Head injury patients develop brain clumps associated with Alzheimer's disease

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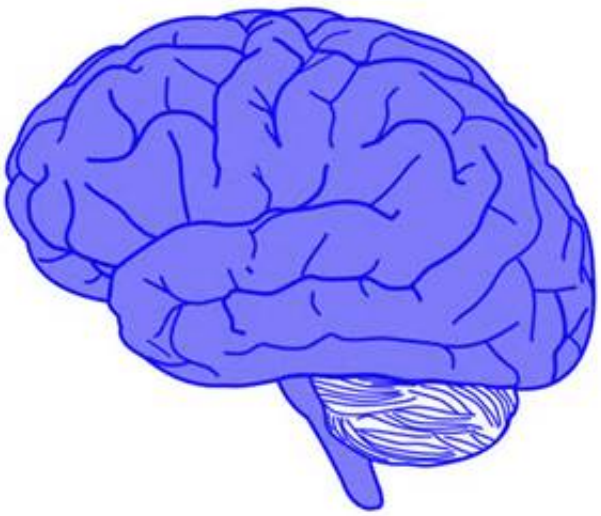

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Scientists have revealed that protein clumps associated with Alzheimer's disease are also found in the brains of people who have had a head injury.

Although previous research has shown that these clumps, called amyloid plaques, are present shortly after a brain injury - this study shows the plaques are still present over a decade after the injury.

The findings, by researchers from Imperial College London, may help explain why people who have suffered a serious brain injury appear to be at increased risk of dementia. Although extensive research now suggests major head injury increases dementia risk in later life, scientists do not know the biological changes that cause this effect.

"The consequences of a head injury have been called a hidden disability - although patients may seem to have outwardly made a good recovery, when we see them in clinic years later they can have persistent problems which affect their daily life, for example impairments in concentration and memory," said Dr Gregory Scott, the lead author of the paper, from the Department of Medicine at Imperial.

"Research is increasingly showing that a blow to the head, such as that sustained in a road accident, triggers biological processes in the brain that burn away in the background for years," added Dr Scott.

"Although previous research has shown that some head injury patients have these amyloid plaques shortly after the incident, these findings suggest these plaques are still present in the brains of patients over 10 years later. This helps shed light on why brain injury patients seem to be at increased risk of dementia - and may help us develop treatments that reduce this risk."

In the research, published in the journal *Neurology*, the team studied nine patients with moderate to severe traumatic brain injuries. Many had sustained these in road traffic accidents, such as being hit by a car, between 11 months to 17 years prior to the study. Although they had no physical disabilities from the injury, many still suffered daily problems with memory and concentration.

The patients, who were aged between 38-55, underwent a brain scan that used a technique that allows scientists to view amyloid plaques. These

proteins are thought to be a hallmark of Alzheimer's disease, and their formation may trigger other changes that lead to the death of brain cells.

The team also scanned the brains of healthy volunteers, and people with Alzheimer's disease. The patients with head injury were found to have more amyloid plaques than the healthy volunteers, but fewer than those with Alzheimer's disease.

In the head injury patients, the amyloid plaques were found to be centred mainly in two brain areas: the posterior cingulate cortex - a highly active area in the centre of the brain involved in controlling attention and memory, and the cerebellum - a region at the base of the brain involved in motor control and coordination.

In a second part of the study, the team assessed damage to so-called white matter. This is the 'wiring' of the brain, and enables brain cells to communicate with each other. The results showed that amyloid plaque levels in the posterior cingulate cortex were related to the amount of white matter damage, suggesting that injury to the brain's wiring may be linked to the formation of amyloid plaques.

Although this is small-scale study, explained Dr Scott, it provides hope for developing treatments in the future that may help treat the long-term effects of head injuries.

"This is a preliminary study, and it's important to stress that these head injury patients didn't have Alzheimer's disease. However it supports the idea that the window of treatment for brain injury is potentially months or even years after the initial event. If we can find out exactly what processes are going on in the brain, it may be that we can intervene and improve long-term outcomes for patients.

"The works also highlights how damaging brain injury can be - and fuels

the public health debate about what we can do to protect ourselves against head injuries."

Provided by Imperial College London