

# More-forgiving headgear

## The NFL will adopt a high-tech helmet to head off career-ending head injuries.

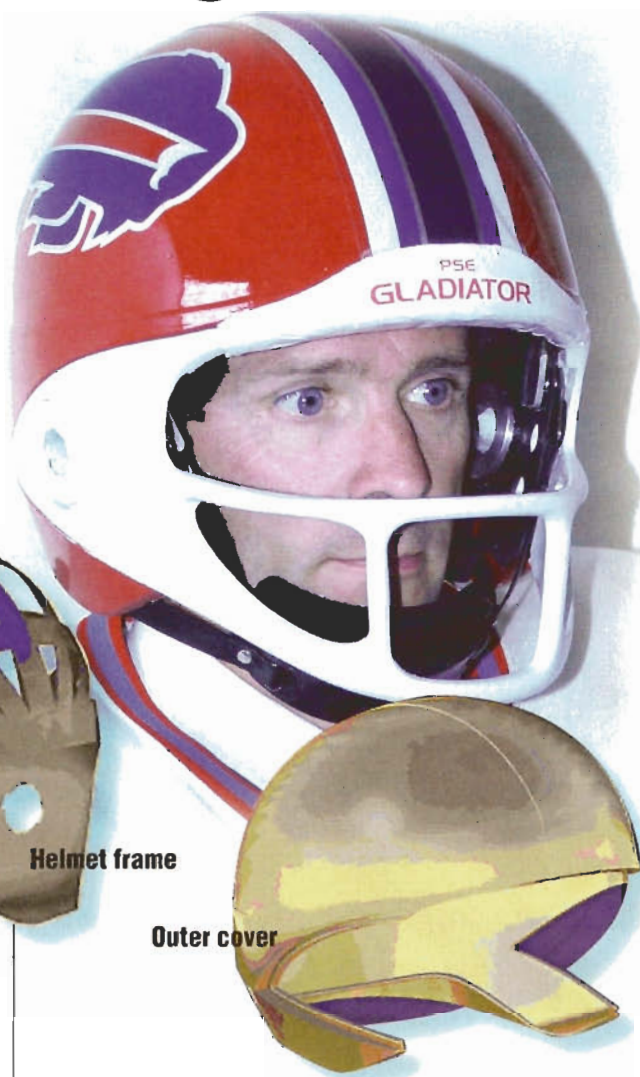
Few people who watched Buffalo Bills tight end Kevin Everett go down after a helmet-to-helmet hit will forget the image of the motionless player laying on a backboard and being carried off the field. Everett's injury in September was only the most recent example of what can happen when two NFL players traveling full speed meet head on.

Now, the League is getting ready to do something about head, neck, and spine injuries that can result when helmets collide. Players next season will have the option to don a high-tech helmet designed specifically to thwart head injuries. Dubbed the Gladiator, it is more like a cushioning system than a helmet.

Industrial designer Bert Straus at **Protective Sports Equipment** developed the Gladiator as an alternative to current helmets, which use a hard polycarbonate shell, inflatable bladders that cushion impacts and hold the helmets on, and inner foam pads. He calls this a "hard-soft" design, with the hard shell the first line of defense, backed up by softer materials.

The Gladiator, a "soft-hard-soft" design, has a relatively soft urethane-foam outer covering over a polycarbonate shell holding foam inner pads. It should be lighter than current helmets, which should reduce neck strain and fatigue. (Fatigue is a known factor in head-down tackling, a poor technique that can lead to severe injuries.)

The Gladiator will also have resin-composite face guards. This should better balance the design, move the center of gravity back toward the center of the player's head, and reduce the potentially harmful moment around the neck. The faceguard will have a quick release, important for access to the



Helmet frame

Outer cover

The Gladiator helmet has much the same look of conventional NFL helmets but adds several new layers of protection. The Gladiator helmet consists of a reaction-molded flexible urethane foam outer covering and a carbon-fiber frame.

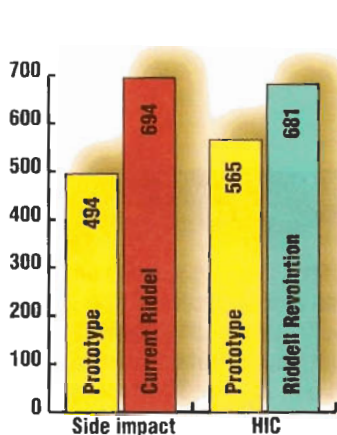
player's airways when the head and helmet are immobilized. Current helmets must be cut or the four clamps unscrewed in similar situations. A second quick-release latch holds the chin cup in place.

This eliminates snaps and buckles which can lacerate the skin.

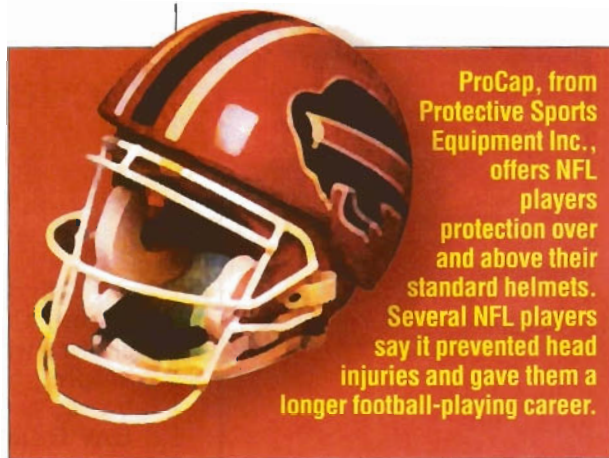
Inside, contoured pads with a

Edited by Stephen J. Mraz

## Comparing helmets



Head Injury Criterion (HIC) takes into account all accelerations, loading, and torque in evaluating helmets, with the lower HIC indicating a safer design. And this chart shows that the Gladiator helmet has lower HICs for side and front impacts when compared against the Riddell helmet currently used and the new Revolution T Riddell helmet which is supposed to be safer.



ProCap, from Protective Sports Equipment Inc., offers NFL players protection over and above their standard helmets. Several NFL players say it prevented head injuries and gave them a longer football-playing career.

viscoelastic layer should improve fit and comfort. They are covered with a wicking material, as opposed to being crammed into PVC pockets, again for comfort, especially in colder weather. These pads still inflate for fit, but a bladder comprised of inflatable cells give the pads an inward, evenly distributed push.

Finally, Gladiator helmets will contain no metal, making them transparent to X-ray machines, CAT scanners, and MRI imagers, an obvious plus in cases of spinal or head injury. The final helmet will likely cost more than the current \$198 models, but it will also contain significantly more technology.

This will not be Straus' first time at offering the NFL a way to improve helmet safety. Sixteen years ago, he invented ProCap, a large, hard outer covering made of urethane foam, which is tough, light, resilient, and slippery. Velcro holds it tightly on the normal high-school, college, or NFL helmet. It's about 0.6-in thick, but is thicker where impacts are more likely. Adding a soft outer covering to the hard shell and inner pads reduces the force of impacts.

In side-by-side comparison

with standard helmets, with ProCap randomly put on every other players' helmet, not a single ProCap wearer suffered a concussion. 15% of the nonwearing players did, and half of them got concussed more than once. There were also only one-third as many neck strains reported by ProCap wearers. Straus believes it is reasonable to expect that if ProCap were universal among football players, concussion rates would fall below 1%.

The NFL let players use ProCap, but there was a catch. Only two firms made helmets for the NFL, and Straus claims both had a "not-invented-here" syndrome and they would void all warranties on their helmets and "back away from all liability," if a player used ProCap.

In the mid-1990s, a biomechanical consultant told an NFL committee that the ProCap could cause serious and catastrophic injuries, heat prostration, and even death. The consultant's conjecture was not based on any experimental data or studies. Still, the NFL backed away from the ProCap, says Straus.

Despite being, in Straus' own words, "rather dorky looking," the ProCap is still legal in the

NFL. Mark Kelso, a free safety with the Buffalo Bills credits his wearing the ProCap, or, in his words, the "gazoo" helmet, for letting him play his last five years of professional football. His first four years of pro ball had left him with a loss of peripheral vision after big hits during games and migraine headaches.

The helmet will be commercially available next year when fully certified. NFL team trainers and medical personnel will get particular attention during the product rollout. "The technology will be adopted at all levels because of its superior performance," says Straus confidently. If all goes according to his plan, after the Gladiator is widely accepted in the NFL and college, other sports, including skiing, hockey, and roller-blading, will want similar helmets.

Most importantly to Straus, if the pros are seen using his Gladiator, then high-school and collegiate football players will likely want to use it as well. **MD**

### MAKE CONTACT

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