

BRAINS RESEARCHERS REVEAL DEFICIENCIES IN FOOTBALL HELMET DESIGN

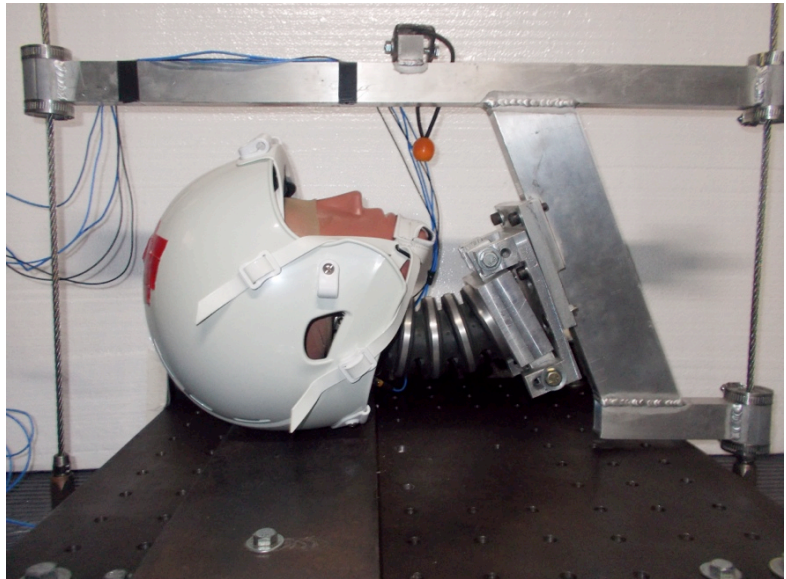
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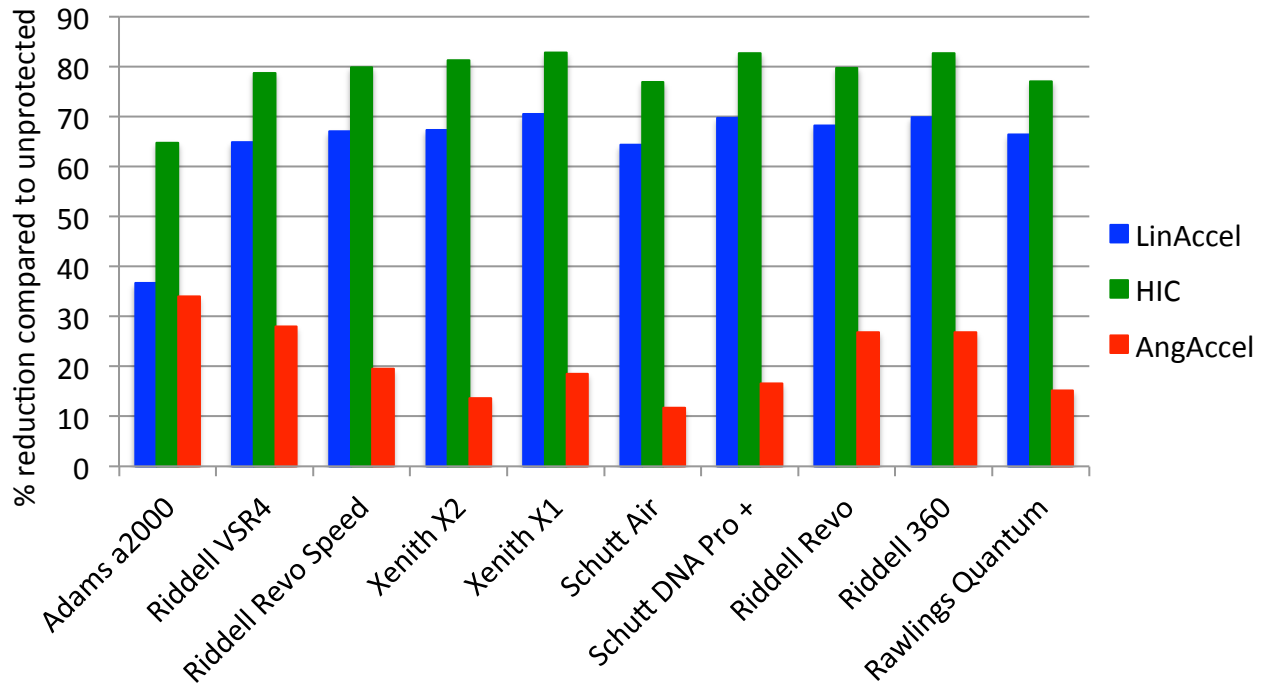
Researchers at BRAINS, Inc. have conducted a systematic biomechanical study, which reveals the deficiency of current football helmet designs in protecting players from traumatic brain injury, including concussion.

Historically, helmet effectiveness has been measured through drop-tests, using a device approved by the National Operating Committee on Standards for Athletic Equipment (NOCSAE). The result is helmets that are optimized against skull fractures, bruising, and other focal effects. However, biomechanics researchers have long understood that angular forces can cause serious brain damage including concussion, axonal injury, and hemorrhages. “We modified the standard test device to consider rotational acceleration in addition to conventional linear impact measures” explains John Lloyd, PhD.



Using miniature sensors to measure linear and angular acceleration risk at the center of the brain, BRAINS researchers completed more than 330 tests across ten popular helmet brands. The team concluded that while these helmets provide excellent protection from linear impacts – those leading to bruising and skull fracture – they offer little or no protection against angular acceleration, a dangerous source of traumatic brain injury, which could potentially lead to long term cognitive problems.

Results show percent reduction in linear impact acceleration, Head Injury Criterion (HIC), and angular acceleration provided by the different football helmets. Note that all helmets provide considerable protection from skull fracture (**blue**) and focal brain impact (**green**), but are far less effective at reducing risk of diffuse brain injury and concussion and encephalopathy (**red**). In fact, some helmet designs offer no significant protection from concussion — and those that offer the least protection are among the most popular on the field.



Helmet	Overall Result	Rank
Riddell 360	59.8	1
Riddell Revolution	58.3	2
Xenith X1	57.3	3
Riddell VSR4	57.2	4
Schutt DNA Pro +	56.4	5
Riddell Revolution Speed	55.4	6
Xenith X2	54.1	7
Rawlings Quantum	52.9	8
Schutt Air Advantage	51.0	9
Adams a2000	45.1	10

The table alongside presents a ranking of the more popular football helmets, from best to worst, based on their combined protection from skull fracture, focal brain impact and diffuse brain injury.

Protection against traumatic brain injury, including concussion, is especially important for young players, including peewee, high school, and college participants, whose still-developing brains are more susceptible to the lasting effects of trauma.

Consistent with their innovative approach to meeting the challenges of brain trauma, combined with 20+ years of experience in biomechanics, and neurophysiology, BRAINS researchers have investigated several new technologies to provide better protection against the debilitating effects of brain injury. The team is poised to integrate their new technology into helmet design – a paradigm-shift in helmet construction – and bring to market a more comprehensive form of head gear to defend against catastrophic brain injuries while also mitigating linear forces associated with impact.