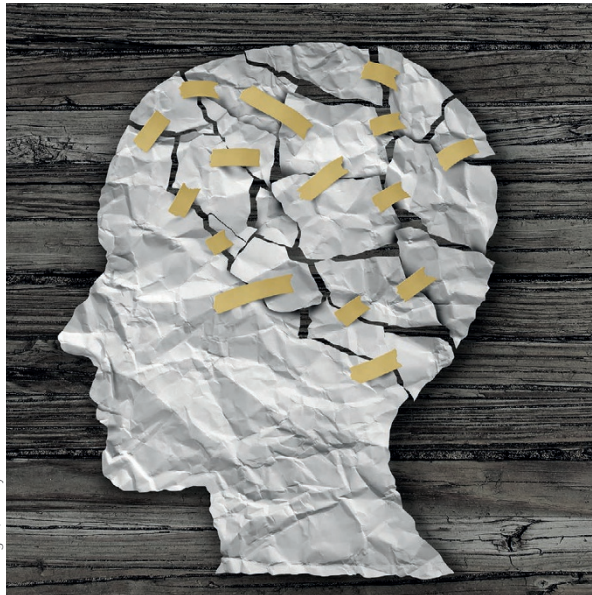


 TRAUMATIC BRAIN INJURY

New insights into the long-term effects of mild brain injury



Brain light / Alamy Stock Photo

Two reports have shed new light on the long-term consequences of mild brain injury. The research teams studied two different groups of people who are at risk of head injuries: Helen Ling and colleagues examined retired association football players, who were exposed to repeated head–ball and head–player impacts throughout their career, whereas Christine Mac Donald and colleagues studied individuals from the US military who had been exposed to blasts.

Athletes who participate in contact sports, such as boxing, are known to be at risk of chronic traumatic encephalopathy (CTE), a degenerative brain pathology that involves progressive impairment

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of memory, behaviour and motor function. As CTE is thought to be exacerbated by repetitive head impacts, Ling and colleagues investigated whether CTE might underlie the onset of dementia in a series of association football players.

The investigators identified 14 retired footballers who had progressive cognitive decline. Postmortem examination of six of these individuals showed septal abnormalities in all six brains — a sign of repetitive head impacts. Four of the six individuals exhibited confirmed CTE pathology, and the remaining two had features supportive of a CTE diagnosis.

“The frequency of CTE pathology in our series represents a significant excess when compared with the 12% average background rate of incidental CTE pathology in elderly individuals with or without neurodegenerative disorders,” comments Ling. The investigators note that association football is the most popular sport worldwide, so a potential link between repetitive head impacts from playing football and the development of CTE is of considerable interest to the public. “Our findings support the pressing need to instigate large-scale studies to identify at-risk groups of footballers, which will justify the implementation of protective strategies and education of current players,” adds Ling.

Another population at risk of head injury is military personnel, many of whom are young and risk

living with the complex and poorly understood long-term consequences of these injuries. The pathological changes that result from mild traumatic brain injury caused by blast exposure are difficult to detect using standard radiological techniques such as conventional CT or MRI scans. To address this difficulty, Mac Donald and colleagues used diffusion tensor imaging to study white matter changes associated with exposure to blasts.

The researchers longitudinally monitored individuals from the US military and found that 74% of participants who received a concussive blast had a reduction in fractional anisotropy after 5 years, which indicated the presence of chronic brain injury. “It was surprising to identify significant numbers of these uncomplicated mild traumatic brain injury cases with sustained imaging sequelae at 5 years post injury,” Mac Donald remarks, “We see evolution, not resolution, of imaging abnormalities.” The team also identified factors that predict the presence of long-term imaging abnormalities, which included older age, poor verbal memory and poor verbal fluency.

The researchers plan to study these individuals for many more years; Mac Donald argues that this long-term follow-up is of particular importance, given the link between early-life head injuries and late-life neurodegeneration and dementia.

Charlotte Ridler

ORIGINAL ARTICLES Ling, H. *et al.* Mixed pathologies including chronic traumatic encephalopathy account for dementia in retired association football (soccer) players. *Acta Neuropathol.* <http://dx.doi.org/10.1007/s00401-017-1680-3> (2017) | Mac Donald, C. L. *et al.* 5-year imaging sequelae of concussive blast injury and relation to early clinical outcome. *Neuroimage Clin.* <http://dx.doi.org/10.1016/j.nicl.2017.02.005> (2017)