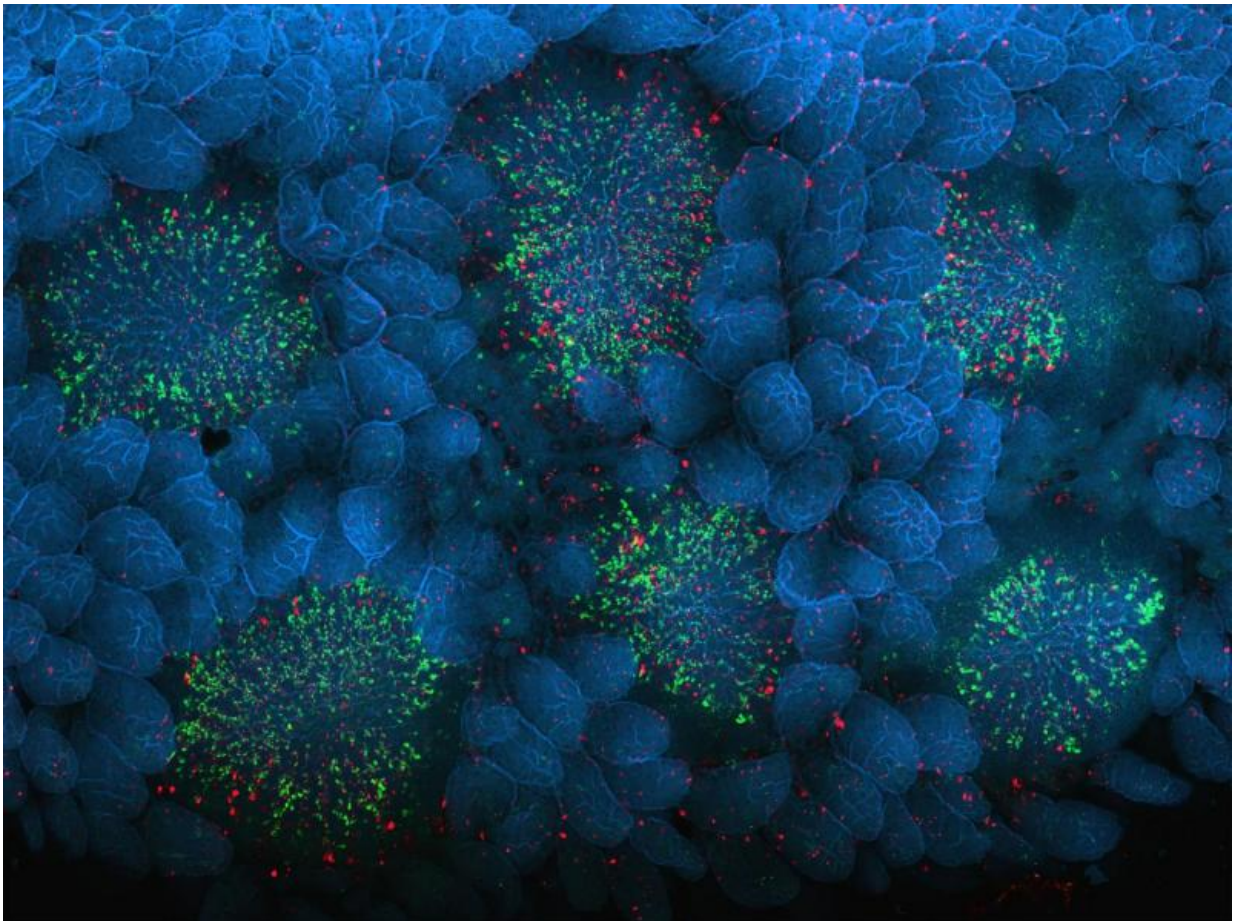


Brain infection study reveals how disease spreads from gut

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This magnified image of the small intestine shows specialized structures called Peyer's patches -- which are part of the body's immune system. Researchers have shown how deadly proteins called prions -- which cause variant CJD in people and BSE in cows -- invade the body through Peyer's patches before infecting the brain. Credit: Prof Neil Mabbott & Dr David Donaldson, The Roslin Institute, University of Edinburgh

Diagnosis of deadly brain conditions could be helped by new research that shows how infectious proteins that cause the disease spread.

The study reveals how the proteins - called prions - spread from the gut to the brain after a person or animal has eaten contaminated meat.

Scientists say their findings could aid the earlier diagnosis of [prion](#) diseases - which include variant Creutzfeldt-Jakob disease (vCJD) in people and bovine spongiform encephalopathy (BSE) in cows.

In people, the disease remains very rare - 229 people have died from vCJD since it was first identified almost 20 years ago, of which 177 were from the UK.

Prions are infectious proteins with abnormal shapes that can be passed between people and animals by eating contaminated meat. Until now, it was not known how prions spread from the gut to the brain after consuming infected meat.

Researchers at University of Edinburgh's Roslin Institute studied the course of prion infection in mice.

They found that prions must first build up in specialised structures in the lining of the small intestine before they are able to spread throughout the body to the brain.

The structures - called Peyer's patches - are part of the body's immune system and form the first line of defence against contaminated food. The study suggests prions hijack Peyer's patches to cause infection.

Prions did not build up in similar patches in the large intestine until a

later stage of infection, the team found. At this stage, prions were also detected in the spleen and lymph nodes.

As many as one in 2000 people in the UK could be carrying [infectious prions](#) without showing any symptoms of disease, according to recent estimates. These are based on analysis of tissue taken during routine appendix removal operations.

The researchers say that these estimates may fail to identify individuals in the earliest stages of infection, where prions have not yet spread beyond the [small intestine](#).

When prions get into the brain, they destroy nerve cells. This can lead to major neurological symptoms including memory impairment, personality changes, and difficulties with movement.

Other [prion diseases](#) include scrapie in sheep and [chronic wasting disease](#) in deer.

Professor Neil Mabbott, of The Roslin Institute at the University of Edinburgh, who led the study, said: "Whether all individuals with evidence of prion infection in their gut go on to develop neurological disease is not known. We need a greater understanding of what factors enhance our susceptibility to prion diseases so that we can put in place safeguards to prevent these conditions from spreading in people and farmed animals."

More information: D.S.Donaldson, K.J.Else & N.A.Mabbott. The gut-associated lymphoid tissues in the small intestine, not the large intestine, play a major role in oral prion disease pathogenesis. *Journal of Virology*, 2015 [DOI: 10.1128/JVI.01544-15](https://doi.org/10.1128/JVI.01544-15)

Provided by University of Edinburgh

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