

Researchers identify new biomarker for Creutzfeldt-Jakob disease, the human form of mad cow disease

March 9 2011

Neena Singh, MD, PhD and colleagues at Case Western Reserve University School of Medicine have identified the first disease-specific biomarker for sporadic Creutzfeldt-Jakob disease (sCJD), a universally fatal, degenerative brain disease for which there is no cure. sCJD is one of the causes of dementia and typically leads to death within a year of disease onset.

The finding, published in the March 9th issue of [PLoS ONE](#), a scientific journal produced by the Public Library of Science, provides a basis for developing a test to diagnosis sCJD while patients are still alive. Presently, the only definitive diagnostic test for the disease requires brain tissue be obtained by biopsy or after death.

In their study, Dr. Singh, associate professor of pathology at the School of Medicine, and her team found that levels of the iron-transport protein transferrin (Tf) are significantly decreased in the cerebrospinal fluid (CSF) of patients with sCJD well before the end stage of the disease, potentially allowing for earlier diagnosis.

"The decrease in Tf is significant enough to distinguish sCJD from dementia of non-CJD origin with an accuracy of 80 percent," Dr. Singh says. "When combined with the currently used non-disease-specific biomarker T-tau, the diagnostic accuracy increases to 86 percent. This suggests that the two biomarkers represent separate disease processes,

and complement each other as diagnostic biomarkers."

A decrease in the levels of CSF Tf reflects the imbalance of brain's [iron metabolism](#) that is associated with sCJD. Being a part of the sCJD disease process, CSF Tf is likely to be a more precise indicator of sCJD than the current tests, Dr. Singh explains.

"CSF Tf is the first biomarker that is related to the underlying pathology in sCJD brains," Dr. Singh explains.

Presently, sCJD is diagnosed by testing for elevated levels of the proteins 14-3-3 and T-tau in the CSF of cases suspected of the disease. Since these biomarkers are elevated in several other diseases besides sCJD, the incidence of false positive results is high. Replacement of 14-3-3 with Tf increases the specificity of the test significantly, providing a superior biomarker combination for the diagnosis of sCJD.

The ability to accurately diagnose patients while they are still living is critical to prevent inadvertent spread of sCJD to healthy individuals, to reduce the misdiagnosis of potentially treatable causes of dementia, and to eventually develop potential therapies for sCJD, according to Dr. Singh.

As a part of their study, Dr. Singh and her team estimated levels of Tf in the CSF collected up to 24 months before death from confirmed cases of sCJD (n=99) and dementia of non-CJD origin (n=74). They found that levels of Tf were decreased significantly in sCJD cases compared to dementia of non-CJD origin. Further testing revealed that measurement of CSF Tf alone identified sCJD with a sensitivity of 85 percent, specificity of 72 percent, and accuracy of 80 percent. When combined with the surrogate [biomarker](#) T-tau, the CSF Tf and T-tau combination identified sCJD with an improved specificity of 87 percent and accuracy of 86 percent according to the research.

In addition to providing improved diagnostic accuracy, Dr. Singh notes that CSF Tf has several other advantages. It is resistant to degradation by enzymes, ensuring consistent results even in poorly preserved CSF samples; Tf- β 2, the brain specific isoform of Tf is equally efficient in identifying sCJD and is likely to provide accurate results even from samples that are accidentally contaminated with blood during the collection process; and, Tf is abundant in the CSF relative to the currently used biomarkers 14-3-3 and T-tau, allowing accurate diagnosis from a small sample volume.

Moving forward, researchers will work to establish a user-friendly, quantitative test for CSF Tf to provide a quick and uniform method of diagnosis for sCJD. They will also continue testing CSF samples from sCJD and other forms of human and animal prion disorders to establish the earliest time point in the disease course when this test becomes positive.

More information: Singh A, Beveridge AJ, Singh N (2011) Decreased CSF Transferrin in sCJD: A Potential Pre-Mortem Diagnostic Test for Prion Disorders. PLoS ONE 6(3): e16804.

[doi:10.1371/journal.pone.0016804](https://doi.org/10.1371/journal.pone.0016804)

Provided by Case Western Reserve University

Citation: Researchers identify new biomarker for Creutzfeldt-Jakob disease, the human form of mad cow disease (2011, March 9) retrieved 23 December 2023 from

<https://medicalxpress.com/news/2011-03-biomarker-creutzfeldt-jakob-disease-human-mad.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--