



# DEATH BY INDUSTRIAL DISEASE

**C**HRIS NOWINSKI WAS THE FIRST EVER HARVARD GRADUATE TO JOIN THE WWE.

Wrestling isn't a common destination for alumni of the prestigious college, but Nowinski took to it with aplomb. He was naturally athletic - he had played as a defensive tackle for Harvard's American football team and, at 6ft 5in, he had the physique to look the part as a wrestler. His character played on the stereotypes associated with his education - Nowinski wore briefs emblazoned with the Harvard 'H', and quoted Shakespeare to his opponents.

In 2003, an incident in the ring sparked a dramatic career change. "I was wrestling in a non-televised match in front of about 5,000 people," he recalls, when we speak to him on the phone from his Boston office. "I was supposed to get kicked in the head and I was too close to the kick and it caught me under the chin. I immediately forgot where I was, and what we were doing." He carried on, despite the concussion.

"I didn't know enough to stop, so we ended up finishing the match, making up a new ending and then I went backstage and downplayed my symptoms. Even though I had headaches and nausea for weeks, I kept on telling the medical team I was fine, because I thought I was supposed to tough my way through those sorts of symptoms." ☪

**Footballers, rugby players, wrestlers and NFL stars are risking their futures and their lives by playing through concussion. The end results can be devastating**

It's a common attitude among sportspeople, who regularly try and play on through concussion. Sometimes, they might not even be aware that they have a concussion - there's a lack of understanding about what the word actually means. It's not just getting knocked out. Seeing stars or feeling dizzy after a blow to the head are also symptoms of a concussion.

Over time, repeated concussions can cause serious problems, and scores of retired athletes in contact sports have suffered. "The headaches were pretty consistent for five years," says Nowinski of his own issues, which forced him to retire from wrestling. "The sleep disorder lasted for three-and-a-half years. I would act out my dreams, I would have dreams that I was choking to death. I had memory problems that lasted for about a year-and-a-half that were pretty tough to deal with, and the depression that comes with those symptoms."

Keen to spread the word, Nowinski wrote a book called *Head Games*, which has also been made into a documentary of the same name, exploring the dangers of sporting concussions. Now the 36-year-old heads up the Sports Legacy Institute, an organisation that seeks to raise awareness and lobbies sporting organisations to change their rules for the sake of athletes' safety. Part of his job is persuading the families of deceased NFL players to donate their relatives' brains so they can be studied for signs of damage.

Sometimes, he doesn't even have to ask.

## THE BRAIN BANK

On February 17, 2011, former NFL defensive back and two-time Super Bowl winner Dave Duerson was desperate to get a message across. The 50-year-old sent a text to his ex-wife, and also left a scrawled note at his home in Sunny Isles Beach, Florida. Both read the same: "Please, see that my brain is given to the NFL's brain bank." Then he shot himself in the heart.

The 'brain bank', or the Center for the Study of Traumatic Encephalopathy, is a research lab at Boston University where scientists examine the brains of sportspeople post-mortem to look for signs of damage related to concussion. Duerson's brain tested positive for chronic traumatic encephalopathy (CTE), a degenerative brain disease that has been implicated in the mental decline, bizarre behaviour and suicide of several athletes. The symptoms are similar to Alzheimer's disease - the damaged bits of nerve cells in the brain form abnormal proteins that then multiply and spread into other areas.

"It looks like the brain essentially starts to rot," says Nowinski. "The most advanced case of CTE we've seen was in a former NFL running back whose brain shrunk to half its original size."

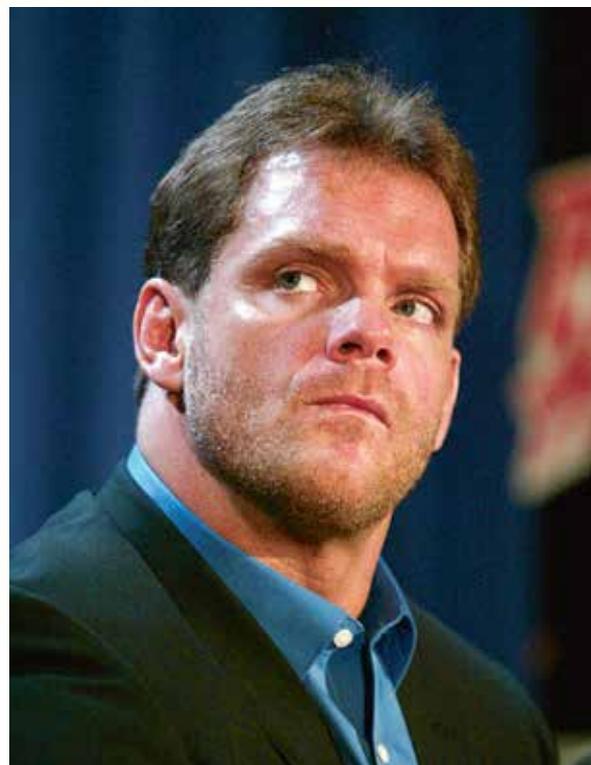
CTE was found in the brain of Justin Strzelczyk, the former Pittsburgh Steelers offensive lineman killed when he drove into a tanker truck at 90mph while driving the wrong way up the freeway during a police chase.

It was also found in wrestler Chris Benoit (below), who murdered his wife and son before taking his own life.

"Benoit's brain was so severely damaged it resembled the brain of an 85-year-old Alzheimer's patient," said one report. Nowinski writes of his former colleague in *Head Games*: "Whatever role steroids may have played in the situation, I believe he would never have become a murderer without the brain disease."

One study by the Boston brain bank looked at the brains of 34 deceased NFL players, and found evidence of CTE in 33 of them. Another study, commissioned by the NFL, found retired players over the age of 50 were five times more likely than the rest of the US population to be diagnosed with dementia, Alzheimer's disease or other memory problems, and that those

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between the ages of 30 and 49 were 19 times more likely.

The most recent research estimates that 30 per cent of NFL players will develop a neurodegenerative disease. It's also possible that concussions could help explain some active players' behaviour, too. Baltimore running back Ray Rice's suspension from the league for domestic violence is far from an isolated incident - NFL players are about four times more likely to be arrested for domestic violence than you would expect based on their overall arrest rates. Research has linked domestic violence to problems with the pre-frontal cortex, an area at the front of the brain that can easily be damaged in a concussion because it bears the brunt of head-on impacts.

## THE DEATH STAR

We've known about the link between sport and mental problems for almost a century. In 1928, the swaying and slurring of the punch-drunk boxer was investigated scientifically for the first time, and given the label 'dementia pugilistica'. The plight of Muhammad Ali (diagnosed with Parkinson's syndrome) is just one of a long line of warnings about the long-term dangers of repeated head injuries.

Despite that, Nowinski reckons as many as 80 per cent of concussions in contact sports still go undiagnosed - either because players are unaware of the symptoms, or they don't want to show weakness. However, things are better than they were, according to Welsh rugby star Jamie Roberts, who is also a trained medical doctor.

"Go back six or seven years and there was a three-week rule that was standard, but teams would never stick to it," he says. "Players get knocked out, go to the side of the pitch, have a splash of cold water on their face and go back on. It's that macho bravado side: 'I got knocked, but I'll carry on playing.'"

Roberts cites an example from his own career, where he stayed on the field for 10 minutes with a fractured skull before his symptoms worsened and he had to come off. It's a regular occurrence in football, most recently in the case of Chelsea goalkeeper Thibaut Courtois, who stayed on the field for 14 minutes after a heavy blow to the head, and who appeared to be bleeding from his ear when he eventually came off.

Staying on the pitch is a terrible idea for several reasons, the foremost of which is 'second impact syndrome'. The brain is vulnerable in the days and weeks after a concussion - damaged nerve cells teeter on the brink, like buildings after an earthquake. Another hit can lead to instant death or severe disability. Nowinski likens it to Ⓢ

“the Death Star in *Star Wars* when the deflector shield is down”.

“If you keep playing during a concussion, you’re most likely going to increase the length and the severity of symptoms,” he says. Part of the challenge is convincing players that they need to come off - a club doctor can’t do anything [to help] if the player isn’t being honest with them about their symptoms. “Concussions regularly cause problems with balance, reaction time and cognition, so what I tell athletes is that they’re usually dumber and slower when they’re on the field and they become a liability for their team,” says Nowinski.

“I think the World Cup showed that - a couple of players who played through concussion were pulled only when they made a mistake that nearly exposed the team to a goal. So the athletes should be told they should come off not only because it’s the right thing for their health, but also because it’s the right thing for the team.”

## THE BOTTOM LINE

It’s not a problem confined to the highest level - there are an estimated three million sporting concussions a year across all levels of sport, and the best way to counteract it is education.

“It’s not just the players who need to be educated,” says Roberts. “It’s coaches, parents and referees. It’s everyone outside the game who can take decisions away from players. If I got knocked out playing for my local club, I’d want to carry on playing and go back to training on Tuesday ready for next Saturday. It’s important for that decision to be taken out of players’ hands, and that’s where coaches and coach education is paramount.”

Baseline testing is one of the ways to take the onus off the players. Roberts explains: “Before any season or campaign, you do a baseline test, which includes questions about your symptoms, balance tests, memory tests, memory recall, numeracy tests, which challenge every part of cognitive function. You have to attain those baseline test scores before you go out on to the field of play.”



Jason Sada is president of Axon Sports, an American company that produces baseline tests for athletes. “It measures something you can’t see,” he says. “It’s used to determine cognitive change - the tests are measurements that shouldn’t increase and improve - when they change, it’s really because there’s an impairment. But it is just one piece of the equation.”

These tools can’t help unless they’re implemented. Change is happening - slowly. Rugby union has been fiercely criticised in the past, but has changed its rules extensively in recent years. “In the elite game, it is pretty much spot on at the moment,” says Roberts. “The concussion bin has been put in place and it’s great - players go off and they’re assessed by a doctor, assessed by a competent healthcare professional and have to attain their baseline tests.”

It took a long battle for the NFL to recognise the dangers posed by concussion, but now the league has one of the best protocols in place for dealing with them. Other sports are following suit: this season the Premier League introduced new guidelines for concussion, including a tunnel doctor, but incidents such as the Courtois one show there’s a lot still to do.

Nowinski is critical of football for its approach to head injuries: “It is probably the biggest problem in sport - you have the world’s most popular

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sport doing everything wrong on the international stage.”

Jeff Astle (above) played for West Brom and England in the 1960s and 70s, and suffered with Alzheimer’s disease before he died in 2002. His family launched the Justice for Jeff campaign, calling for an independent inquiry on the link between heading heavy leather footballs and brain disease.

“It’s terrible to think what he went through,” said Astle’s widow Laraine when it was confirmed her husband’s disease had been caused by football. “The job he loved in the end killed him. Everything he won, he remembered none of it.” The dry language of the coroner’s report boiled down Astle’s career of crashing headers into four words: “death by industrial disease”.

Like any industry, sport has a responsibility to look after its own. ●

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## GAME-CHANGERS New research and initiatives are fighting against the scourge of sporting concussions

### Living test

CTE can currently be identified only by staining slices of the brain post-mortem. Scientists are working on tests that inject a living patient with a tracer that attaches to the abnormal protein in the brain and can be seen with a scanner.

### Safer soccer

Chris Nowinski’s Sports Legacy Institute is campaigning to ban heading from youth football below high school level. “At least 30 per cent of concussions are caused by attempting to head the ball,” he says.

### Reverse it

A compound found in red wine called resveratrol could potentially undo some of the damage caused by concussions. Tests are ongoing, but it could work by decreasing inflammation within the brain.

### Head tracking

Sensors on helmets can help scientists get a better idea of the forces involved, and why some types of impact tend to cause concussions more than others. Twisting and rotational forces are thought to be worse.