Brainstorm: Head Injuries and the NFL, Part 3: A History of Terms – Characteristics of CTE

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Though repetitive closed-head injuries are often experienced in professional contact sports, many injuries are minor, with collisions involving the head an everyday experience of the sport. Collegiate football players can sustain anywhere from 400 to more than 2,400 head impacts per season, depending upon the player — and possibly his position. The athlete usually walks it off, or is examined and benched for a period of time, lives to play another day. Eventually he joins the NFL, retires, starts endorsing products, and, except for maybe gaining a few pounds, seems to suffer few ill effects.

But is this lack of ill effects true of all sports figures? Though the exact percentage is in dispute (and the time-to-symptom onset may be quite variable), some players begin deteriorating mentally and physically after retirement — and do so in a heartbreakingly predictable fashion. They lose the ability to focus on things, suffer memory loss, become confused, have sudden outbursts of anger, start hallucinating, turn quickly violent, then just as suddenly become depressed. Some suffer uncontrollable shaking, slurred speech. They may attempt suicide. They may succeed in ending their lives. This is not a description of the effects from your garden-variety concussion. This is CTE. Maybe.

The severity of the symptoms appears to correlate with two variables: the amount of time they spent in the contact sport and the number of traumatic events they suffered while they participated. This deterioration is not normal. It is the subject of our articles.

Let’s look at the symptoms in greater detail.

CTE is understood as a series of irreversible and increasingly debilitating symptoms. A group of British researchers divided the clinical progression of CTE into three stages:

**Stage 1**
The athlete becomes increasingly mentally disoriented. He experiences affective disorders (such as anxiety or depression) and memory loss. He may display occasional psychotic symptoms.

Stage 2

The athlete's behavior becomes increasingly erratic, accompanied by escalating social instability. Loved ones report that the athlete is "no longer himself." Ruptured relationships with friends/children/marriage are common. Memory loss becomes severe. The initial symptoms of Parkinson's appear. The athlete may attempt suicide.

Stage 3

The athlete's body begins to break down. His speech becomes slurred, vision is perturbed, the athlete experiences difficulty swallowing (dysphagia) and may become deaf. Most tragically for a person who made a career out of quick and controlled actions, the athlete's movement is slowed and a shuffled gait is often observed. Tremors are, too, as is shaking, and full-blown Parkinsonism. Sporadic erratic behavior erupts into full-blown dementia.

Though CTE shares a number of features with other neurodegenerative disorders (the dementia and memory loss can look just like Alzheimer's, for example), the disease is considered to be "neuropathologically distinct." That simply means the disease is its own thing, rather than a variation on another disorder, with a discrete procession of symptoms and a predictable, if depressing, outcome. It also has a clear external origin, those blows to the head, something researchers call an "environmental etiology."

Exactly what happens when the head suffers trauma, and why this physics can lead to such a tragic behavioral outcome, is the subject of our next installment.

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