Boston University School of Medicine
Center for the Study of Traumatic Encephalopathy

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CENTER FOR THE STUDY OF TRAUMATIC ENCEPHALOPATHY NEUROPATHOLOGY REPORT

PATIENT'S NAME: Joseph Chernach
AUTOPSY#: VABT-13133
DATE OF DEATH: 6/7/12
DATE TISSUE RECEIVED: 9/6/12
FROM: SACRED HEART PATHOLOGY DEPARTMENT, EAU CLAIRE WISCONSIN
TYPE OF SPECIMEN: FIXED BRAIN TISSUE FRAGMENTS, blood samples

The fixed tissue samples consist of thirteen small tissue fragments, the largest sample is made up of frontal cortex, caudate, putamen and globus pallidus, and superior temporal cortex. There are also samples of hippocampus, medulla, 2 levels of pons, 2 fragments of cerebellum, upper spinal cord, 2 unidentifiable areas of neocortex and 3 other unidentifiable small fragments.

FINAL DIAGNOSES:

1. Chronic Traumatic Encephalopathy: Stage II/III

Comment: There are abundant p-tau (AT8) immunoreactive neurofibrillary tangles and neurites in the superior, dorsolateral superior, inferior frontal cortices, temporal and parietal cortices. There is a strong perivascular proclivity as well as accentuation at the depths of the sulci. NFTs are also found in the thalamus, hypothalamus, and substantia nigra and are particularly dense in the locus coeruleus. There is mid involvement of CA4 of the hippocampus and entorhinal cortex. This pattern of p-tau deposition is diagnostic of Chronic Traumatic Encephalopathy (CTE) and indicates Stage II/IV CTE with beginning involvement of the entorhinal cortex and hippocampus. These findings are particularly noteworthy given the young age of the subject.
There is no beta amyloid (Aß), alpha-synuclein or TDP-43 deposition. There are no other neurodegenerative diseases identified. There is no evidence of neoplasia or infection.

GROSS EXAMINATION
(Numerical score of severity key: 0 = none, 1+ = mild, 2+ = moderate, 3+ = severe, 4+ = very severe)

No abnormalities are noted

MICROSCOPIC EXAMINATION
Available for microscopic examination are sections from representative regions listed below. The sections have been stained with Luxol fast blue, hematoxylin and eosin (LHE), and with Bielschowsky silver.

Additional staining methods have been used as follows:
AT8: 4, 5, 5A, 10, 12, 14,16, 20, 21, 24
Alpha-synuclein: 2, 1, 21
Amyloid beta: 10,
TDP-43: 2, 14, 21
Key sheet of available sections

4. Inferior parietal cortex (BA 39,40)
5. Anterior cingulate (BA 24)
5A. Superior frontal (BA 8,9)
10. Superior temporal (BA 20, 21,22)
12. Globus pallidus, insula, sub. Innominata
14. Hippocampal formation, lateral geniculate
16. Thalamus
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
23. Cerebellar vermis
24. Cerebellum with dentate nucleus

MICROSCOPIC FINDINGS

I. Leptomeninges:
Fibrosis: 2+ thickening

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

IV. Cerebral cortex:
Cytoarchitecture (radial and laminar): normal
Neuronal loss: none
Spongiform change: slight vacuolation layer 2
NFTs: (AT8) (areas of maximum involvement)
Cingulate: 1+ NFTs
Dorsolateral frontal: 4+
Inferior parietal: 3+
Temporal isocortex: 3+
Distribution of NFTs:
Glial NFTs: 2+
White matter NFT and neurites: 1+
Perivascular collections: 4+
Patchy distribution depth of sulcus: 4+
Subpial glial NFTs: 1+
Superficial layers NFTs: 1+
Aß/Bielschowsky
SPs: (diffuse): none
SPs: (neuritic): none
TDP-43: none
Neuropil dot-like threads: 4+
Microinfarcts: none
Lewy bodies: none

Hippocampal formation:
Neuronal loss (CA1): none
NFTs@200X: count CA1: 1+
Dentate: none
CA4: 2+
CA2: 1+
SPs: none

Hippocampal sclerosis: none
Hippocampal ferruginization: none
Microinfarcts: none
TDP-43: dentate@200X: none
Lewy bodies, CA1, synuclein: none
synuclein positive neurites in CA2/3: none
Ballooned neurons, CA1: none

Entorhinal cortex:
Neuronal loss: none
Astrocytosis: none
NFTs layer 4/5 @ 200X: 3+
SPs; layer 4/5@ 100X; neuritic: none
Pick bodies: none
Lewy bodies: none
Ballooned neurons: none

Cerebral white matter:
Loss of myelinated nerve fibers: 1+
Arteriolosclerosis: none
Microinfarcts: none
Perivascular macrophages: 2-3+
Cribriform state: none

V. Subcortical Nuclei:

Substantia innominata (nuc basalis Meynert):
Neuronal loss: none
NFTs: 1+

Caudate/ Putamen: unremarkable

Globus pallidus: unremarkable

Thalamus: 1-2+ NFTs

Hypothalamus: 1+ NFTs

VI. Brainstem
Substantia nigra, pars compacta:
Neuronal loss: none
Astrocytosis: 1+
Extraneuronal pigment: 1+
Lewy bodies: none
Lewy neurites: none
Pale bodies: none
Spheroids: none
NFTs: 2+, neurites
TDP-43:
Microinfarcts:
Pars reticulata: unremarkable
Cerebral peduncle: unremarkable

Dorsal and median raphe: unremarkable

Locus coeruleus:
Neuronal loss: 1+
NFTs: 4+

Basis pontis: unremarkable

Dorsal nucleus of the vagus: unremarkable
Inferior olives: unremarkable
Pyramid: unremarkable

VII. Cerebellum:
Cortex: + p62 positive neurites
Dentate nucleus: unremarkable
    NFTs: none
Purkinje cells:
    Neuronal loss: 1+
    Spheroids: 1+
White matter:
    Astrocytosis: 1+
    Myelin loss: 1+

VII: Spinal cord:
Cervical: unremarkable

NEUROPATHOLOGIST:

Ann C. McKee, MD