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Rethinking the Next-Generation Helmet

Some of the cutting-edge ideas in the works to help reduce the risk of head-related injuries

By

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A decade has passed since the world began to learn, officially, that the repeated hits to the head that athletes endure can cause multiple concussions and potentially lead to serious health problems.

Now the issue is receiving unprecedented attention because of the movie “Concussion,” starring Will Smith as Dr. Bennet Omalu, the pathologist who performed the initial studies of deceased NFL lineman Mike Webster’s brain and documented the long-term neurodegenerative changes.

While awareness and treatment of brain injuries have improved, progress on equipment that can actually do a better job of protecting the skull and the brain remains slow.

“We’ve seen a lot of effort going into detection and treatment of concussions, which is great, but wouldn’t it be nice if we could actually have a piece of equipment that helped reduce them as well?” said Dr. Eric Morgan, a radiologist at Orangeburg Regional Medical Center in South Carolina and an advisory board member at Tate Technology, one of a handful of companies working to design a safer helmet.

Jeff Crandall, who specializes in applied biomechanics at the University of Virginia and is the chairman of the NFL’s Head, Neck and Spine engineering subcommittee, said any product that reduces the most severe forces by 20% would be significant.

Everyone pursuing a next-generation helmet accepts that it will not prevent all sports-related brain injuries. Because the brain essentially floats in fluid, when an athlete endures a serious hit, forces can send the brain colliding into the skull or cause brain tissue to shear, which can lead to serious injury.

“Helmets do a lot of good, like preventing facial and scalp injuries and skull fractures and brain hemorrhages, but they don’t prevent brain slosh,” said Dr. Julian Bailes, a Chicago-area neurosurgeon and an early partner of Dr. Omalu on the concussion research. “Sloshing is the mechanism of the injury.”

Dr. Bailes’s theory is at the root of one of the more outside-the-box equipment products: a collar that increases the volume of fluid in the skull to help keep the brain more stable. Most others have been more focused on dissipating the force of hits at impact.

Here are some of the cutting-edge ideas in the works, which could become lucrative if they hit.



Tate Technology's Coil system *PHOTO: TATE TECHNOLOGY*

Coil Sports Safe Technology

Jenny Tate Morgan comes by her obsession with helmet safety first-hand. The granddaughter of John Tate Riddell, one of the pioneers of the sports equipment industry, she was left temporarily paralyzed after a severe head and spine injury playing polo in 2011. After her recovery, Ms. Morgan left her career in finance to found Tate Technology, which she describes as a “technology think tank” focused on sports safety and staffed with physicians, engineers and equipment experts.

During the past year and a half, the company has been testing helmets into which they have embedded a coiled shell made from 24-gauge steel wire. The coil, which is 1/48th of an inch thick, is designed to absorb and spread the force of a hit in multiple directions upon impact.

Ms. Morgan said the group focused on the shell of the helmet because it saw most of the competition focusing on the inner liner.

“The overlapping loops are like one big continuous Slinky wrapped around your head,” she said. The coil, she explained, takes the force of impact and turns it into “a wave form and makes it turn right and left.” Tate claims that initial test helmets it manufactured reduced forces by as much as 35% and limited what is referred to as the “rotational impact” that leads to injuries caused by slosh.

“It isn’t a 90% reduction—you’re not going to see that,” said Eric Morgan, a South Carolina radiologist who is Ms. Morgan’s nephew. “But a solid 15%-30% reduction is significant.”