

ATF3 as an Easily Measurable Injured Neuron-Specific Biomarker for Injuries of the Central Nervous System

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OTHER INFORMATION

CATEGORIZED AS

- ▶ **Medical**
- ▶ Diagnostics
- ▶ Disease: Central Nervous System

RELATED CASES

2020-226-0

TECHNOLOGY DESCRIPTION

The invention is a method of assessing brain and spinal cord injuries using a blood or cerebrospinal fluid (CSF)-based polypeptide biomarker. UCSF researchers have found that ATF3 is induced specifically in the injured brain and spinal cord neurons, suggesting that ATF3 is a specific marker for injured neurons in the central nervous system (CNS). Increased ATF3 protein levels in blood and CSF have been found after stroke as well as spinal cord injury. These findings provide an opportunity to leverage ATF3 as a neuron-specific biomarker measurement to determine the severity and predict the clinical outcomes in patients with CNS damage and potentially other neurological disorders.

INVENTION NOVELTY

Neuronal injury is the major pathology caused by CNS injuries like stroke or spinal cord injury. However, currently available biomarkers for CNS injuries are either not expressed in neurons at all, or are expressed constitutively in all neurons, regardless of whether the neurons are injured or not. ATF3 as a CNS injury biomarker is revolutionary because its baseline expression in CNS is very low, and it is rapidly induced only in CNS neurons shortly after CNS injuries like stroke or spinal cord injury. Of note, human serum ATF3 level can be easily measured by a commercially available ELISA kit.

ADVANTAGES

- ▶ The first [injured neuron-specific biomarker for CNS injuries](#)
- ▶ The detection method has been fully developed
- ▶ Can utilize either serum or CSF
- ▶ [Enables rapid and direct detection of neuronal injury at early disease stage](#)
- ▶ Biomarker of CNS injuries, including stroke, cardiac arrest and spinal cord injury, that directly correlates with injury severity
- ▶ Potentially more sensitive, less expensive, and easier-to-perform diagnostic compared to gold standard MRI

APPLICATION

Determine severity and predict outcomes of CNS injuries (including stroke, cardiac arrest, spinal cord traumatic injury, likely traumatic brain injury, and potentially other neurological disorders)

LOOKING FOR PARTNERS

To commercialize the technology

STAGE OF DEVELOPMENT

Proof-of concept.

[Serum ATF3 levels have been measured in patients with ischemic stroke, hemorrhagic stroke, and cardiac arrest, with serum ATF3 level elevated in patients of all three conditions.](#)

ATF3 levels in serum samples of nearly 80 spinal cord injury patients have also been measured, with serum ATF3 levels significantly higher in patients with severe spinal cord injury. Differentiation of patients with severe spinal cord injury from trauma patients without spinal cord injury was achieved with a sensitivity of 83.3% and specificity of 80%. Importantly, ATF3 levels in serum samples of trauma patients without spinal cord or brain injury were not increased compared to samples from healthy control.

RELATED MATERIALS

► Not available at this time.

DATA AVAILABILITY

Under CDA

PATENT STATUS

Patent Pending

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