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## As Heads Collide, Helmet Measures Impacts

Tracy Staedter, Discovery News

**Feb. 1, 2008** -- This Superbowl Sunday, heads will knock.

And new research using high-tech helmets is showing that even low-impact head hits can cause brain injuries. The results, which challenge some conventional views about head trauma, could lead to safer practice sessions, improve sports equipment, and help physicians better understand injuries such as [concussions](#).

Players who look like they have been hit really hard aren't necessarily the ones who will sustain the most brain damage, said Kevin Guskiewicz, professor of exercise and sport science and director of the Sports Medicine Research Laboratory at the [University of North Carolina](#), Chapel Hill.

"There's no relationship between the magnitude of the impact and the clinical outcome," he said.

Guskiewicz and his team conducted their research using a sensor-imbedded helmet called the [Revolution IQ HITS](#), distributed by Rosemont, Ill.-based [Riddell](#). The helmet, which was made commercially available last fall and sells for \$999, contains six sensors that measure acceleration.

Placed at the crown of the helmet, as well as the left side, right side, face and back, the sensors measure in real time the amount of g-force a player's head experiences at impact, where the hit occurs, and where it comes from.

The sensors communicate the force measurements wirelessly by way of a radio frequency to a receiver on the sidelines. The data is then automatically uploaded to a computer program that tracks impact location and magnitude.

G-force, which is a measure of acceleration against the Earth's gravitational pull, is something astronauts or jet pilots experience. But even in car crash tests at 25 m.p.h., dummies hit windshields at 100g.

Football players are no different. They commonly experience hits at forces between 50g and 100g. Previous research suggested that concussions likely resulted at forces above 75g, but the new study indicates otherwise.

Between 2004 and 2006, University of North Carolina football players wore the helmets during practice sessions and games. Some players sustained concussions undergoing hits just above 60g while others had no sign of injury after a hit above 90g.

Other findings showed that a single knock to the head at an impact greater than 90g doesn't always result in immediate concussion symptoms, such as headache, nausea, blurred vision or ringing in the ears.

In fact, location, not necessarily force, seemed to play a significant role in brain injury. Six out of 13 players that sustained a concussion had experienced impacts at the top of the their head, as opposed to the side.

The findings could help trainers coach players on how to better position their body to absorb a hit, said Guskiewicz. Such information may also call into question whether players should practice wearing pads, which encourages them to take harder hits in situations where it's not necessary.

The information could lead to better equipment, as well.

"We know that this data is going to help us develop better football helmets in the future," said Thad Ide, vice president of research and development at Riddell.

"You could tailor the helmet to be specific to the position," he said. Adding more padding or other material to areas, such as the crown, could make the helmet more robust, he suggests.

The researchers are now conducting a study to see if players who have reported three or four prior concussions sustain injuries at a lower magnitude than those who have no concussions.

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