

Comprehensive Neurosurgery supplement covers sports-related concussions

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Neurosurgeons have treated head and spinal sports injuries since the specialty was formed in the early 20th century, with formal efforts to mitigate these injuries dating back to 1931. *Current Concepts in Sports Concussion* is a comprehensive, 16-article supplement of *Neurosurgery*, official journal of the Congress of Neurological Surgeons, published by Lippincott Williams & Wilkins, part of Wolters Kluwer Health. The supplement includes a detailed, fascinating history of concussion treatment and research. The lead guest editor is Chicago-area neurosurgeon Gail Rosseau, MD, who serves on the Board of Directors of USA Football and ThinkFirst.

"Neurosurgeons have always been and remain at the forefront of [sports](#) concussion and traumatic brain injury advocacy and prevention initiatives. In 1986, [ThinkFirst](#), the international [head](#) and spine injury prevention program was established by organized [neurosurgery](#). More recently, neurosurgeons were front and center in the national advocacy effort to get Lystedt laws passed in all 50 states. Further, as the articles attest to, many neurosurgeons are right there on the sidelines and working in research labs, with the common goal of keeping athletes safe, whether NFL players or youngsters playing Pop Warner football," Dr. Rosseau said.

History and the Role of the Helmet

The origin of the leather football helmet goes back to the Army-Navy

game of 1893 when a Navy player was told by a physician that "he would be facing death if he took another hit to the head." In 1906, the Intercollegiate Athletic Association of the United States was formed and it was then that protective leather headgear was worn by players with increasing frequency. Helmets became mandatory at the high school level in 1935, and at the college level in 1939.

In the 1950s-1960s, Richard C. Scheider, a neurosurgeon in Ann Arbor, Michigan, reviewed and analyzed injury patterns in serious or fatal neurosurgical football injuries. He used this data to develop primate research studies which concluded that vertex deceleration resulted in direct transmission of force through the rigid, nonresilient helmet and intact skull to the brain. This important research resulted in his own helmet patent and set the stage for ongoing improvements in helmet technology. Along these lines, *Current and Future Concepts in Helmet and Sports Injury* analyzes the biomechanics of helmets, looking at translational (linear) force and rotational (angular) force and how this relates to concussion and more severe head injury.

- In 1941, neurosurgeon Walter Dandy patented the first protective baseball cap insert.
- While protective helmets do not prevent concussion, it is widely believed that if used properly, they may prevent other forms of head injury (eg, skull fracture) and are recommended for many sports.
- Helmet-to-helmet blows in American football lead to 61% of impacts causing concussion.
- A 2002 to 2004 study of 2141 high school football players found a reduction in the concussion rate from 7.6% with standard helmets to 5.3% with helmets with greater offset and padding.
- When the NFL began fining players for intentional head-to-head contact, it became a huge disincentive for players to tackle with their helmets, and the activity began to disappear.

NFL Commissioner Roger Goodell articulates his plans for improving the safety of football players in *Accelerating Progress on the Road to Safer Sports: Neurosurgical Society of America - NSA Medal Lecture*.

"Our primary commitment is to change the culture of football to better protect players without changing the essence of what makes the game so great. How do we do that? We start by leading a culture change in the NFL that will impact the culture at other levels of the game, especially youth football. A culture of safety includes rule changes, investment in the development of innovative protective equipment, and providing medical staffs with the tools and authority to protect players."

The story of Zackery Lysedt, who suffered a lifealtering acute bilateral subdural hematoma during a middle school football game in October 2006, is compellingly retold in *Concussion Advocacy and Legislation: A Neurological Surgeon's View From the Epicenter*. Many medical experts believe that if Zack had been removed from the game after his first obvious concussion, that he would not have experienced catastrophic neurological deterioration later that day. On May 14, 2009, The Zackery Lystedt Law passed in Washington State and served as an inspirational model for youth sports concussion laws for the rest of the country. The article expounds on the details of Zack's injury, the legislation he inspired, and the many "players" who helped in this concerted national advocacy effort.

Overview of Sports Concussions

While limited by a small sample size and surveying method, recent data suggest that less than 50% of high school athletes disclose "concussion" events to trainers or coaches. Furthermore, an estimated 56% of college athletes surveyed indicated no knowledge about the potential consequences of mild head injury. The importance and efficacy of education programs including the Center for Disease Control and Prevention Heads Up program, ThinkFirst programs, and the Sports

Legacy Institute Educators program are discussed in *Concussion 101: The Current State of Concussion Education Programs*.

Although many questions remain unanswered, such as long-term effects of sports concussion, there are several areas of agreement. In *Current Concepts in the Treatment of Sports Concussion*, the authors discuss the importance of education, preseason assessment, the benefit and utility of a standardized multimodal assessment on the sidelines, individualized treatment and return-to-play protocols, and the benefit of a multidisciplinary team in managing complicated injuries.

The primary role of the [concussion](#) specialist on the sidelines is to perform appropriate and immediate assessment and triage of potentially concussed athletes. *Sideline Assessment Tools for the Evaluation of Concussion in Athletes: A Review*, discusses the four principles used to evaluate athletes on the sidelines: symptom/history evaluation, balance assessment, cognitive/memory evaluation, and neurological exam. An overview of testing methods, advancements in electronic applications formats, as well as the efficacy of each as a prognostic tool are explored in depth.

Currently, there are more than 41 million children playing organized sports. As contact and collision sports continue to grow in popularity, there is increased concern for the safety and welfare of young athletes. In *Concussion: Key Stakeholders and Multidisciplinary Participation in Making Sports Safe*, the authors discuss the risks and benefits of playing contact sports, providing a detailed analysis of the important role each stakeholder plays in a multidisciplinary approach to help prevent injury.

"History has provided a great number of lessons, as well as technological innovations regarding the prevention and treatment of [sports concussion](#). As [neurosurgeons](#), we endeavor to provide the highest quality of care to our patients, work on the sidelines and in research laboratories to

improve sports safety, and help prevent devastating neurological injuries through organized advocacy and education efforts," Dr. Rosseau concluded.

More information: journals.lww.com/neurosurgery/toc/2014/10001

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