

Testimony of:

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Chairman Conyers, members of the committee, and other distinguished guests, it is my honor to join you today and I am extremely grateful for the opportunity to testify as part of this hearing.

My name is Jeff Kutcher. I am a neurologist at the University of Michigan where I serve as chief of inpatient neurological services as well as director of Michigan NeuroSport, a comprehensive academic program in sports neurology. NeuroSport cares for athletes at all levels, from youth sports to professional leagues, conducts research on sports concussion as well as other issues in sports neurology, and provides education to athletes, parents, coaches, schools, and health care providers.

I am the team neurologist for the University of Michigan and Eastern Michigan University athletic programs as well as a neurological consultant for several local area high schools and the USA Hockey Developmental Program. Through these roles, I conduct pre-season baseline concussion testing, diagnose and manage concussion on the sidelines, and follow patients after concussion in the training rooms and in my clinic. As a practicing general neurologist, I also have experience with the complete spectrum of neurological disease, including stroke, epilepsy, headache disorders, and dementia.

Additionally, I am here today as a representative of the American Academy of Neurology, being chair of that organization's section on Sports Neurology. The Sports Neurology section of the American Academy of Neurology was established in 2009 with the expressed purpose of improving the neurological care of athletes at all levels through education, advocacy, and research. Finally, I should also note that I recently accepted an invitation from Dr. Elliot

Pellman to serve as a member of the National Football League's concussion committee. I am looking forward to working with Dr. Pellman and the committee to help ensure the safety of the sport.

With that in mind, I am encouraged that today's hearing goes beyond the scope of the NFL. While professional contact sport athletes may have a longer period of lifetime exposure, they represent only a small fraction of those at risk. Only by considering the effects of concussion across an athlete's entire lifespan can we begin to fully understand this injury.

Sports Concussion: A simple cause, a complicated injury

It is not uncommon in the field of neurology to come up against a diagnosis with an unknown cause. In contrast, sports concussion, at first glance, has a very clear cause, a mechanical force delivered to the brain as the result of a collision during play. Over twenty years ago, with this simple model in mind, the field of sports concussion management began trying to delineate concussion risk by establishing a clinically relevant way to classify each concussive injury. Despite excellent work by many individuals, we have yet to establish a system to classify concussion that has proven to be clinically useful. Current international consensus, as defined by the Zurich consensus statement from 2008, is that concussive injuries should not be classified at all.

Our failure to identify a clinically useful classification system for concussion is an indication that this injury is much more complicated than initially thought and, while the proximal cause may be straight forward, it is what happens to each brain after the hit that is more important clinically. A more prudent approach, in my opinion, is to move on from attempting to classify concussion at the level of the injury itself, to broaden the scope and work to better understand concussion at the level of the individual.

We know from our knowledge of the brain and other brain disorders that there is a tremendous amount of variability between individuals. It follows, then, that when a mechanical force is applied, we should not expect one brain to react the same as another. To understand the short-term, as well as the long-term, sequelae of single or multiple concussive injuries, we must first understand how concussion varies between individuals. We need to better understand what risk factors lead to worse outcomes and how much risk can be attributed to genetic versus environmental factors. To this end, I urge researchers to focus on these specific questions and funding agencies to provide the support needed to find the answers.

Concussion management: a public health concern

Because the brain is a highly complex, individualized, and dynamic organ, concussion management does not lend itself well to the use of protocols. It is, rather, an injury that is best managed by people with neurological expertise and experience treating athletes. Unfortunately, the vast majority of athletes who sustain a concussion do not have access to concussion experts.

Add to this the fact that approximately half of all high school athletes in this country do not have access to certified athletic trainers or any other medical specialist on site, and the problem deepens. Because of these shortages, sports concussion is a public health issue that could use protocols that can be followed by our country's network of primary care providers, as well as more simple guidelines that can be followed by parents, coaches, friends, and teammates. Therein lies the rub, sports concussion is an injury that is hard to fit into protocols, yet has a natural need for them.

Concussion Management at the University of Michigan and Eastern Michigan University Athletic Programs

As one example of how to practically approach this dilemma, allow me to quickly highlight the concussion programs at the University of Michigan and Eastern Michigan University. Given the state of concussion science and the rate with which new information is published, we consider our management programs to be under constant review and modify them when appropriate. We consider the acquisition of baseline objective data to be a necessary component. We conduct a pre-season baseline evaluation for all at risk athletes that includes neuropsychological testing, screening neurological examination, and a sideline assessment tool. We understand the limitations of computerized neuropsychological testing and take great care to use it appropriately. Concussions occur in many sports, so we use our own injury surveillance data to help determine which sports to include in baseline testing, going beyond the obvious contact

sports such as football and ice hockey to include less obvious ones such as water polo, field hockey, and diving.

When a concern for concussion arises, the student athlete undergoes an immediate clinical evaluation by the on site certified athletic trainer and/or team physician when present. A return-to-play decision is based on the initial evaluation and subsequent follow-up assessments with a team physician, and is not entertained until the student athlete is completely free of symptoms, has a completely normal examination, and has successfully progressed through graded exercise challenges without a return of symptoms. Computerized neuropsychological testing is considered to be an extension of our physical examination and not a decision tool unto itself. Return-to-play decisions, as well as retirement decisions, are, furthermore, made by careful consideration of each athlete's history. We fully realize that there is very little published data to help guide these decisions. The key to making these programs work is the direct involvement of an experienced and knowledgeable medical staff.

The American Academy of Neurology

Realizing that this approach requires resources that are not available to the vast majority of athletic programs at the high school level and even many at the college level, we must address the need to have scientifically valid guidelines for the masses. The American Academy of Neurology has recently begun the process of creating new practice parameter guidelines to help health care providers of all types manage their patients with sports concussion. This scientific

process will include a rigorous and critical review of all published data on the topic. We have assembled a multidisciplinary panel of concussion experts from the fields of neurology, neurosurgery, sports medicine, athletic training, emergency medicine, rehabilitation medicine, and neuropsychology. The goal of this panel is to create a document that is widely accepted, scientifically valid, and clinically useful.

In the interim, I would like to highlight two general rules that I feel should apply to all athletes:

- Any athlete that is suspected to have suffered a concussion should be removed from participation until he or she is evaluated by a physician.
- No athlete should be allowed to participate in sports if they are still experiencing symptoms from a concussion.

The American Academy of Neurology is also partnering with other medical and athletic organizations to help disseminate basic concussion knowledge to the individuals who need it most, the athletes, their families, coaches, schools and caregivers. The Sports Neurology section of the academy acts as a common ground, bringing together the fields of sports medicine and neurology and fostering a cooperative approach to sports concussion in order to effect change on a public health level. As chair of the section, I have three particular goals:

- To increase the awareness of sports concussion issues among primary caregivers and general neurologists.

- To provide both groups with the education and tools needed to provide optimal care.
- To help ensure the safety of our high school and junior high school athletes by insisting on the presence of a certified athletic trainer at all contact and collision competitions and practices.

As evidenced by this hearing today, the management of sports concussion is evolving. I am honored to be a part of this effort, and grateful to be working with colleagues of such talent and focus. I am confident that, together, we will do what is best for athletes at all levels.