More evidence emerges for 'transmissible Alzheimer's' theory

Autopsies reveal plaques in the brains of people who died after receiving grafts from cadavers.

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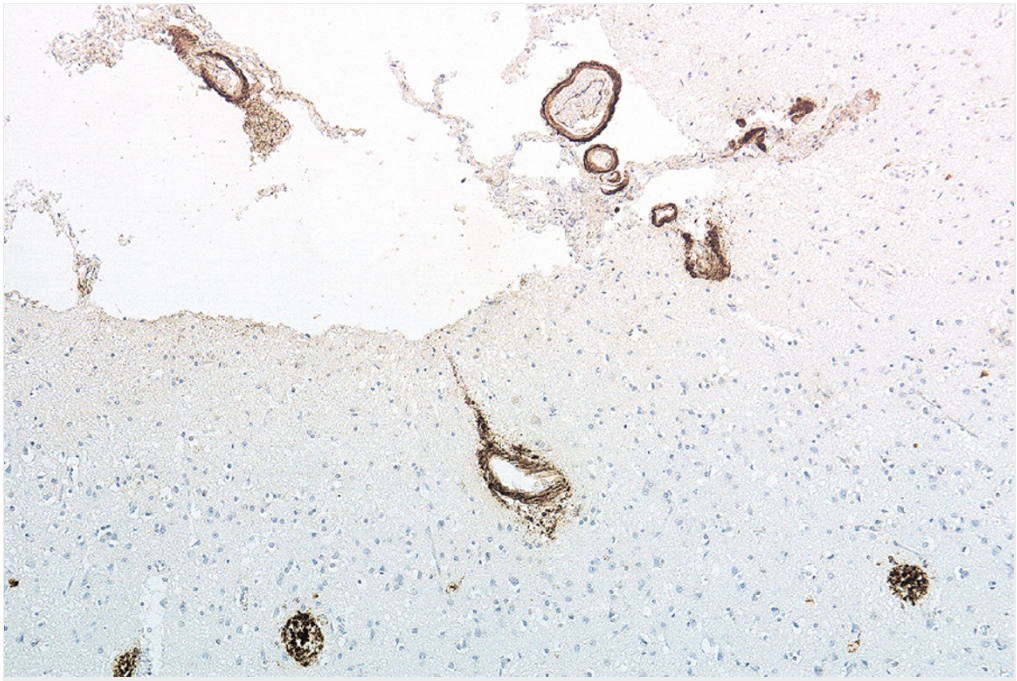
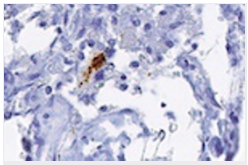


Ref. 1

Deposits of amyloid-β protein (brown) in the frontal cortex of patients who developed CJD after surgery.

For the second time in four months, researchers have reported autopsy results that suggest Alzheimer's disease might occasionally be transmitted to people during certain medical treatments — although scientists say that neither set of findings is conclusive.



Autopsies reveal signs of Alzheimer's in growth-hormone patients

The latest autopsies, described in the *Swiss Medical Weekly*[1] on 26 January, were conducted on the brains of seven people who died of the rare, brain-wasting Creutzfeldt–Jakob disease (CJD). Decades before their deaths, the individuals had all received surgical grafts of dura mater — the membrane that covers the brain and spinal cord. These grafts had been prepared from human cadavers and were contaminated with the prion protein that causes CJD.

But in addition to the damage caused by the prions, five of the brains displayed some of the pathological signs that are associated with Alzheimer's disease, researchers from Switzerland and Austria report. Plaques formed from amyloid-β protein were discovered in the grey matter and blood vessels. The individuals, aged between 28 and 63, were unusually young to have developed such plaques. A set of 21 controls, who had not had surgical grafts of dura mater but died of sporadic CJD at similar ages, did not have this amyloid signature.

Transplant trouble

According to the authors, it is possible that the transplanted dura mater was contaminated with small 'seeds' of amyloid-β protein — which some scientists think could be a trigger for Alzheimer's — along with the prion protein that gave the recipients CJD.

Genetic mutation

Both diseases have long incubation periods. But whereas CJD progresses quickly once initiated, age-related Alzheimer's develops slowly. None of the individuals had displayed obvious Alzheimer's symptoms before their deaths.

The results follow a study published in *Nature*[2] last September in which scientists from University College London reported that four of eight relatively young people, all of whom died of CJD decades after receiving

contaminated batches of growth hormone prepared from cadavers, also displayed amyloid plaques in the blood vessels and grey matter of their brains.

blocks prion disease

“Our results are all consistent,” says neurologist John Collinge, a co-author on the *Nature* paper. “The fact that the new study shows the same pathology emerging after a completely different procedure increases our concern.”

Not infectious

Neither study implies that Alzheimer’s disease could ever be transmitted through normal contact with caretakers or family members, the scientists emphasize. And no one uses cadaver-derived preparations in the clinic anymore. Synthetic growth hormone is used for growth disorders, and synthetic membranes are used for patching up in brain surgery.

But the scientists say that if the theory of amyloid seeding turns out to be true, it would have important clinical implications. In general surgery, for example, any amyloid-β proteins, which are very sticky, would not be routinely removed from surgical instruments; standard sterilization procedures cannot shift them.

“It is our job as doctors to see in advance what might become a problem in the clinic,” says neuropathologist Herbert Budka of the University Hospital Zurich, Switzerland, who is a co-author of the latest paper.

Alzheimer's disease: The forgetting gene

“Nothing is proven yet,” cautions Pierluigi Nicotera, head of the German Centre for Neurodegenerative Diseases in Bonn. He points out that amyloid-β has not been identified in the preparations that were transplanted in either the growth hormone or dura mater studies. Nor can researchers rule out the possibility that the underlying condition that led to the need for neurosurgery could have contributed to the observed amyloid pathology, as the authors of the latest paper note.

“We need more systematic studies in model organisms to work out if the seeding hypothesis of Alzheimer’s is correct,” Nicotera says.

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References

1. Frontzek, K. *et al*. *Swiss Med. Wkly* **146** w1287 (2016).
2. Jaunmuktane, Z. *et al*. *Nature* **525**, 247–250 (2015).