

Common cough medicine may help treat multiple sclerosis

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(Medical Xpress) -- A drug widely used in over-the-counter cough medicines appears to protect against symptoms of multiple sclerosis, a finding that could offer a new and inexpensive therapy for a condition with few effective treatment options, a study by UC Davis researchers has found.

In tests using animal models, the drug, dextromethorphan, was found to significantly reduce the loss of the fatty sheath (or myelin) surrounding [nerve fibers](#) in the [central nervous system](#) and to minimize the development of paralysis during [multiple sclerosis](#) attacks.

The study is available online in the journal *Neurobiology of Disease*.

"This finding provides an exciting opportunity to better understand the disease and to pursue a new treatment strategy with a drug that is widely available, inexpensive and known to be safe," said Wenbin Deng, principal investigator of the study and assistant professor of cell biology and human anatomy at UC Davis.

Multiple sclerosis affects about 400,000 people in the United States, and most often first appears in young to middle-aged women. It is caused by cells of the immune system attacking myelin, the fatty sheath surrounding nerve fibers in the central nervous system that speeds the transmission of nerve impulses. Symptoms of the disease vary widely and often involve periods of motor problems, including paralysis of a limb or poor coordination, which unpredictably may either go away or

become permanent. As the disease progresses, it causes increasing disability and has no known cure. Moreover, many of the current treatments are poorly tolerated and produce a wide range of side effects.

For the current study, investigators induced mice to have either a moderate or severe type of multiple sclerosis and then treated them with either very low or high dosages of dextromethorphan. They found that very low dosages given to mice with moderate disease significantly reduced the loss of myelin and the development of paralysis during acute attacks. The high dosages did not offer any benefit.

"Finding that a chemical like dextromethorphan might be useful for treating multiple sclerosis is especially significant because we already know it is safe," said David E. Pleasure, director of research at the Institute for Pediatric Regenerative Medicine at Shriners Hospitals for Children Northern California in Sacramento and one of the authors of the study. "Normally, a possible new treatment must first undergo years of clinical trials to prove this."

The Shriners-UC Davis research team, which also conducts leading-edge stem cell investigations, began investigating common, over-the-counter [cough medicines](#) as treatments for devastating diseases like multiple sclerosis because their molecular structure is similar to morphine. Low dose morphine-like agents — known as morphinans — have been used "off label" for individuals. While these drugs are not cures, they potentially can be helpful for selected patients, and they appear to have little or no toxicity at low doses. The team looked at dextromethorphan because it is one of a few morphinan drugs similar in structure to morphine, but without the addictive properties.

Deng and Pleasure would like to see clinical trials conducted soon to find out if dextromethorphan is effective in humans with multiple sclerosis. Such a trial would likely involve testing in combination with current

standard treatment of the disease.

"Dextromethorphan has a different mode of action than current drugs for multiple sclerosis," said Deng, who leads a team of researchers at the Institute of Pediatric Regenerative Medicine. "While current treatment targets inflammation and the immune system, dextromethorphan appears to be more directly neuroprotective. Combining the different strategies could offer a real breakthrough in fighting the disease."

One potential obstacle to further research is obtaining a funding source. Because dextromethorphan is an old drug that no longer has a patent, pharmaceutical companies might be unlikely to invest in such research. The federal government or private multiple sclerosis research societies would be the likeliest sources of funding, according to Pleasure.

The study is entitled "Low dose [dextromethorphan](#) attenuates moderate experimental autoimmune encephalomyelitis by inhibiting NOX2 and reducing peripheral immune cells infiltration in the spinal cord." The lead author is Olga V. Chechneva, a postdoctoral fellow in the UC Davis Department of Cell Biology and Human Anatomy. Other authors are Florian Mayrhofer and Daniel J. Daugherty, also from the UC Davis Department of Cell Biology and Human Anatomy, and Jau-Shyong Hong, of the National Institute of Environmental Health Sciences in North Carolina.

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