How Chronic Traumatic Encephalopathy (CTE) Affects the Brain

October 8, 2013, by Evan Wexler

It’s the disease linked to brain trauma in football players – here’s how it works.

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http://www.pbs.org/wgbh/pages/frontline/league-of-denial/

In 2002, a rare disease was discovered in the brain of football legend Mike Webster:

Chronic Traumatic Encephalopathy (CTE)

Since then, researchers at Boston University have found the disease in 50 additional players, one as young as 17.

Neuropathologist Dr. Ann McKee has identified four stages of the degenerative disease.

STAGE 1

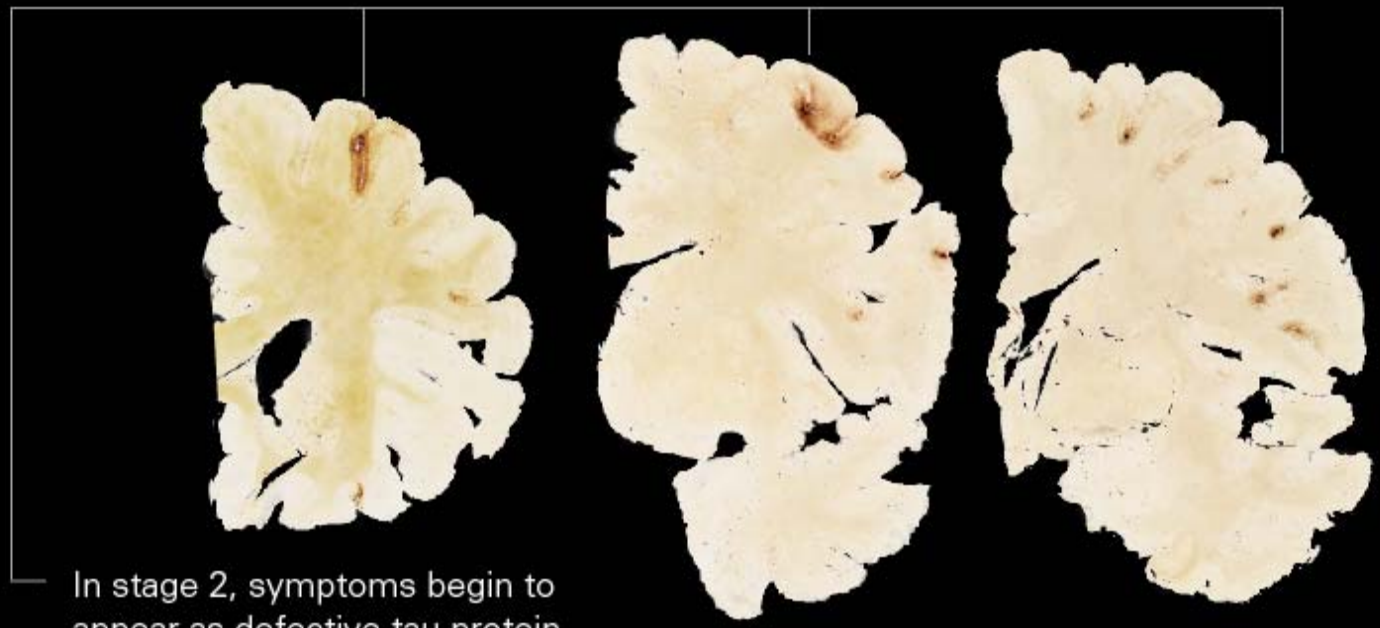
NO SYMPTOMS

In stage 1, isolated spots of tau build up mostly around the frontal lobe, or the crown of the head.

CTE causes a protein known as tau (the brown spots in this stained slide above) to form around the brain's blood vessels, interrupting normal functioning and eventually killing nerve cells.

STAGE 2

RAGE, IMPULSIVITY, DEPRESSION



In stage 2, symptoms begin to appear as defective tau protein affects more nerve cells in the brain's frontal (top) lobes.

STAGE 3

CONFUSION, MEMORY LOSS

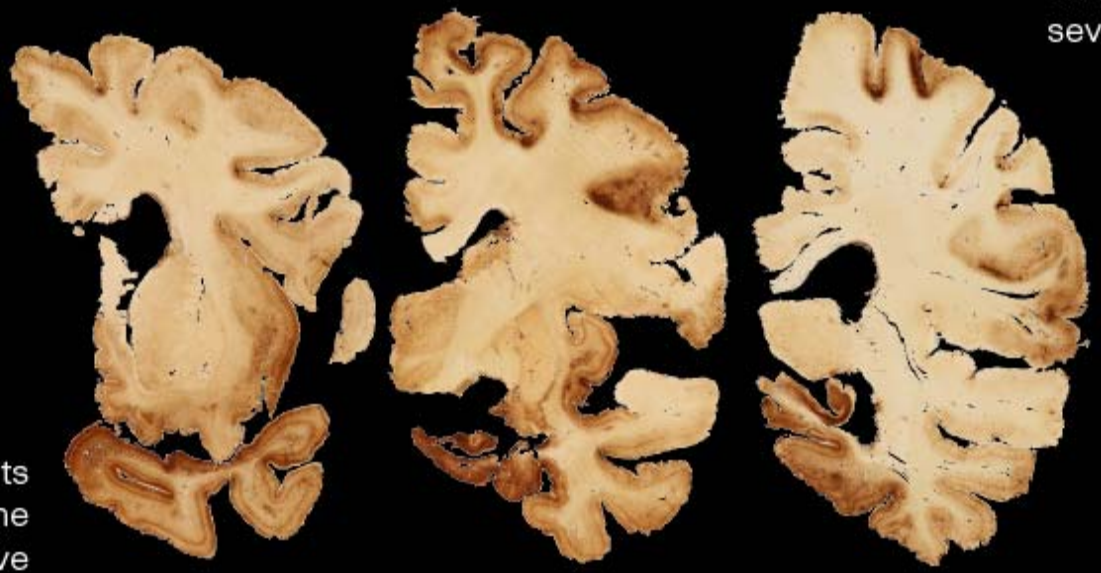
Tau deposits expand from the frontal (top) section to the temporal (side) section of the brain.

Condition begins to affect the amygdala and the hippocampus, which impairs emotion and memory.

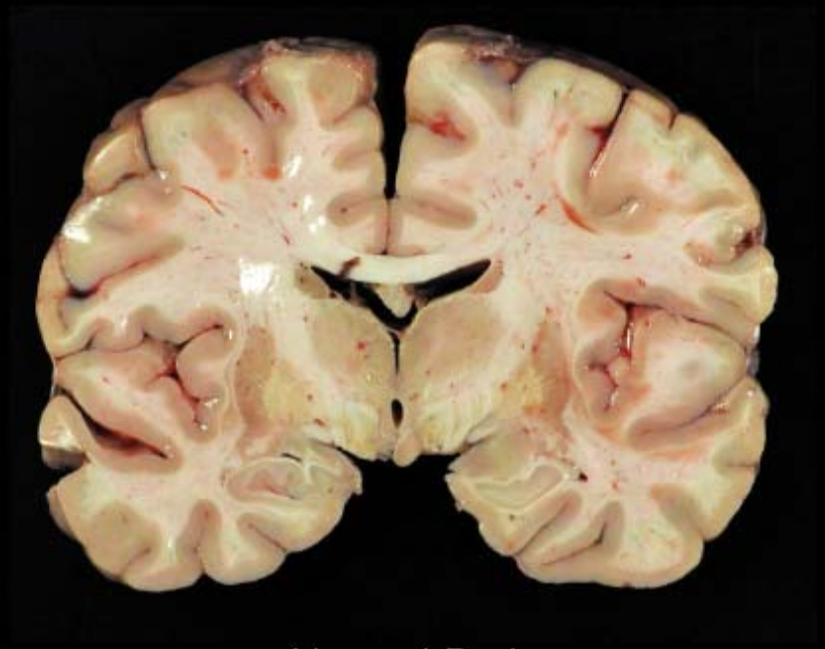
STAGE 4

ADVANCED DEMENTIA

The brain becomes deformed and brittle, and cognitive function is severely limited.



By Stage 4, tau deposits have overwhelmed the brain, killing many nerve cells and shrinking it by roughly half its size.



Normal Brain

Advanced CTE

Source: Boston University Center for the Study of Traumatic Encephalopathy