

MS[®]

Research

Spring/Summer 2016

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takes guts*

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@Dr_KarenLee

Multiple sclerosis is a highly variable and complex disease. As a result, researchers from different scientific backgrounds are interested in discovering what causes MS and how it can be tracked and managed. MS research has focused primarily on the immune system: how immune cells enter the brain and spinal cord and mistakenly attack the protective myelin sheath.

As new knowledge about MS emerges, however, experts are turning their attention to other areas, such as the processes of nerve degeneration and repair; mechanisms underlying MS-related pain and fatigue; physical activity as a form of symptom management and disease modification; and the roles of other systems in the body, such as the digestive or lymphatic systems. Exploring these topics in greater detail allows researchers to paint a clearer picture of the disease, which in turn brings us closer to a cure.

The University of British Columbia's Dr. Helen Tremlett is leading a new wave of studies observing the gut microbiome and its link to MS. Although preliminary, research suggests that changes to the composition of bacteria that live within the gut may contribute to autoimmunity. Read more about Dr. Tremlett's recently funded study of the gut microbiome as part of a larger Canadian collaborative project on pages 3–4.

The impact of physical activity on MS is also gaining momentum in the field of research. We know that engaging in physical activity is beneficial for our overall health, but a growing body of evidence is demonstrating that physical activity also has positive effects specifically for people living with MS. In this issue of *MS Research*, we provide an update on what we know about physical activity and its effect on MS symptoms and quality of life.

As the research community builds its understanding of MS and all of its intricacies, it's encouraging to know that no stone is being left unturned. In addition to examining all potential causes, triggers, and treatment targets, researchers are engaging in collaborations that enable them to combine expertise and resources. I look forward to seeing progress in previously unexplored areas of research, and providing funding opportunities at the MS Society that aim to stimulate innovation and translation of exciting results.

For more MS research stories, visit my blog at DrKarenLee.ca or follow me on Twitter [@Dr_KarenLee](https://twitter.com/Dr_KarenLee)

Sincerely,

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Vice-president, research



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Risk Factors

Researching MS takes guts

Gut microbiome and its link to MS



“ Since our gastrointestinal system is an entry point for many disease-causing bacteria, the composition of our gut microbiome plays an essential role in regulating our immune system to recognize what’s foreign and potentially dangerous and what isn’t. ”

Our digestive tract contains trillions of bacteria that together make up our gut microbiome. In fact, the bacteria that live in our bodies outnumber the human cells that make up our various tissues by a factor of ten to one. Of course, these little passengers aren't just along for the ride; while they enjoy a place to call home and a constant supply of food, we benefit from their ability to break down our food into vital nutrients that we need to survive.

The gut microbiome plays an even larger role beyond helping us digest our food. Disruption of the delicate balance of different bacteria residing in our gut can have enormous implications for many of our body's essential biological functions – from our metabolic processes to the health

of our immune system. How the gut microbiome influences disease is a question on many researchers' minds.

The gut microbiome is shaped by various exposures we come across in life, such as the food we eat, any infections we've acquired or drugs we've taken. The influence of these factors is particularly strong during childhood development, a time in which the gut microbiome acts as a "tuning fork" for the developing immune system. Research is revealing that imbalances in the gut microbiome composition in early life can lead to the development of food sensitivities, allergic reactions and asthma. Could this also be the case for autoimmune disease like multiple sclerosis?

MULTIPLE SCLEROSIS AND THE GUT MICROBIOME: WHAT'S THE LINK?

Since our gastrointestinal system is an entry point for many disease-causing bacteria, the composition of our gut microbiome plays an essential role in helping our immune system recognize what's foreign and potentially dangerous. Unfortunately, this process can sometimes go awry. Emerging evidence from animal studies suggests that changes to the gut microbiome can trigger autoimmunity and harmful inflammation. But what does this mean in the context of MS?

Researchers are now embarking on the task of comparing the gut microbiome in people living with MS to healthy individuals while posing the following questions: "How do they differ? Why do they differ? Could this be important?" Dr. Helen Tremlett, Professor at the University of British Columbia, is taking a fresh approach to this perplexing question. As part of a collaboration with the Canadian Pediatric Demyelinating Disease Study funded by the MS Society of Canada and MS Scientific Research Foundation, Dr. Tremlett has set out to gather clues about how the gut microbiome can influence the development of MS by mapping out a detailed catalogue of intestinal microbes from children and adolescents living with MS and their healthy counterparts.

While MS in youth is relatively rare, studying kids can offer a unique perspective into the earliest stages of the disease. "Compared to MS diagnosed in adults with decades' worth of life experiences and exposures such as diets,

exercise, medications, travel, and so on," says Dr. Tremlett, "children have had a more limited lifetime of exposures." In this way, studying the gut microbiome in youth presents a unique opportunity for exploring what might cause or trigger MS, in turn revealing insights that could benefit all people living with MS. Collaborating with a world class initiative such as the Canadian Pediatric Demyelinating Disease Study allows Dr. Tremlett to tap into an established cohort of young people with MS who can provide a vast wealth of knowledge about the cause of the disease.

When asked what drew her to the study of microbes in the gut, Dr. Tremlett explains that the gut microbiome could provide new, meaningful insights into the origins and drivers of MS. "The bacteria in your gut educates your immune system, and vice versa," says Dr. Tremlett. "We really believe we're onto something important in pursuing these lines of research."

Can changing one's gut microbiome through diet and lifestyle influence the course of MS? Dr. Tremlett admits that it's too early to say. "There is currently no 'one size fits all' evidenced-based method of saying to an individual 'do this, eat that and this will happen to your gut microbiome and your future health will benefit,'" says Dr. Tremlett. However, she hopes that information from her study will help us better understand how the bacteria that live within us play a role in health and disease, and particularly how they may drive or control MS.



Physical activity and MS

Research update

People living with multiple sclerosis were historically advised to avoid physical activity for fear that physical exertion would make them feel worse. Over the past few decades, new research has uncovered considerable benefits associated with increased physical activity. Now, people living with MS are encouraged to pursue a more active lifestyle that fits their own capabilities and interests. In addition to improving overall physical function, there is evidence that physical activity can help maintain a person's independence, enhance their quality of life, and lead to improved cognitive function and brain health.

Researchers have been investigating the relative benefits of different types of physical activity for people living with MS, through clinical trials and questionnaire-based studies. Here's a snapshot of some current research findings that will provide insights into how different types of physical activity may help manage MS symptoms.

- 1 Braendvik et al. *Physiother Res Int*. 2015
- 2 Sandroff et al. *J Clin Exp Neuropsychol*. 2015
- 3 Newman et al. *Mult Scler*. 2007
- 4 Grover et al. *Neurology*. 2015
- 5 Ratchford et al. *NeuroRehabilitation*. 2010
- 6 Castro-Sánchez et al. *Evid Based Complement Alternat Med*. 2012
- 7 Broekmans et al. *Mult Scler*. 2011
- 8 Sabapathy et al. *Clin Rehabil*. 2011
- 9 Guner et al. *J Bodyw Mov Ther*. 2015
- 10 Robinson et al. *BMC Sports Sci Med Rehabil*. 2015



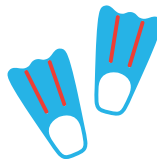
WALKING

Treadmill walking has been shown to improve mobility,¹ increase cognitive performance,² and decrease fatigue.³ Running and jogging is linked to smaller brain lesions and lower relapse rate in children and teens living with MS.⁴



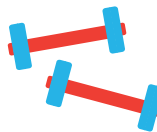
CYCLING

When paired with functional electrical stimulation as a rehabilitation strategy, cycling could lead to improvements in walking speed and endurance, leg muscle strength, and quality of life in people living with progressive MS.⁵



AQUATIC TRAINING

Ai Chi, an aquatic exercise program that is used for relaxation and physical rehabilitation, has been demonstrated to improve pain, fatigue, spasms, and depression.⁶



STRENGTH TRAINING

Strength training, in particular for the legs and hips, may be an effective method for improving balance,⁷ quality of life, and fatigue in people with MS.⁸



YOGA

Certain yoga programs including Ananda, Hatha and Raja yoga, are linked to improved quality of life, diminished pain, and improved balance, fatigue, and walking performance.⁹



EXERCISE AND VIDEO GAMING (Exergaming)

Some videogame training programs have been shown to improve balance in a fun way, which in turn improves motivation and adherence.¹⁰

➤ For more guidelines on physical activity for adults who live with MS, visit mssociety.ca/physicalactivity. See also our Hot Topics page at mssociety.ca/research-news/exercise-and-physical-activity

Collaborative research

Strength in numbers



**“ Collaboration is what drives innovation—
this is what brings results into the
hands of people living with MS. ”**

JOE RANDELL’S COMMITMENT TO THE MULTIPLE SCLEROSIS SCIENTIFIC RESEARCH FOUNDATION

The MS Society’s Multiple Sclerosis Scientific Research Foundation (MSSRF) is the largest fund in the world dedicated strictly to MS research. With a focus on collaborative research, the MSSRF is able to fund large-scale, multi-site studies that have the potential to dramatically influence the course of care of MS, and advance knowledge in the field.

Joe Randell, president and CEO of Chorus Aviation, has been on the MSSRF’s board of directors since 2013, and he’s particularly invested in the translation of research discoveries into tangible treatments for people affected by MS. “My daughter was diagnosed when she was 19,” says Mr. Randell. “Today she’s 32, she’s just had her first child—and she’s happy and healthy. We’re all very grateful for that.”

Mr. Randell was a dedicated member of the Halifax Chapter board of directors when he was approached by Bob Decker, a vital contributor to the endMS campaign, to become a proactive part of the campaign. Randell’s involvement

ultimately led him to become an active board member of the MSSRF.

A long-time entrepreneur hailing from Halifax, Nova Scotia, Mr. Randell thinks about MS research similarly to how he thinks about business: the best possible return on investment. “A delay of a year or two for the development of a tangible treatment might not seem like a lot,” Randell says, “but if you’re a person who is living with MS every day, it can seem like an eternity. We need to get research discoveries into the marketplace, as treatments, now.”

When Mr. Randell attended the endMS Conference a few years ago, he witnessed first hand the power of collaboration as MS researchers gathered to learn from each other and gain new insights. “Collaboration is what drives innovation—this is what brings results into the hands of people living with MS,” says Mr. Randell. “That’s what excites me about the work of the MSSRF. It’s about using all the appropriate tools to get us to our end goal – which is to end MS and help people manage their symptoms now.”

➤ To find out how you can contribute to large-scale initiatives like the MSSRF, email lee.nichols@mssociety.ca

Trending in MS research

Noteworthy advancements

Canada has the highest rate of multiple sclerosis in the world. It's because of our donors, event participants, and volunteers that we are able to fund some of the best MS research in the world, right here in Canada. To read more about the studies mentioned below and the latest in MS research, visit mssociety.ca/research-news, and follow [@MSSocietyCanada](https://twitter.com/MSSocietyCanada) on Twitter.



MS Society of Canada @MSSocietyCanada · Dec 18

Early-stage study shows that **vitamin D** can promote myelin repair. Evidence has recognized vitamin D as a protective factor against the development of multiple sclerosis.
[#VitaminD](#) [#endMS](#)



MS Society of Canada @MSSocietyCanada · Oct 8

MS Scientific Research Foundation-funded research draws links between **exercise** and disease severity in children living with MS.
[#exercise](#) [#IncreasedMobility](#) [#endMS](#)



MS Society of Canada @MSSocietyCanada · Oct 1


Promising results from **ocrelizumab** clinical trial: shows potential for reducing disability progression in people living with primary-progressive MS. [#Progressive](#)
[#TeamFight](#)



MS Society of Canada @MSSocietyCanada · Dec 2

Study strengthens understanding of the **inflammatory nature of #MS**—potential to propel the development of therapies for progressive MS. [#endMS](#) [#ProgressiveMS](#)

MS DOESN'T HAVE TO BE CANADA'S DISEASE.



“NEW RESEARCH HAS MOVED MY DISEASE OUT OF PERMANENT
DISABILITY AND INTO A LIFE WHERE I CAN FULLY PARTICIPATE AS A
PHYSICIAN, FRIEND AND ACTIVE MEMBER OF MY COMMUNITY.”

— ALEX, DIAGNOSED WITH **MS** IN 2007

Make a donation today.
mssociety.ca/give

Canada has the highest rate of MS in the world—and we need your help to eliminate this statistic.

Funding the best and brightest minds in MS research starts with every Canadian. With the continued support of our donors, we're enabling Canada's young researchers to make a life changing impact on people living with MS.