

New Blood Test Detects Human Prion Disease

Prion Test

eQuIC, a new antibody-based test for abnormal prion protein, shows increased sensitivity in detection of human prion disease in blood plasma.

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May 18, 2011 – An antibody-based test for human prion disease detected variant Creutzfeldt-Jacob (vCJD) in blood plasma with greater than 10,000 times the sensitivity of other methods, according to the findings of a new study.

A team of scientists from the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health (NIH), and from Prionics AG, of Zurich, Switzerland, led by Byron Caughey, PhD, senior investigator in the NIAID Laboratory of Persistent Viral Diseases, report their findings in the May 10, 2011, issue of *mBIO* online.

Prions are infectious agents that result from misfolding of normally harmless proteins found in mammals. Once misfolded, the proteins recruit and convert normal proteins to a misfolded state that is highly resistant to degradation. Accumulation of this aberrant form in brain tissue causes the sponge-like damage and cell death characteristic of transmissible spongiform encephalopathies (TSEs), including vCJD, bovine spongiform encephalopathy (BSE or Mad Cow Disease), scrapie in sheep, and chronic wasting diseases of cervids.

As infected individuals can remain asymptomatic for many years, a sensitive diagnostic test for TSEs is needed and would help prevent transmission of prion diseases within and between species.

In the current study, investigators combined two methods for detecting misfolded prion protein, one an antibody-based test and the other an improved version of the recently-developed real-time quaking-induced conversion assay (RT-QuIC).

The combined method, known as enhanced QuIC (eQuIC), detected approximately 2 attograms per milliliter of proteinase K-resistant prion protein following 10^{14} -fold dilution of vCJD brain tissue into human plasma. This represents a sensitivity of approximately 10,000 times greater than previously reported with other methods.

Investigators also showed that the new eQuIC test can differentiate plasma and serum samples from scrapie-infected and uninfected hamsters, even prior to appearance of clinical symptoms.

The researchers stated, "The ability of eQuIC to detect prions in plasma samples raises the possibility that this assay could be used to improve prion disease diagnosis in humans and animals and to screen the blood supply for prion contamination."

"The remarkable resistance to inactivation of prions relative to other pathogens also makes it important to develop practical assays for prion contamination in a wide variety of materials, such as foods, feeds, transplanted tissues, medical devices, agricultural wastes and by-products, soils, water sources, and other environmental samples," Dr. Caughey and colleagues concluded.

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