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### **Colleges Struggle to Protect Athletes From Concussion and Its Aftermath**

**Research shows the head injury is far more common, and more complex, than previously thought**

*By Libby Sander*

When the National Football League came under fire last year for the harrowing long-term effects of head injuries among many of its former players, the league's commissioner took a hard line: He ordered the 32 NFL teams to abide by strict new policies for managing concussions and said players could not return to competition until cleared by an independent physician.

At the college level, the response has not been nearly as clear-cut. Managing this common form of brain injury, which affects athletes in many sports, not just football, has proved to be a persistent challenge with high stakes and few easy answers.

Last month research revealed that the brain tissue of a 21-year-old football player at the University of Pennsylvania who committed suicide in April showed early signs of a progressive brain disease previously associated only with former professional football players who had suffered multiple concussions. The lineman, Owen Thomas, had never reported a head injury. But his family has said it was possible that he ignored concussive symptoms to keep playing. (Mr. Thomas's mother will testify on Thursday at a Congressional hearing on concussions.)

In November, La Salle University agreed to pay \$7.5-million to settle a lawsuit brought by a former football player, Preston Plevretes, who claimed that the Philadelphia university's medical staff had cleared him for competition before he had fully healed from a concussion. After a particularly hard tackle in a game, Mr. Plevretes suffered permanent brain damage and now requires 24-hour medical care.

Concussions are hardly a new injury, especially in sports. But knowledge of what causes them, how to identify and treat them, and their long-term effects has evolved at a rapid pace in recent years. And as evidence of the injury's severity continues to mount, sports organizations from the pros all the way down to youth leagues are under pressure to be vigilant.

In April the National Collegiate Athletic Association adopted stricter guidelines for concussions. It now advises colleges not to let athletes with the head injury return to play until cleared by a physician, and requires every athletics department to have a written protocol for handling concussions. The association has also instructed athletics departments to distribute educational materials to athletes and coaches on the dangers of concussions—and requires programs to have athletes sign statements accepting responsibility for reporting symptoms of the injury to medical staff members at their institutions.

While many athletics officials welcome the new guidelines, it remains to be seen how effective they will be in managing a complex injury. NCAA officials have made clear that colleges, not the association, are responsible for the health of their athletes. But at many institutions, treatment of concussions comes down to a question of resources: Top-of-the-line care often involves a combination of prolonged attention from sports-medicine staff members and extensive computer-based testing—luxuries for many of the more than 1,000 NCAA programs.

If there's worry over how to ensure the right kind of treatment of concussions, though, there is little question that the risks are great. Athletes who resume practicing or competing before fully recovering from a concussion are more vulnerable to suffering a second one. And in the worst cases, that second impact can lead to permanent brain damage or death.

"The culture of sport has been, 'Let's rub some dirt on it and play,'" says Kelsey Logan, medical director of the Sports Concussion Program at Ohio State University Medical Center. "That's fine with an ankle sprain, but you can't do that with brains."

#### A Complicated Injury

A concussion occurs when a blow to the head or body jars the soft brain, causing a temporary disturbance in brain function. The injury can trigger a wide range of symptoms, including headache, nausea, and dizziness.

Experts believe that as many as 3.8 million people a year may suffer the head injury in a sports or recreational setting. Among college athletes, the NCAA estimates that concussions represent 5 to 18 percent of injuries, depending on the sport. And while anyone can get one, the injury is far more common in contact sports like football, soccer, ice hockey, and basketball.

Despite its ubiquity, the injury is still a bit of a mystery. Mark R.

Lovell has been studying the effects and treatment of sports-related concussions for 25 years, most recently at the University of Pittsburgh Medical Center. "For many of those years, people didn't even know what a concussion was," says Mr. Lovell, who developed one of the leading computer-based tests used in hundreds of athletics departments to measure the neurocognitive skills of athletes recovering from concussions.

Now, it seems, there is a push to make up for lost time. The National Athletic Trainers' Association devoted its annual meeting this year to discussion of the topic. Several states, including Connecticut, Oklahoma, Oregon, and Washington, have recently passed laws that require minimum standards for concussion safety in elementary and secondary schools. Federal lawmakers, in the meantime, have introduced a similar measure and will hear testimony on the topic at Thursday's hearing.

There is still much to learn. Unlike many of the familiar battle scars of sports, concussions can be persistent and unpredictable. One athlete can take a hard hit on the field and be fine, while another can absorb a seemingly innocuous blow and be out of commission for months.

Last fall college-football fans got a prime-time glimpse of the injury when the University of Florida's standout quarterback, Tim Tebow, was sacked during a game, causing his head to collide violently with a teammate's leg as he went down. The incident focused attention on the issue among college athletes: Mr. Tebow, a Heisman Trophy winner, was sidelined for two weeks while he recovered, and coaches were careful to say that there was no deadline for returning him to competition.

It used to be that when the symptoms of a concussion had disappeared, an athlete could go back to practice. Now, many colleges, but not all, conduct baseline neurocognitive tests on athletes in contact sports when they first arrive on the campus, so that a "normal" measurement is available for use as a comparison if an athlete gets a concussion down the road. An athlete's recovery is now deemed complete only after her symptoms have disappeared and her balance and cognitive abilities—the latter assessed through a battery of tests—are normal.

The setting at many colleges, let alone the baffling nature of the injury itself, can make it difficult for physicians and athletic trainers to treat the problem.

Unlike younger athletes, who presumably have parents looking out

for them and shaping their daily schedules, college athletes often live on their own. And sometimes they are tempted to bend the rules: When Dr. Logan worked at Wesleyan University, in Connecticut, some athletes with concussions who had been told to rest would insist on going to class and taking exams for fear of getting behind.

There are financial roadblocks, too. The highly individualized approach to treatment appears to work well in well-staffed athletics departments outfitted with the latest computer-based testing, but not always at small programs operating on a shoestring.

Still, colleges that have been slow to adjust their response to concussions—and there are many, critics say—must find ways to safely manage the injury within their budgetary constraints, says Kevin M. Guskiewicz, chair of the department of exercise and sport science at the University of North Carolina at Chapel Hill, who has researched the effects of concussions on athletes for years. There are ways to do it cheaply, he says, by replicating the computer-based neurocognitive tests with old-fashioned pencil and paper.

"If you can't implement some sort of concussion protocol, then you may want to think about whether you should offer these contact, high-risk sports," he says. "If you're going to put money into buying new uniforms and refurbishing your helmets every year and preparing the field and all the money that goes into those sorts of things, there should be resources to implement screening for concussion."

#### Young Athletes at Risk

New revelations about the effects of concussions on athletes of all ages, amateur and professional, seem to emerge each month.

Researchers at Boston University, led by Robert Cantu, have been studying the brain tissue of deceased former NFL players for signs of a progressive brain disease that is believed to be caused by multiple concussions. (It was Dr. Cantu's research team that studied the brain of Mr. Thomas, the Penn football player.) The condition, known as chronic traumatic encephalopathy, often leads to depression, memory loss, and impaired judgment.

But concussions can be just as damaging among young athletes, and in recent months much of the scrutiny has shifted from the pro leagues to amateur sports. Two articles published recently in the medical journal *Pediatrics* grabbed headlines with their findings that concussions among children have increased sharply in recent years and that head injuries related to basketball, the most popular youth sport, are on the rise.

A recent study found that athletes on three Division I college-football teams suffered more total hits to the head during practices than in games. The study's conclusion led Dr. Cantu, in Boston, to call for limits on hits similar to pitch-count regulations in Little League baseball, which are meant to prevent wear and tear on young pitchers' arms.

Mr. Guskiewicz has been at the forefront of measuring the impact—literally—of football on athletes' brains. Since 2004, he has outfitted the football helmets of North Carolina players with devices that measure the force of hits. The results, he says, have been surprising: It's not always the big hits that result in the greatest impairment. And the threshold for injury—when a blow causes a concussion—is almost impossible to pinpoint.

"We can't just ignore these little hits. They're not trivial," he says.

"We need to pay as much attention to those as to the bigger hits when you see the helmet flying."

Mr. Lovell, at Pittsburgh, is devoting much of his research of late to the role of gender in athletes' recovery from concussions. "We're continuing to learn," says Mr. Lovell, who is a consultant to several professional sports leagues, including the NFL, on proper concussion management. "We're not close to having a total understanding of it."

#### An Ounce of Prevention?

Much of the research and chatter about concussions has centered on treatment and long-term effects. But some proposals have called for altering the playing rules of certain college sports to reduce head injuries in the first place.

Over the past several months, at least four NCAA sports—football, men's and women's ice hockey, and men's lacrosse—have amended their playing rules with concussions in mind. To protect players from head injuries in football, the NCAA now bans helmet-first tackles and, starting this season, began barring receiving teams from using wedge formations of three or more players. It is also considering rule changes to minimize head injuries during practices.

Charlie Thompson, head athletic trainer at Princeton University, is skeptical of many rule changes, which he says can be slow to take hold. "You're never going to eliminate all concussions," says Mr. Thompson, who is chairman of the National Athletic Trainers' Association's college and university committee.

All the same, Mr. Thompson, who has been an athletic trainer for

three decades, says he's impressed by how awareness of concussions has grown among his colleagues and the athletes he treats. The treatment is more sophisticated, and so are the attitudes toward the injury, he says.

Still, there are moments when he suspects the newfound awareness isn't taking root as quickly as it could. A couple weeks into the fall season, he says, three Princeton athletes had already come to him, clearly struggling with symptoms of concussions. That's what every trainer would hope for.

Still, he was chagrined: "All three reported they'd been hit the day before and didn't say anything," he says with a sigh. "So you do worry."

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