# Research could lead to blood test to detect Creutzfeldt-Jakob disease

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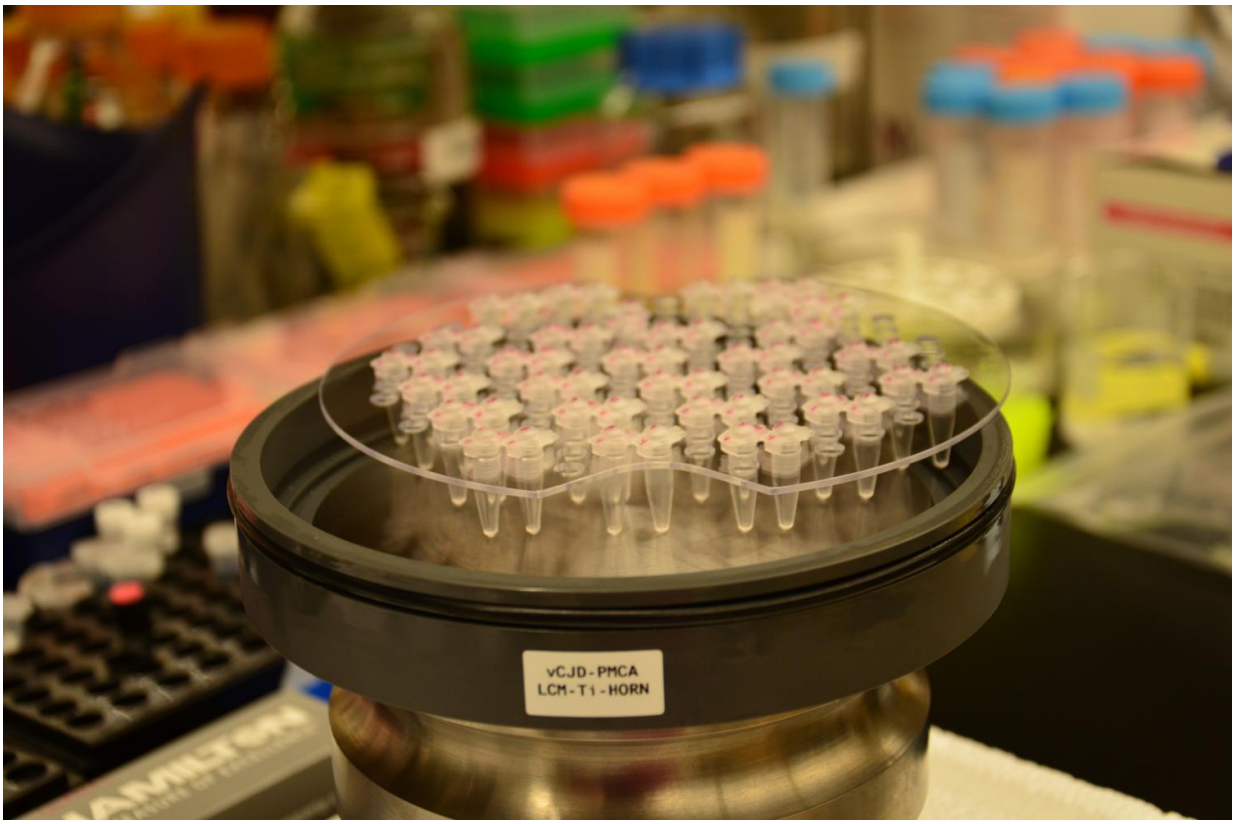
Claudio Soto, Ph.D., is in his lab at McGovern Medical School at UTHealth in Houston. Credit: Alex Luster with The Storyhive

The detection of prions in the blood of patients with variant Creutzfeldt-Jakob disease could lead to a noninvasive diagnosis prior to symptoms and a way to identify prion contamination of the donated blood supply, according to researchers at McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth).

The results of the research, led by senior author Claudio Soto, M.D., professor in the Department of Neurology and the director of the George and Cynthia Mitchell Center for Alzheimer's disease and Related Brain Disorders at UTHealth, were published today in *Science Translational Medicine*, a journal of the American Association for the Advancement of Science. First author of the paper is Luis Concha-Marambio, senior research assistant in the Department of Neurology at McGovern Medical School.

" Our findings, which need to be confirmed in further studies, suggest that our method of detection could be useful for the noninvasive diagnosis of this disease in pre-symptomatic individuals," Soto said. "Early diagnosis would allow any potential therapy to be given before substantial brain damage has occurred. In the case of the blood supply, availability of a procedure to efficiently detect small quantities of the infectious agent would allow removal of blood units contaminated with prions, so that new cases can be minimized substantially."

Human prion diseases are infectious and invariably fatal neurodegenerative diseases. They include sporadic Creutzfeldt-Jakob disease (sCJD), the most common form, and variant Creutzfeldt-Jakob disease (vCJD), which is caused by the transmission of bovine spongiform encephalopathy - commonly known as mad cow disease - from infected cattle to humans.




The sonicator used for Protein Misfolding Cyclic Amplification (PMCA), the amplification technique used to detect abnormal prion proteins in patient blood. Credit: Luis Concha-Marambio

Since 1990, 178 people in the United Kingdom have died from vCJD, according to the National CJD Research & Surveillance Unit at the University of Edinburgh. The disease has claimed an additional 49 people worldwide, including four United States residents, according to the European Centre for Disease Prevention and Control. In a handful of cases, the disease was spread through the donated blood supply.

The disease can lay silent in the body for decades as damage slowly builds in the brain from the misfolded infectious proteins called prions. On average, people infected with vCJD die two years after the

development of the first symptoms, which can include psychiatric alterations such as depression, anxiety and hallucinations that progress to more severe dementia, muscle contractions and loss of coordination.

Soto's team analyzed blood samples from 14 cases of vCJD and 153 controls, which included patients affected by sCJD and other neurodegenerative or neurological disorders as well as healthy subjects. To detect the prions, the team used a protein misfolding cyclic amplification assay, invented in Soto's lab, which mimics the prion replication process in vitro that occurs in prion disease.

The results showed that prions could be detected with 100 percent sensitivity and specificity in blood samples from vCJD patients.

The new study builds on years of research by Soto's team, whose detection of prions in urine was published in the *New England Journal of Medicine* in August 2014. In June of this year, Soto received $11 million from the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health, to study the pathogenesis, transmission and detection of prion diseases including chronic wasting disease in deer.

**More information:** "Detection of prions in blood from patients with variant Creutzfeldt-Jakob disease," *Science Translational Medicine*, stm.sciencemag.org/lookup/doi/ … scitranslmed.aaf6188

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