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Eye test peers into heat-related multiple sclerosis symptoms

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A bodysuit that heats or cools a patient, combined with painless measurements of eye movements, is providing multiple sclerosis researchers at UT Southwestern Medical Center with a new tool to study the mysterious link between body temperature and severity of MS symptoms.

The researchers studied an aspect of MS called Uhthoff's phenomenon, named for the German ophthalmologist who reported in 1889 that some people have temporary vision problems after exercise or in hot weather. This and other symptoms of MS, such as fatigue or problems with coordination, worsen in the heat for most people with the disease.

Although doctors and researchers have long known about Uhthoff's phenomenon, there has been no way to objectively measure its severity or how it is related to body temperature.

The UT Southwestern study, available online and appearing in the March 25 edition of the journal *Neurology*, demonstrated that as body temperature rises, the severity of an eye-movement disorder called INO, or internuclear ophthalmoparesis, also increases. When a person with INO looks rapidly from one object to another, one eye moves more slowly than the other. Normally, the eyes move at the same speed.

INO can serve as an easy-to-measure "canary in a coal mine," acting as a surrogate for other heat-related symptoms that are harder to measure, such as fatigue, mental confusion or bladder or bowel problems, said Dr.

Elliot Frohman, professor of neurology and ophthalmology, director of the Multiple Sclerosis Program and Multiple Sclerosis Clinical Center at UT Southwestern and senior author of the study.

The researchers' tools were a whole-body suit, riddled with tubes for circulation of water, that can change body temperature; a pill-like thermometer that measures core body temperature after being swallowed; and an infrared camera that painlessly tracks eye movements.

The study, conducted at UT Southwestern, included eight patients with MS who have INO, eight with MS but not INO, and eight healthy control subjects. Warm water in the body garment raised each subject's normal temperature by one-half of a degree Celsius, and the cool water brought it down by one-half of a degree.

The subjects also wore a lightweight device, fitted on a headband, that used infrared light to track their eye movements as they followed a random sequence of blinking lights.

In the subjects with INO, increasing the body temperature worsened the differences between their two eyes' relative motion. Conversely, cooling the body made the eyes synchronize better.

Monitoring INO in a clinical setting could provide a sensitive test to determine a patient's susceptibility to other heat-related MS symptoms, as well as a way to monitor the effectiveness of treatments, Dr. Frohman said.

"With this new technique, we can objectively test new therapies that specifically treat a host of MS-related symptoms," said Dr. Frohman.

The next step in the research, Dr. Frohman said, is to use this system to measure the effectiveness of a drug that appears to relieve heat-induced

symptoms in people with MS.

“We’ve shown that by this method we can model the principal mechanisms that cause certain symptoms to worsen in people with MS,” he said.

Source: UT Southwestern Medical Center

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