

What's wrong with football? It's written in the pain on Greg Hadley's face. The senior from Colgate University, a two-time all-conference linebacker on the school's football team, is sitting in a Bedford, Mass., laboratory, staring at shattered brains of dead football players. On this Friday afternoon, Hadley has come to visit Dr. Ann McKee, a Boston University neurological researcher who has received a dozen brains donated from former NFL, college and high school players. In each one, it's simple to spot a protein called tau, which defines a debilitating disease known as chronic traumatic encephalopathy, or CTE. Common symptoms of CTE include sudden memory loss, paranoia and depression during middle age. The disease is also known as dementia pugilistica, or punch-drunk syndrome, because until recently the overwhelming majority of its victims were boxers. Not anymore. Researchers like McKee have found a deep and disturbing association between CTE and America's most popular sport.

### (Watch a video of what football can do to the brain.)

Hadley wants to see, in raw, microscopic detail, what could await him. All CTE victims have had some kind of head trauma, and Hadley has received four concussion diagnoses during his college days. As they examine images under a microscope, McKee tells Hadley that the brown splotches represent the dreaded tau buildup in the brain. The brains are as brown as the pigskin itself.

Hadley lets out a quiet "Jesus" and sinks in his chair. His girlfriend stares at him, looking as if her cat just died. "I had no idea it was all over the place like that," Hadley says. He glances at a picture of a normal brain next to the stained brain of a deceased player. "You look at something like that and think, "This is your brain, and this is your brain on football."

On Feb. 7, some 90 million people will watch the Indianapolis Colts play the New Orleans Saints in Super Bowl XLIV in Miami. Perhaps the Roman numerals are appropriate. Although football hasn't quite reached the bloodlust status achieved at the ancient Coliseum, the path to Super Bowl XLIV is strewn with the broken bodies and damaged brains that result when highly motivated, superbly conditioned athletes collide violently in pursuit of glory. The more we learn about the human cost of this quintessentially American sport, the more questions are being raised regarding the people who run it and play it. More than 3 million kids play football at the youth level, and an additional 1.2 million suit up for their high school teams. So football's safety issues reverberate far beyond the NFL. From within the NFL, and without, a consensus is emerging that reforms are needed to keep football from becoming too dangerous for its own good.

Baseball is America's pastime, but football is its true passion. The Friday-night lights bond towns across the heartland; on Saturdays, fans forget their worries to worship at the altar of the campus tailgate, smoke rising above grills like incense. On Sundays, we park our posteriors on the sofa to cheer the sublime spirals, miraculous catches and riveting runs down the sideline. It is one of our most lucrative forms of mass entertainment, celebrated not just on ESPN but in prime-time soap operas (*Friday Night Lights*) and Hollywood blockbusters (*The Blind Side*). The NFL's players and owners and the myriad industries associated with the game — fanzines, websites, merchandisers, fantasy leagues — have all been beneficiaries of the tens of billions of dollars the sport generates. But it is irrefutable that

those profits have come at the expense of the long-term mental health of those who play football. And perhaps more important, the young people emulating the actions of their NFL heroes are putting their futures on the line as well. "We need to do something now, this minute," says McKee, the brain researcher. "Too many kids are at risk."

**Concussive Dangers:** Football has been a rough sport since the leather-helmet days, but today's version raises the violence to an art form. No other contact sport gives rise to as many serious brain injuries as football does. High school football players alone suffer 43,000 to 67,000 concussions per year, though the true incidence is likely much higher, as more than 50% of concussed athletes are suspected of failing to report their symptoms.

The human brain, although encased by a heavy-duty cranium, isn't designed for football. Helmets do a nice job of protecting the exterior of the head and preventing deadly skull fractures. But concussions occur within the cranium, when the brain bangs against the skull. When helmets clash, the head decelerates instantly, yet the brain can lurch forward, like a driver who jams the brakes on. The bruising and stretching of tissue can result in something as minimal as "seeing stars" and a momentary separation from consciousness.

Repeated blows to the head, which are routine in football, can have lifelong repercussions. A study commissioned by the NFL found that ex-pro players over age 50 were five times as likely as the national population to receive a memory-related-disease diagnosis. Players 30 to 49 were 19 times as likely to be debilitated. Of the dozen brains of CTE victims McKee has examined, 10 were from either linemen or linebackers; some scientists now fear that the thousands of lower-impact, or "subconcussive," blows these players receive, even if they don't result in documented concussions, can be just as damaging as — if not more so than — the dramatic head injuries that tend to receive more attention and intensive treatment.



Kyle Turley, 34 Offensive lineman  
Peter Hapak for TIME

There is every reason to believe that the concussion crisis will get worse. The speed and size of pro athletes have made the game more dangerous. Offensive linemen now average nearly 315 lb. — 65 lb. more than they did 40 years ago. They launch that weight from a three-point stance, headfirst, at opposing linemen of nearly the same size. There are no small collisions in the NFL.

The average pro career is short but lucrative (average annual pay: \$1.1 million). Because there are just 53 jobs on an active NFL roster, however, holding on to one of them requires not only supreme athleticism but also the ability to play in pain, whether it's a twisted knee, a broken finger or a bruised brain. Coaches and fans, of course, laud hard hitters. "Guys don't think about life down the road," says

Harry Carson, a Hall of Fame ex-linebacker who has postconcussion symptoms like headaches. "They want the car. They want the bling. They want to have a nice life."

**The Players' Crusade:** Carson is one of a growing number of former pros who have begun to petition the NFL for help in dealing with their deteriorating health and finances. Carson and Kyle Turley, a former NFL offensive lineman who has had post-concussive symptoms like vomiting, vertigo and headaches, have emerged as advocates for improved health care benefits for retired players. Dwight Harrison, an NFL player for 10 years who retired in 1980, symbolizes football's blight. His postconcussion syndrome has robbed him of short-term memory and left him severely depressed. He lives in a trailer in Texas. Though some former players have been making their cases for years, the NFL has until recently downplayed any link between football head trauma and cognitive decline. In 2009, after a study sponsored by the league showed evidence that retired players had long-term mental trauma, and after more damaged players came forward, Congress stepped in. At one hearing, Representative Linda Sanchez, a Democrat from California, compared the NFL's stance on concussions to tobacco companies' denial that smoking causes lung cancer. Others have taken up the players' cause, like Gay Culverhouse, the terminally ill former president of the Tampa Bay Buccaneers, who has established an outreach program for those needing assistance.

The NFL has finally acknowledged the potential long-term consequences of concussions and taken first steps toward addressing the problem. Now an NFL player who sustains a concussion cannot return to the game that day. Since 2007 the NFL and its players' union have spent some \$7 million on health care expenses for retirees with dementia or Alzheimer's.

Help is already too late for Tom McHale, one of the CTE victims Hadley examined in McKee's lab. A nine-year NFL vet who became an ebullient restaurateur after he retired in 1995, McHale suddenly lost interest in his work — and life — about four years ago. He couldn't focus, fought addictions to painkillers and cocaine, and died of a drug overdose at a friend's apartment in 2008. McHale was 45. "He went in, lay down and didn't wake up," says his widow Lisa, a mother of three sons, ages 15, 12 and 10. "God, if you would have known him ... The fact that he won't be around to raise his boys — that's the hardest thing."

**How to Fix Football:** Restoring safety and sanity to the gridiron can't simply be left to the NFL's overlords. The pressures on players to perform may be too great, and the financial stakes too high, to expect the league's teams to back dramatic changes. Should others step in? High-level government intervention to quell violence in football would not be without precedent. A story in the Oct. 10, 1905, New York Times reads, "Having ended the war in the Far East, grappled with the railroad rate question and made his position clear, [and] prepared for his tour of the South ... President [Theodore] Roosevelt to-day took up another question of vital interest to the American people. He started a campaign for reform in football." T.R. used his bully pulpit to summon coaches from Harvard, Princeton and Yale to the White House for a little pigskin summit, imploring them to cut down on violent play among the blue bloods.

Can the government intervene now? President Obama has in the past expressed support for a playoff system in college football — a goal whose gravity and significance pale in comparison with the goal of reducing the number of brain injuries occurring at all levels of football. Congress has rarely hesitated to assert its right to police professional sports, from pressuring baseball to enforce tougher steroid penalties to threatening to end the NFL's antitrust exemption.

Hearings that shed further light on football's concussion crisis would be a more productive use of the power of the congressional subpoena.

Beyond pols and pros, school boards and colleges, with an eye on legal liabilities, certainly have an interest in making play safer. Parents, and of course players themselves, play a crucial role. The reform movement is desperately needed at the lowest levels of the game, where amateur coaches can cause the most harm to their young players. It should also target the very ways in which football is covered and consumed. Spectators who fetishize the sights and sounds of high-speed collisions share responsibility for those who suffer the consequences of such violent encounters.

Woodrow Wilson once said that football "develops more moral qualities than any other game of athletics." The game has always been a laboratory for traits like teamwork, discipline and perseverance. If it is to remain a metaphor for American exceptionalism, however, we can't let it leave so many victims in its wake. Here's a game plan to lessen the pain:

1. Change the rules. The NFL's competition committee seems ready to move on player-safety fixes. "You start with the premise that nothing is off the table," says Atlanta Falcons president Rich McKay, a co-chairman of the committee. This is crucial, as NFL changes will not only protect athletes who suit up on Sunday; they will also trickle down to football's lower levels, reducing injury risk for all.

So go ahead and ditch the three-point stance for linemen, except perhaps for very-short-yardage situations. "You wouldn't be firing out, I guess," says New York Jets guard Alan Faneca, initially skeptical when asked his thoughts about this change. "I'd buy that." Starting linemen upright in a "two-point" stance — two feet, no hands on the ground — would result in more blocking with the arms and hands.

The goal is to prohibit head games. "The No. 1 thing: take the purposeful helmet hit out of football, for both blocking and tackling," says Dr. Robert Cantu, one of the country's premier concussion experts and a co-founder of Sports Legacy Institute. That goes for running backs as well. Too often, they make a conscious decision to lower their head into a defender, hoping the forward lean will give them an extra yard. That defender's natural reaction? Go head-on as well. What if running backs weren't allowed to intentionally lead headfirst? The NFL is at least considering such a rule. "What concerns me is the runners," says McKay. "A lot of those hits are voluntary, where a player ducks his head and is in a position to deliver a blow ... that's something we have to look at. Because you see it more today than you did 20 years ago."

Hall of Fame coach and legendary broadcaster John Madden, whom NFL commissioner Roger Goodell appointed to help solve the concussion problem, has spent his first year out of the booth developing smart reforms. He points out that today's players wear less padding than they did in the past, either to increase their speed or for fashion appeal. "So the helmet becomes the only protected part of your body," he argues. Madden suggests that if players were required to wear more padding, they'd be less likely to consider their helmet a safe weapon.

It's time to think even more radically. How about removing an offensive lineman from the equation? Linemen are more likely to butt heads on every play, so simple math dictates that this move would reduce overall head trauma. Why not penalize egregious head hits with not only a 15-yard penalty for the guilty player but a stint on the

sideline too? Let's give football a penalty box.

2. Change the equipment and training. When people start discussing fixes for football, the talk inevitably begins with helmets: Is there a design that is more likely to prevent concussions? There have been some impressive innovations. The Riddell Revolution Speed embeds sensors that can record the impact of collisions. Another company, Xenith, markets a model with shock absorbers within the helmet. These devices, shaped like hockey pucks, are supposed to soften the impact of blows to the head. The company said it surveyed 540 players using the helmet and found reports of only three concussions.

But even Vin Ferrara, the former Harvard quarterback who founded Xenith in 2004, warns against putting too much faith in helmet technology. "You will never hear me say that protection is more than half the battle," he says. "The most effective thing is not getting hit in the first place."

On that point, football players could probably benefit from fewer full-contact practices. "There's so many damn drills," says Cantu. "You don't need all this one-on-one, helmet-on-helmet macho stuff." The NFL can easily take the lead on this commonsense solution. Right now, contact continues year-round at assorted training camps. "We're looking at off-season programs that are probably too long," says Madden. At some point, the cost of constant blows to the head far outweighs any competitive benefit.

3. Change youth football. Chris Nowinski is a former Harvard defensive tackle whose pro-wrestling career — he didn't want to sit in a cubicle — was derailed by concussions. He has since emerged as one of the country's most prominent advocates for football reform and has written a book, *Head Games: Football's Concussion Crisis*. To illustrate his points, he pulls up a YouTube clip titled "Big Football Hit — Helmet to Helmet." In a drill supervised by the coaches, two 8-year-olds charge toward each other, heads down, as a woman yells, "Go! Go!" The tiny helmets collide — pop! After one kid gets knocked back to the ground, you can hear his whimpers. "Who the hell is teaching this?" asks Nowinski.

Far too many of us, it turns out. To improve player safety, all youth coaches should be trained in a concussion-management program approved by the Centers for Disease Control and Prevention and be certified before strapping a whistle around their neck. Make coaches carry a concussion card that shows they're aware of the risks and aren't idiotic enough to unleash two 8-year-old heads on each other. "If you're going to coach football, you should be trained — like a lifeguard sitting over a swimming pool learning CPR," says Turley, the former NFL offensive lineman and concussion-prevention advocate. "Because that's what they are — they're lifeguards."

Youth coaches must also rethink tackling technique. One method that has received positive reviews is the "Dip 'n' Rip," taught by a former UCLA defensive back named Bobby Hosea. Hosea instructs kids to wind back their arms and explode up with their hips while going in for a hit. Such a movement causes the head to rock away from oncoming traffic. One convert to Hosea's method is Mike Kulow, a veteran youth coach who says his Murrieta, Calif., Pop Warner league, which has 450 players, witnessed only one whiplash injury this past season. "Man, do I wonder, if I had this education about the consequences in the past, could I have curbed injury?" asks Kulow. "Absolutely."

4. Change the culture. Listen to the logic of A.J. Hatfield, a stud fullback from Port Angeles, Wash. During a practice in October, his head was knocked against the ground. Hatfield felt dizzy and

developed a splitting headache. Did he tell his coaches about his condition? "Nah," Hatfield says. "I didn't want to seem like I was being a baby." He played the next day — and struggled to stay awake afterward. He received a concussion diagnosis. Oh yeah, Hatfield is in the eighth grade. Luckily, he swears he learned his lesson.

**Bravery. Bravado. Machismo.** These qualities create superior football players. But they can be poisonous. "You've got to change the culture, change the mentality," says Turley. "This whole archaic notion that football is everything, all these stupid things coaches go around saying, comparing football to the military ... It's not."

The euphemistic lexicon that pervades locker-room culture — calling punishing hits "dings" or being knocked unconscious "getting your bell rung" — has contributed to a perception that the problem isn't serious. "We need to use more medical terms here, as opposed to slang," says Tennessee Titans center Kevin Mawae, president of the NFL Players Association. "The language makes light of the situation."

The actions of the media can also influence the football culture. Over the past few years, the television networks have toned down the glorification of violent collisions, which is a positive development. Yet during the Jan. 24 telecast of the NFC championship game, Fox repeatedly replayed images of Minnesota Vikings quarterback Brett Favre being brutalized. The most powerful media outlet in sports, ESPN, should set the standard for concussion awareness. "I think that's fair," says Chris Berman, ESPN's lead football studio host. "We've done it and will be a little more cognizant of the fact that a 10-second comment, for a 13-year-old or high school player watching, might be helpful." Let's see if he keeps his word.

**The Last Hit:** The momentum for change is strong. Last spring, for example, the state of Washington passed the Lystedt Law, named for Zackery Lystedt, who as a 13-year-old played with a concussion during a 2006 game. Lystedt collapsed after the game. His brain hemorrhaged, he went into a monthlong coma, and he remains paralyzed on one side of his body. The law requires that all youth athletes suspected of sustaining a concussion or head injury during a practice or game must sit out and may not return to play unless cleared by a licensed medical provider trained in concussion management. New Hampshire, Massachusetts, New Jersey, Rhode Island and Florida are among the states considering similar legislation. "I believe we're reaching a tipping point," says Richard Adler, a Seattle lawyer who was instrumental in designing the Lystedt Law.

Meanwhile, more players are becoming enlightened. Once again, consider those tortured looks from Hadley, the Colgate senior who was shocked by the images of damaged brains of dead football players. Hadley loves football and doesn't regret a single hit or his four concussions. He holds a warrior bond with his fellow players. "It's bothering me that I'm telling you all this," Hadley says after outlining his concussion history and explaining how he decided to play through headaches until he couldn't remember the plays. "It's like I'm betraying a fraternity," he says.

Hadley's veneer is strong but no longer impenetrable. Though not quite big enough for the NFL, Hadley has thought about pursuing a pro-football career in Europe's minor leagues. However, after reading about football's potential cognitive consequences and seeing all that tau, he's reconsidering that career move. He'll either pursue the dream of playing pro football or give his long-term health first priority. At least he's thinking about it. Perhaps the football fixing has begun.