

**Table 1. Cases of reported chronic traumatic encephalopathy exposure, clinical descriptions, and cognitive findings.**

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
1	Case 1 [Roberts 1969]	Boxing	60	15	13 (200 bouts)	P, B	Number: 0 Severity: N/A	Age and Onset: 29yrs Clinical Features: Slurred speech, left arm tremor, limping left leg, paranoid delusion, Parkinsonian resting tremor (L), slowed movements, markedly akinetic, euphoric. Cognitive Findings: Lacks insight, poor memory, demented (slowed thinking, inability to register).	No
2	Case 2 [Roberts 1969]	Boxing	50	12	10 (80 bouts)	P, B	Number: 0, 3 TKOs Severity: N/A	Age and Onset: 22yrs Clinical Features: Slurred speech, unsteady on feet, increasingly insensitive to alcohol, 10yrs post progressively worsening tremor, outbursts of uncontrollable temper, emotionally labile, Parkinsonian tremor. Cognitive Findings: Not conducted	No
3	Case 3 [Roberts 1969]	Boxing	58	14	15 (300+ bouts)	P	Number: 1 Severity: NR	Age and Onset: 30yrs Clinical Features: Speech abnormalities (past 10+ yrs), mild degree of ataxia, slow movement, terminal intention tremor. Cognitive Findings: Mentation was extremely slow, cerebellar dysarthria.	No
4	Case 4 [Roberts 1969]	Boxing	48	9	13 (300 bouts)	P, B	Number: 0, 7'al TKOs Severity: N/A	Age and Onset: NR Clinical Features: Alcohol intolerance, slurred speech, expressionless face, inconstant rhythmic Parkinsonian tremor in right arm. Cognitive Findings: Intact	No
5	Case 5 [Roberts 1969]	Boxing	53	15	10 (96 bouts)	P	Number: 2, 7'al TKOs Severity: NR	Age and Onset: Neurology report aged 33 years; slurred speech, headaches, memory difficulty, & depression. Diagnosed with punch drunk & discharged from military service. Clinical Features: Chronic alcoholic, apathetic, slurred speech, mentation slow. Cognitive Findings: Not conducted	No
6	Case 6 [Roberts 1969]	Boxing	57	17	10 (110 bouts)	P, B, SP	Number: 4 Severity: NR	Age and Onset: 27yrs Clinical Features: Dribbled & slurred speech, unsteady gait, mining accident exacerbated his problems; increasingly irritable & liable to outbursts of anger, paranoid delusion, euphoric. Cognitive Findings: Demented, disoriented to time & place, mentation markedly slow.	No
7	Case 7 [Roberts 1969]	Boxing	57	12	9 (150 bouts)	P, B	Number: 0 Severity: N/A	Age: NR Clinical Features: Slurred speech, mild truncal ataxia and unsteady gait, drag left foot. mTBI exacerbated his difficulties. Cognitive Findings: Intact	No
8	Case 8 [Roberts 1969]	Boxing	45	17	13 (137 bouts)	P	3 NR	Age: NR Clinical Features: Slurring dysarthria, expressionless face, forgetful, mild euphoria, slow movements. Cognitive Findings: Intact	No
9	Case 9 [Roberts 1969]	Boxing	58	19	NR (250+ bouts)	P	3 NR	Age and Onset: "Many years" Clinical Features: Slurred speech, dabbled, unsteady on feet and falls, poor memory. Cognitive Findings: Intact	No
10	Case 10 [Roberts 1969]	Boxing	35	11	NR (70 bouts)	P, B	1 NR	Age and Onset: N/A Clinical Features: N/A Cognitive Findings: Intact	No
11	Case 11 [Roberts 1969]	Boxing	39	17	7 (60 bouts)	P, B, SP	3 NR	Age and Onset: Licence not renewed at 24yrs Clinical Features: Dysarthric, very slow cerebration. Cognitive Findings: Poor memory	No
12	Case 1 in McKee et al 2009 [Brandenburg & Hallervorden	Boxing	51	17	11	Unkn wn	Unknown Unknown	Age and Onset: 38yrs; memory & speech Clinical Features: Personality/behaviour change - agitation'; 'Movement abnormalities: Parkinsonism, slowed speech' Cognitive Findings: Retrospective reports: memory loss, dementia	Yes

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13	1954] * Case 2 in McKee et al 2009 [Grahmann & Ule 1957] *	Boxing	48	15	14	Unknown	Unknown Unknown	Age and Onset: 36yrs; euphoria & dementia Clinical Features: Personality/behaviour change - dysphoria; 'Movement abnormalities: Parkinsonism, slowing, ataxia.' Cognitive Findings: Retrospective reports: memory loss, dementia	Yes
14	Case 3 in McKee et al 2009 [Neubuerger et al 1959]	Boxing	53	14	23 (150 bouts)	P, B	Number: KO'd 30 times Severity: NR	Age and Onset: 46yrs; tense, tremulous, suspicious, and irritable, with some "delusory phenomena". Clinical Features: Four years after initial presentation, he returned complaining of persistent bilateral frontal and temporal headaches. From the age of 50 to 53, he was observed frequently, continuing to complain of headaches, occasional blackout spells, and tremulousness. Intermittent fine, rapid tremor of the head and neck, which occasionally spread to the arms, particularly the right. A slight increase in tone was noted in the right arm, along with some decrease in ability to perform rapid alternating movements. The electroencephalogram showed intermittent bursts of 4- to 5-second slow waves, with or without sharp waves, apparently originating in the left temporal area. Cognitive Findings: Simple tests of mental function showed inability to recall five digits forward, to subtract 7 from 100 serially, to perform any but the simplest calculations, and to recall presidents and dates of world wars. Psychological tests revealed loss of immediate recall and of the ability to learn new tasks. The full-scale intelligence performance was 84.	Yes
15	Case 4 in McKee et al 2009 [Neubuerger et al 1959]	Boxing	58	18	7 (10 bouts)	P	Number: NR Severity: NR	Age and Onset: 48yrs Clinical Features: He retired age 24yrs because of a "paralysed left side," but tried an unsuccessful comeback one year later. In the year following a cholecystectomy he became forgetful, confused, irritable, and moody. At this time the Mayo Clinic, documented that he was an affable, alert, restless patient, disoriented as to time and place, able to perform only the simplest calculations, and unable to find his way about Rochester unescorted. He showed an ataxic gait, decreased speed of motion in the left hand, increased tendon reflexes, and extensor plantar reflexes on the left. The impression was "psychotic reaction—the result of organic brain disease—most likely in the nature of a traumatic encephalopathy (punch drunk)". He deteriorated progressively, several hospitalizations were necessary because of confusion, hyperactivity, loquaciousness, and "nervous breakdown." He died of progressive pulmonary insufficiency, having required oxygen continuously for the last few months of his life. Cognitive Findings: NR	Yes
16	Case 5 in McKee et al 2009 [Courville 1962]	Boxing	49	Unknown	4	P	Number: NR Severity: NR	Age and Onset: Age NR, Clinical Features: Confusion, memory difficulty, & "erratic behaviour." Cognitive Findings: NR	Yes
17	Case 6 in McKee et al 2009 [Mawdsley & Ferguson 1963], Case 1	Boxing	54	14	19 (250 bouts)	P	Number: KO'd 4 times Severity: He was badly beaten on several occasions, and after one bout had a period of amnesia lasting 12 hours.	Age and Onset: 30yrs slurred speech, difficulty sleeping at night, and increasing lethargy and drowsiness during the day. Clinical Features: Shortly after retirement unsteady gait and clumsy with his hands, fastening laces and buttons and writing became difficult. His speech and gait slowly deteriorated. In his youth he had been aggressive, and throughout his boxing career was a heavy drinker. He is still prone to outbursts of rage and violence but drinks little alcohol, because small amounts aggravate his ataxia. At 34yrs he was discharged from the Army on psychiatric grounds. Between the ages of 37 and 44 he was admitted to mental hospitals on three occasions after episodes of violence. His speech was slurred; his gait was ataxic. The CSF was normal. EEG was within normal limits. Lumbar air-encephalography showed generalised dilatation of the ventricular system. Cognitive Findings: Progressive deterioration in his memory over the past 20yrs. Clinical and psychometric evidence of dementia with a distinct defect of retentive memory. Falling off in his social habits, and slovenliness of his dress.	No

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18	Case 7 in McKee et al 2009 [Mawdsley & Ferguson 1963], Case 2	Boxing	58	16	21 (500bouts) then >1000 booth fights	P, B	Number: Never KO'd but received many beatings with fights stopped due to helpless state. Severity: NR	Age and Onset: Retired aged 36yrs because his legs were becoming unsteady. Clinical Features: Unsteadiness of gait slowly worsened following onset. At 38yrs onset of slurred speech, with an onset of hand tremor 2 years later. His speech was dysarthric and monotonous, his gait distinctly ataxic. His facial expression was fixed, and he showed a constant, coarse tremor of the arms and hands which was more obvious on the right. Tone was increased in his arms and legs. Finger movements were clumsy. Plantar responses were flexor. Clinical exam: CSF was normal; EEG was abnormal; cavum septi pellucidi; the two leaves were widely separated and faintly defined. Cognitive Findings: A gross defect of retentive memory which was confirmed on psychometric testing.	No
19	Case 3: Mawdsley & Ferguson 1963	Boxing	69	16	13 (100 bouts - lost 40)	P, SP	Number: 4 Severity: NR	Age and Onset: 50yrs: memory deterioration Clinical Features: Severe memory issues for recent events. He became increasingly depressed and irritable, and was apt to fall asleep during the day and to have occipital, throbbing headaches almost daily. Speech and gait were normal. Cognitive Findings: Clinical testing showed grossly defective memory, which was confirmed by psychometry.	No
20	Case 4: Mawdsley & Ferguson 1963	Boxing	57	15	10 (204 bouts) then >1000 fights in booths	P, B, SP	Number: Not KO'd, though several TKOs Severity: NR	Age and Onset: NR Clinical Features: Retired aged 24yrs due to a grand-mal convulsion. Continued suffering fits at intervals of a few days; their frequency gradually decreased, but continued at a rate of one major attack each month. Occasional paranoid hallucinatory states which were accompanied by clouding of consciousness and usually followed a series of grand-mal fits. Fine nystagmus on lateral deviation of the eyes and severe impairment of fine hand movements. The CSF contain 50mg of protein per 100 ml. EEG beyond normal limits. The lateral ventricles were greatly dilated. Cognitive Findings: In the past 3 years his wife noticed deterioration in his memory. A gross defect of retentive memory was apparent clinically, and psychometric testing showed evidence of intellectual deterioration.	No
21	Case 5: Mawdsley & Ferguson 1963	Boxing	55	15	7 (100 bouts) then booths & sparring partner until 30yrs age	P, B, SP	Number: KO'd once but regularly beaten Severity: NR	Age and Onset: 30yrs: right hand tremor Clinical Features: Tremor slowly increased in amplitude, and his writing steadily deteriorated. At 35yrs his gait became unsteady and his speech became slurred. These symptoms have progressed. He then began to show defects of memory and developed paranoid delusions requiring psychiatric hospitalisation on two occasions. He was grossly dysarthric; his gait was spastic and ataxic - a constant "pill-rolling" tremor of both hands at rest and gross intention tremor on purposive movements of the right arm. CSF was normal. The EEG showed slight abnormalities. Air encephalography demonstrated dilated lateral ventricles, cerebral sulci were widened and excess of air in the subarachnoid space overlying the cerebral hemispheres. There was a cavum septi pellucidi with two clearly defined leaves, well separated. Cognitive Findings: There was clinical and psychometric evidence of dementia and gross memory defect.	No
22	Case 6: Mawdsley & Ferguson 1963	Boxing	55	12	19 (90 + 320 bouts)	P	Number: 12 Severity: 12 times protracted amnesia post-fight	Age and Onset: 33yrs: left arm and hand became weak and unsteady. Clinical Features: At age 50yrs his wife noticed slurring of his speech and unsteadiness of his gait. His writing slowly deteriorated. During the past 4 years, on seven occasions he lost consciousness for 30 to 45 minutes. Facial expression was "fixed" and Parkinsonian, and his speech was dysarthric. He had an ataxic gait. There was sustained nystagmus on lateral deviation of the eyes and restriction of upward gaze. Tone was increased in the left arm and leg. Fine movements of the left hand were clumsy, and there was gross intention tremor on purposive movements of the left arm. CSF was normal. EEG showed slight abnormalities. Lumbar air-encephalography showed slight dilatation of the lateral ventricles. The cerebral sulci were coarse and wide, and there was an excess of air over the cerebral hemispheres. There was a cavum septi pellucidi; the two leaves were clearly seen and were not widely separated. Cognitive Findings: Clinical and psychometric evidence of intellectual impairment and memory	No

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23	Case 7: Mawdsley & Ferguson 1963	Boxing	63	16	Claimed to have boxed 'nightly' for 10 yrs	NR	Number: NR Severity: NR	defect. Age and Onset: 38yrs: staggered gait. In his early 50s he noticed gait unsteadiness and heaviness of his legs, and found he was unable to run or to walk quickly. Clinical Features: At 50yrs he had a single episode of LOC for a few minutes; unsteadiness of gait and speech difficulty slowly worsened. His speech was dysarthric, his gait was grossly ataxic, and he was unable to walk without support. Upward gaze was restricted. He had nystagmus on full lateral deviation of the eyes, slower and coarser in amplitude on looking to the right. There was intention tremor of the right hand. Air-encephalography suggested advanced cerebellar atrophy. Cognitive Findings: In the past 10 years, deterioration in his memory was observed, otherwise no further reported cognitive findings beyond suggestion of dementia.	No
24	Case 8: Mawdsley & Ferguson 1963	Boxing	59	14	22 (600 bouts)	P	Number: 5 Severity: On one occasion - LOC 60mins; On several occasions he was dazed for hours after being beaten.	Age and Onset: NR Clinical Features: His only complaint was of poor eyesight. He denied any other disability and it was impossible to obtain a detailed history from him. He had always been a heavy beer drinker and was involved in many brawls and had convictions for assault. Because of his violent behaviour he was admitted to a mental hospital when he was 40. His wife left him 3 years ago because of his drunkenness and violence. Constantly chattering or singing, he was impervious to discipline. His facial expression was fixed. His speech was slow and dysarthric. He walked with an ataxic gait on a broad base, taking short, shuffling steps. There was rigidity of all four limbs, and a coarse tremor of the hands. Fine movements of the fingers were impaired, and there was slight intention tremor in both hands. CSF contained 70 mg of protein per 100 ml. The EEG was abnormal. Air-encephalography - the lateral ventricles showed considerable symmetrical dilatation of the lateral ventricles. There was a cavum septi pellucidi, the leaves being faintly defined and well separated. Cognitive Findings: There was gross impairment of intellect and memory.	No
25	Case 9: Mawdsley & Ferguson 1963	Boxing	33	14	13 (80 bouts)	A	Number: No KO's reported Severity: One of his fights was stopped when he was concussed and this bout was followed by a period of amnesia lasting 6 hours.	Age and Onset: 19yrs; speech becoming slurred, memory deterioration & untidy handwriting. Clinical Features: From 19yrs experienced persistent speech & memory difficulties. He reduced his frequency of boxing - only occasionally did he fight in the following 5 years before he ceased completely. At this time he began to experience almost constant occipital, throbbing headaches, which latterly occurred at weekly intervals. His only neurological abnormality was slight but definite slurring dysarthria. CSF contained 55 mg of protein per 100 ml. Cognitive Findings: None reported	No
26	Case 10: Mawdsley & Ferguson 1963	Boxing	51	14	22 (300 bouts)	P	Number: No KO's reported Severity: NR	Age and Onset: 35yrs retired experiencing a set, expressionless face and slurring of his speech, and was noticeably clumsy in the use of his hands. His wife noticed a progressive mental impairment. Clinical Features: Pronounced slurring dysarthria and an expressionless Parkinsonian-like face. During the last 10 years of his life he spent most of the day sitting apathetically at home. He became slovenly in his dress and habits, he took no interest in his family's welfare. Cognitive Findings: Deteriorating memory reported but not formally assessed	Yes
27	Case 8 in McKee et al 2009 [Constantinidis & Tissot 1967] *	Boxing	58	16	7	Unknown	Number: Unknown Severity: Unknown	Age and Onset: 25yrs; cognitive decline & hemiparesis. Clinical Features: Personality/behaviour change - dysphoria, irritability, confusion, paranoia, aggression/violence, poor insight/judgement'; epilepsy; 'Movement Abnormalities: Parkinsonism, decreased facial movement, gait problems, ataxia.' Cognitive Findings: Retrospective reports: memory loss, dementia.	Yes
28	Case 9 in McKee et al 2009 [Payne 1968]	Boxing	?	12	12	P, SP	Number: Unknown Severity: Unknown	Age and Onset: 30yrs Clinical Features: At 30yrs admitted to psychiatric institution and diagnosed with 'manic-depressive psychosis'. He spent many year thereafter institutionalised. Cognitive Findings: NR	Yes

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29	Case 10 in McKee et al 2009 [Payne 1968]	Boxing	46	15	20 (300 bouts)	P, B	Number: 1 KO but 'had taken many beatings' Severity: NR	Age and Onset: 33yrs: headache and noise sensitivity. Clinical Features: At 43yrs he had a left ventricular failure due to malignant hypertension, at which time examination detected slurring of speech and an unsteady gait; his dysarthria and ataxia became progressively more severe; he became violent and paranoid. He was emotionally labile; 1mth prior to his death medical examination noted additional diagnosis of papilloedema and left CNIII palsy. EEG at this time demonstrated a possible right parietal lesion. Cognitive Findings: NR	Yes
30	Case 11 in McKee et al 2009 [Payne 1968]	Boxing	46	19	13 (200 bouts)	P	Number: 50 Severity: NR	Age and Onset: 31yrs: headache, poor concentration, insomnia, enuresis, & depression. Clinical Features: He drank heavily, many convictions for drunkenness & several for larceny, marriage breakdown, could not maintain employment. During his many hospitalisations he threatened and abused medical staff. Aged 39yrs first noticed slurring of his speech, and mild impairment of coordination of his left arm. EEG showed diffuse abnormality and air encephalogram demonstrated evidence of brain atrophy. Cognitive Findings: Not formally assessed; however, in his final year of life his memory was poor, he was sometime confused and vague.	Yes
31	Case 12 in McKee et al 2009 [Payne 1968]	Boxing	45	16	14 (300 P bouts) & several yrs at A level	A, P	Number: NR Severity: Unknown	Age and Onset: 40yrs Clinical Features: Alcoholic, prone to violence. He had slurred speech & shuffling gait. EEG demonstrated slight theta activity in left temporal area. He unsuccessfully attempted extended period of alcohol abstinence; complained of headaches, depression, poor concentration, insomnia & enuresis, slurred speech, nystagmus, coordination problems. CSF was 60mgm%. Cognitive Findings: NR	Yes
32	Case 13 in McKee et al 2009 [Payne 1968]	Boxing	44	15	Approx. 14 (initially B every night) (200 P bouts)	P, B	Number: NR Severity: NR	Age and Onset: 28yrs retired but no report of symptoms. Clinical Features: Vaguely described as occasionally unsteady on his feet and experiencing slurred speech. Slightly enlarged ventricles, cavum septi pellucidi with small fenestrations, slight cerebral atheroma. Cognitive Findings: NR	Yes
33	Case 14 in McKee et al 2009 [Payne 1968]	Boxing	28	12	12 (28 bouts (17-11 Win-Loss record)	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Prematurely ended his career due to imprisonment. Died four years later of a stab wound to the heart. Cognitive Findings: NR	Yes
34	Case 15 in McKee et al 2009 [Corsellis et al 1973]	Boxing	63	11	14 (400 bouts)	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: He changed completely, drank & gambled heavily, marriage breakdown, socially isolated, violent outbursts, became vagrant, speech slurred, right-sided ptosis. Cognitive Findings: NR	Yes
35	Case 16 in McKee et al 2009 [Corsellis et al 1973]	Boxing	77	Boyhood'	Retired in early 30s (700+ bouts)	P, B	Number: NR Severity: NR	Age and Onset: NR Clinical Features: By 50yrs old he staggered slightly, slow and slurred speech, next 10 yrs he became child-like, right upper limb tremor, markedly ataxic, nystagmus in right. Cerebral atrophy & punch-drunk syndrome were diagnosed. Cognitive Findings: NR	Yes
36	Case 17 in McKee et al 2009 [Corsellis et al 1973]	Boxing	62	16	13 (300+ bouts)	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: By retirement he had already become muddled and by 36yrs he often fell backwards, paranoid, at age 44yrs early Parkinsonism was suggested, at 50 yrs slurred speech was evident and the term 'punch-drunk' was mentioned, at 56yrs extrapyramidal tremor of upper limbs and ataxia of lower limbs. By early 60s, hospital notes suggested 'diffuse degenerative brain disease affecting extrapyramidal & pyramidal systems as well as causing mental impairment'. Cognitive Findings: NR	Yes

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37	Case 18 in McKee et al 2009 [Corsellis et al 1973]	Boxing	69	15	25 (600 bouts)	P	Number: ? Severity: NR	Age and Onset: NR Clinical Features: In his mid-30s he became unsteady on his feet by age 40 he had a shuffling gait and a marked tremor in his hands. At 57yrs he attended hospital and was found to have a spastic gait and slurred speech. Punch-drunk syndrome was diagnosed. Cognitive Findings: By 64yrs he was disoriented to time and place and did not recognise his relatives.	Yes
38	Case 19 in McKee et al 2009 [Corsellis et al 1973]	Boxing	61	As a child	18yrs	P, B	Number: ? Severity: NR	Age and Onset: NR Clinical Features: This patient was described as a "deaf mute". He sometimes boxed in a trance, drunk excessively in his 20s and by the end of his career at the age of 30 he could no longer manage his personal affairs. He became neuritic around 35yrs and was placed in a home. At age 60yrs he developed a right facial weakness and right homonymous hemianopia. Cognitive Findings: NR	Yes
39	Case 20 in McKee et al 2009 [Corsellis et al 1973]	Boxing	83	13	25 (500 bouts)	P, B	Number: "Occasionally" Severity: NR	Age and Onset: NR Clinical Features: He was fit until age 32yrs when his legs began to give way. Post-retirement he had two failed marriages. By age 65yrs he was placed in a nursing home and later a psychiatric facility, where it was noted he possessed paranoid delusions, dysarthria, ataxia - with slowed shuffling gait and had Parkinsonian signs with left leg weakness. Cognitive findings: Not formally assessed but described as possessing a poor memory	Yes
40	Case 21 in McKee et al 2009 [Corsellis et al 1973]	Boxing	62	16	20 (400 bouts)	P	Number: ? Severity: NR	Age and Onset: NR Clinical Features: A few years post retirement he began drinking heavily and became moody and violent. By 54yrs he was unsteady on his feet and fell frequently. He complained of violent headaches, behaved strangely and had 'glassy-looking eyes'. He was doubly incontinent at times and was admitted to a psychiatric hospital at 59yrs old. Cognitive Findings: File notes indicated he was "grossly demented".	Yes
41	Case 22 in McKee et al 2009 [Corsellis et al 1973]	Boxing	71	17	23 (565 bouts)	P	Number: ? Severity: NR	Age and Onset: NR Clinical Features: At age 60yrs deterioration became apparent, he was ataxic and demonstrated left-sided weakness, he had a number of episodes of unconsciousness. He was intolerant of alcohol and was only interested in boxing and gambling. His intellect and behaviour deteriorated and he became violent. A tremor also developed.	Yes
42	Case 23 in McKee et al 2009 [Corsellis et al 1973]	Boxing	72	Unknown	Unknown but > 10yrs	P	Number: ? Severity: NR	Age and Onset: NR Clinical Features: Aged 31 he was noted to have a left hand tremor and slurred and hoarse speech. He began to drink heavily and at age 65yrs he attempted suicide, resulting in psychiatric hospitalisation. A tremor and rigidity of the left upper limb was noted. Cognitive Findings: NR	Yes
43	Case 24 in McKee et al 2009 [Corsellis et al 1973]	Boxing	67	Unknown	Unknown	P	Number: ? Severity: NR	Age and Onset: NR Clinical Features: Known as a violent man and drunk heavily aged 40yrs. By 60yrs, he developed a left hemiparesis. At 63yrs he was admitted to a psychiatric facility, paranoid & deluded, confused and aggressive. Cognitive Findings: Poor memory at age of 40yrs, by 63yrs disoriented, with marked loss of recent memory.	Yes
44	Case 25 in McKee et al 2009 [Corsellis et al 1973]	Boxing	67	Unknown	Retired approx. 35yrs	P	Number: ? Severity: NR	Age and Onset: NR Clinical Features: Limited history but by age 67yrs there was a history of increasing confusion, disorientation, and aggression. Cognitive Findings: NR	Yes
45	Case 26 in McKee et al 2009 [Corsellis et al 1973]	Boxing	91	Unknown	Boxed during youth	P ?	Number: ? Severity: NR	Age and Onset: NR Clinical Features: Little history, aside he spent the last years of his life in a home for the partially disabled. He was solitary and placid but occasionally became aggressive, but considered to be mentally alert. Cognitive Findings: NR	Yes

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46	Case 27 in McKee et al 2009 [Corsellis et al 1973]	Boxing	57	14	Unknown	A	Number: "Several times" Severity: NR	Age and Onset: NR Clinical Features: By age 43yrs he was vague and spoke more slowly; became intolerant of alcohol. At 53yrs he was admitted to a mental hospital and was found to be mildly confused and complained of blackouts. His personality was reported to have changed. Cognitive Features: His memory, mobility, and speech became progressively worse, eventually he became incontinent, paranoid, and aggressive.	Yes
47	Case 28 in McKee et al 2009 [Corsellis et al 1973]	Boxing	61	Unknown	Unknown	A	Number: ? Severity: NR	Age and Onset: NR Clinical Features: Unremarkable boxing career and post-retirement life. Cognitive Features: NR	Yes
48	Case 29 in McKee et al 2009 [Corsellis et al 1973]	Boxing	58	Unknown	Unknown	A	Number: ? Severity: NR	Age and Onset: NR Clinical Features: Unremarkable boxing career and post-retirement life. Cognitive Features: NR	Yes
49	Case 30 in McKee et al 2009 [Roberts GW et al 1990]	Female; physical abuse	76	Unknown	Unknown	N/A	Number: Unknown Severity: Unknown	Age and Onset: NR Clinical Features: History of a stroke; she had become demented over the past few years, this manifesting predominantly as memory loss and mental confusion. Relatives reported a long standing history of domestic violent. Cognitive Features: Memory loss and mental confusion	Yes
50	Case 31 in McKee et al 2009 [Hof et al 1991]	Female; Autistic head banging	24	7yrs	Approx. 15yrs	N/A	Number: Unknown Severity: Head banging; subconcussive blows.	Age and Onset: NR Clinical Features: She became blind as a bilateral detachment of the retina and dullness of the cornea resulted from repeated head and eye trauma. Head banging behaviour was so severe that she developed a hyperostosis frontalis externa. EEG revealed no epileptic loci, EEG trace was dominated by rapid activity (20 cycle/s) in the anterior areas and showed some theta elements. Cognitive Features: Diagnosed with infantile autism. Did not develop more than three words in her vocabulary and did not develop intellectual abilities. What she had achieved was lost around 11-years of age.	Yes
51	Case 32 in McKee et al 2009 [Hof et al 1992]	Diagnosis: PSP					Number: No reported history of any head trauma Severity: NR	Age and Onset: NR Clinical Features: NR Cognitive features: NR	No
52	Case 33 in McKee et al 2009 [Hof et al 1992]	Diagnosis: PSP					Number: No reported history of any head trauma Severity: NR	Age and Onset: NR Clinical Features: NR Cognitive features: NR	No
53	Case 34 in McKee et al 2009 [Williams & Tannenbergl 1996]	Circus Clown	33	Unknown	15yrs in the circus as a clown; also 8-10yrs involved in dwarf throwing.	N/A	Number: "A dozen times" Severity: Never hospitalised but no data recorded on severity.	Age and Onset: NR Clinical Features: Known to abuse alcohol with associated poor eating habit and frequent hospitalisation with withdrawal seizures. Hospital notes recorded aggression, impatience, panic symptoms, and blackouts. Clinical examination had revealed ataxia, nystagmus, mild Rombergism, and brisk reflexes and he had received treatment for Wernicke's encephalopathy. Cognitive Features: Not formally assessed; but the hospital report indicated poor concentration.	Yes
54	Case 35 in McKee et al 2009 [Jordan et al 1995]	Boxing	71	Unknown	>11 (85 bouts, 16 losses)	P	Number: 3 KOs recorded Severity: NR	Age and Onset: 61yrs Clinical Features: At 63yrs he developed an acute right hemiplegia and no longer recognised his family. Cognitive Features: Not formally assessed; although he was described as suffering from "cognitive decline"	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure			Number of Concussion(s) & Concussion Severity	Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play			
55	Case 36 in McKee et al 2009 [Geddes et al 1996; Geddes et al 1999]	Boxing	23	11	12yrs	19 bouts (totalling 120 Rds) / 4yrs P; 80 bouts / 8yrs A	Number: 1 KO; At the age of 10yrs, suffered a concussive HI by falling from a wall. Severity: No severe injury due to his boxing prior to the fatal KO sustained in his final bout. The previous HI at 10yrs-old resulted in transient loss of consciousness, followed by a short period of agitation and then complete recovery. Skull X-rays at the time revealed a right-sided skull fracture.	Age and Onset: NR Clinical Features: There were no neurological symptoms demonstrated on previous assessment. CT scan performed at the time he was granted a professional licence was normal, as was a CT scan 1 week prior to the last fight. He had no history of a severe head injury during his career, until his final fight, as a result of which he developed an acute subdural haematoma; he died 48 h after the contest, despite neurosurgical intervention. Cognitive Features: Not formally assessed; although he was described as being 'somewhat forgetful.'	Yes
56	Case 37 in McKee et al 2009 [Geddes et al 1999]	Boxing	28	16	5yrs (approx. 20 bouts)	A	Number: 0 Severity: He suffered from haematuria after contests but no history of a serious HI during his boxing career.	Age and Onset: NR Clinical Features: History of psychotic illness; diagnosed with paranoid schizophrenia at 20yrs, he was readmitted with an acute psychotic illness at the age of 25, this time more depressive in nature, and then again 2 years later. He died unexpectedly the following year during a grand mal seizure. Cognitive Features: Not formally assessed	Yes
57	Case 38 in McKee et al 2009 [Geddes et al 1999]	Epilepsy & Head Banging	28	Unknown	Unknown	N/A	Number: No history of severe HI History: NR	Age and Onset: NR Clinical Features: A "mentally subnormal" man, who had been slow to achieve childhood developmental milestones, developed grand mal epilepsy at the age of 7 years, at which time he was also diagnosed to be autistic. There was a long history of head banging, but no episode of severe HI. He lived his adult life in residential care, and died 2 days after a fall from a first floor window, in which he sustained a skull fracture, extradural and acute subdural haematomas, and large basal frontal contusions. Cognitive Features: Not formally assessed	Yes
58	Case 39 in McKee et al 2009 [Geddes et al 1999]	Epilepsy	27	2.5yrs	24yrs	N/A	Number: NR Severity: NR	Age and Onset: NR Clinical Features: A "mentally retarded" man who had suffered from intractable complex partial seizures with secondary generalised seizures. He was born 2 months prematurely, suffered from birth trauma and had his first seizure at the age of 2.5 years. The seizure frequency gradually increased, until in recent years he had both "major attacks" seven to ten times a week in which he dropped heavily to the ground and "minor attacks" which occurred once a week. Imaging showed that he had a calcified lesion under the right motor strip. Right frontal lobectomy was performed to include removal of the calcified lesion. Cognitive Features: Not formally assessed	Yes



Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
59	Case 40 in McKee et al 2009 [Geddes et al 1999]	Soccer	23	Unknown	Unknown	A	Number: 1 fatal sports HI; sustained 1 other non-sports related HI Severity: He had had a single severe head injury in the past, from which he had made a full recovery (no further details available)	Age and Onset: NR Clinical Features: A regular 'header' of soccer balls; he was reported to have been previously well with no history of neurological disease. He sustained a head injury while playing in a soccer match and developed an acute subdural haematoma and brain swelling, from which he died. Cognitive Features: Not formally assessed	Yes
60	Case 41 in McKee et al 2009 [Newell & Drachman 1999; Drachman & Newell; Schmidt et al 2001 - case 2]	Boxing	67	Unknown	10 (100 bouts); reported to be a "slugger"	P	Number: NR Severity: Had been knocked down 13 times in one fight; otherwise no details regarding severity.	Age and Onset: 64yrs (40yr latency); 'cognitive decline' Clinical Features: Hospitalised due to increasing dementia. 3yrs prior to admission, cognitive decline was noted. One year later, a neurologist diagnosed progressive dementia with Parkinsonism. During the two months before admission, the patient became agitated, experienced transient periods when he stared into space and did not respond to his surroundings, several falls, with apparent loss of consciousness but without obvious injury. One week before admission, physical violence toward family and paranoid behaviour. On admission, found to be oriented only to person, his speech was hypophonic; his facial expression was reduced, and he drooled; posture was slightly stooped, tandem walking was unsteady. MRI: severe, diffuse ventricular and cortical sulcal enlargement, T2-weighted images showed slight thinning of the corpus callosum, atrophy of the mammillary body, a moderately reduced signal in the globus pallidus and putamen, and minimal hyperintensity of periventricular white matter. The pars compacta was thinned on the proton-density-weighted images. A cavum septi pellucidi was noted. EEG findings were consistent with the presence of a generalized disorder of the motor neurons, their axons, or both. Interestingly, severe atrophy of both shoulder girdles and distal muscles, and diffuse fasciculations were present, although muscle strength was reported to be normal, and Babinski signs were absent, an electromyogram showed chronic denervation and re-innervation in all muscle groups, a finding consistent with the presence of a "generalized disorder of motor neurons, their axons, or both." Cognitive Features: Lost concentration when attempting serial tasks; abstract tasks were performed poorly; recalled none of three objects at five minutes, even with cues; left-right confusion was present.	Yes
61	Case 42 in McKee et al 2009 [Schmidt et al 2001]	Boxing	78	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: History of dementia with Parkinsonism for several years. Cognitive Features: NR	Yes
62	Case 43 in McKee et al 2009; Case 1 / Omalu et al 2010; Case 1 / Omalu et al 2011	AF	50	16	NFL: 17 (245 games); HS/College: 5	NFL	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Medical history that included atrial fibrillation and coronary atherosclerotic disease (with stenting). A neuropsychiatric history that resembled a dysthymic disorder. A deficit in memory and judgment as well as Parkinsonian symptoms. Anabolic steroid use; history of marked physical abuse; depression; repeatedly stunned himself into unconsciousness with a Taser gun to fall asleep; would not eat for days at a time; chronic use of Ritalin, Dexedrine, Paxil, Prozac, Ultram, Darvocet, Vicodin, Lorcet, and Eldepryl; extensive liver and kidney damage; never treated for a concussion or complained of concussive symptoms during playing career; financial ruin; legal troubles. Cognitive Features: Not conducted - retrospective study.	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
63	Case 44 in McKee et al 2009; Case 2 / Omalu et al 2010; Case 2 / Omalu et al 2011	AF	45	18	NFL: 8; College: 4; Military: 2	NFL	Number: Reportedly 'sustained repeated mild concussions on numerous occasions' Severity: There was at least one clinically documented severe concussive brain injury during play of football in 1987, which necessitated removal from play for at least 1 week. He was hospitalized for one night and complained of lightheadedness, unsteadiness in gait, and difficulty concentrating.	Age and Onset: 35yrs Clinical Features: Increasingly quiet and that he was afraid and fearful, with paranoid tendencies. In private he occasionally became extremely reclusive. He manifested unpredictable fluctuations in mood and personality. His business activities and decisions were regarded as extraordinarily risky, ambitious, and rather irrational; numerous business failings and he was under federal indictment at time of death. He was diagnosed with adjustment disorder with depressed mood after this first suicide attempt. Suicide by drinking anti-freeze; prior suicide attempt with rat poison. He had been previously admitted for psychiatric treatment three times. He had received a diagnosis of major depressive disorder, which was severe and without psychotic features. There was a documented single episode of a rollover of a sport utility vehicle which he was driving when he swerved to avoid hitting a deer. He experienced a brief loss of consciousness at the scene, but reportedly recovered completely. Other medical history included thyroidectomy for hyperthyroidism, and history of anabolic steroid use. Cognitive Features: Not conducted - retrospective study	Yes
64	Case 45 in McKee et al 2009; Case 3 / Omalu et al 2010; Case 3 / Omalu et al 2011	AF	44	15	NFL: 9; College: 4	NFL	Number: "Lost count at 15" Severity: Once suffered a seizure - hospitalised but practiced 2 days after discharge and played within 7 days.	Age and Onset: 38yrs: Memory problems 3-4 years post-retirement. 5 years post-retirement, he began to get upset and angry if people did not do what he wanted. 8 years post-retirement excessively driven, sleeping little and focused on coaching college football. Clinical Features: Constant headaches and pain, medicated for this at retirement. History of alcohol abuse starting one year post-retirement and lasting approx. 8 years. Progressively avoided social interaction and became a "needy, dependent" man, angry and overreacted to trivial situations with fluctuations in his mood. He exhibited paranoid ideations; persecutory nature, depression, and harboured a fear of financial ruin. A number of suicide attempts prior to his death by gunshot wound to the head. Depression, particularly about low-level college coaching jobs and inability to become NFL coach. Cognitive Features: Not conducted - retrospective study.	Yes
65	Case 46 in McKee et al 2009 [Cajigal 2007]; Case 5 / Omalu et al 2010; Case 6 / Omalu et al 2011	Wrestler	40	18	22yrs	P	Number: None diagnosed but allegedly reported several to his father. Severity: Unknown	Age and Onset: 38yrs Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Died via hanging; Xanax, hydrocodone; high levels of synthetic testosterone in blood upon death; history of anabolic steroid use and alcohol abuse. Cognitive Features: Not conducted - retrospective study.	Yes
66	Case 47 in McKee et al 2009; Case 4 / Omalu et al	AF	36	16	NLF: 8; 17 in all	NFL	Number: NR Severity: NR	Age and Onset: 36yrs Clinical Features: "Manifested progressive symptoms and signs of cognitive and neuropsychiatric impairments." Died of brain injury from MVA; history of anabolic steroid use; chronic marijuana use; often excessive alcohol use; no known prior concussion history; depression; possible	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
	2010; Case 5 / Omalu et al 2011							undiagnosed bipolar disorder/psychosis; extensive psychosocial stressors. Cognitive Features: Not conducted - retrospective study.	
67	Case 48 in McKee et al 2009 [Areza-Fegyveres et al 2007]	Boxing	61	16	14 yrs amateur; 3 yrs Professionally, > 60 bouts.	P	Number: No documented KOs Severity: N/A	Age and Onset: 58yrs Clinical Features: Medical follow up was conducted at least twice a year for seven years. No cerebellar, pyramidal, or extrapyramidal signs were seen during the follow-up period. Cognitive Features: Initial three year history of progressive memory decline. Followed-up over seven years, demonstrating continuous cognitive decline, very similar to that usually observed in Alzheimer's disease. Initial MMSE: 24/30 with NP Ax demonstrating predominately memory problems. His cognitive impairment steadily worsened with progression of the disease, predominant impairment in memory, attention, and executive functions were observed.	Yes
68	Case A in McKee et al 2009; BU CSTE website / John Grimsley / McKee et al (2012) Case 61	AF	45	16	NFL: 10yrs; 16 in all	NFL	Number: 3 in college; 8 or 9 in NFL. Only 1 medically verified. No hospitalisations or residual deficits Severity: Appear to be very mild	Age and Onset: 40yrs Clinical Features: Toward the end of his life, he tended to become angry and verbally aggressive over insignificant issues and was more emotionally labile. He also began to consume more alcohol but did not show other signs or symptoms of depression. Cognitive Features: Retrospective information only; initial minor impairments of short-term memory, attention, concentration, organization, planning, problem-solving, judgment, and multi-tasking. His spatial abilities were mildly impaired, and his language was unaffected.	Yes
69	Case B in McKee et al 2009 / McKee et al (2012) Case 81	Boxing	80	17	5yrs	P	Number: NR; however he sustained a non-sports related mTBI in his teens. Severity: NR	Age and Onset: 63yrs Clinical Features: There was history of alcohol abuse and a family history of Alzheimer's disease. Computed tomographic scan revealed cerebral and cerebellar atrophy. By age 78 years, he was paranoid, his gait was unsteady, his speech slowed, and he frequently fell. He was easily agitated and required multiple hospitalizations for aggressive behaviours. Brother had AD. Cognitive Features: Retrospective information only; he had reportedly suffered from relatively stable cognitive difficulties throughout his life until he developed a marked cognitive deterioration after 70 years of age. By 78yrs his memory loss had increased.	Yes
70	Case C in McKee et al 2009 / McKee et al (2012) Case 75	Boxing	73	11	22 (48 bouts)	P	Number: NR Severity: NR	Age and Onset: 58yrs Clinical Features: Approximately 20 years after retirement, he developed a progressive behavioral disorder with evidence of impairment in all cognitive domains. Neuroimaging showed cerebral atrophy, a cavum septum pellucidum (CSP), and a lacunar infarct in the left globus pallidus. He had a family history of dementia. In his late 50s, he became forgetful with mood swings and restlessness. He changed from his normally happy easy-going self to become apathetic, socially withdrawn, paranoid, irritable, and sometimes violently agitated. During the next 2 years, he began to confuse close relatives and developed increasing anxiety, aggression, and agitation; on occasion, he was verbally abusive toward his wife and tried to strike her. By age 70 years, he had severe swallowing difficulties, diminished upgaze, masked facies, garbled speech, and a slow shuffling gait. Cognitive Features: Neuropsychological testing showed deficits in all cognitive domains, including executive functioning, attention, language, visuospatial abilities, and profound deficits in learning and memory. Repeat neuropsychological testing at age 67 years revealed further global deficits, again with prominent impairments in memory. By age 70 years, MMSE several months before death was 7/30.	Yes
71	BU CSTE website / Lou Creekmur / McKee et al (2012) Case 82	AF	82	High school or younger	NFL: 10yrs	NFL	Number: "16 or 17" (broken nose 13 times) Severity: No LOC or hospitalisations	Age and Onset: NR Clinical Features: A 30-year decline of behavioral issues such as increasingly intensive angry and aggressive outbursts. Cognitive Features: Retrospective information only; 30-year cognitive decline including memory loss, lack of attention and organization skills.	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Number of Concussion(s) & Concussion Severity	Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play				
72	BU CSTE website / Mike Borich / McKee et al (2012) Case 60	AF	42	High school or younger	NR	College	Number: Approx. 10 but unconfirmed Severity: NR	Age and Onset: NR Clinical Features: Downward spiral of depression and substance abuse. Died of alcohol, cocaine, and oxycontin overdose; history of alcohol abuse, pain killer abuse, and other drug abuse. Cognitive Features: Not conducted - retrospective study.	Yes	
73	BU CSTE website / Thomas McHale; Case 8 Omalu et al 2011 / McKee et al (2012) Case 62	AF	45	High school or younger	NFL: 9yrs	NFL	Number: None during college or NFL according to his wife. Severity: N/A	Age and Onset: NR Clinical Features: Developed such chronic pain in 2005 that he used improperly large doses of the painkiller OxyContin, which exacerbated his lethargy and depression and led him to take cocaine occasionally to offset those effects. Overdose of oxycodone and cocaine as well as alcohol combined with Xanax. Father had bipolar disease. Cognitive Features: Not conducted - retrospective study.	Yes	
74	BU CSTE Media Release / Derek Boogaard / McKee et al (2012) Case 45	NHL	28	NR	NHL: 6yrs 277 games Other Professional leagues: 9yrs	NHL	Number: "Bell rung" at least 20 times. Involved in 174 career fights in professional hockey Severity: Twice diagnosed with PCS	Age and Onset: 26yrs; drug addiction, emotional instability, impulsive behaviour, disorientation, poor short-term memory. Clinical Features: Two weeks prior to his final game he had "seen stars" following a fight in which he sustained a concussion. Drug addition, abnormal behaviours, emotional instability. Cognitive Features: Impulsive behaviour, disorientation, poor short-term memory and poor impulse control.	No	
75	BU CSTE Media Release / Rick Martin / McKee et al (2012) Case 55	NHL	59	NR	NHL: 12yrs 685 games; Minors: 3yrs	NHL	Number: NR Severity: NR	Age and Onset: NR Clinical Features: NR Cognitive Features: NR	No	
76	BU CSTE Media Release / Bob Probert / McKee et al (2012) Case 50	NHL	45	NR	NHL: 15yrs 935 games	NHL	Number: NR Severity: NR	Age and Onset: NR Clinical Features: NR Cognitive Features: NR	No	
77	BU CSTE Media Release / Reggie Fleming / McKee et al (2012) Case 97	NHL	73	NR	NHL: 11yrs + 2 Minor Leagues	NHL	Number: NR Severity: NR	Age and Onset: NR Clinical Features: 30 years of worsening behaviour. Diagnosed with dementia. Cognitive Features: 30 years of worsening cognitive difficulties.	No	
78	Case 4 Omalu et al 2011	AF	24	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes	

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
79	Case 7 Omalu et al 2011	Wrestler	38	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
80	Case 9 Omalu et al 2011	AF	52	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Although he was reportedly found dead while intoxicated. Cognitive Features: Not conducted - retrospective study.	Yes
81	Case 10 Omalu et al 2011	AF	39	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. However, history of crystal methamphetamine and alcohol abuse, died of acute cocaine and heroin toxicity. Cognitive Features: Not conducted - retrospective study.	Yes
82	Case 11 Omalu et al 2011	MMA	28	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
83	Case 12 Omalu et al 2011	Wrestler	34	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
84	Case 13 Omalu et al 2011	Wrestler	33	NR	NR	NR	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
85	Case 14 Omalu et al 2011	Boxing	50	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
86	Case 15 Omalu et al 2011	AF - HS	18	NR	NR	High School	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
87	Case 16 Omalu et al 2011	AF - HS	16	NR	NR	High School	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
88	Case 17 Omalu et al 2011	AF - HS	17	NR	NR	High School	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Results limited to neuropathological observation only, no description of clinical correlates. Cognitive Features: Not conducted - retrospective study.	Yes
89	Saing et al (2012)	Boxing	55	18	13yrs	P	Number: 2 KOs Severity: 1 PTA 72hrs.	Age and Onset: 32yrs memory problems 1 yr post retirement Clinical Features: Behavioural impairments; outbursts of anger, poor judgment, inability to tolerate frustration, fluctuating mood. Initial neurological exam unremarkable aside from bilateral slowing of fine sequential finger movements and mild difficulties with tandem gait. Progressed to include impairments in gait, bilateral paramyotonia and bradykinesia were observed six years post initial examination. Of note there was a significant history of AD in his brother and his father. Cognitive Features: 7 visits: initial presentation he demonstrated mild dementia. Neuropsychological assessment demonstrated a slow but progressive deterioration in cognitive	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
								abilities; by the final exam (7-year follow up; and approx. 11-mths prior to his death), he was severely demented and unable to perform many of the tasks. Executive dysfunction, particularly disinhibition.	
90	McCrorry, Turner, Murray (2004) Punch drunk jockey?	Jockey	48	15 (18yrs prof)	20 (200–250 rides a year)	P	Number: Approx. 10-12 Severity: 10–12 hospitalisations; Cantu grade 1 or Severity: 2. 16yrs 1 LOC approx. 24hrs; In 1988, 2-3hrs LOC.	Age and Onset: Three year history of progressive short-term memory loss. Clinical Features: Developed progressive short-term memory loss about 10 years after retirement. MR brain scan shows cerebral atrophy. Cognitive Features: Progressive short term memory loss; slowed reaction times and processing speed.	No
91	King et al (2010) Case 35	Boxing	76	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Diagnosis of dementia Cognitive Features: Not conducted	Yes
92	King et al (2010) Case 36	Boxing	62	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Diagnosis of dementia Cognitive Features: Not conducted	Yes
93	King et al (2010) Case 37	Boxing	69	NR	'several years'	Unkn wn; A or P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: Diagnosis of dementia Cognitive Features: Not conducted	Yes
94	Hazrati et al (2013) Case 1	Canadian Football League	86	5 in the CFL	"Played football from a young age"	P	Number: "multiple" Severity: Unknown	Age and Onset: 70 yrs; memory impairment, apathy, decreased concentration, getting lost, language deficits. Clinical Features: Apathy in early 70s, eating habits changed, restless sleeper, increased irritability and agitation, wheel chair bound at 86 yrs. Family history of AD (brother) and dementia in paternal aunt and grandfather. Cognitive Features: Word finding difficulties and semantic paraphasias, by 85 yrs progressed to a significant expressive aphasia.	Yes
95	Hazrati et al (2013) Case 2	Canadian Football League ice hockey & rugby	61	12 in the CFL	"Played football, hockey and rugby from a young age"	P	Number: "multiple" Severity: Unknown	Age and Onset: 56 yrs; emotional lability and slurred speech Clinical Features: Diagnosis of bulbar ALS. From initial onset progression over next few years to loss of speech and ability to swallow, requiring a feeding tube at 59 yrs and a tracheotomy at 61 yrs. Cognitive Features: mild decline at age 61 yrs, otherwise relatively well preserved.	Yes
96	Hazrati et al (2013) Case 3	Canadian Football League	79	12 in the CFL	NR	P	Number: "multiple" Severity: Unknown	Age and Onset: 50 yrs; flat affect and depressed mood, STM deficits and subtle gait changes Clinical Features: Diagnosed with PD in his 70s. At 62 yrs, subtle changes in gait, he walked more slowly and less steadily. He had major depressive episode that year and underwent ECT. Developed a tremor, rigidity, a Parkinsonian gait, REM sleep behaviour disorder, and lost his sense of olfaction. Apathy and reduced empathy. In his 70s developed hallucinations, episodes of agitation, and aggression. Family history of PD (sister) and both parents suffered from depression. Cognitive Features: STM impairment aged 55 years, in his 60s executive impairment and could no longer manage his business. In his 70s became disinhibited.	Yes
97	Hazrati et al (2013) Case 4	Canadian Football League	67	6 in the CFL	Played HS football	P	Number: "multiple" Severity: Unknown	Age and Onset: 55 yrs; STM difficulties and less able to formulate arguments, apathetic, and depressed Clinical Features: CoD: lung cancer. He developed apathy, agitation, and became depressed. He became a ward of the state following bankruptcy at 66 yrs. He had paranoid delusions. Family history of vascular dementia (paternal grandfather). Cognitive Features: Following initial onset of symptoms he subsequently developed visuospatial impairments and became lost in familiar environments. His loss of judgement reportedly led to bankruptcy at the age of 66 yrs. He developed language deficits and exhibited word substitution,	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
98	Hazrati et al (2013) Case 5	Canadian Football League	74	6 in the CFL	NR	P	Number: "multiple" Severity: Unknown	and was incoherent at times. Age and Onset: 62 yrs; angry, irritable, poor judgement, and memory deficits Clinical Features: He experienced episodes of hallucinations of strangers in his home and misidentification of others and himself; e.g. he attacked mirrors. He developed delusions that people were stealing from him and had episodes of aggression and agitation and impaired motor function. Family history of late-onset AD (mother) and late-onset 'dementia' (father). Cognitive Features: In the years following onset of symptoms, his memory worsened and he began to get lost.	Yes
99	Hazrati et al (2013) Case 6	Canadian Football League	63	7 in the CFL	Began playing football in HS	P	Number: "multiple" Severity: Unknown	Age and Onset: 48 yrs; withdrawn, anxious, insecure, and lethargic. Motor slowing Clinical Features: At age 50 yrs, he noted his handwriting had become messier, and also complained of some cramping and numbness in his feet and decreased ability to play baseball. His movements progressively slowed. He became obsessed with bladder incontinence, attending the bathroom multiple times a day, yet appeared incongruously unperturbed when accidents did happen. By 55 yrs he had repeated episodes of bladder incontinence. He had vivid dreams he was convinced were real. He became less attentive to hygiene. He had delusions and hallucinations, which ceased with discontinuation of Sinemet. He eventually had episodes of agitation and developed great difficulty ambulating. Cognitive Features: At 50 yrs he began to exhibit memory deficits, which became progressively worse over subsequent years. After a few years his speech became slurred and hypophonic. Concerns regarding his judgement became apparent at 54 yrs, manifest in his poor business decisions. His judgement continued to deteriorate. At 58 yrs he had prosopagnosia. At that time he also displayed difficulty recalling names of his children.	Yes
100	McKee et al (2012) Case 36	AF – HS, HS basketball	10-19	NR	NR	High School	Number: NR Severity: NR	Age and Onset: 17yrs; headaches Clinical Features: CoD: second impact syndrome. Moderate headache. Mild attention deficits. Cognitive Features: Not conducted - retrospective information only.	Yes
101	McKee et al (2012) Case 37	AF – HS, rugby	10-19	NR	NR	High School	Number: NR Severity: NR	Age and Onset: 18yrs; headaches Clinical Features: CoD: cerebral oedema. Moderate headache. Cognitive Features: Not conducted - retrospective information only.	Yes
102	McKee et al (2012) Case 38	IED/explosives, AF – HS, Vet	20-29	NR	NR	High School	Number: NR Severity: NR	Age and Onset: 20yrs; headaches Clinical Features: CoD: ICH. Moderate headache, depression, explosivity and aggression. Mild apathy; diagnosed with PTSD. Cognitive Features: Retrospective information only; moderate attention deficits and mild memory deficits.	Yes
103	McKee et al (2012) Case 39	NFL	20-29	NR	NR	P	Number: NR Severity: NR	Age and Onset: 26yrs; attention deficits, STM, language deficits Clinical Features: CoD: suicide. Mild depression and impulsivity and moderate suicidality, diagnosed with PTSD. Cognitive Features: Retrospective information only; mild executive dysfunction and language difficulties; moderate attention and memory deficits.	Yes
104	McKee et al (2012) Case 40	AF – HS, Vet	20-29	NR	NR	High School	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: suicide. Cognitive Features: Not conducted - retrospective information only.	Yes
105	McKee et al (2012) Case 41	NFL	30-39	NR	NR	P	Number: NR Severity: NR	Age and Onset: 30yrs; headaches, STM Clinical Features: CoD: cardiac. Mild aggression; moderate headache, depression and explosivity. Cognitive Features: Retrospective information only; mild executive dysfunction, attention and memory deficits.	Yes
106	McKee et al (2012) Case 42	NFL	50-59	NR	NR	P	Number: NR Severity: NR	Age and Onset: N/A Clinical Features: CoD: malignancy. Mother had AD. Cognitive Features: Not conducted - retrospective information only.	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
107	McKee et al (2012) Case 43	AF – college	20-29	NR	NR	College	Number: NR Severity: NR	Age and Onset: N/A Clinical Features: CoD: suicide. Moderate suicidality. Cognitive Features: Retrospective information only; mild impulsivity.	Yes
108	McKee et al (2012) Case 44	Wrestling	20-29	NR	NR	P	Number: NR Severity: NR	Age and Onset: 26yrs: headache, STM Clinical Features: CoD: OD. Moderate headache, depression, explosivity, aggression. Cognitive Features: Retrospective information only; mild memory deficits; moderate attention deficits.	Yes
109	McKee et al (2012) Case 46	AF – college, HS wrestling	30-39	NR	NR	High School / college	Number: NR Severity: NR	Age and Onset: 30yrs: MND Clinical Features: CoD: respiratory failure. Moderate depression, explosivity, aggression, mild apathy and suicidality. Neuropathological diagnosis of CTE-MND. Gait and speech disturbance associated with MND. Cognitive Features: Retrospective information only; mild impulsivity, attention and memory deficits and executive dysfunction.	Yes
110	McKee et al (2012) Case 47	IED, AF-HS, prison guard, Vet	30-39	NR	NR	High School	Number: NR Severity: NR	Age and Onset: 31yrs: STM, depression, PTSD Clinical Features: CoD: OD. Moderate depression. Moderate suicidality and apathy; diagnosed with PTSD. Cognitive Features: Retrospective information only; mild executive dysfunction, language deficits and impulsivity; moderate attention and memory deficits.	Yes
111	McKee et al (2012) Case 48	AF – college	40-49	NR	NR	College	Number: NR Severity: NR	Age and Onset: 40yrs: MND Clinical Features: CoD: respiratory failure. Mild headache; moderate depression and explosivity, gait and speech difficulties associated with MND. Neuropathological diagnosis of CTE-MND. Cognitive Features: Retrospective information only; impulsivity, mild attention and memory deficits.	Yes
112	McKee et al (2012) Case 49	IED, MVA, Vet	40-49	NR	NR	N/A	Number: NR Severity: NR	Age and Onset: 42yrs: headache, depression, attention deficits Clinical Features: CoD: cerebral aneurysm. Moderate headache and depression. Cognitive Features: Retrospective information only; moderate attention deficit..	Yes
113	McKee et al (2012) Case 51	NFL	40-49	NR	NR	P	Number: NR Severity: NR	Age and Onset: 46yrs: headache Clinical Features: CoD: cardiac. Mild depression; moderate headache. Cognitive Features: Not conducted - retrospective information only.	Yes
114	McKee et al (2012) Case 52	AF – HS	40-49	NR	NR	High School	Number: NR Severity: NR	Age and Onset: 47yrs: STM, attention deficits, executive dysfunction, depression Clinical Features: CoD: suicide. Mild explosivity and aggression; moderate depression and suicidality. Father possible AD, bipolar disease. Cognitive Features: Retrospective information only; mild language deficits; moderate attention and memory deficits and executive dysfunction.	Yes
115	McKee et al (2012) Case 53	NFL	40-49	NR	NR	P	Number: NR Severity: NR	Age and Onset: 48yrs: MND Clinical Features: CoD: respiratory failure. Mild explosivity and aggression; moderate depression. Gait and speech difficulties associated with MND. Father possibly undiagnosed dementia. Neuropathological diagnosis of CTE-MND. Cognitive Features: Not conducted - retrospective information only.	Yes
116	McKee et al (2012) Case 54	AF – college	50-59	NR	NR	College	Number: NR Severity: NR	Age and Onset: 52yrs: headaches, STM Clinical Features: CoD: malignancy. Moderate headache, depression, impulsivity, explosivity and aggression. Cognitive Features: Retrospective information only; mild attention, memory, language and visuospatial deficits, mild apathy; moderate executive dysfunction.	Yes
117	McKee et al (2012) Case 56	NFL, Vet	80-89	NR	NR	P	Number: NR Severity: NR	Age and Onset: N/A CoD: cardiac. Mild explosivity. Cognitive Features: Not conducted - retrospective information only.	Yes



Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Number of Concussion(s) & Concussion Severity	Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play				
118	McKee et al (2012) Case 57	NFL	30-39	NR	NR	P	Number: NR Severity: NR	Age and Onset: 34yrs: headache, mood swings, paranoia Clinical Features: CoD: suicide. Mild depression and explosivity; moderate headache, aggression, paranoia and suicidality. Cognitive Features: Retrospective information only; mild attention, memory and language deficits, impulsivity and apathy; moderate executive dysfunction.	Yes	
119	McKee et al (2012) Case 58	Boxing	40-49	NR	NR	P	Number: NR Severity: NR	Age and Onset: 37yrs: headache, psychosis, STM Clinical Features: CoD: suicide. Moderate headache, depression, explosivity and aggression, paranoia and suicidality. Cognitive Features: Retrospective information only; moderate impulsivity, mild dementia, gait disturbance and dysarthric speech; moderate attention, memory, language and visuospatial deficits, moderate executive dysfunction.	Yes	
120	McKee et al (2012) Case 59	HS - basketball, AF – college, A boxing, Vet	40-49	NR	NR	High School / College	Number: NR Severity: NR	Age and Onset: 27yrs: MDN Clinical Features: CoD: respiratory failure. Mild depression. Gait and speech difficulties associated with MND. Neuropathological diagnosis of CTE-MND. Cognitive Features: Retrospective information only; moderate attention deficits.	Yes	
121	McKee et al (2012) Case 63	NFL	50-59	NR	NR	P	Number: NR Severity: NR	Age and Onset: 45yrs: headache, explosivity Clinical Features: CoD: suicide. Mild impulsivity; moderate headache, depression, explosivity and aggression. Suicidality. Father had AD. Cognitive Features: Retrospective information only; Mild dementia with mild language and visuospatial deficits, mild apathy; moderate attention, memory deficits and executive dysfunction.	Yes	
122	McKee et al (2012) Case 64	NFL	50-59	NR	NR	P	Number: NR Severity: NR	Age and Onset: 53yrs: STM, attention deficits, executive dysfunction Clinical Features: CoD: cardiac. Mild headache and depression; moderate explosivity. Cognitive Features: Retrospective information only; mild dementia with mild attention, memory language, visuospatial deficits and mild executive dysfunction..	Yes	
123	McKee et al (2012) Case 65	Self-injury	50-59	NR	NR	N/A	Number: NR Severity: NR	Age and Onset: Not reported Clinical Features: CoD: respiratory failure. Cognitive Features: Not conducted - retrospective information only.	Yes	
124	McKee et al (2012) Case 66	NFL	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: 56yrs: STM, apathy Clinical Features: CoD: respiratory failure. Moderate explosivity and aggression. Gait and speech difficulties associated with MND. Neuropathological diagnosis of CTE-MND. Cognitive Features: Retrospective information only; Mild dementia with mild memory and visuospatial deficits; moderate attention deficits, executive dysfunction and apathy.	Yes	
125	McKee et al (2012) Case 67	NFL	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: 63yrs: STM, executive dysfunction, attention deficits Clinical Features: CoD: OD. Mild depression. Brother mental illness. Cognitive Features: Retrospective information only; mild dementia, with moderate attention, memory, visuospatial deficits and executive dysfunction..	Yes	
126	McKee et al (2012) Case 68	NFL	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: N/A Clinical Features: CoD: cardiac. Mild depression, explosivity and aggression. Cognitive Features: Retrospective information only; mild visuospatial deficits..	Yes	
127	McKee et al (2012) Case 69	NFL	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: 52yrs: headaches, STM, depression, impulsivity Clinical Features: CoD: respiratory failure. Moderate headache, depression and impulsivity. Gait and speech difficulties associated with MND. Neuropathological diagnosis of CTE-MND. Father had depression. Cognitive Features: Retrospective information only; mild dementia with mild attention, language and visuospatial deficits, mild executive dysfunction; moderate memory deficits.	Yes	
128	McKee et al (2012) Case 70	TBI, PT epilepsy, Vet	70-79	NR	NR	N/A	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: pneumonia. Cognitive Features: Not conducted - retrospective information only.	Yes	

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
129	McKee et al (2012) Case 71	MVA, altercation, Vet	70-79	NR	NR	N/A	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: pneumonia. Cognitive Features: Not conducted - retrospective information only.	Yes
130	McKee et al (2012) Case 72	Boxing	50-59	NR	NR	P	Number: NR Severity: NR	Age and Onset: 42yrs: aggression, depression, paranoia Clinical Features: CoD: respiratory failure. Mild explosivity; moderate depression and aggression. Mild language deficit, apathy, gait disturbance and dysarthric speech; and moderate paranoia. Cognitive Features: Retrospective information only; moderate dementia with moderate attention, memory and visuospatial deficits, moderate executive dysfunction.	Yes
131	McKee et al (2012) Case 73	Boxing	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: 46yrs: executive dysfunction, impulsivity, paranoia, aggression Clinical Features: CoD: respiratory failure. Moderate depression, impulsivity, explosivity and aggression. Moderate paranoia and suicidality; and gait and speech difficulties associated with MND. Neuropathological diagnosis of CTE-MND. Cognitive Features: Retrospective information only; moderate dementia with moderate attention, memory, and language deficits, moderate executive dysfunction.	Yes
132	McKee et al (2012) Case 74	Boxing	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: 64yrs: STM, executive dysfunction, paranoia Clinical Features: CoD: cardiac. Moderate impulsivity, explosivity and aggression. Mild Parkinsonian signs; paranoia; and gait and speech disturbance associated with MND. Neuropathological diagnosis of CTE-MND. Sibling had ALS. Cognitive Features: Retrospective information only; mild language deficits, moderate dementia with moderate attention, memory and visuospatial deficits, moderate executive dysfunction.	Yes
133	McKee et al (2012) Case 76	NFL	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: 35yrs: paranoia, impulsivity, bizarre behaviour Clinical Features: CoD: malignancy. Moderate depression, impulsivity, explosivity and aggression, and paranoia. Cognitive Features: Retrospective information only; mild attention deficits; moderate dementia with moderate memory deficits, executive dysfunction.	Yes
134	McKee et al (2012) Case 77	NFL	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: 58yrs: depression, aggression Clinical Features: CoD: cardiac. Moderate depression, impulsivity, explosivity and aggression. Mild gait disturbance and suicidality; Mother had bipolar disease. Cognitive Features: Retrospective information only; moderate dementia with moderate attention and memory deficits, moderate executive dysfunction; severe apathy.	Yes
135	McKee et al (2012) Case 78	NFL, Vet	80-89	NR	NR	P	Number: NR Severity: NR	Age and Onset: 60yrs: STM, executive dysfunction, bizarre behaviour Clinical Features: CoD: respiratory failure. Mild Parkinsonian signs. Cognitive Features: Retrospective information only; moderate dementia with moderate attention, memory, language and visuospatial deficits, executive dysfunction, and gait disturbance and dysarthric speech; severe apathy.	Yes
136	McKee et al (2012) Case 79	Boxing, Vet	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. Cognitive Features: Not conducted - retrospective information only.	Yes
137	McKee et al (2012) Case 80	NFL, Vet	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: 76yrs: STM, executive dysfunction, language deficits Clinical Features: CoD: respiratory failure. Mild explosivity and aggression; moderate depression. Cognitive Features: Retrospective information only; Moderate dementia with moderate executive dysfunction, memory and language deficits.	Yes
138	McKee et al (2012) Case 83	NFL, Vet	80-89	NR	NR	P	Number: NR Severity: NR	Age and Onset: 65yrs: executive dysfunction, explosivity Clinical Features: CoD: FFT. Moderate explosivity and aggression. and paranoia. Cognitive Features: Retrospective information only; moderate dementia with moderate executive dysfunction, attention, memory, language and visuospatial deficits, moderate apathy.	Yes
139	McKee et al (2012) Case 84	AF, Vet	80-89	NR	NR	Semi-P	Number: NR Severity: NR	Age and Onset: 74yrs: paranoia Clinical Features: CoD: FFT. Mild explosivity and aggression; moderate headache. Mild apathy and gait disturbance, and paranoia.	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure				Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play	Number of Concussion(s) & Concussion Severity		
								Cognitive Features: Retrospective information only; moderate dementia with moderate executive dysfunction, memory, language and visuospatial deficits.	
140	McKee et al (2012) Case 85	Boxing, Vet	90-99	NR	NR	A	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FFT. Cognitive Features: Not conducted - retrospective information only.	Yes
141	McKee et al (2012) Case 86	NFL, Vet	90-99	NR	NR	P	Number: NR Severity: NR	Age and Onset: 83yrs: STM, executive dysfunction Clinical Features: CoD: FFT. Moderate dementia. Cognitive Features: Moderate executive dysfunction, attention, memory, language and visuospatial deficits.	Yes
142	McKee et al (2012) Case 87	AF – college	60-69	NR	NR	College	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. AD. Cognitive Features: Not conducted - retrospective information only.	Yes
143	McKee et al (2012) Case 88	NFL, Vet	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. AD. Cognitive Features: Not conducted - retrospective information only.	Yes
144	McKee et al (2012) Case 89	AF – college	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. AD. Cognitive Features: Not conducted - retrospective information only.	Yes
145	McKee et al (2012) Case 90	NFL, Vet	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. AD. Cognitive Features: Not conducted - retrospective information only.	Yes
146	McKee et al (2012) Case 91	NFL	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. AD, PD. Cognitive Features: Not conducted - retrospective information only.	Yes
147	McKee et al (2012) Case 92	NFL	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. AD, LBD. Cognitive Features: Not conducted - retrospective information only.	Yes
148	McKee et al (2012) Case 93	Hockey, Vet	80-89	NR	NR	A	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. AD, PD. Cognitive Features: Not conducted - retrospective information only.	Yes
149	McKee et al (2012) Case 94	College AF & rugby, Vet	60-69	NR	NR	College	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. PD. Cognitive Features: Not conducted - retrospective information only.	Yes
150	McKee et al (2012) Case 95	NFL	60-60	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: respiratory failure. LBD. Cognitive Features: Not conducted - retrospective information only.	Yes
151	McKee et al (2012) Case 96	NFL	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: cardiac. LBD. Cognitive Features: Not conducted - retrospective information only.	Yes
152	McKee et al (2012) Case 98	NFL, Vet	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: cardiac. PD. Cognitive Features: Not conducted - retrospective information only.	Yes
153	McKee et al (2012) Case 99	NFL, Vet	80-89	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: malignancy. LBD. Cognitive Features: Not conducted - retrospective information only.	Yes
154	McKee et al (2012) Case 100	NFL	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: cardiac. PD, FTLD-TDP Cognitive Features: Not conducted - retrospective information only.	Yes

Case No.	Source [Reference]	Sport / Activity	Age	Exposure			Number of Concussion(s) & Concussion Severity	Age and Symptom Onset Clinical Description / Symptoms Reported Cognitive Findings	Pathology Reported <sup>§</sup>
				Age Started	Years of Participation	Level of Play			
155	McKee et al (2012) Case 101	Canadian Football League	70-79	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: respiratory failure. PD, PSP Cognitive Features: Not conducted - retrospective information only.	Yes
156	McKee et al (2012) Case 102	NFL	60-69	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. Pick's Cognitive Features: Retrospective information only.	Yes
157	McKee et al (2012) Case 103	NFL	80-89	NR	NR	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: FTT. FTLT-DTP Cognitive Features: Not conducted - retrospective information only.	Yes
158	National Institutes of Health, Junior Seau	NFL	43	NR	NFL: 20yrs	P	Number: NR Severity: NR	Age and Onset: NR Clinical Features: CoD: GSW. Demonstrated marked personality change for months prior to his suicide, including depression and irritability. Cognitive Features: Not conducted – retrospective information only; attention problems.	Yes

Definitions: <sup>§</sup>: For further details regarding neuropathology refer to Table 2; \*: Original source not checked (not in English); HI: Head Injury; mTBI: mild traumatic brain injury; KOs: Knock Outs; P: professional; A: amateur; B: booths; SP: sparring partner; KO'd: knocked out; LOC: loss of consciousness; yrs: years; dec: decade; AF: American Football; AF - HS: High school American Football; NHL: National Hockey League; MMA: Mixed Martial Arts; CFL: Canadian Football League; Vet: military veteran; IED/explosives: improvised explosive device blast exposure; MVA: motor vehicle accident; PT: post-traumatic; NR: Not Reported; CC: cerebral cortex; SNr: Substantia Nigra; LC: Locus Coeruleus; STM: short-term memory; CTE: chronic traumatic encephalopathy; DP: dementia pugilistica; AD: Alzheimer's disease; PD: Parkinson's disease; FTLT: Frontotemporal lobar degeneration; TDP: TAR DNA-binding protein; LBD: Lewy body disease; ALS: amyotrophic lateral sclerosis; MND: motor neuron disease; PSP: progressive supranuclear palsy; ECT: electroconvulsive therapy; PTSD: post-traumatic stress disorder; PCS: Post-Concussive Syndrome; REM: rapid eye movement; CoD: Cause of death; OD: overdose; ICH: intracerebral haemorrhage; GSW: gunshot wound; FTT: failure to thrive associated with dementia; G&M: The Globe and Mail Newspaper.