

Muscling in on multiple sclerosis

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Multiple sclerosis (MS), a neurodegenerative disease, causes periodic attacks of neurologic symptoms such as limb weakness and mobility defects. And while MS patients' walking abilities and muscle strength are examined on a regular basis, doctors have yet to determine when the lower limb muscles begin to deteriorate. That's important because with earlier identification of mobility problems, doctors would be able to implement early intervention programs that could make all the difference for those with MS.

Now, Dr. Alon Kalron and his fellow researchers from Tel Aviv University's Sackler Faculty of Medicine and the [Multiple Sclerosis Centre](#) in Sheba Medical Center, Tel-Hashomer, have discovered that specific laboratory tests for leg muscle endurance and gait — the pattern of movement while walking or running — are highly effective in identifying mobility deficits at the initial stage of [MS](#). These deficits are difficult to discover during standard neurological testing.

According to Dr. Kalron, who was supervised by Profs. Anat Achiron and Zeevi Dvir, patients in the early stages of MS had 40 percent less muscle endurance compared to their healthy counterparts. Additionally, distinct abnormalities were observed in their walking patterns. The study, which was published in the *Journal of Neurologic Physiotherapy*, could help researchers understand the mechanisms underlying the evolution of MS, and improve the management of patients afflicted with the disease.

One step at a time

Reduced muscle endurance may be one of the earliest signs of MS and is a common complaint among patients, but it is hard to detect, says Dr. Kalron. In order to quantify muscle fatigue, the researchers conducted a study that included 52 patients in the early stage of MS, and a control group of 28 healthy subjects.

Participants were examined using an isokinetic dynamometer, a special instrument for measuring lower limb [muscle strength](#) and endurance. They were asked to attempt to bend or straighten a knee exerting maximum effort, and maintain this position for 30 seconds. Muscle fatigue was calculated by measuring the decline in muscle strength during that period. On average, those in the early stages of MS were not able to maintain their strength — they demonstrated 40 percent less endurance compared to the healthy control group.

In addition, patients' gait was observed for factors such as how far a patient spreads his legs while walking, the length of their steps, and symmetry of movement. By examining walking patterns, the researchers discovered specific abnormalities in the MS group. Patients in the early stages of MS "tend to walk with a wider base, because walking with your legs further apart helps to improve stability. It's probably a compensation strategy due to the lower muscle endurance," explains Dr. Kalron. The participants in the MS group also walked more slowly, in an asymmetrical pattern with shorter steps.

Giving physical therapy a head start

Clinicians should be more aware of possible gait and lower limb muscle deficits very early in the disease process, especially because minor impairments are difficult to detect with regular neurological examinations. "The downside of detecting such deficits using advanced instruments is offset by the positive potential of early intervention

programs," suggests Dr. Kalron. "If we find the abnormalities earlier, then we can start intervention programs when they have a chance to benefit the most." Programs based around physical therapy and fitness can help [MS patients](#) maintain higher levels of [muscle endurance](#) and improve balance, holding off the fatigue that typically accompanies the disease.

Provided by Tel Aviv University

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