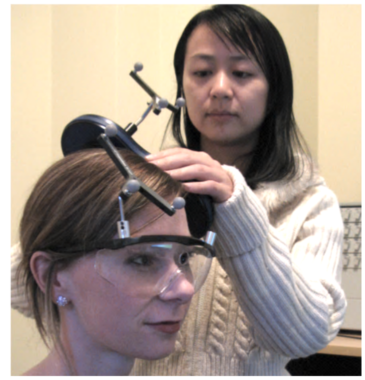
1st issue | December 2013

TransMag*MS*

newsletter



Dr Lisa Koski, PhD
and her
research team

- ✓ In 1988, Dr Koski was trained to use TMS
- ✓ In 2004, Dr Koski started her laboratory at McGill University

Lab statement:

Our research programs focus on **predicting and enhancing motor and cognitive function** in the context of neurological disorders, with a particular focus on **multiple sclerosis**.

Visit our website for more information:

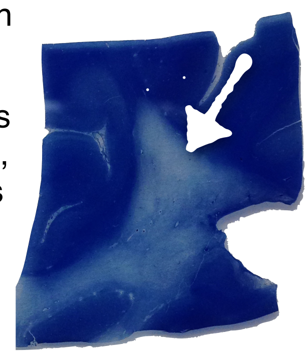
koskilab.mcgill.ca/index.html

Welcome to the first issue of TransMag*MS*, the newsletter for people interested in learning more about the ongoing research projects and interests of the Neurorehabilitation Research Centre at McGill University. In this newsletter, you will find information about the techniques we use to better understand how the brain responds to damage caused by multiple sclerosis (MS).

Something about MS:

MS is a chronic disease of the central nervous system and is the most common non-traumatic cause of disability among young adults. Whether you live with MS or know someone who does, understanding this disease is a challenge. While the exact cause is unknown, immune cells that originally protected us from diseases mistake an important structure as an intruder and mount attacks against it.

This structure, called myelin, helps brain cells talk to one another. When it is destroyed, communication between brain cells slows down or stops altogether. Using new techniques to look into the brain is often the first step in finding tools that can help with disease management.



MS lesion in a human brain

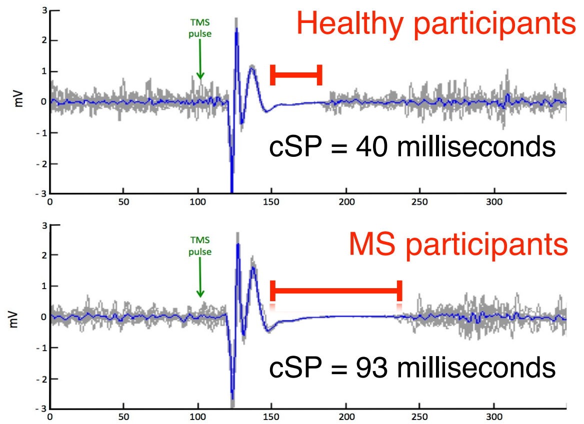
Unraveling changes in the brain with transcranial magnetic stimulation (TMS)

TMS has emerged as a key research tool to probe the physical and chemical activities of the brain. This non-invasive technology uses magnetic pulses to stimulate specific areas of the brain and monitor their functional state.

In our lab, we use TMS to stimulate the motor control area of the brain. This typically produces a twitch of the finger muscle that we are able to record and measure the activity of the muscle. Differences in the size and timing of the muscle twitch tell us a lot about how the brain processes information for movement in people living with MS.

Measuring the excitatory and inhibitory activity of the brain

One of the measures from TMS that we are interested in is called the cortical silent period (cSP). This period of silence comes after the magnetic stimulus has been delivered and the motor neuron has been activated. The duration of the cortical silent period measures the length of inhibitory activity in the brain.



Recordings of the cortical silent period (cSP)

MS patients often have longer silent periods than normal (see image on the right). We think this is because brain circuitry is working to compensate for the damage caused by MS. Thus this abnormality/alternation might be a good thing because it may help preserve motor control. You have told us that you're all different, and that's correct. With TMS, we can see differences even between patients at different disease stages, and we hope that this individual variability will tell us more about how this disease affects transmission within the brain.

Why doesn't lesion damage correlate with clinical impairment?

Have you ever wondered how the brain adapts to the damage caused by MS? The answer to this question may lay in the ways the brain responds to damage caused by MS. Under one hypothesis, it is believed that motor and cognitive performance might be directly related to attacks on brain tissue. Another explanation is that the brain is capable of reducing the impact of MS lesions by increasing the activity of specific brain regions and altering their nerve connections. Consequently, this process allows the brain to maintain performance on motor and cognitive tasks despite the presence of lesions.

Conclusion:

TMS helps to unravel what makes people living with MS different from each other. A better understanding of the adaptive changes occurring during MS will therefore help us refine diagnosis, prognosis and treatment options as we move forward.

Ongoing research projects:

1. Assessing the impact of fatigue in MS vs. excitability measures — 44 participants *(data analysis completed)*
2. Balance between neurochemicals in the brain and neuroimaging measures in healthy vs MS participants — 28 participants *(underway)*

WE ARE SEEKING TO RECRUIT PEOPLE LIVING WITH MS AND HEALTHY VOLUNTEERS

Contact us for more information!

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