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Concussion in sport

Evidence from:

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This submission relates to the following areas for interest:

- funding for further scientific research

Funding for further scientific research

- The clinical presentations of chronic traumatic encephalopathy (CTE) are not well understood and may include cognitive impairments; behavioural disturbances; altered movement; disturbed gait and coordination, that may lead to falls, accidents or disability; slurred speech and tremors. There are no rigorous prospective studies assessing CTE clinical presentation with the majority of retrospective studies confounded by recall bias [1]. There is one published prospective study which used data from a dementia brain bank and concluded CTE may clinically overlap with Alzheimer's disease (AD) and other neurodegenerative diseases [2] but the data quality was insufficient to make firm conclusions. Both CTE and AD also have some neuropathological similarities, but also differences, perhaps explaining some of the clinical overlap between the two diseases [3].

- CTE, previously termed *dementia pugilistica* was first described in boxers [4]. Professional boxers likely represent a sporting population with the highest incidence of CTE where it is considered an occupational hazard rather than a yet to be proven association.

- The British Boxing Board of Control has been screening all UK boxers for brain abnormalities including CTE, with annual scans, for approximately 15 years. They have a specific CTE screening protocol which includes neuropsychology if brain scan abnormalities are discovered. This is the largest sporting population with recurrent brain imaging over time in the UK, yet it represents a much larger population of amateur, white collar or semi-professional boxers who are subject to similar risks and 'exposures' but without the protection of this being part of an occupation. Indeed, another but less appreciated group in society that would also have some of the same relevant exposure risks are those in situations of domestic abuse but by their very nature are isolated in having a voice.

- Brain banks, for which an existing network exists, provide an opportunity to prospectively collect valuable brain tissue for research, alongside data regarding participant symptoms in addition to clinical markers in the blood and brain imaging, and correlate these to pathological brain abnormalities following death. An analogous model to achieve this would be akin to the Brains for Dementia Research (BDR) initiative (https://bdr.alzheimersresearchuk.org/). The key issue limiting recruitment to brain bank donation is funding. The annual cost of brain retrieval, storage and research access for 10 years is £1,663 per brain [5]. However this value is much lower than the average annual cost of care for a person with dementia, which ranges from £26,000 to £55,000 [6].

Recommendations

- Targeted funding to support brain bank collection from sports people (professional and amateur) at risk of CTE, particularly boxers and rugby players, to complement clinical data collection from ongoing studies in dementia brain banks.

- There is a unique opportunity to harness existing momentum to prospectively follow up boxers once they have retired and recruit them into a dementia brain bank. This offers a time and cost efficient way to study the evolution of clinical features and brain imaging markers of CTE. It will provide tangible biomaterials to advance scientific understanding of the underlying mechanisms of brain damage following recurrent concussion, which could lead to new strategies to improve long term outcomes and reduce associated Health and Social Care costs.

References

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