

Cognitive deficits in retired fighters

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Background: Cumulative exposure to head trauma is associated with cognitive decline and enhanced risk of neurodegenerative disease. This study examines the results of cognitive testing and brain structure volumes in professional fighters. **Methods:** Fourteen retired professional boxers participating in the Professional Fighters Brain Health Study underwent cognitive testing in addition to MRI brain imaging that was processed to provide volumetric measures using commonly used an automated program. We concentrated on regions (thalamus and caudate) previously shown to be smaller in those who have fought the most, and relevant to many cognitive functions including speed of processing. We computed the frequency with which retired fighters' cognitive test scores were 1.5 SDs below the mean of age- and education-matched normals. In addition, we compared the frequency of impairments in these retired fighters with a larger cohort of active fighters matched on fight exposure. **Results:** 13 fighters were boxers, 1 was a mixed martial arts fighter. The mean age of the subjects was 48.9 years (35-66), with a mean of 12.6 years of education (8-17). The mean number of professional fights was 45.2 and years of professional fighting, 14.3. Impairments on cognitive tests were frequent, with 43% failing a psychomotor speed test, 57% failing a processing speed test and 28.6% failing a memory test. The memory test was failed by a similar proportion of active fighters, while less active fighters failed the tests involving speed. When corrected for age and other relevant variables, thalamic volume did not differ between active and retired fighters, but a greater fight exposure was associated with smaller volumes ($p=0.031$) **Conclusions:** Cognitive dysfunction is common in retired fighters, and may be associated with specific changes in the brain. Timed tasks are particularly vulnerable, whereas impairment in memory is seen similarly in younger, active fighters. Analysis of larger groups of fighters will further elucidate this relationship.