

GAME CHANGERS

IN THE LAND OF 10,000 INNOVATIONS, VISIONARIES FROM THE GREATER MSP REGION ARE CHANGING THE WAY SPORTS ARE PLAYED.

Profile: Prevent Biometrics

Prevent Biometrics has invested in a revolutionary impact-sensing mouthguard, networked to a coaches app and feeding data into a centralized database, to better identify those who have sustained hits and concussions so they can be treated correctly.

PROFILE > Prevent Biometrics

TYPE > Concussion-sensing mouthguard sports tech business

STORY THEMES > Concussions
Sports technology
Med tech
Player safety
Youth sports

OVERVIEW > At a time when concussions in sports are a major topic, researchers and sports organizations, especially for youth sports and high schools, are trying to find ways to better identify those who have sustained hits and concussions so they can be treated correctly. Prevent Biometrics has invested in a revolutionary impact-sensing mouthguard, networked to a coaches app and feeding data into a centralized database, to do exactly that.

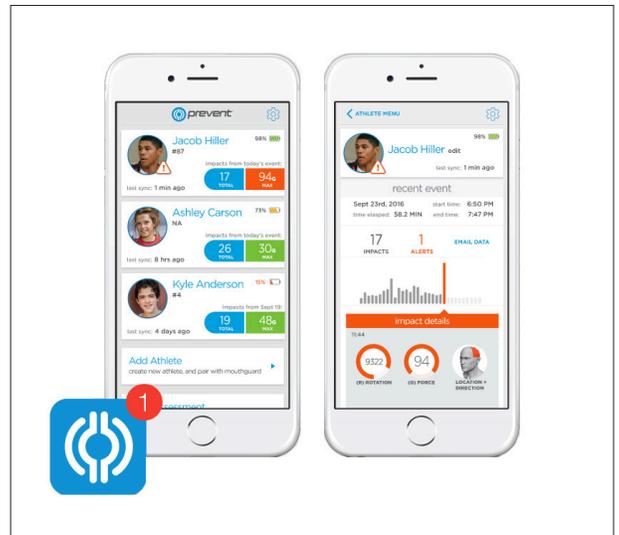
KEY PEOPLE > Steve Washburn, co-founder and CEO
Mike Shogren, chief revenue officer

KEY QUOTE > *"There's no data on what's actually happening to players [in terms of concussions.] It's like the car before speedometers, or understanding blood pressure before pressure cuffs. It's an invisible risk people guess at."*
- Steve Washburn

WEB SITE > preventbiometrics.com

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Profile: Prevent Biometrics



The increased focus on concussions in sports – how they impact lives and teams and society – has been missing one key component: How do we tell who has a concussion?

One Minnesota technology start-up hopes to fill in those answers. “There’s no data on what’s actually happening to players,” said Steve Washburn, co-founder and CEO of Prevent Biometrics, which is rolling out a system of impact-sensing mouthguards and data infrastructure to notify coaches and sideline medical professionals in real-time. “It’s like the car before speedometers, or understanding blood pressure before pressure cuffs. It’s an invisible risk people guess at.”

The Prevent Biometrics system doesn’t measure a concussion directly – but it is the most sophisticated technology available to measure the forces impacting the head. The company has raised some \$8.5 million and is poised to make their product commercially available in the coming year.

And it has come together in Minnesota thanks to a variety of factors: ample technical skill, both on the software/development side and in med-tech design and medical device manufacturing; a sports technology niche that has grown up around local youth sports management company SportsEngine; angel investors who know medical technology; and a strong marketing industry to help Prevent Biometrics get the word out.

Ultimately, the hope is that the technology can transform sports by monitoring and getting appropriate care for individuals play by play, and helping sports researchers understand how to prevent concussions.

CHANGING THE CONCUSSION DETECTION PARADIGM

Medical practitioners, including those who attend to athletes, recognize concussion identification is a subjective process. Someone sees a player take a hit, or the player displays extreme signs after an impact, and the doctor starts a protocol and makes a judgment based on the player’s responses and appearance. But objective data has been hard to come by, and there is broad consensus that many concussions are missed – particularly worrying, since research seems to indicate that it is subsequent hits after a concussion that can significantly increase risk.

Prevent Biometrics’ solution has been to mount four accelerometers (like those in cell phones), a microprocessor, batteries and Bluetooth transmitter on a flexible circuit board, which is then embedded in the guard. A boil-and-bite inner layer forms to the player’s teeth like many traditional mouthguards.

“There have been other attempts to measure impact, with helmets and headbands and skin patches, but they had huge accuracy and false positive problems because they always can move independently in an impact,” said Mike Shogren, chief revenue officer. “The researchers working on this needed a direct coupling with the skull – and the arch of the upper teeth is part of the skull. Hence the mouthguard.”

The device’s four accelerometers (more power efficient than the gyroscopes often used in other applications) can measure the forces generated from an impact both linearly – how fast the head accelerates in a given direction – and rotationally – how it twists. From this data it can calculate the maximum G-forces endured, and can also report on the area of the impact.

Data from all impacts during play are recorded and stored; impacts above a threshold set by a league or other administrator trigger an alert that goes to the sidelines and a red LED flashes in the mouthguard to ensure officials know the player needs to leave the game.

FROM THE LAB TO THE PLAYING FIELD

The system has been more than 7 years in development. A National Institute of Health grant required recipients to find a commercial partner to go to market and keep programs from remaining dependent on government money.

The researchers found their partner in Washburn and other founders. Washburn had been CEO of another Minnesota mouthguard maker and knew about running a sports gear business. The company was also able to recruit local top talent for other positions; Minnesota’s history as home of many Fortune 500 companies and other major businesses means a lot of talent is concentrated here.

Minnesota also has a robust youth sports culture, giving Prevent Biometrics its proving ground. Local high school teams have been testing beta versions of the device and system for the past few seasons. It was there they worked out the kinks that come when you move from laboratory to real world.

“We were getting all kinds of false positives,” said Shogren. “Kids would have the mouthguard in their pocket and it would bang around, or drop it on the floor. We had to improve accuracy.”

Refinements to the algorithm that underpins the system have made it smart enough to filter out the vast majority of these instances. “The algorithm is the secret sauce,” noted Shogren.

FROM THE PLAYING FIELD BACK TO THE LAB

One critical opportunity Prevent Biometrics sees lies in the data it generates. Impact data will be aggregated and made available back to researchers, who will then be able to see what kinds of patterns emerge. For example, they will be able to see which sports have the most major impacts, whether specific types of impact are more likely to result in concussions, and the effects of multiple impacts.

At the team and sport level, the data can help identify if there are coaching or rule issues. “If you see a pattern in impacts on a team, there may be technique problems” that the coaching staff can address. Likewise, if certain types of legal plays are resulting in a disproportionate number of high-impact hits, sports leagues may consider adjusting rules to reduce that activity.

COMING SOON TO A GAME NEAR YOU

Prevent Biometrics has secured patents around the world, lined up suppliers and business partners, and is now ready to take the next step in 2018.

The mouthguard will be marketed to schools and sports leagues. How costs are managed will vary – it is expected some organizations may fold the cost into their fees or make them part of their equipment expenditures, or parents may be expected to pick up part of the cost – but the company aims to get the cost per unit down from its current \$200 to the \$100 range to make it more accessible.

Ultimately, Prevent Biometrics sees its role as one of providing visibility. “People worry about concussions and rightly so, but they’re hearing about what happens to giant, professional players at the top of their game,” said Shogren. “In high school sports, you won’t see nearly as many high-impact hits as some people might expect,” and with the Prevent Biometrics system, parents will be able to see that – and take appropriate action when it does happen.

“We believe in the value of youth sports,” said Washburn. “We want to take the risk out of it.”

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