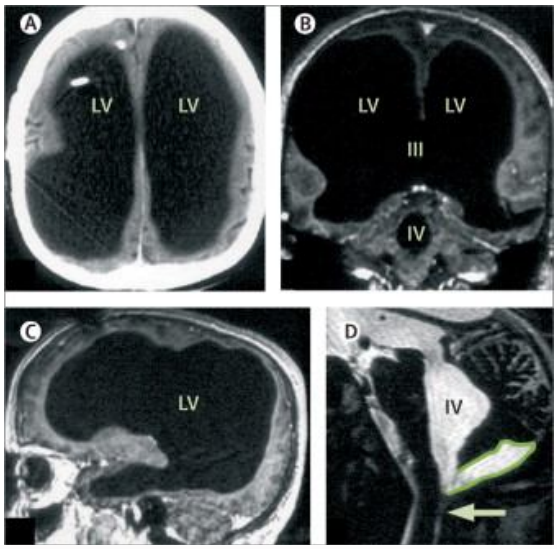
Brain of a white-collar worker



Massive ventricular enlargement, in a patient with normal social functioning

(A) CT; (B, C) T1-weighted MRI, with gadolinium contrast; (D) T2-weighted MRI. LV=lateral ventricle. III=third ventricle. IV=fourth ventricle. Arrow=Magendie's foramen. The posterior fossa cyst is outlined in (D).

A 44-year-old man presented with a 2-week history of mild left leg weakness. At the age of 6 months, he had undergone a ventriculoatrial shunt, because of postnatal hydrocephalus of unknown cause. When he was 14 years old, he developed ataxia and paresis of the left leg, which resolved entirely after shunt revision. His neurological development and medical history were otherwise normal. He was a married father of two children, and worked as a civil servant. On neuropsychological testing, he proved to have an intelligence quotient (IQ) of 75: his verbal IQ was 84, and his performance IQ 70. CT showed severe dilatation of the lateral ventricles (figure); MRI revealed massive enlargement of the lateral, third, and fourth ventricles, a very thin cortical mantle and a posterior fossa cyst. We diagnosed a non-communicating hydrocephalus, with probable stenosis of Magendie's foramen (figure). The leg weakness improved partly after neuroendoscopic ventriculocisternostomy, but soon recurred; however, after a ventriculoperitoneal shunt was inserted, the findings on neurological examination became normal within a few weeks. The findings on neuropsychological testing and CT did not change.

Article Information

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Man Missing Most Of His Brain Challenges Everything We Thought We Knew About Consciousness

IS IT POSSIBLE TO MAINTAIN CONSCIOUSNESS WITHOUT A FULL BRAIN? LIA KOLTYRINA/SHUTTERSTOCK

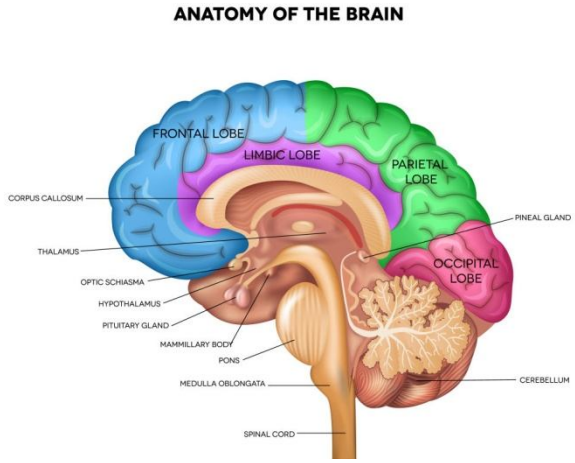
By Ben Taub

14/07/2016, 15:37

Back in 2007, scientists reported that a French man in his mid-40s had walked into a clinic complaining of a pain in his leg. As a child, he'd had this same problem as a result of the ventricles in his brain filling with cerebrospinal fluid, so the doctors decided to scan his brain to see if this was again causing his limb-related

lamentations. To their astonishment, they found that his ventricles had become so swollen with fluid that they'd replaced virtually his entire brain, leaving just a thin cortical layer of neurons.

Yet miraculously, the man was not only fully conscious, but lived a rich and unhindered life, working as a civil servant and living with his wife and two kids, blissfully unaware of the gaping hole in his brain. His ability to function without so many of the key brain regions previously considered vital for consciousness raises some major questions about existing theories regarding how the brain works and the mechanisms underlying our awareness.



For example, neuroscientists have often asserted that a brain region called the thalamus, which relays sensory signals to the cerebral cortex, is indispensable for consciousness. This is because research has indicated that damage to the thalamus often causes people to fall into a coma, while one team of scientists were even able to manually "switch off" an epileptic patient's consciousness by electrically stimulating this brain region.

Similarly, researchers have shown that it is possible to cause people to lose consciousness by using electrodes to manipulate the activity of a brain region called the claustrum, which receives input from a wide variety of brain areas and communicates extensively with the thalamus.

Image: A brain region called the thalamus has been shown to be vital for consciousness to exist. Tefi/Shutterstock

Clearly, then, the fact that a man was able to maintain consciousness with nothing but a sliver of cortical neurons rains all over the theories put forward by the great many neuroscientists who have sought the origins of consciousness in the structure of the brain. It may, however, add weight to the arguments made by other researchers who claim that brain anatomy is not actually all that vital for consciousness, which instead arises simply via the ways in which neurons communicate with one other.

For instance, a recent study looking into the patterns of neural activity that give rise to thoughts found that neurons rarely send signals to one another by the most direct route when communicating, but instead explore every possible connection and channel, producing a complex and highly improvised impulse. This idea also forms the basis of what Axel Cleeremans has termed the "Radical Plasticity Theory", which suggests that consciousness arises as a result of the brain continually reflecting on itself in order to "learn" how to become self-aware.

Undoubtedly, though, there are a whole host of questions still to be answered, and the majority of theories regarding the nature of consciousness are yet to be fully developed. On the plus side, at least we know what was making that French guy's leg hurt.

Image: Scans showed that the man's ventricles had swollen so much that they had replaced the majority of the man's brain. Feuillet et al/ The Lancet

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Dylan Beard ·
Undergraduate Researcher at UCSB

When saying "with nothing but a sliver of cortical neurons" this article seems to imply that that the neurons in the most interior regions of his head had sort of 'died off' to make room for his CSF. This is incorrect, and pretty careless of the author not to clarify. In fact, the CSF actually pressed against the brain 'squishing' it against the skull rather than removing and replacing it. *As far as I understand*, there was not a reduction of the amount of living neurons but rather all of the density was compressed to a smaller space. Poor writing from someone who is supposed to be translating science for public reading, but of course it is expected with IFLScience.

Cheryl Kristensen ·
Viborg, Denmark

I'm pretty sure that's his thalamus in the bottom left scanning behind his eyes, and pons seems to be unaffected by the hydrocephalus, so....no, they are not gone!

Hi, I wanted to comment on YOUR comment on the "missing/squished" brain article. My observation would be, TAKEN IN CONTEXT OF THE MANY OTHER CASES (such as studied by Lorber and others) of ACTUAL MISSING BRAIN MASS where the question of insufficient remaining tissue for critical cognitive functioning was established... this new 2007 case both fits in and is consistent with a genuine anatomical mystery unexplained by modern science. (me)