Study focuses on causes of MS disability

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Hannah Salapa's research may improve multiple sclerosis treatments. Credit: Dave Stobbe

"Determining the mechanism that may be contributing to nerve cell damage could help us develop new drugs that better treat the disability caused by multiple sclerosis," said USask neurology professor Dr. Michael Levin, Saskatchewan Multiple Sclerosis Clinical Research

Chair.

Levin and his Ph.D. student Hannah Salapa have been the first to identify that stress granules found in nerve cells of MS brains may contribute to patients' permanent disability by damaging nerves through inflammation of brain and spinal cord. The findings have been published in the *Journal of Neuroimmunology* and were presented at a major international conference in Brisbane, Australia, in August.

MS, which can include symptoms such as visual loss, paralysis, pain and sexual dysfunction, may impair a person's ability to walk, drive or maintain a job. The disease strikes women twice as often as it does men, and often affects young people. In rare cases, MS may lead to death.

"Seeing my grandparents both affected by incapacitating neurological diseases really motivated me to jump into scientific research to help find a cure or more effective treatments," said Salapa, a student from the United States.

Saskatchewan has one of the highest rates of MS in the world, with about 3,200 people living with the disease. MS-related healthcare costs in Canada are projected to reach $2 billion by 2031.

By analyzing a cell line model, Salapa and Levin found that nerve cells in MS patients contain a protein called A1 that does not work properly.

Hannah Salapa (right) and Michael Levin's research may improve multiple sclerosis treatments. Credit: Dave Stobbe

When functioning normally, the protein is vital to maintaining the health of brain cells, but when it doesn't function, it spurs the formation of abnormal stress granules that may contribute to brain cell degeneration. The researchers have found the granules both in cell lines and in the brain of an MS patient who donated his body to science.

The team's results show that the combination of A1 protein antibodies and immune molecules called inflammatory cytokines causes the protein to act abnormally. This results in damage to the brain and spinal cord.

"Knowing how the A1 protein dysfunction works may help us find

treatments to reverse the effects of the A1 antibodies and inflammatory cytokines, so that we could reduce the disability caused by multiple sclerosis," said Levin.

Similar stress granules are found in patients with diseases such as amyotrophic lateral sclerosis (ALS or Lou Gehrig's disease) and other forms of dementia, but this is the first time that the granules have been detected in an MS patient.

Levin cautions that even though these results are encouraging, more research is needed before developing new therapies.

"Our next step is to determine which molecular pathways lead to nerve damage and study what is the difference between healthy brains and MS brains so that we can prevent the disruption from happening," said Salapa.

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