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Prion disease detected soon after infection and in surprising place in mouse brains

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Prion diseases—incurable, ultimately fatal, transmissible neurodegenerative disorders of mammals—are believed to develop undetected in the brain over several years from infectious prion protein. In a new study, National Institutes of Health (NIH) scientists report they can detect infectious prion protein in mouse brains within a week of inoculation. Equally surprising, the protein was generated outside blood vessels in a place in the brain where scientists believe drug treatment could be targeted to prevent disease. The study, from NIH's National Institute of Allergy and Infectious Diseases (NIAID), appears in the Sept. 22 issue of *mBio*.

Scientists believe prion diseases potentially could be treated if therapy starts early in the disease cycle. However, identifying who needs treatment and pinpointing the optimal timeframe for treatment are open questions for researchers.

Human prion diseases include variant, familial and sporadic Creutzfeldt-Jakob disease (CJD). The most common form, sporadic CJD, affects an estimated one in one million people annually worldwide. Other prion diseases include scrapie in sheep, chronic wasting disease in deer, elk and moose, and bovine spongiform encephalopathy in cattle.

In their study, the NIAID scientists injected infectious scrapie prion protein into the brains of mice. After 30 minutes, they began observing whether the injected material generated new infectious protein at the injection site. By examining mouse brain tissue, the researchers

measured and detected new infectious prion protein three days after infection on the outside walls of capillaries and other blood vessels at the injection site. Using Real-Time Quaking-Induced Conversion (RT-QuIC), a feasible testing method for people, the scientists detected newly generated prion protein after seven days. In prior studies, it took about six weeks to detect infectious prion protein. The new findings enhance scientific understanding of where infectious prion diseases might take hold in the brain and provide possible targets for treatment.

More information: B Chesebro et al. Early generation of new PrPSc on blood vessels after brain microinjection of scrapie in mice. *mBio*. DOI: 10.1128/mBio.01419-15 (2015).

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