How well do football helmets protect players from concussions?

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A new study finds that football helmets currently used on the field may do little to protect against hits to the side of the head, or rotational force, an often dangerous source of brain injury and encephalopathy. The study released today will be presented at the American Academy of Neurology's 66th Annual Meeting in Philadelphia, April 26 to May 3, 2014.

"Protection against concussion and complications of brain injury is especially important for young players, including elementary and middle school, high school and college athletes, whose still-developing brains are more susceptible to the lasting effects of trauma," said study co-author Frank Conidi, MD, DO, MS, director of the Florida Center for Headache and Sports Neurology and Assistant Clinical Professor of Neurology at Florida State University College of Medicine in Port Saint Lucie, Fla. Conidi is also the vice chair of the American Academy of Neurology's Sports Neurology Section.

For the study, researchers modified the standard drop test system, approved by the National Operating Committee on Standards for Athletic Equipment, that tests impacts and helmet safety. The researchers used a crash test dummy head and neck to simulate impact. Sensors were also placed in the dummy's head to measure linear and rotational responses to repeated 12 mile-per-hour impacts. The scientists conducted 330 tests to measure how well 10 popular football helmet designs protected against traumatic brain injury, including: Adams a2000, Rawlings Quantum, Riddell 360, Riddell Revolution, Riddell

Revolution Speed, Riddell VSR4, Schutt Air Advantage, Schutt DNA Pro+, Xenith X1 and Xenith X2.

The study found that football helmets on average reduced the risk of traumatic brain injury by only 20 percent compared to not wearing a helmet. Of the 10 helmet brands tested, the Adams a2000 provided the best protection against concussion and the Schutt Air Advantage the worst. Overall, the Riddell 360 provided the most protection against closed head injury and the Adams a2000 the least, despite rating the best against concussion.

"Alarmingly, those that offered the least protection are among the most popular on the field," said Conidi. "Biomechanics researchers have long understood that rotational forces, not linear forces, are responsible for serious brain damage including concussion, brain injury complications and brain bleeds. Yet generations of football and other sports participants have been under the assumption that their brains are protected by their investment in headwear protection."

The study found that football helmets provided protection from linear impacts, or those leading to bruising and skull fracture. Compared to tests using dummies with no helmets, leading football helmets reduced the risk of skull fracture by 60 to 70 percent and reduced the risk of focal brain tissue bruising by 70 to 80 percent.

Provided by American Academy of Neurology