Ann C. McKee, MD
William Fairfield Warren Distinguished Professor
of Neurology and Pathology
Boston University School of Medicine
amckee@bu.edu

Director of the Boston University CTE Center
Associate Director, Boston University Alzheimer's Disease Center

Director, Brain Banks
ADC, Framingham, VA-BU-CLF

Director, Neuropathology
VA Boston Healthcare System
150 S. Huntington Avenue
Boston, Massachusetts 02130
T 857-364-5707

72 East Concord Street Robinson
Complex, Suite B7800
Boston, Massachusetts 02118
Administrator: Caitlin Liddiard
Office: 617.358.5991

DEPARTMENT OF VETERANS AFFAIRS
VA Boston Healthcare System

BOSTON UNIVERSITY

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CTE CENTER NEUROPATHOLOGY REPORT

K0623
PATIENT'S NAME: Ellison, Kevin
AUTOPSY#: K-0623
DATE OF DEATH: 10/04/2018
DATE OF AUTOPSY: Unknown
DATE BRAIN RECEIVED: 1/22/2019
FROM: Los Angeles, CA
TYPE OF SPECIMEN: Fresh whole brain, dura, pituitary
Brain weight: 1374g

FINAL DIAGNOSES:

1. Chronic Traumatic Encephalopathy (CTE): Stage II

Comment: There is mild ventricular dilation and frontal lobe atrophy. There is a small cavum septum pellucidum. Multiple perivascular CTE lesions are present in the superior frontal, dorsolateral frontal, inferior temporal and inferior parietal cortices. Superficial neurofibrillary tangles (NFTs) are also found in the temporal cortices. There is mild neurofibrillary degeneration of the locus coeruleus and substantia nigra. These changes conform to Chronic Traumatic Encephalopathy (CTE), Stage II (out of a possible IV, with IV being the most severe).

McKee AC, Cantu RC, Nowinski CJ, Hedley-Whyte ET, Gavett BE, Budson AE, Santini VE, Lee H-Y, Kubilus CA, Stern RA. Chronic Traumatic Encephalopathy in Athletes: Progressive Tauopathy following Repetitive Head Injury. *J Neuropath Exp Neurol*, 2009 68(7): 709-735.

McKee AC, Stein TD, Nowinski CJ, Stern RA, Daneshvar DH, Alvarez VE, Lee H-S, Hall GF, Wojtowicz SM, Baugh CM, David O. Riley DO, Kubilus CA, Cormier KA, Jacobs MA, Martin BR, Abraham CR, Ikezu T, Reichard RR, Wolozin BL, Budson AE, Goldstein LE, Kowall NW, Cantu RC. The Spectrum of Disease in Chronic Traumatic Encephalopathy, Brain 2013, Jan; 136(Pt 1): 43-64. doi: 10.1093/brain/aws307.

McKee AC, Cairns NJ, Dickson DW, Folkerth RD, Keene CD, Litvan I, Perl DP, Stein TD, Stewart W, Vonsattel JP, Tripodis Y, Alvarez VE, Bieniek KF, Crary J, Dams-O'Connor K, Gordon W and the TBI/CTE group. The First NINDS/NIBIB Consensus Meeting to Define Neuropathological Criteria for the Diagnosis of Chronic Traumatic Encephalopathy. Acta Neuropathol. 2016 Jan; 131(1): 75-86. doi: 10.1007/s00401-015-1515-z.

Mez J, Daneshvar D, Kiernan P, Abdolmohammadi B, Alvarez V, Huber B, Alosco M, Solomon T, Nowinski C, McHale L, Cormier K, Kubilus C, Martin B, Murphy L, Baugh C, Montenigro P, Chaisson C, Tripodis Y, Kowall N, Weuve J, McClean M, Cantu R, Goldstein L, Katz D, Stern R, Stein T, **McKee A.** Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football. JAMA. 2017 Jul 25; 318(4): 360-370. doi: 10.1001/jama.2017.8334. PMID: 28742910

Montine TJ, Phelps CH, Beach TG, Bigio EH, Cairns NJ, Dickson DW, Duyckaerts C, Frosch MP, Masliah E, Mirra SS, Nelson PT, Schneider JA, Thal DR, Trojanowski JQ, Vinters HV, Hyman BT. National Institute on Aging-Alzheimer's Association guidelines for the neuropathologic assessment of Alzheimer's disease: a practical approach. *Acta Neuropathol* 2012; 123:1-11. PMC3268003

GROSS EXAMINATION

The meninges are translucent
The cranial nerves (I-XII): unremarkable
The cerebral blood vessels: unremarkable
    Atherosclerosis of cerebral vessels: none

There are no contusions.
There is no atrophy of the cerebral cortex, basal ganglia, brainstem or cerebellum

Cavum septum: 1.0 cm AP x 0.3 cm lateral x 0.8 cm DV

Ventricular size:
    Lateral ventricles: 1+ enlarged
    Third ventricle: 0-1+ enlarged
    Fourth ventricle: unremarkable
    Cerebral aqueduct: unremarkable

Parenchymal vascular lesions:
    Infarct(s) (>1.0 cm in diameter): none
    Lacunes (<1.0 cm): none
    Hemorrhages (parenchymal): none

There is no atrophy of hippocampal formation, amygdala, entorhinal cortex, striatum, hypothalamus, mammillary bodies, or thalamus.

Brainstem:
    Substantia nigra: unremarkable
    Locus coeruleus: 1+ pallor

Cerebellum: unremarkable

Other non-vascular gross CNS: none

MICROSCOPIC EXAMINATION

Available for microscopic examination are sections from representative regions listed below. A subset of slides was prepared from the paraffin embedded blocks and stained with Luxol fast blue, hematoxylin and eosin (LHE), and some of the following: AT8, Alpha-synuclein, Amyloid beta, TDP-43, PrP and APP

Key sheet to possible sections

1. Olfactory bulb
2. Midbrain at level of red nucleus
2A. Midbrain at superior cerebellar peduncle
3. Precentral, postcentral cortex (BA 4,3,2,1)
4. Inferior parietal cortex (BA 39,40)
5. Anterior cingulate (BA 24)
5A. Superior frontal (BA 8,9)
6. Inferior frontal cortex (BA 10,11,12)
7. Dorosolateral frontal (BA45, 46)
8A. Caudate, putamen, and accumbens (CAP) with septal cortex, fornix
8B. Insular cortex
9. Anterior temporal (BA 38)
10. Superior temporal (BA 20, 21,22)
11. Amygdala, with entorhinal cortex (BA 28)
12. Globus pallidus, insula, sub. Innominata
13. Anterior hippocampus
14. Hippocampal formation, lateral geniculate
15. Superior temporal posterior (BA 41,42)

16. Thalamus with subthalamic nucleus
16A Thalamus with mammillary body
17. Posterior cingulate (BA23, 31)
18. Calcarine cortex (BA 17,18)
19. Superior parietal cortex (BA 7B)
20. Upper pons (level of locus cœruleus)
20A. Lower pons at Vth cranial nerve
21. Medulla oblongata (including inferior olives)
22-1. Cervical spinal cord
22-2,3 Thoracic spinal cord
22-4, 5 Lumbar spinal cord
22-6 Sacral spinal cord
23. Cerebellar vermis
24. Cerebellum with dentate nucleus
25. Parastriate cortex

MICROSCOPIC FINDINGS

I. Leptomeninges:
Fibrosis: none

III. Cerebral Blood Vessels:
Arteriolosclerosis: mild
Amyloid angiopathy:
Leptomeninges: none
Intraparenchymal: none

IV. Cerebral cortex:
Cytoarchitecture (radial and laminar): normal
Neuronal loss: none
Spongiform change: none
NFTs: (AT8)
Rolandic: perivascular lesion at depth of sulcus
Superior frontal: perivascular lesions at depth of sulcus
Dorsolateral frontal: perivascular lesions at depth of sulcus
Inferior temporal: perivascular lesions at depth of sulcus
Inferior parietal: perivascular lesions at depth of sulcus
Temporal pole: superficial NFTs
Temporal isocortex: superficial NFTs
Calcarine: none

Aß/Bielschowsky
SPs: (diffuse): none
SPs: (neuritic): none
TDP-43: Dorsolateral frontal: none
PrP: none

Hippocampal formation: unremarkable

Entorhinal cortex: unremarkable

Cerebral white matter:
Loss of myelinated nerve fibers: mild
Arteriolosclerosis: mild
Microinfarcts: none
Perivascular macrophages: 2-3+

V. Subcortical Nuclei:
Amygdala:
NFTs: 2+

Thalamus: 1+ NFTS

VI. Brainstem

Substantia nigra, pars compacta:
- Neuronal loss: none
- Lewy bodies: none
- NFTs: 1+
- TDP-43: none

Locus coeruleus:
- NFTs: 1+

VII. Cerebellum:
Cortex: unremarkable
Dentate nucleus: unremarkable
Purkinje cells: unremarkable
White matter:
- Astrocytosis: 2+
- Myelin loss: 2+

VII: Spinal cord: unremarkable

NEUROPATHOLOGIST:

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