Written evidence submitted by Alzheimer's Research UK

30th March 2021

Alzheimer's Research UK's submission to the Concussion in Sport Inquiry

About Alzheimer's Research UK:

1. Alzheimer's Research UK is the largest charitable funder of dementia research in Europe. Our focus on research means that we can channel our expertise and energy into catalysing scientific efforts in the UK and across the world. We are currently funding £39 million in world-class science at leading universities and research institutions and to date have funded £143 million in research projects.

2. Alzheimer's and other dementias are now the UK's leading cause of death and with no treatments to slow, stop or cure them, they are diseases that no-one has yet survived. However, we are committed to changing that. Backed by our passionate scientists and supporters, we are challenging the way people think about dementia, bringing together the people and organisations who can speed up progress, and investing in research to make these breakthroughs possible.

3. Our mission is to bring about the first life-changing dementia treatment by 2025. Our research strategy is targeted to deliver research that offers the most potential for health benefit, including:

    a. Accelerating discovery science, including as a founding partner of the UK Dementia Research Institute, the country's largest ever dementia research initiative.

    b. Driving international early-stage drug discovery to translate promising developments in the laboratory into transformational treatments.

    c. Co-ordinating global efforts to detect the diseases that cause dementia at their earliest stages when treatment is more likely to be successful.

Scientific evidence for links between head trauma and dementia

4. In recent years there has been growing interest in the link between head injuries and dementia, from the more severe traumatic brain injury to repeated sports injuries. However, there is still a limited amount of research in this area, and we do not fully understand why this link exists or which patients may develop dementia following head injuries.

5. In 2020 the Lancet Commission on Dementia Prevention, Intervention and Care[1] systematically reviewed the current evidence to suggest that globally up to 40% of dementia cases may be prevented or delayed by addressing 12 modifiable risk factors. These risk factors included traumatic brain injury, which researchers suggested may contribute to 3% of dementia cases.

6. **Chronic traumatic encephalopathy (CTE**) – While research suggests that people with a traumatic brain injury could be around 50% (1.5 times) more likely to more likely to develop dementia[2], head injuries can vary enormously, and so can the diseases that cause dementia, so the relationship is hard to unravel. We do know that one specific type of dementia is associated with head injury, known as chronic traumatic encephalopathy (CTE)[3].

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[1] https://www.alzheimersresearchuk.org/blog/can-we-really-reduce-the-number-of-people-living-with-dementia-by-40/
[2] https://pubmed.ncbi.nlm.nih.gov/28068405/
[3] Chronic traumatic encephalopathy - NHS (www.nhs.uk)

7. Early symptoms of CTE usually appear around 10 years after brain injuries occur, but changes can be gradual and not always noticeable at first. CTE changes have been seen in a relatively small number of people typically following repeated injury, and very occasionally after a single severe hit.

8. CTE is thought to exhibit a distinct pattern of changes in the brain. While these share some similarities with Alzheimer's, such as the build-up of abnormal tau protein, the changes in CTE appear unique compared to other causes of dementia. Because the symptoms of CTE overlap so much with other dementias, a diagnosis is currently not possible during life – only at post-mortem. Therefore, we do not know how common CTE is. Much of the research into CTE has focussed on American football and boxing, and more in-depth research is needed into CTE in other sports, such as rugby and football.

9. **Football** – The FIELD study[4] is the largest study to date on the link between dementia and professional football. In this study an independent research team from the University of Glasgow led by Professor Willie Stewart compared the death records and prescription information of 7,676 male, ex-professional football players in Scotland, with those of 23,028 people from the general population who had the same age, sex and socio-demographic profile.

10. The study found that although the football players lived just over three years longer than the general population and were less likely to die of heart disease or lung cancer, they were 3.5 times more likely to die of dementia. This strong association with dementia needs to be taken on board by football associations across the world, and there should be enhanced precautions to minimise the risk of head injuries to players at all levels.

11. It is only due to the quality and availability of health records in Scotland, and the UK more widely, that a study of this size and type was possible. However, the FIELD study was still limited by the accuracy of the medical records the researchers could access. This is particularly an issue for the older players in the study as we know that historically dementia has not been consistently reported in records.

12. In addition, the study did not look at the head injuries experienced by these players, or any other factor on or off the pitch that could have contributed to their risk. This means the results do not conclusively show that heading is behind the higher risk of dementia.

13. Despite the limitations of the FIELD study, it is a crucial first step in determining whether there are links between heading in professional football and dementia. To get more conclusive answers we now need high-quality research to understand why professional footballers are at increased risk.

14. **Rugby** – Research into the link between rugby and dementia is even more limited than for football, but in recent years, several research studies have been set up to address questions about the potential impact of rugby on long term brain health.

15. While the FIELD study primarily looked at the lifelong outcomes of professional footballers, part of this work continues and includes a small cohort of former rugby internationalists. A large-scale study, like the one carried out for football, has been challenging in rugby as it is hard to identify a database of sufficient numbers.

16. Former England rugby players are also taking part in a major study to investigate the sport's effects on brain health. The BRAIN Study[5], run by the London School of Hygiene and Tropical Medicine, Queen Mary University of London and the Institute of Occupational Medicine, aims to examine brain health and healthy ageing in approximately 200 former elite rugby players aged 50+.

17. **Research funded by Alzheimer's Research UK –** We continue to fund research to understand more about the link between head injuries and dementia. This includes research from Dr Neil

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[4] https://gbirg.inp.gla.ac.uk/the-field-study/
[5] https://www.lshtm.ac.uk/research/centres-projects-groups/brain-study

Graham, at Imperial College London, looking at the link between traumatic brain injury and dementia[6]. This research is examining traumatic brain injury after a blow to the head and not necessarily the same type of head injuries sustained in sports like rugby and football.

18. Dr Graham's team are looking for brain shrinkage soon after a person experiences a head injury, to understand how this relates to future thinking and memory problems. The work seeks to identify whether long-term problems can be predicted using scans and an ultra-sensitive blood test for proteins released during brain damage.

19. Dr Graham will also carefully compare patterns of brain degeneration following traumatic brain injury with those seen in the early stages of Alzheimer's. The project aims to find out if the same areas of the brain are affected and whether traumatic brain injury could increase someone's risk of Alzheimer's by making these regions more vulnerable to the damaging processes that cause the disease.

20. Critically, the project will contribute to our ability to predict and diagnose dementia after injury while people are still alive. The hope is that by understanding these changes, researchers will be able to design studies that can test medicines to stop nerve cell loss and prevent dementia after traumatic brain injury. Finding treatments in this setting may also have important implications for other forms of dementia including Alzheimer's.

Recommendations for further research

21. As the link between sport and dementia becomes an increasingly prominent public issue, we urgently need further research to understand the long-term implications of concussive and sub-concussive events and how they influence dementia risk. In particular, we need to understand:

    a. which sports are most associated with concussive and sub-concussive events;

    b. what are the research gaps and overlaps in the field of sport and dementia; and

    c. what are the research recommendations that will help to improve our understanding of the links between sport and dementia?

22. It is important that funding for this research comes from a balance of sources, including sporting agencies, governments, and charities. Progress in dementia research has been held back by decades of underfunding, and any investigations into the link between sport and dementia must be part of an overall increase in investment, rather than diverting vital resources away from other promising avenues for research.

23. In addition to looking at the role of sport in increasing dementia risk, we need more research to understand other risk factors and find ways to reduce dementia prevalence more broadly. There has been an increase in dementia prevention research in recent years, but this still lags far behind many other disease areas. In particular, there is a need for robust evidence on how multi-morbidity and clustering of risk factors affects overall risk development during the life course.

24. To help address the historic lack of investment and speed up progress in dementia research, including the understanding of links between dementia and sport, the UK Government must urgently set out plans to deliver on its election pledge to double funding for dementia research.

25. Known as the 'Dementia Moonshot', this would increase funding to over £160 million a year and put the UK at the forefront of dementia research at a pivotal moment for progress. Not only would this investment bring hope to millions of people affected by dementia in the UK and around the world, but it would also accelerate the government ambition to make the UK a science superpower and a world leader in AI; and establish the UK as a frontrunner in a field of medical research with a substantial and increasing global market.

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[6] https://www.alzheimersresearchuk.org/research-projects/looking-head-injury-dementia/

Other risk factors for dementia

26. Any recommendations on concussion in sport must also consider other modifiable aspects of dementia risk. The risk of head injury must be balanced against the wider benefits of exercise for dementia risk and a healthy life expectancy more broadly. The most consistent evidence to date suggests that what is good for heart health is also good for brain health for most of the population[7]. So common risk factors like high blood pressure, smoking, physical inactivity and diabetes could have a big impact on dementia rates at a population level.

27. The evidence shows that managing modifiable risk factors (including traumatic brain injury) throughout the life course is important to reduce the risk of developing dementia. To do this, people need to have a greater awareness that they can improve their brain health and reduce their risk of developing dementia and an understanding of how they can do this.

28. Earlier this year, Alzheimer's Research UK and the Royal Society for Public Health produced a joint insight report on brain health[8]. This report advocates for a greater emphasis on brain health in national conversations to enable everyone to take positive steps to look after their brains throughout life. The report recommends that the UK Government should take this opportunity to embed brain health messaging within wider health decision-making, including:

    a. A funded commitment to implement cost-effective interventions to address risk factors. For example, a recent analysis has estimated that treatments for stopping smoking, the provision of hearing aids, and treatment for hypertension may be either cost effective or cost saving and may reduce dementia prevalence in the UK by 8.5% if fully implemented[9].

    b. Development of a targeted public awareness-raising campaign aimed at those with most to gain from good brain health, especially minority ethnic groups.

    c. Creation of healthcare professional resources and educational opportunities to improve practitioners understanding of the emerging evidence and equip them with the skills to support patients.

    d. Ensuring that all opportunities to embed brain health within existing services are supported. For example, the dementia risk reduction messaging within the NHS Health Check could be reframed as promoting good brain health.

    e. Commitment to embed brain health across the life course, for example by working with employers and schools to raise awareness and understanding.

    f. Commitment to fund more research to find ways to reduce the prevalence of dementia.

29. To further embed the benefits of good brain health with the public, in January 2021, Alzheimer's Research UK launched its Think Brain Health campaign[10]. The social media campaign ran for seven weeks and saw half a million people visit our web resources to understand more about the modifiable risk factors for dementia and the principles of maintaining good brain health throughout life. This successful pilot demonstrates public appetite for understanding brain health, and the need for clear and consistent information on dementia risk factors.

30. We invite the Committee to consider these recommendations as a way of reducing dementia risk in sport, while also acknowledging that a broader focus on brain health will support both the Conservative manifesto commitment to achieve an extra five healthy years by 2035 and the objectives of a new Dementia Strategy currently in development by the Department of Health and Social Care.

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[7] https://www.alzint.org/u/WorldAlzheimerReport2014.pdf
[8] https://www.alzheimersresearchuk.org/wp-content/uploads/2021/01/ARUK_TBH_PolicyReport_12Jan21.pdf
[9] https://linkinghub.elsevier.com/retrieve/pii/S2666756820300040
[10] www.thinkbrainhealth.org.uk