# High Impact

With the National Football League and National Collegiate Athletic Association establishing committees to review ways of keeping athletes safe, considerable attention recently has been paid to concussion and how it affects the brain. Jeffrey S. Kutcher, M.D., assistant professor of neurology and director of the U-M's new NeuroSport Concussion Program, has been influential nationally in enlisting neurologists in the discussion, and in developing concussion policies for high-impact sports.


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**Q: What exactly is concussion?**
A: Concussion is the clinical manifestation of a brain injury brought on by force. Classic symptoms are headache, confusion and dizziness, but it's a very diverse injury that can present in different ways, such as personality changes, slowed thinking, and subtle physical signs. The key is that it's a functional injury, not structural, so it's one you can't necessarily see with traditional neuroimaging. Rather, it's best diagnosed with a good history and physical examination.

**Q: Sports-related concussion has become a hot topic recently. Are rates of concussion going up, or are we simply more aware?**
A: I think both. Over the last couple decades, I suspect there's been an increase in the actual concussion rate as a result of how our games have evolved, the way our youth are being coached and taught how to play, the fact that they're perhaps training and getting stronger and faster at an earlier age. All of these factors have led to an increasing rate of concussion that I think has been slow and progressive. On top of that, over the past few years, there's been much higher awareness about the injury, so we've seen a large bump in the number of diagnosed concussions.

**Q: Are some athletes more prone to concussion than others?**
A: Absolutely, depending on what sport and position they play, but also how they play, how they hit, how they're taught to hit — all those things add to the variability of concussion risk. The brain is an extremely complex and diverse organ; it's different from individual to individual more than any other part of us. If you gave 100 kids the same blow to the head, you'd get 100 different responses because the threshold for being concussed is different, and that threshold is dynamic and can change over time. We need to look into what factors determine that threshold. We also need to consider individual differences at the cellular level — how do neurons respond to these forces? That response in a lot of ways predicts not only the kind of symptoms, but perhaps how each brain handles long-term multiple impacts. Why do some individuals over time develop significant problems or Parkinson-like syndromes, and some don't? We need to figure out what it is about those brains that leads them down that path.

**Q: How serious is the issue of athletes hiding concussions?**
A: That is true, but I don't know that it's necessarily truer for concussion than other injuries. Athletes are also going to try to hide ankle or knee injuries because they want to play, but it's more obvious when somebody's limping. But that's only one aspect of it. Traditionally concussion has been thought of as part of the game, an injury that goes away in a few minutes. The awareness and concern at the athlete level is a lot greater today than it was 10 years ago. It's not always that athletes are hiding injuries — sometimes they simply don't realize that they've been concussed. After the game they may experience headache or vomiting and realize they don't remember certain plays, but during the game it's not always so obvious to them.

**Q: How does the neurological approach to concussion differ from the traditional approach?**
A: The neurological approach applies our expertise in knowing the brain from

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the clinician standpoint, understanding the complexity of taking a neurological history, performing a complete neurological examination, understanding how the brain performs in the setting of other diagnoses and injuries. We care for patients with migraine headache, with encephalopathy from other causes, with Alzheimer's, so we know the different states of the brain and how it performs in these settings — insight that the average sports medicine doctor, orthopedic surgeon or neuropsychologist doesn't have. A lot more neurologists realize that this is a serious injury; when I trained, very few understood that it was a serious issue, and so neurology didn't get involved. That's changing.

**Q: What are the goals of the NeuroSport Concussion Program?**

A: Simply stated, our goal is to improve the neurological care of athletes at all levels. Specifically, we want to increase athletes' access to sports neurologists and concussion experts, while educating the entire spectrum of the health care profession, from EMTs and ER nurses to physicians, pediatricians, sports medicine doctors, orthopedic surgeons, neurologists. While there's a need for neurology in sports medicine, there's also a need for sports-specific training in neurology because the average neurologist doesn't know how to take care of athletes. We weren't trained to do that; it's a completely different paradigm. So another of our goals is to bring those two worlds together — educating neurologists and sports medicine people about the other side. We also have a serious commitment to the community and educating parents, coaches and athletes. We have several ongoing research projects that are looking at diagnostic and management questions of concussion, risk factors, and long-term outcomes.

**Q: What is the role of the American Academy of Neurology's Section of Sports Neurology, which you helped create and now chair?**

A: The Sports Neurology Section of AAN was started in 2009 to improve the neurological care of athletes at the national level — working within the community of neurology toward greater understanding that sports neurology is a unique and specific subspecialty. We have approximately 300 members of the section from around the country, and we've seen a growing influence on the national concussion conversation in the press, and in the political and scientific arenas. The section is trying to formalize our curriculum in sports neurology so we can train our neurology residents and fellows in sports-specific issues. We also provide neurological expertise to sports medicine associations, like the American Medical Society for Sports Medicine and the American College of Sports Medicine.

**Q: What has been your role in crafting policies with the NCAA, Big Ten and Mid-American Conferences?**

A: I've acted as an expert consultant to the NCAA's committee on competitive safeguards, which oversees medical issues in college athletics, helping them develop their concussion policy. I also participated in an educational webinar for athletic training and sports medicine staff at the collegiate level, allowing me to get key messages out to more than 1,000 universities. At the Big Ten level, I helped develop the concussion policy that's now in place; with the Mid-American Conference, essentially the same.

**Q: Are you active in high-impact sports yourself? Have you experienced concussion personally?**

A: I played hockey most of my life and thinking back over the years, almost certainly had concussions. One of the big dilemmas we face is, are our sports safe as we play them? I view my role first and foremost to protect athletes, and I want to do so in any way that it takes, but I also see the value in the sports that we play and understand what makes them such a large part of our culture. [M]

*Interview by Rick Krupinski*