Spinal fluid proteins signal Lou Gehrig's disease

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High levels of certain proteins in the spinal fluid could signal the onset of Lou Gehrig's disease, according to researchers. The discovery of these biomarkers may lead to diagnostic kits for early diagnosis, accurately measuring the progression of the disease and monitoring the effects of treatment.

Lou Gehrig's disease -- or Amyotrophic Lateral Sclerosis (ALS) -- is caused by the degeneration of nerve cells controlling the voluntary movement of muscles. However, it is hard to diagnose because symptoms such as muscle weakness are common in other ailments and currently, there is no diagnostic test for the disease.

"The disease has to progress far enough so that the patient begins to experience significant muscle weakness, so that a physician can identify the problem," said James Connor, distinguished professor and vice-chair of neurosurgery, Penn State Hershey. "If we had a biomarker we could start treatments earlier and perhaps save more nerve cells and slow the disease."

The problem is compounded by the speed at which the disease progresses. In some patients the disease can run its course in just a couple of years, while in others it can take seven to ten years.

To find an early warning signal for the onset of Lou Gehrig's disease, Connor and his colleagues, Zachary Simmons and Ryan Mitchell at the Hershey Medical Center, focused their attention on proteins related to

inflammation in the spinal cord. Studies show that the progression of the disease involves excessive inflammation of nerve cells. The team also argued that because these proteins tend to be much smaller than most other proteins, they are likely to be overlooked in large-scale protein studies.

The researchers extracted spinal fluid from two groups of patients. The first group, comprising 41 patients, was known to have Lou Gehrig's disease, while the second group of 31 patients complained of muscle problems such as weakness and cramps.

Next, the researchers tested the samples from the two groups for the presence or absence of proteins linked to inflammation.

"We found a set of 11 proteins that were significantly higher in the spinal fluid of ALS patients," said Connor, whose findings appear in the January issue of Neurology. "Two proteins were significantly higher in the control group, suggesting that ALS is associated with an increase in some proteins, and a decrease in other proteins."

The researchers report that with the help of these biomarkers, they were able to identify the spinal fluid samples from ALS patients with 92 percent accuracy.

These findings, Connor explains, tell that ALS involves an inflammatory process in the spinal cord and that physicians can detect the extent of the inflammation by sampling the spinal fluid. Therefore, a potential therapy should not be restricted to treating cells throughout the body and hoping the effects trickle back into the brain and spinal cord, he added.

In a second study, researchers found a set of five separate proteins in the blood that are capable of identifying ALS. However, the proteins in the spinal fluid appear to be more accurate indicators of the disease.

"We are not finding that same degree of inflammatory activity in proteins in the blood that we find in the spinal fluid," said Connor, who has filed a provisional patent for the disease biomarkers he found.

The biomarkers could help save time otherwise lost in diagnosing the disease. For instance, a patient complaining of weakness in the legs or reduced grip strength could be checked for the biomarkers. If ALS is suspected, further treatment may begin.

"What we want is to have a diagnostic kit that can be used by any physician, not just a specialist, to provide timely advice to patients and their families," explained Connor. "We are basically trying to find the bad news before its too late."

Source: Penn State