Vol. 16

msdialogue®

FOR THOSE WHOSE LIVES ARE AFFECTED BY MS

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"Have hope...keep a positive attitude, and hopefully things will get better."

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Stem cell research

Dear msdialogue® Readers,

Usually, we are reporting on what's new in the world of MS but in this issue, we have some news of our own!

Currently in our fifteenth year of publication, we have been fortunate to have Ontario resident Danielle Charbonneau as part of our Editorial Board since the beginning. As someone who lives with MS, her insights have brought a human perspective to the stories and news articles we have published, which many of you have found helpful, based on the letters we receive. She has decided to retire from her role at ms*dialogue*® and we would like to thank you Danielle for your invaluable voice and dedication these many years.

Some of you may remember Christen Demaries – she and baby Stella graced our cover two years ago when she shared her personal story with MS, specifically her decisions around having children. We welcome her to our ms*dialogue*® editorial family and look forward to her personal perspective on all things MS (such as her ***New Favourite Thing*** on page 5).

In digital news, we are excited about our new e-ms*dialogue*® format which will be debuting later this year as an addition to our printed magazine. We will publish two e-versions this year – the first one will look at MS from the caregiver's perspective. We would love to hear about other topics you would like to see in this format. Please drop me an email or give me a call! I can be reached at info@tamarindhealthcare.ca or (514) 693-2033 ext. 101.

Finally, be sure to check out our two new columns: our ***Canadian Corner*** is making its debut in the ***News Flash*** section (we are very fortunate to have such high caliber MS research being done across Canada) as well as our new ***"Reading Shelf"*** in which we discuss books we feel would be of interest to our readers. Just in time for the summer reading season!

Live well,

Clare

Clare Lord
President & Publisher

Note to Reader:
Words in **purple** throughout the magazine are defined in the glossary on page 15.

msdialogue® Vol. 16

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In depth report on:

news Flash!

Lots of interesting research was reported at this year's European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS) meeting, held October 7 - 10 in Barcelona, Spain.

Biotin a potential for progressive MS?

A small randomized-placebo clinical study, which includes 154 subjects, has suggested that biotin, an enzyme that's thought to be important in the creation of myelin, was shown to have a small but significant positive effect on disability and risk of progression in people with progressive MS. Biotin was given orally at a high dose of 300 mg/day. Effects were strongest in patients with secondary progressive MS (SPMS), partially because there were too few people in the PPMS arm of the study to allow researchers to draw a strong conclusion. The benefits were more pronounced in people also receiving fampridine, a medication shown to improve walking speed in people with MS. More studies that include a larger population are needed to verify and/or confirm these preliminary data.

Camping for Kids with MS

For kids with MS, attending summer camp can offer more than great friendships and memories that last a lifetime – it may have important mental and physical health benefits. That said, the whole idea of this camp is to give the kids a break from their MS; to let them just have fun and be kids and not worry about anything else, MS Society of Canada's Emily Knight told ms*dialogue*®.

Campers at the Easter Seals Camp Merrywood, near Ottawa, Ontario, can participate in kayaking, canoeing, sailing, swimming, wheelchair basketball, wheelchair floor hockey, drama, arts & crafts, cooking/baking lessons & nightly campfires. Physical activity has been reported to improve MS symptoms in children as well as in adults. A small Canadian study found that kids who were more physically active were less fatigued, and those involved in more strenuous physical activity also tended to have smaller lesions and fewer relapses, although larger studies are needed to confirm this.

Many campers also benefit from quiet late-night conversations with Peer Support Leaders (PSLs), individuals with MS in their mid-to-late twenties who attend camp each year. Two MS nurses are also available to answer campers' questions and provide education as needed.

The Summer Camp is open to children from 8 and up to 21 years of age. Thanks to generous funding, all costs associated with attending the camp are covered. This year's camp will be offered August 13-20, 2016.

To find out more, visit https://mssociety.ca/living-with-ms/young-people-with-ms/summer-camp or contact Holly Guthrie, Easter Seals Camp Coordinator at 1-800-668-6252 ext. 325 or e-mail hguthrie@easterseals.org.

CANADIAN Corner

Antibiotic minocycline may delay CIS progression to MS

Minocycline, a widely used antibiotic, appears to delay the onset of MS in people with clinically isolated syndrome (CIS), according to results of a 2-year Canadian study. Patients (n=143) who had their first clinical demyelinating event within 180 days of the study were randomly assigned to receive placebo or twice daily minocycline 100 mg, the standard dose used for infections or long-term acne treatment. Note that MS is a disease that might be influenced by the **microbiome**. Given that minocycline is an antibiotic, the potential long-term impact of this therapy remains to be seen.

At 6 months, 61.4% of the placebo group developed MS compared with 34.0% in the treatment group, an absolute risk reduction of 27.4%, and a **relative risk** reduction of 44.6% (P=0.001). At 24 months, however, the difference was not statistically significant. Notably, however, the study was not designed to show a difference between the arms at the 24-month time point. At this point, we do not know if a disease-modifying capacity is maintained beyond the six-month endpoint. This level of efficacy at 6 months is comparable to that of other approved therapies, said neurologist and lead author, Luanne Metz, of the University of Calgary in Alberta.

food Flash!

Fad diets

Special "fad" diets make the news regularly, promising everything from easy weight loss to increased libido.

Unfortunately, they rarely measure up to the hype or the hope they generate. The same is true when it comes to special diets for MS – some approaches may work for some of the people some of the time, but strong scientific support for any diet is lacking.

The best plan may be to identify your favourite healthy foods in each food group, and try to eat a balanced selection from each, according to the number of portions recommended by the Canada Food Guide.

Combining healthy eating choices with daily exercise can offer benefits, and there's nothing 'faddy' about it.

Consider this approach if you would like to reduce your fatigue, keep your bowel and bladder in good working order, reduce the risk of having skin problems, keep your bones, teeth and gums, and your heart strong and healthy.

health Flash!

Immunization is particularly important when you have MS because it helps protect against infections, which have the potential to trigger relapse in people with MS.

In general, vaccines (particularly inactivated vaccines) are considered safe for people with MS – several studies assessing immunizations for hepatitis B, influenza, tetanus, measles and rubella suggest that they do not increase either the risk of developing MS or, in the case of the first three vaccines, of triggering a relapse.

Inactivated vaccines are also considered safe in people who are taking an MS treatment such as fingolimod, glatiramer acetate, an interferon medication, mitoxantrone or natalizumab. Vaccines may not have their full effect in people taking fingolimod or natalizumab, or those who have received an immune globulin preparation in the past three months.

In contrast, **live attenuated vaccines (LAV)** such as the nasal spray used to protect against the flu are not generally recommended for people with MS because theoretically, they may increase disease activity. And people taking an immunosuppressive therapy such as azathioprine, cyclophosphamide, methotrexate, mitoxantrone and/or chronic corticosteroid therapy may be at increased risk of developing the disease the live-virus vaccine is meant to prevent.

Live attenuated vaccines should be avoided in people who are taking immunosuppressant therapy, and for three months after treatment has been stopped. Effects of the human papilloma virus (HPV) vaccine in people with MS have not been fully determined, and it has been suggested that individuals with MS may not benefit from this vaccine.

The inactivated, injectable flu vaccine is recommended for everyone over 6 months of age. Extensive study of this vaccine in people with MS suggest that it is quite safe, and may be of special value to individuals with MS, since the seasonal flu is quite common and can trigger an MS exacerbation.

Patient postcards

Dear ms*dialogue*®:

MS and Lyme disease share some of the same symptoms – how can you tell the difference?

MSD: Growing public awareness about the prevalence of Lyme disease has led to concerns that this tick-borne infection may sometimes be misdiagnosed as multiple sclerosis. In some cases, symptoms of the two may be similar; however, when treated early, Lyme disease responds to antibiotics, while symptoms of MS do not.

The characteristic red bulls-eye rash around a tick bite may last only days to weeks, and does not occur in everyone with Lyme disease. Common symptoms of Lyme disease include unexplained rashes, flu-like symptoms, sore or stiff joints/bones and muscle cramps.

Infection can also cause delayed neurologic symptoms like those seen in MS, including weakness, blurred vision due to inflammation of the optic nerve, abnormal sensations in response to touch, fatigue, confusion and cognitive difficulties.

Testing and diagnosis

Blood tests for Lyme disease are known to generate false negatives and false positives, and results of magnetic resonance imaging (MRI) scans of the brain and cerebro-spinal fluid (CSF) tests can also appear to reflect MS.

Diagnosis should be based on all available information, including symptoms, risk factors for Lyme disease (i.e., time spent outdoors in well-known tick habitats) and results of blood tests and other tests. For more information on Lyme disease, for yourself or for your physician, or to access a questionnaire to help you track symptoms, visit www.canlyme.com.

Dear ms*dialogue*®:

How should I dispose of my used needles?

MSD: All needles (sharps) waste must be disposed of directly into a puncture-resistant container. Check with your MS medication patient support program or the drugstore that fills your prescription for injected medication; some pharmacies will provide their own sharps containers; others may dispose of any filled suitable sharps container for you. If not, call your local hospital, health unit or municipal waste authority to ask about where you can deliver the container for safe disposal.

My New Favourite THING

Mont-Tremblant, Quebec 2015

My name is Christen and since my RRMS diagnosis 13 years ago, I have been on two DMTs and had the support of two Patient Support Programs.

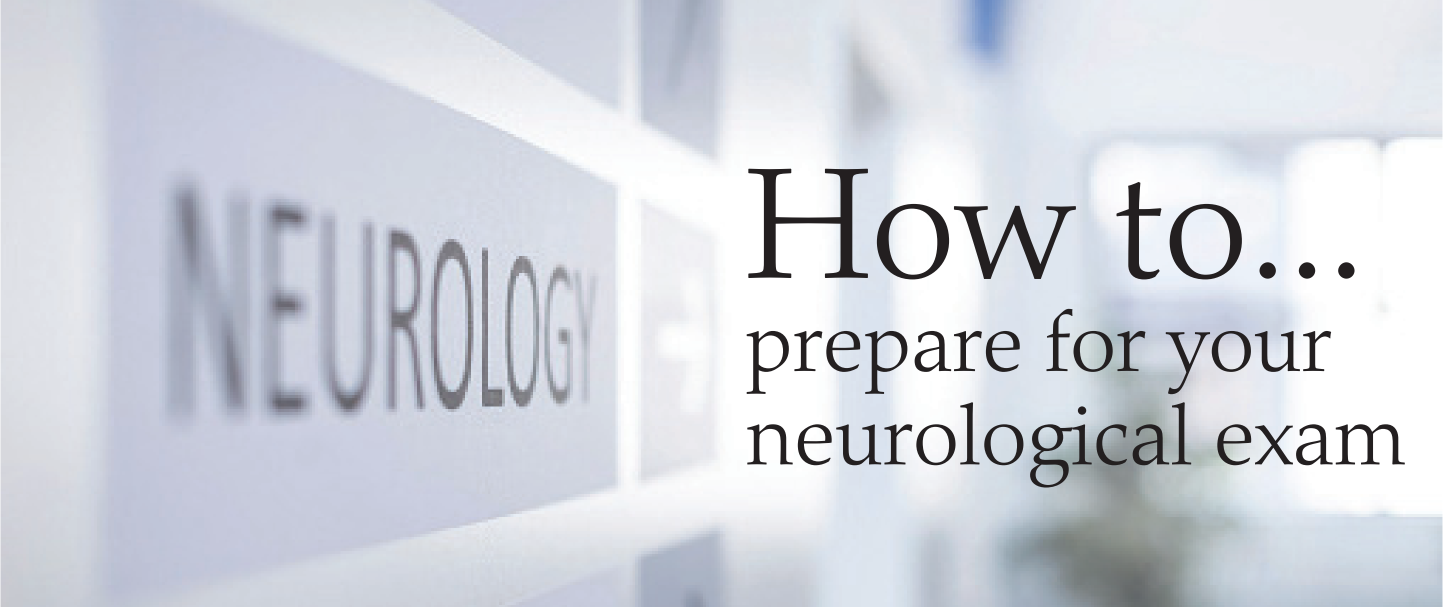
They are great! They offer as much or as little contact as you need, help arrange financial assistance and insurance coverage, and never have I felt that either program was pushing a particular medication onto me.

When I started my first (injected) DMT, the nurse came to my house, and they sent me a very cool kit of things I would need to organize my daily needle routine.

I have called in for tips to help with injection side effects like bumps, bruising, and pain. It helps to have a person on the phone to talk to rather than looking it up on the Internet, because no two people are the same and some of those side effect pictures online can be scary!

After I had my first child and was ready to get back on my DMT, the nurse came to my house to refresh my injection technique. She assessed my physique and showed me where I should inject and where to avoid because of 'lack of cushion' (a compliment to someone 8 months post-pregnancy!). The refresher course was fantastic and more necessary then I had realized.

When I changed to an oral medication, I used the PSP website to set up email reminders of upcoming doctor visits, and I receive a text message daily to remind me when it is time to take my pill. On the second day of my new treatment, I had a complete panic attack and called the nurse, who talked me through it and even followed up a week later. After all these years, and for all these reasons, patient support programs are still my new favourite thing.



How to...
prepare for your neurological exam

A thorough physical examination, including neurologic assessment, is important for diagnosis and for ongoing monitoring to identify functional changes in MS.

Your medical history

Be prepared to describe past symptoms and problems; even things you experienced years earlier could help identify problems that may explain current symptoms.

General assessment

Mental capability (cognition) is assessed based on your ability to answer simple, everyday questions, or to correctly repeat a series of words or numbers. Emotional condition is tested if problems are suspected.

Functions such as vision, hearing and swallowing will be assessed for evidence of MS effects. Gait (the way you walk), dexterity, muscle strength, muscle tone and muscle control will also be tested. For instance, strength might be assessed by having you push against the doctor's hand with your arms and legs.

Sensory function

The ability to feel pain (via a pinprick), light touch, temperature, and vibration (via a tuning fork) is tested, as well as your ability to sense the position of the arms or legs.

Reflexes

Deep tendon reflex: The tendon is tapped with a reflex hammer, stimulating a brisk muscle contraction that causes the limb to move suddenly, eg, the knee reflex causes the leg to kick out. An increased or decreased reflex suggests a nervous system disruption.

Plantar response: An instrument is scraped along the sole of the foot, from heel to great toe. In a normal response, the toes curl downward. Upward extension of the great toe and fanning of other toes indicates a problem in the central nervous system; this is called a Babinski response.

Coordination (hand and foot)

Finger-nose-finger: Rapidly touch your nose and then touch the doctor's finger.

Heel to shin: Move the heel of your foot up and down the length of your shin.

Balance

Walking and tandem walking (walking heel to toe) are used to assess balance.

Secondary problems

Report any possible MS-related problems such as infections, urinary problems, skin breakdown and musculoskeletal complaints. Visual problems often affect people with MS – tell your doctor about any changes to your vision, such as the ability to see colour and distinguish contrast.

If the neurologic exam is for diagnostic purposes rather than for ongoing follow-up after diagnosis, these factors will be used along with medical test results such as MRI and/or a lumbar puncture test of the cerebrospinal fluid (CSF) to confirm or rule out MS.

Patient Power!

Lifestyle choices that can really make a difference

One of the great things about lifestyle is that it is under one's own control – and if your goal is a better quality of life (QoL) and improved control over your MS, you have a wide variety of options to consider and adopt (or adapt) to fit your needs.

What you choose to eat, drink and do to sustain a healthy body and mind – within your own parameters – can have a big impact on QoL. MS is often accompanied by, and in some cases aggravated by, other medical or health conditions (comorbidities).[1,2] Managing your MS carefully, along with any coexisting health problems, can enhance your QoL and give you some added measure of control in your life.[3]

Co-existing cardiovascular conditions such as high blood pressure or cholesterol, diabetes or heart disease have been associated with a greater disability at diagnosis, and a substantially increased risk of disability progression in MS, according to a 2010 study involving nearly 9,000 MS patients. Investigator Dr. Ruth Ann Marrie, of the University of Manitoba, said, "Among people with MS, we have an opportunity to aggressively treat comorbidity and improve the course of disease".[4]

Being overweight or obese, and smoking – which all increase a person's risk for cardiovascular conditions – are more common and associated with worse outcomes in people with MS. Depression is also prevalent, affecting about one in two individuals with MS at some point during their lifetime.[5]

There are simple ways that every individual can combat these conditions and improve their wellbeing. It all begins with the awareness that what you eat, how much activity you get, and how you choose to manage your mental health and wellbeing really does make a difference to your MS as well as your QoL.[2,3]

When it comes to eating habits, being overweight in adolescence has been linked with an increased risk of developing MS.[5] How-ever, no specific diet has been identified as contributing to MS development or to improving MS symptoms.[6,7] Still, given the link between cardiovascular comorbidities and worsening MS outcomes,[1] eating a healthy diet makes good sense.

For a more heart-healthy and MS-friendly diet, try to avoid fried foods, snack foods, and baked goods made with hydrogenated fats in favor of a diet focused on lean meats, low-fat dairy products, whole grains and dietary fibre, fruits and vegetables, and replace saturated fats with unsaturated vegetable-based fats, particularly omega-3 fats.[7] Consider limiting your intake of salt, which (in addition to contributing to high blood pressure) may have pro-inflammatory effects and aggravate CNS inflammation in people with MS.[8]

Eating healthy may even benefit your mood. A study of depression risk in MS found that participants who supplemented with omega-3s (particularly flaxseed oil), ate fish frequently, and supplemented with vitamin D, were least likely to suffer from depression.[2]

And those who enjoy a glass of wine with their meal will be pleased to know that moderate alcohol consumption may have a beneficial effect on the course of MS,[9] and also contributed to the significantly reduced depression risk seen in this study population.[2]

GET YOUR VITAMINS

Research to date suggests that vitamin D likely plays an important role in MS risk and progression. Most recently, researchers identified a link between vitamin D and a protein involved in myelin repair.[10] Further study is needed to confirm and clarify these connections. While most of our vitamin D is generated by skin exposure to the sun, oily fish, such as salmon and sardines, fortified breakfast cereals and eggs are also good dietary sources of vitamin D.[11]

Vitamin B12 also appears to play an as yet undetermined role in MS – we know that the vitamin is required by the body for myelin production, and that a B12 deficiency can lead to MS-like symptoms. Meat, fish and dairy are good sources of vitamin B12. If you are considering supplementing your dietary intake of vitamins D and B12, talk to your healthcare provider about having your levels checked.[11]

BUTT OUT

If you smoke, you should know that not only does smoking increase a person's risk of developing MS, it has also been shown to increase lesion load and the rate of brain atrophy (shrinkage) in those who have MS, and worsen prognosis.[14]

Now for the good news – kicking the habit appears to slow down a person's rate of disease progression: in RRMS patients who smoked, conversion to SPMS occurred at an average age of 48 among those who continued to smoke after diagnosis, and at age 56 among those who quit at diagnosis.[15] Quitting also significantly slowed down the loss of brain volume in patients with MS, according to a study comparing brain volume in RRMS patients who quit smoking (n=106) versus those who continued (n=148). Average age was 33 years; all participants had smoked cigarettes for at least five years, and had been living with MS for a **mean** of 4.8 years.[16]

MOOD MATTERS

A recent study of depression in people with MS found that it affected about one fifth of the study population, and the risk was increased in those with a poor diet, low levels of exercise, obesity, smoking, marked social isolation and the use of an interferon.[2]

We all seem to feel better when the sun is shining. Light therapy, used for years to treat seasonal affective disorder (SAD) or the "winter blues", has recently been shown to be effective in the treatment of major depressive disorder. The study compared four treatment arms: 30 minutes of real or **sham** light therapy at the beginning of the participant's day, with or without real or sham antidepressant treatment using fluoxetine (Prozac).[17]

Treatment uses light boxes, which give off an artificial light that's similar to natural sunlight. Of the 122 study participants, 29% of patients using only antidepressant medication, and 50% using only light therapy had their depression lift, while 76% of patients using combined light therapy and fluoxetine felt their depression lessen.[17]

Living with MS is often challenging and can put you in a chronic state of stress – and that can be bad not only for your state of mind, but for your MS as well by increasing the risks of worsening symptoms, signs of disease progression on MRI, and exacerbations.[19]

While some stress is unavoidable, there are techniques you can learn to help minimize or avoid its negative effects. Research has shown that stress management training can have a significant effect on disease activity, by reducing the occurrence of new brain lesions in people with relapsing MS.[19]

Mindfulness – *the practice of paying attention to your moment-by-moment experiences in an open and non-judgmental way*[20] – is significantly associated with decreased psychological stress, a more constructive approach to coping, increased resilience, and better quality of life in MS. While some people are naturally mindful, mindfulness is a trait that can be developed with training.[17]

In a study of people with MS, just 8 weekly sessions of mindfulness-based stress reduction (MBSR) training, which includes mindfulness meditation, breath work, yoga postures, self-reflection and awareness, led to significant improvements in depression, anxiety, fatigue and quality of life.[19] Individuals interested in trying a free introduction to MBSR training online can visit http://www.bemindfulonline.com.

Be active every day!

Daily physical activity benefits body and mind, and the options are almost endless. Aim for 20 minutes of enjoyable, moderate exercise every day – and divide that time into shorter sessions if you prefer.

The goal is to stick with it, so choose a variety of activities that you enjoy – from taking a brisk walk to swimming to gardening, from working out at the gym to your own at-home Wii fitness program.

Choosing to do something with others can be helpful too: exercising with friends can help you stay motivated, and the social interaction can make your walk or work-out more fun.[11]

People with MS tend to lose muscle mass and have a decline in the cells that rebuild muscle. Although it's not for everyone, a small study of a high-intensity training program that used exercise machines to strengthen upper and lower body muscles found that after just 12 weeks, muscle building stem cells increased by 165%.[13] You might want to try stretching along with your weight training: recent research suggests this combination can actually create strength faster than weight training alone.[12]

Regular aerobic exercise that's vigorous enough to raise your heart rate and breathing rate has been shown to increase overall fitness level and workout capacity, strengthen arms and legs, and improve study participants' bowel and bladder control. Those who exercised also reported reduced depression, fatigue and anger.[12]

Exercise even has benefits in terms of improved brain function, and that helps with mobility issues. In one small study of 26 individuals with MS-related balance problems, using videogames and the Wii balance board five times a week for 30-minute sessions over 12 weeks improved study participants' balance, and increased functional connectivity in several areas of the brain, including the cerebellum, which controls bodily movement.[13]

BRAIN WORKS

About two in three people with MS experience cognitive impairment,[21] which may involve problems with learning and memory, and a decline in skills such as planning or decision-making, focusing attention, multi-tasking, and problem-solving[22] (known as executive functions).

A recent study by DeLuca and colleagues suggests that if people with MS can learn new information effectively, their recall and recognition over the long term can be as good as that of those who are healthy. It may be all about learning properly in the first place.[21]

Researchers identified a combination of helpful cognitive techniques, such as spaced learning and spaced retrieval; thus, studying on separate occasions is better than studying material several times in a row in the same sitting. The same spacing applies to testing your memory of what you are learning. And they found that recall improved when people generated their own answers to questions rather than memorizing prepared answers.[21]

While cognitive problems can have far-reaching effects, cognitive rehabilitation can have a positive impact on a person's family life, employment, social relationships and everyday life.[21] Effective programs are available – ask your physician or MS Society if you think you could benefit from improved cognitive functioning.

YOUR DMT COMMITMENT

Disease modifying therapies for MS are generally intended for ongoing, long-term use. Taking your medications as prescribed may be more important than ever, since a rebound effect has been reported following discontinuation of some of the new, longer-acting DMTs.[23] If you are having trouble staying on your treatment, avoid possible complications – talk to your physician about your concerns.

e-msdi@logue® Based on your feedback, we are pleased to announce that in addition to our print version, we will be creating two e-versions of MS*dialogue*® that will be disseminated later this year. Our first topic will center on the challenges of being an MS caregiver. If you have a subject you would like us to consider, please let us know at: info@tamarindhealthcare.ca.

Sources: 1. RA Marrie et al. Vascular comorbidity is associated with more rapid disability progression in multiple sclerosis. *Neurology*® 2010;74:1041–47. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2848107/pdf/7518.pdf **2.** Taylor KL et al. Lifestyle factors, demographics and medications associated with depression risk in an international sample of people with multiple sclerosis. *BMC Psychiatry*, 2014 14:327 (www.biomedcentral-com/1471-244X/14/327 **3.** C.A. Young, A. Tennant, TONiC Group The role of positive coping and hopefulness in predicting quality of life in multiple sclerosis ECTRIMS Online Library. Oct 8, 2015; 115747. **4.** National MS Society. Summary of Research Progress Reported at the World's Largest MS Meeting. September 17, 2014. http://www.nationalmssociety.org/About-the-Society/News/Summary-of-Research-Progress-Reported-at-the-World **5.** Marrie RA et al. Effects of comorbid disease and health behaviors on MS susceptibility and prognosis. Abstract PS5.1. MSBOSTON 2014. 2015-12-13. http://www.professionalabstracts.com/msboston2014/planner/index.php?go=abstract&action=abstract_show&absno=2077 **6.** Rotstein D. Dietary patterns not associated with the risk of multiple sclerosis. ECTRIMS 2015. Abstract PS 5.3. http://onlinelibrary.ectrims-congress.eu/ectrims/2014/ACTRIMS-ECTRIMS2014/64783/dalia.rotstein.ps5.3.dietary.patterns.not.associated.with.the.risk.of.multiple.html?f=p14m5s64692 **7.** MS Essentials. MS Society, UK. Diet and Nutrition. August 2012. https://www.mssociety.org.uk/sites/default/files/Documents/Essentials/Diet%20and%20nutrition%20(MS%20Essentials%2011)%20ES11.0812%20-%20web_0.pdf **8.** Dietitians of Canada. http://www.dietitians.ca/Your-Health/Nutrition-A-Z/Heart-Health/Healthy-Eating-Guidelines-to-Prevent-Heart-Disease.aspx **9.** Hucke S et al. Sodium chloride promotes pro-inflammatory macrophage polarization thereby aggravating CNS autoimmunity. *J Autoimmun*. 2015. pii: S0896-8411(15)30052-4. http://www.ncbi.nlm.nih.gov/pubmed/26584738 **10.** Diaz-Cruz C et al. Abstract P2.213. Does Alcohol and Red Wine Consumption Play a Role in Multiple Sclerosis Disease Course? American Academy of Neurology Annual Meeting 2015; April 18-25, 2015. Washington, D.C. http://www.abstracts2view.com/aan/view.php?nu=AAN15L1_P2.213&terms= **11.** de la Fuente AG et al. Vitamin D receptor-retinoid X receptor heterodimersignaling regulates oligodendrocyte progenitor cell differentiation. *J Cell Biol*.2015; 211(5):975-85. http://jcb.rupress.org/content/211/5/975 **12.** Harmon M. Exercise as Part of Everyday Life. 2014 NATIONAL MS SOCIETY. http://www.nationalmssociety.org/NationalMSSociety/media/MSNationalFiles/Brochures/Brochure-Exercise-as-Part-of-Everyday-Life.pdf **13.** LaRocca N. National MS Society. ECTRIMS: Research Spotlight on Diet and Wellness Approaches. Oct 11, 2015. **14.** Correale J, Farez MF. Smoking worsens multiple sclerosis prognosis: two different pathways are involved. *J Neuroimmunol*. 2015 Apr 15;281:23-34. doi: 10.1016/j.jneuroim.2015.03.006. Epub 2015 Mar 6. www.ncbi.nlm.nih.gov/pubmed/25867464 **15.** R. Ramanujam et al. Beneficial effect of smoking cessation on multiple sclerosis prognosis. *JAMA Neurol.* 2015 Oct;72(10):1117-23. http://www.ncbi.nlm.nih.gov/pubmed/26348720 **16.** Ciccone A. Digital Content Editor. Smoking Cessation Slows Brain Volume Loss in Multiple Sclerosis. *Neurology Advisor*. Oct 8, 2015.http://www.neurologyadvisor.com/ectrims-2015/multiple-sclerosis-brain-volume-loss-smoking-cessation/article/443832/ Seraji-Bozoergzad N et al. Abstract P994. **17.** Lam RW et al. Efficacy of Bright Light Treatment, Fluoxetine, and the Combination in Patients With Nonseasonal Major Depressive Disorder. *JAMA Psychiatry*. 2016;73(1):56-63. http://archpsyc.jamanetwork.com/article.aspx?articleid=2470681 **18.** Leung M. Light therapy could be used to treat all depression, not just 'winter blues': study. CTVNews.ca. November 18, 2015 **19.** Senders A et al. Perceived stress in multiple sclerosis: The potential role of mindfulness in health and wellbeing. *J Evid Based Complementary Altern Med.* 2014 19(2):104-111 **20.** Detert NB. Mindfulness for Neurologists. *Pract Neurol.* 2015;15(5):369-74 **21.** Lebano L. Cognitive Rehabilitation Improves Quality of Life in Patients With MS. *Neurology Reviews*. 2012;20(9):1,22.http://www.neurologyreviews.com/?id=24816&tx_ttnews[tt_news]=208098&cHash=998b66381fa1008535400012f6b7b37b **22.** Cognitive problems in MS. MS Society, UK. https://www.mssociety.org.uk/what-is-ms/signs-and-symptoms/memory-and-thinking/cognitive-problems **23.** Lugaresi A et al. Risk-benefit considerations in the treatment of relapsing-remitting multiple sclerosis . *Neuropsych dis and treatment* 2013:9 893-914.

In depth report on...
stem cell research

The potential of stem cells in the treatment of MS, both for slowing MS disease activity and for repairing damage to the nervous system, is the subject of ongoing research.

Two types of stem cell transplants are currently being investigated in people with MS. While promising, stem cell treatments are experimental and carry some serious risks, including death. As such, they are restricted to patients with aggressive forms of MS who are unresponsive to approved therapies and have a poor prognosis.

Early research in patients with aggressive forms of MS offers reason for optimism: an update on an ongoing study of nonmyeloablative* hematopoietic stem cell transplantation (HSCT) suggests that the experimental therapy reduces disability and improves quality of life in patients with RRMS (n=118) and secondary progressive (SPMS) patients (n=27) who had undergone HSCT using their own stem cells (autologous) an average of 2.5 years previous.

HSCT, which is the approach most studied in MS stem cell research to date, has been described as an attempt to "reboot" the immune system using stem cells from a person's own bone marrow or blood that are collected and stored; usually, chemotherapy or radiation is used to deplete the body's remaining immune cells. The stored stem cells are then returned to the body, where they migrate to the bone marrow and begin regenerating the immune system in a non-inflammatory environment with the hope they will no longer attack the body's myelin or other brain tissue.

It takes time for the stem cells to repopulate the body with new cells, as is reflected in the interim results of the Burt study. At 2 years, significant improvements in disability (a decrease in EDSS score of 1.0 point or more) were noted in 50% of patients (n=41); by 4 years, that improvement was seen in 64%.

**The nonmyeloablative approach studied by Burt et al. does not use chemotherapy or radiation, but instead uses a conditioning regimen of medications to deplete the blood cells that make up the immune system, in order to stop MS-related inflammation.*

Another type of adult stem cell that is the subject of more recent studies is mesenchymal (pronounced mess-EN-kimmul) stem cells (MSCs), which are found in many places in the body including the bone marrow, skin and fat.

Following a pivotal study (Miller et al.) in which mice with MS-like disease were treated with human MSCs demonstrated improvements in MS-like symptoms, as well as signs of brain repair and recovery of function, a phase II RCT study called MESCAMS was launched June 2015 in Canada. Using a process similar to HSCT (without the depletion of the immune cells), each participant's mesenchymal stem cells are collected from bone marrow or blood stream and multiplied in the lab, and then returned to the body in greater numbers.

Stem cell primer

All of the body's organs and tissues originate from stem cells, although there are different kinds and sources of stem cells. There are two main types: embryonic stem cells, which exist only at the earliest stages of development, and give rise to every kind of body cell. Adult stem cells, which develop before birth and remain in the body throughout life, are specific to the body tissue or organ in which they live, and can generate only that particular type of cell.

Much of the stem cell research to date has used adult blood-forming (or hematopoietic) stem cells, which are found in bone marrow, blood and umbilical cord. These are capable of maturing into all cells that make up the blood and immune system, and have been used for many years to treat leukemia, lymphoma and blood disorders.

MSdossier

MS is notorious for being difficult to diagnose in some cases, and Krista's is one of those.

Krista's story of delayed diagnosis

Krista agreed to share her story for MSdossier just 3 months after she was diagnosed, at the age of 44. Since childhood, she has struggled with chronic pain and an array of often mystifying symptoms: "It got to the point where I was basically an invalid," Krista recalled. She later said that recounting her history leading up to her recent diagnosis was a very intense experience…"it's all still so raw".

As Krista's condition steadily worsened, the stress on her family grew significantly. Around the time that she was hospitalized and finally diagnosed, Krista's husband, Jeff, had a cardiac arrest from which he was brought back to life. "My daughter and only child, Reese, was just starting high school – it was very tough for her to have to go through all that on her own."

For Krista, it has been a long road: "Since I was a child, I have had a lot of pain, back problems, and then migraines that lasted for weeks; a lot of different physical symptoms. I was told I had fibromyalgia. While the classic symptoms of MS are vision changes, loss of sensation and relapses, for me, it was just continually feeling worse, more and more tired, and a lot of pain every day. I was very ill."

After a whole range of medical tests for likely conditions, including arthritis tests, an MRI, and a neurological examination, the presumed diagnosis was still fibromyalgia. A subsequent referral to a neurologist was lost, and a year later, Krista had still not had her follow-up assessment.

She was finally correctly diagnosed with MS at the end of August, 2015, after being hospitalized for what appeared to be seizures: "My body kept cramping up and I would just lose control of it. That was my worst time." The hospital physician was convinced that Krista had MS and since nothing else was helping, treated her with corticosteroids, frequently used to treat MS relapses: "I felt better almost immediately. Then the spinal tap confirmed the diagnosis."

Krista shares her thoughts on coping with symptoms

To those struggling to cope with pain or other symptoms, or waiting for a diagnosis, Krista says:

"Have hope – that's the only thing that got me through even when I was so ill and felt like my life was over. Keep a positive attitude, and hopefully things will get better."

My Road to Wellness

Over the past 10 years, Krista has been persistent in her efforts to improve the way she felt, and to manage her constant pain and fatigue.

She has consulted a chiropractor, osteopath, and psychotherapist among others, all in an effort to find paths to a better quality of life.

"I kept tweaking my lifestyle to try to make it better because I didn't know I had MS. The amount of energy you have has nothing to do how much you've rested. There were times when I slept for 24 hours. That scared my family… a lot."

While she isn't up to going out for classes yet, Krista finds it helpful to do yoga and stretching at home. "When I feel a surge in my energy, I feel I have to exercise and build up my muscles to better support my body. But you have to be careful not to overdo it." As for diet, Krista has had a lot of stomach issues and just keeps to a "plain food" diet.

All the pain medications she had used over the years turned out to be "a waste of money". Krista found a medical marijuana referral service, provided documentation of her MS diagnosis, talked to a physician via Skype, and was prescribed medical marijuana for pain. [The service cost her $250.] "They told me to get this magic butter machine and make a tincture that I could eat – it saves money and I just managed to quit smoking cigarettes, so I don't want to smoke."

Krista is sensitive to the social stigma that surrounds marijuana; she has found marijuana helpful, but "it was an issue because no one will talk about it. Even the MS Society representative I spoke to was unable to connect me with another MS patient using marijuana. I wanted to find out about dosing and using different strains of marijuana for different symptoms. It's been trial and error to get pain relief without the high, but it also helps with sleep. I really like having control of the dosing, and being free of narcotics."

When it came to choosing an MS medication, Krista's neurologist was pretty definite about starting with a one-year trial of one of the newer oral DMTs. The patient support programs help with the paperwork, which can take some time if you have a drug plan, she told MSD. "It's expensive and has some potentially serious side effects. It does help to have my medication delivered to my door, an advantage when getting out is a struggle."

Krista knows it will take up to 3 months for the medication to have its full effect, but says, "I feel a little bit better every day. Who knows, I might end up feeling better than I have in years."

When she spoke with ms*dialogue*®, she was preparing to return to work after a 3-month leave from her job as a busy account manager selling safety training to businesses globally. "Sales never stop so it can be difficult, but I am lucky to have a flexible work situation. It's hard for employers too – I am glad to have a livelihood."

ReadingShelf

"How to Live Well with Chronic Pain and Illness: A Mindful Guide"

By Toni Bernhard

Presented in 42 short chapters (making it very accessible for those with attention issues), this book is a treasure trove of practices that will help those readers who live with persistent pain. Much more than a book that is read once and passed along, this Mindful Guide is certain to become an essential reference text in your library. Even the Forward and Afterword sections are chock full of useful information for dealing with chronic pain.

Some of her suggestions are drawn from the author's Buddhist studies. For example, she explains how to use breath meditation (being mindful only of your breathing) to help reduce anxiety and create a calming, restorative effect. Another helpful approach: "Accepting that life is uncertain, unpredictable, and doesn't always conform to your wishes is the first step toward making peace with your circumstances."

She also provides practical strategies: House a mess? Energy low? Clean before neat is a housekeeping rule offered to those running on low batteries. In other words, do the laundry but don't hurry to put it away! Occupational therapists call this helpful advice "prioritizing".

There are also techniques for managing the emotional turmoil that accompanies chronic pain: among others, the blues, anger, guilt and loneliness. And thoughtfully, there is advice for the caregivers who live with, if not in, chronic pain.

To learn more, visit http://www.tonibernhard.com

Treatment benefits and risks:

Weighing your options

As the number and types of treatments approved for MS continue to increase, choosing a disease modifying therapy (DMT) has become an increasingly complex process for neurologists and MS patients alike.

Given the importance of treating MS early to minimize or prevent permanent nerve damage, initial treatment decisions are often made shortly after diagnosis. Because the course of MS varies between individuals, and patient preferences also differ, treatment choices should be individualized.

A strong relationship between neurologist and patient will help facilitate ongoing shared decision-making.

Patients and their physicians will weigh factors such as convenience, safety, tolerability and affordability differently.

While the efficacy of DMTs is traditionally based on a medication's ability to reduce relapses, this goal appears to be less important to many patients than controlling symptoms and preventing disease progression.

Some of the newer DMTs are taken orally, a convenience that patients clearly prefer over injected or IV infused medications. Surveys suggest that MS patients tend to be more willing than their physicians to accept higher levels of risk that may go along with a medication's greater **efficacy**. Patients' perception of a medication's effectiveness affects the likelihood that they will take the medication as prescribed over the long term, so it's important that you feel positive about your choice of treatment.

Serious adverse effects of some more recently approved DMTs include the risk of potentially fatal progressive multifocal leucoencephalopathy (PML) with natalizumab, rituximab and fumarate, and slowed heart rate and herpes varicella-zoster (HVZ) (shingles) infections with fingolimod.

Neurologists can now determine an individual's level of risk for certain serious complications, such as PML *(see side bar)*, and liver and bone marrow toxicity using blood tests and clinical and radiological evaluations. Patients will want to be aware of safety monitoring requirements, and possible unknown long-term or rare adverse events associated with the medications they are considering.

Clinical risk factors to consider include coexisting medical conditions, and a person's current and previous use of treatments, particularly immunosuppressants, (*eg*, mitoxantrone) which may be used to treat MS and other conditions. This means treatment choice must also take into account a medication's impact on future drug selection in the event of treatment failure.

Female patients must also consider pregnancy planning since DMTs are generally discontinued before conception is attempted, and only resumed after childbirth and breastfeeding are completed. The possibility that MS may be reactivated as a result of discontinuation of long-term treatment, a particular risk with natalizumab, has raised the possibility that treatment should be continued until pregnancy is confirmed. This is a particularly important consideration for women using *in vitro* fertilization (IVF), which also appears to increase the risk of relapse.

About PML risk

There are three currently recognized risk factors for PML:

- The presence of anti-JC virus antibodies (which can be determined with a blood test specifically designed for that purpose)
- Prior or current immunosuppressant therapy
- How long an individual has been taking natalizumab (especially if longer than two years)

Patients who test negative for anti-JC virus antibodies have the lowest risk (estimated as 0.09 cases or fewer per 1000 patients). Patients with all three risk factors have an estimated risk of 10.6 per 1000 patients.

Glossary

Efficacy: the ability of a drug to achieve the desired effect.

Live attenuated vaccine (LAV): a vaccine prepared from living micro-organisms (viruses, bacteria currently available) that have been weakened under laboratory conditions.

Lumbar puncture: the procedure of taking fluid from the spine in the lower back through a hollow needle, usually for diagnostic purposes.

Mean: an average; a number that in some sense represents the central value of a set of numbers.

Microbiome: the totality of microorganisms and their collective genetic material present in or on the human body.

Relative risk: the ratio of the incidence rate among individuals with a given risk factor to the incidence rate among those without it, for a disease, death or other outcome.

Sham: a treatment or procedure that is performed as a control and that is similar to but omits a key therapeutic element of the treatment; like a placebo.