

Home About ScienCentral My Account Help Co

**ScienCentralNEWS**  
MAKING SENSE OF SCIENCE

a production of  
**ScienCentral**

Life Sciences Physical Sciences Technology Full Archive  
Biology Genetics Health **Brain** Education Animals Psychology

September 17,

## High-Tech Helmets

A few universities are using some high-tech football helmets that record the force of the collisions they sustain. This ScienCentral News video explains how that might improve the safety of future helmets.

### Softening the Blow

[DeShawn Smith](#) began his football season at Tye High School in Sea Tac, Washington with a college scholarship in mind. But the fifteen-year-old's helmet did not prevent the impact of a head-to-head collision from causing bleeding on his brain, and three days later his classmates mourned his death.

According to a July, 2004 report from the [National Center for Catastrophic Sports Injuries](#), about 1.5 million junior high and high school students play football in the U.S., with colleges and universities fielding about 75,000 players. Three players died during 2003 as a direct result of injuries suffered on the field, two of which came following severe head injuries.

Now, researchers at [Virginia Tech](#) might help figure out where improvements in helmet technology are needed most, using a system called [HITS](#)—Head Impact Telemetry System—manufactured by [Simbex](#). The team's helmets are rigged with tiny sensors called accelerometers, which measure impacts to helmets in terms of "G," or gravity, forces. During play, the accelerometers sent real-time impact data to a computer system that kept track of the head impact data.

"We have projected certain Gs at certain positions, and we have far exceeded those levels," says [Mike Goforth](#), director of athletic training at Virginia Tech and one of the authors of the study. "If you take a typical sneeze, it might be less than 20 to 30 Gs. A roller coaster ride might be 2 or 3 Gs but it's a sustained G. We were looking at hits from anywhere from 70 to 80 Gs, and we've far exceeded that; we've been up to 150."

The group recorded the precise location and force of every hit sustained by 38 players during practices and games in 2003. "We far exceeded the blows that we thought we would see during a college football game," says Goforth. "Different positions had different patterns of blows. You have a wide receiver that might

09.17.04

[email to a friend](#)

 Video

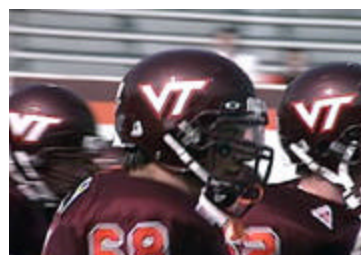


image: Virginia Tech

(movie will open in a separate window)

Choose your format:

 Quicktime

 Realmedia

Search

QuickJump

Also on ScienCentral

[Sports Esteem](#) (1.15.04) - behavior of may have a meaning the love of sport

[Brain Injuries](#) (9.14.04) - research has discovered v happens in 1 after a head That could I treatment th soften the b head trauma

Elsewhere on the site

[Shock Absorption](#)  
Discover Ma

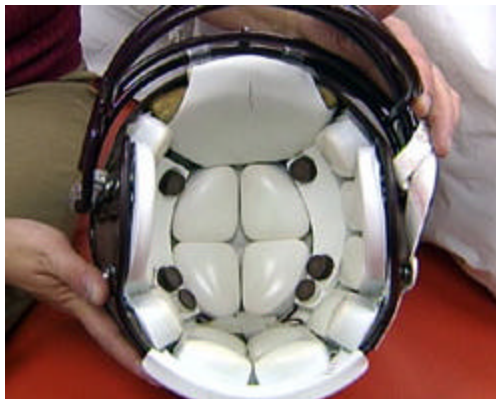
[Medline Plus Injuries](#)

[CDC: Facts on Concussion Injury](#)

[Concussions soccer playe](#)

have all side impacts—might only have 13 in a game, but one of those 13 could be 130 Gs. Whereas a defensive tackle might have more of a Mohawk pattern on their helmet and might receive 50 blows, but they probably wouldn't exceed 70 Gs, unless there was something very unusual happening."

The goal of the research is to help prevent sports-related brain injuries. One injury researchers are particularly interested in is [concussion](#). "At this point in time we're not really sure about the different Gs that cause a concussion or some type of mild traumatic brain injury," says Goforth. "We do know that there was a concussion sustained by one of our individuals and I think that he had a 70 G blow. He had much greater blows during the game that didn't cause anything, but the one 70 G blow did."



The helmets are rigged with tiny sensors called accelerometers.  
image: Virginia Tech

Goforth thinks data like this could lead to changes in the padding or shell for helmets worn by different kinds of players, but says researchers first need to collect much more data.

Another group of researchers has taken a different approach toward calculating the force of blows that lead to concussions. [Elliot Pellman](#) was commissioned by the National Football League to look at impacts that had caused significant head injuries to 182 NFL players over a period of five years. Pellman's group used video analysis combined with software to determine the speed of the two players who collided, and then recreated 31 of those injuries in the lab using crash test dummies. Their study, published in [Neurosurgery](#) in 2003, found that the majority of concussions resulted from hits directly to the player's helmet.

Pellman says the data being collected by Virginia Tech could provide a good way to prove or disprove his group's results, but that "they must prove that their testing methodology can replicate clinically what we found by taking many concussions and then reenacting the real-time injury. I believe they have the capability, but will they actually be able to 'gather' enough injuries? They need a lot of wired helmets to be able to replicate those numbers...though they could potentially do it."

The potential for that to happen was increased recently. Simbex just signed a deal with [Riddell](#), the company that makes helmets for the [National Football League](#). Additionally, two other universities are participating in the study this year.

Goforth's research was presented at the September, 2004 conference of the [American Society of Biomechanics](#). Simbex's research and development was funded by the [National Center for Medical Rehabilitation Research](#) at the [National Institute for Child Health and Development](#) at the [National Institutes of Health](#). Virginia Tech's study was funded by the [Edward Via Virginia College of Osteopathic Medicine](#), the [Virginia Tech College of Engineering](#) and [Department of Sports Medicine](#), and by Simbex.

[Terms of Use](#) [Privacy Policy](#) [Site Map](#) [Help](#) [Contact](#) [About](#) [My Account](#)

ScienCentral News is a production of ScienCentral, Inc. in collaboration with the Center for Science and the Media  
248 West 35th St., 17th Fl., NY, NY 10001 USA (212) 244-9577. The contents of these WWW sites ©  
ScienCentral, 2000- 2004. All rights reserved. The views expressed in this website are not necessarily those of the  
NSF. NOVA News Minutes and NOVA are registered trademarks of WGBH Educational Foundation and are being  
used under license. [Image Credits](#)

