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## This FDA-authorized necklace is designed to prevent brain injuries in athletes

In the future, all athletes may wear neck bands.



**BY MARK WILSON** 5 MINUTE READ

There will never be a concussion-proof helmet. While helmets are good at protecting the skull from fracturing, they don't address the real cause of concussions: When your head suddenly stops from a hit, your brain—which is suspended in liquid—keeps moving and strikes the inside of your skull.

No one knows this better than Dr. Julian Bailes, the former team physician for the Pittsburgh Steelers, a past medical director of the Center for the Study of Retired Athletes at the University of North Carolina, and now a practicing neurosurgeon at the NorthShore Medical Group in Evanston, Illinois.



[Photo: courtesy Q30] “The helmet is basically [the same one](#) I played with a few decades ago, a polycarbonate shell with various layers of foam inside,” Bailes says. “And while you can put six inches of padding inside a helmet, that won’t change the fact that the brain is freely movable inside the skull.”

Twelve years ago, Bailes began experimenting with another approach to protecting the brain during sports—first on mice, then on people. After being approached by inventor Dr. David Smith, he wondered if instead of wrapping the skull in more protection, you could boost the brain’s protection from the inside. What was developed, from an estimated \$35 million in private funding raised by the company [Q30](#), is a necklace that does just that.

[Image: courtesy Q30] Called the [Q-Collar](#), it’s a \$200 band that slips around the neck much like a necktie. Made in Wisconsin with a spring-loaded steel core, the plastic band places about 1.2 pounds of pressure onto the wearer’s internal jugular vein (IJV). This is a vein that carries oxygen-free blood from the brain back to the heart.



[Photo: courtesy Q30]

“This puts a kink on the hose, so the jugular is slower to drain,” Bailes says. This kink fills capillaries around the brain with just about a tablespoon of extra blood, stabilizing it almost like bubble wrap. “That seems to decrease the compliance of the brain, or its ability to move or slosh, when it’s hit by a 250-pound person running at 25 mph.”



[Photo: courtesy Q30] As long as you wear the neck band, the pressure to the IJV is constant. Athletes have not reported any ill effects from this maneuver in testing. Bailes even speculates that as the band actually covers a neck muscle for which there has long been no known purpose, it's possible the human body actually restricts IJV blood flow already during natural human activities like yawning. That would mean the Q-Collar is just duplicating a natural human function on the field. In any case, because no blood is being restricted to the brain, both Bailes and the U.S. Food and Drug Administration have concluded that it is safe.

With a simple, slip-on design created by Priority Designs, the Q-Collar could be used by anyone who plays football, lacrosse, soccer, hockey, or rugby—a market in the hundreds of millions of dollars within the first five years, according to Q30. It's also being investigated by the U.S. armed forces as a way to prevent brain trauma from IED explosions, according to Q30.





[Photo: courtesy Q30]

This brain-boosting necklace is a wild design idea. Most products try to strengthen human performance from the outside, like [Nike shoes](#) and Kinesio tape. Very few products actually hack human physiology itself to make our bodies stronger or more resilient on their own. But there is precedent. A jet fighter's g-suit compresses blood flow, too, preventing it from gathering in the calves and thighs to ensure there is enough blood remaining in people's brains so they don't pass out during high-gravity maneuvers.

Indeed, due to its invasive nature, the Q-Collar is actually not categorized as a piece of performance equipment, like shoulder pads or a football helmet. It's classified as a class 2 medical device. As such, makers of the Q-Collar have spent the past five years seeking FDA authorization through extensive testing, which [included more than two dozen lab and clinical studies](#) conducted by groups including NorthShore Medical Group, Harvard University, and the Mayo Clinic.

The most salient study, sponsored by Q30, was conducted with 284 high school football players in 2018. After a season of play, 77% of the athletes who wore the collars had no significant changes to the white matter in their brains; 73% of the athletes who didn't wear the collar did. Q30's research found similar benefits across hockey and soccer, which can both carry significant risk of brain injury.

Despite all of this data, no one working on the Q-Collar will claim that it can prevent a concussion or damage from the worst helmet-to-helmet hits in the NFL. Instead, it's designed to

prevent subconcussive impacts, the less-reported but worrisome brain trauma that occurs in sports. These little hits add up thousands of times during a season to cause measurable brain damage.



[Photo: courtesy Q30]

Tom Talavage, professor and head of biomedical engineering at the University of Cincinnati who has studied concussions in sports, was brought in as an independent consultant to audit the Q-Collar research. His own research has found that by the end of a single season more than 50% of high school soccer players can be suffering from structural changes to the brain associated with trauma. That led him to conclude, quite unpopularity, that maybe some sports just shouldn't be played at all.

As Talavage sees the Q-Collar today, it's still not a panacea to prevent concussive injuries, but it can make a difference in the safety of a sport. "The collar here is providing, in my opinion, the first protective equipment item that actually does something," he says. Coupled with training—for instance, teaching young soccer players how to properly strike the ball with their head—he does see the Q-Collar as a tool that can measurably drive the safety of some higher-impact sports to the less-risky levels of baseball or basketball.

But what about the NFL? In pro football, players are bigger, they move faster, and the hits can be harder. “At a minimum—the worst-case scenario—if we can at least delay the accumulation of injury to 25 [years old] from 15 [years old], that’s 10 fewer years of accumulation, and therefore, probably a reduced risk later in life of neurological disorders,” Talavage says.

Ultimately that’s the most promising aspect of the Q-Collar. The NFL may never fix its concussion problem. But for all the young athletes in high school, the Q-Collar offers some clinically backed protection to their brains during their earliest days of playing a sport. So hopefully a few mistakes on the field don’t need to follow them through life.

## ABOUT THE AUTHOR

Mark Wilson is the Global Design Editor at Fast Company. He has written about design, technology, and culture for almost 15 years