresearchtownhall to register and learn about the state of MS research today.

with primary-progressive MS experience neurological decline from when they are first diagnosed, and this steady worsening of disease does not involve flare-ups. Those with relapsing-remitting MS who go on to develop the progressive form are said to have secondary-progressive MS. Dr. Haegert argues that some of the biggest obstacles facing researchers in finding treatments for progressive MS is the lack of accessible biomarkers that can predict who will go on to develop progressive MS, and what the disease course will be like in those who do.

Biomarkers — short for biological markers — are molecular signatures found in the body that are used to measure the presence or progress of a disease. In relapsing-remitting MS, biomarkers in certain bodily fluids or shown on brain imaging scans can be powerful tools to help clinicians guide treatment decisions. It's important to find better biomarkers in relapsing-remitting MS to help indicate progression. For progressive MS, finding reliable biomarkers to help diagnose and monitor the disease has remained elusive.

Dr. Haegert hopes to change this — his current research follows on the heels of his team's discovery that people with secondary-progressive MS can be divided into two groups: those in whom certain genes related to the immune response are activated, and those in whom those same genes are dormant. "What was interesting," Dr. Haegert says, "is that the group who had activation of those specific immune genes also happened to progress much

faster from relapsing-remitting to secondary-progressive MS — within about 12 years — whereas the other group progressed much more gradually."

While the link between immune gene activation and the rate of progression to secondary-progressive MS was discovered by happenstance, Dr. Haegert says that his finding will have important implications for determining the most appropriate therapy for people with secondary-progressive MS. "Since a faster rate of progression is a critical determinant of long-term prognosis in MS, finding a biomarker that can predict disease progression is a crucial step towards identifying which people with secondary-progressive MS can potentially respond to immune-modifying drugs."

To maximize the breadth and impact of his PMSA-funded research, Dr. Haegert has joined forces with other MS neuroimmunology experts across Canada, including Drs. Jack Antel and Amit Bar-Or at McGill University and Dr. Mark Freedman at the Ottawa Hospital Research Institute. Dr. Haegert applauds the PMSA for opening up new avenues for collaboration through the introduction of the Challenge Awards. "Bringing together diverse groups of people with diverse expertise is needed to really come to grips with progressive MS," he says. "This kind of research can't be done in a bubble; disease mechanisms, drug discovery and the development of biomarkers are all critical for helping us understand and predict progression."

 This May, take the pledge to end MS — visit endMS.ca to find out how you can step up your support of Canadian MS research during MS Awareness Month.



Waugh Family Foundation: Supporting Canadians living with MS through research

Katerina Othonos

“Having a family member affected by MS was a strong motivator for our family to do our part to contribute to the efforts to find new treatments or a cure for MS.”

—Chair, Waugh Family Foundation

Katerina Othonos has been interested in the brain for as long as she can remember. “As I was growing up,” she says, “I became aware of just how many debilitating diseases affect the brain and central nervous system. Research in MS really sparked my interest after I realized the complexity of the disease, how many young people are affected by it, and its high prevalence in Canada.”

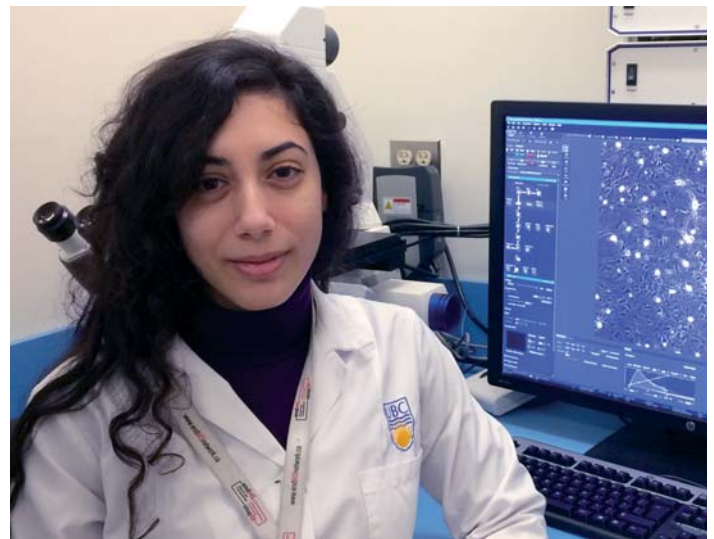
Katerina is currently a doctoral candidate at the University of British Columbia, studying proteins that have the potential to influence neuroprotection of axons and neurons in the brain. Inspired by her supervisor Dr. Jacqueline Quandt’s passion for MS research, Katerina is investigating ways to prevent damage to axons and neurons in the brain, which is a key feature in the pathology of MS progression. Katerina’s research may have a significant impact on not only understanding progression in MS, but also in the development of treatments that slow or prevent this progression.

Her research is possible because of the Waugh family, whose unwavering financial support has enabled 25 promising young researchers, including Katerina, to pursue their goals and remain committed to their research in MS while facing a demanding academic schedule.

The availability of doctoral studentship funding is enough to determine the trajectory of a student’s career. “By the time you become a doctoral student,” Katerina says, “you’re at an age when you may have a family to support. After an undergraduate degree, many people choose to pursue other jobs in the science

industry, outside of research. A doctoral program is quite demanding, and funding allows us to focus on performing our experiments, analyzing data and reading all the current literature that informs our own research.” Doctoral funding allows researchers in MS to pursue a potential career in MS, rather than look outside MS research for work. “We are delighted to contribute to researchers like Katerina, as our family firmly believes that only through investment in talented researchers like her will Canada put an end to MS,” says the chair of the Waugh Family Foundation.

Many people with relapsing-remitting MS fear the possibility of transitioning to a progressive form of the disease — Katerina’s research in neuroprotection may contribute to the prevention of this transition. “Current disease-modifying therapies help manage the disease, but they don’t stop it. My hope for my research is that we can stop MS from progressing altogether.”

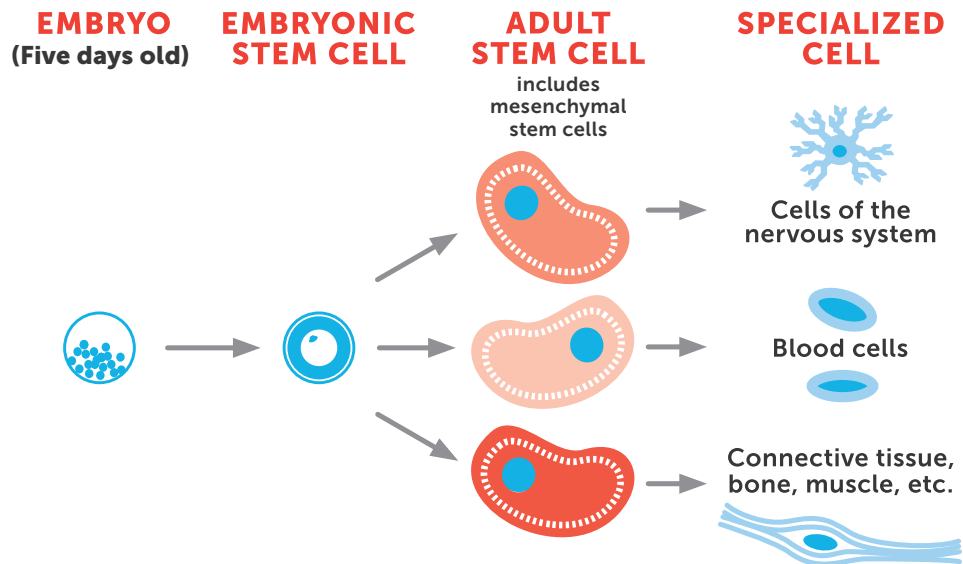


To find out how you can support the next generation of MS researchers, please contact Lee Nichols at lee.nichols@mssociety.ca

MESCAMS

Canadian stem cell trial for MS

Stem cells are remarkable: they are generic cells that can transform into specialized cells that make up our various organs and tissues. For people living with multiple sclerosis, stem cell research may lead to breakthroughs in repairing nerve damage, lowering inflammation and maintaining the health of regenerated myelin – which may mean viable treatments for progressive MS and relapsing-remitting MS. The following graphic illustrates different types of stem cells and their paths of development. Note that these are only a few examples of the many specialized cells in the body that come from stem cells.



MESCAMS trial

In January the MS Society of Canada and MS Scientific Research Foundation announced a \$4.2 million grant for the first Canadian clinical trial to explore the potential of mesenchymal stem cells (MSCs) to treat MS. Funded in part by Research Manitoba and A&W Food Services of Canada, Inc., and led by Dr. Mark Freedman from the Ottawa Hospital Research Institute and Dr. James Marriott from the University of Manitoba, the M**E**senchymal Stem cell therapy for C**A**nadian MS patients (MESCAMS) study will enlist 40 participants to take part in a procedure that involves extracting and receiving their own MSCs. MESCAMS will not require participants to undergo chemotherapy – which

makes the study much safer and less invasive than previous studies involving stem cells.

As a type of adult stem cell, MSCs develop into specialized cells belonging to specific tissues, unlike embryonic stem cells, which give rise to all cell types in the body. Animal studies have revealed that MSCs also have a unique ability to suppress inflammation and repair damaged tissue, and encouraging results have been seen in the treatment of other inflammatory conditions. MESCAMS is one of nine studies happening in parallel around the world, all focused on determining the safety and benefit of this promising treatment.

“Over the past five years, our guests and our franchise operators have been incredibly supportive of our annual Cruisin’ to End MS fundraising campaign. We are delighted to see resources raised through this campaign supporting world-leading research that offers real hope to people living with MS.”

– Paul Hollands, president and CEO, A&W Food Services of Canada, Inc.

Snapshot of MS research

Recent highlights

Multiple sclerosis is Canada's disease, with 100,000 Canadians living with MS. Because of you — our donors, volunteers and event participants — we are able to fund promising avenues of research, such as nerve repair, cause, symptom management, progression and therapies. For more details on MS Society funded studies and more, visit mssociety.ca/msupdates

Risk Factors

Puberty in young girls is a significant factor in the development of MS

In a landmark study led by **Drs. Brenda Banwell** and **Shannon Dunn, Ms. Jennifer Ahn**, University of Toronto graduate student and recipient of the Lawrason Foundation MS Society Doctoral Studentship, studied how puberty may increase the risk of developing MS among women later in life. The team found that puberty in young girls can influence the inflammatory activity of white blood cells, which can lead to or exacerbate MS.

These findings shed new light on why women are more susceptible to MS than men, and future research may build on this knowledge to identify women who may be at a higher risk of developing MS.

Progression & therapies

Breakdown of blood brain barrier precedes lesion formation in MS

This study, led by **Dr. Alexandre Prat** from University of Montreal, mapped out the chronology describing how the blood brain barrier (BBB) — a gateway that controls which cells and molecules enter the central nervous system — is disrupted during the course of MS. The study was performed in both humans and animals with an MS-like disease, and found that inflammation around the BBB can trigger its breakdown weeks before the onset of disease symptoms. Mapping out the sequence of disease events that underlie MS development will allow clinicians to more fully understand the nature of MS and help them to make informed treatment decisions.

Repair/ Remyelination

Promising new target for MS treatment has significant potential to stop neurodegeneration and promote recovery

Dr. Fang Liu and colleagues at the Centre for Addiction and Mental Health in Toronto are studying how the interaction between certain proteins in the central nervous system leads to nerve cell death, a process called neurodegeneration. Dr. Liu and her team tested whether blocking these protein interactions with a specific drug could prevent neurodegeneration and promote recovery in mice with an MS-like disease. The study showed that treatment with the drug alleviated symptoms and prevented neurodegeneration, which paves the way for a new treatment strategy for MS and sheds light on the neurodegenerative aspect of MS.



Studentship Awards

Supporting the next generation of MS researchers

We are grateful to our donors for supporting the next generation of MS researchers through our Studentship Awards program. We are pleased to highlight the recipients of the 2014/2015 Studentship Awards, and we would like to extend a special thank you to those donors who made them possible.

Award	Recipient(s)
Alistair Fraser MS Society of Canada Masters Studentship	Benjamin Ewanchuk, <i>University of Calgary</i>
Asad Wali MS Society of Canada Postdoctoral Fellowship	David Gosselin, <i>University of California, San Diego</i>
Dr. William J. McIlroy MS Society of Canada Doctoral Studentship	Praveena Manogaran, <i>University of British Columbia</i>
Golf Classic Charlebois-Trépanier and Letellier Gosselin MS Society of Canada Doctoral Studentship	Tanguy Duval, <i>Polytechnique Montreal</i>
Sherritt International Corporation MS Society of Canada Doctoral Studentship	Curtis Benson, <i>University of Alberta</i>
The Lawrason Foundation MS Society of Canada Doctoral Studentship	Jeeyoon Ahn, <i>University of Toronto</i>
Waugh Family MS Society of Canada Doctoral Studentship	Alexandre Paré, <i>Université Laval</i> Gregory Duncan, <i>International Collaboration on Repair Discoveries (ICORD)</i> Julia O'Mahony, <i>University of Toronto</i> Katerina Othonos, <i>University of British Columbia</i> Omar de Faria, <i>McGill University</i> Sandra Magalhaes, <i>McGill University</i>

To find out how you can support the next generation of MS researchers through the MS Society's Studentship Awards program, please contact Lee Nichols at lee.nichols@mssociety.ca or 1-866-922-6065 x3131.