Brainline Talks With Dr. James Kelly

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Children, Helmets and Concussion

Dr. James Kelly
BrainLine talks with Dr. James Kelly about: Children, Helmets and Concussion BrainLine's exlusive interview 7/11/08 Produced by Victoria Tilney McDonough and Brian King, BrainLine.org 1 Dr. James Kelly: There is some evidence that it may be worse for a youngster whose brain is developing and then sustains a concussion than for others who are already mature in their development neurologically. And here's what we think is happening. The young brain is not only growing and evolving physically, physiologically, but is engaged in the process of learning in such a way that in school performance and so forth, that is part of what has to happen for the brain to actually develop fully.

And so if the injury interrupts the process of the environmental engagement of that brain, it's not only a physiological disruption for that span of time during recovery. It may skip developmental stages. And so the individual may suffer more protracted, cognitive or other deficits as a result. And some people talk about youngsters' brains being more plastic, more able to regenerate and so forth. And while that may be true, there is at least some evidence that the other problem is also true. The other issue is true. That the developing brain actually can be impaired in a long-term sense that then ultimately creates a different tract of trajectory where that individual ends up.

Dr. James Kelly
We could let our kids play contact sports if in fact we have ways of making them safer. I'm all for healthy, active lifestyles and engagement for kids. But I think we need to look at what the risk factors are and reduce them. And there are plenty of places we can do that, plenty of ways we can do it in skiing and in the contact sports you've talked about with football and hockey. We can do it better with baseball. We can do it with a whole variety of sports that kids should be encouraged to play. But I think that we need to look specifically at rule changes and equipment changes and so forth that are improvements that can actually create the outcomes we're looking for.

Dr. James Kelly
Well, the helmet has to be designed around what the potential injury might be. So, for instance, on a bicycle helmet, that helmet is almost unlikely to ever come into play. Most people wear those things for years riding those bikes. And except for when they drop it on the floor, it doesn't even have a nick in it. But when it comes into play, it's a big time mechanism. They're farther launched over the handlebars and landing on asphalt or something similar.

And so this isn't just a simple blow to a head from an elbow in hockey or something like that. It's a big mechanism injury. And so that actually has to serve, that one time ... it can be disintegrated, but it has to serve the maximum impact absorption that any helmet can under those circumstances. And the material they're made of which is essentially a kind of Styrofoam. It's an expanded polystyrene. Those are designed to do that. They're little air bags. They're little air cells and they crush and disintegrate.

So the helmet itself is no longer integrated in the way it had been in the original forum. But it did the job. It dispersed the energy. And so that particular helmet design is absolutely the best head protector, brain protector, we have. But it's impractical for football and hockey and various other kinds of activities. Because you can't throw that away every play and come back in with another one. So there has to be some resilience built into the helmet. And it's always a tradeoff. How much of the spring back is going to be damaging ultimately because it's pushing then the head in the other direction versus being

absorbable than the softer materials that actually can absorb the impact itself.

And so materials are always being looked at by the people, the engineers, mostly mechanical engineers. And helmet designs evolve. But there is no perfect helmet. And the problem with helmets in general is that the concussion effect primarily occurs because of a rotation of the head. Not because of a blow that actually can be absorbed in one spot. And so the helmet rotates too. And as a result of the head rotating and the brain moving more on the outside than on the inside, there's torque. And so the helmet can't do much about that.

It can if in fact it's so glossy that the blow doesn't stick to it, doesn't connect to it. Like football helmets are designed that way. They're very hard and very slick. So a lot of things just glance off. And the head doesn't move much. But when people historically had leather helmets or they started putting dentable foam rubber caps on football helmets.

They actually grabbed elbows and knees and created more rotational injury. And so the helmet became a problem under the circumstances. So now that they've gone to these very hard shell helmets, that technology I think has been most helpful in preventing a force that could have been applied in a problematic way that then glances off.

Dr. James Kelly
Well, I think that one of the things that I've seen is that often a concussion occurs in a sport that you would not have anticipated has the risk of sports ... of concussion. Wrestling. There's a good example. Wrestlers wear helmets on their ears to protect from cauliflower ear and so forth. But wrestling at the collegiate level is actually third usually in the incidence of concussion. And I had no idea of that until I stated looking into that and the data that others gather.

And so maybe there's something about that that we can help figure out. Are they falling off the map? Are they colliding as if it's no longer the same sport that it had been historically? And there's a different element to it now. I'm not sure. But that's the kind of thing I think that we need to consider is a concussion can happen in any sport, not just the ones that have collisions inherent in them.

Dr. James Kelly
There is some evidence, at least in certain sports to support that, that girls do have more per capita if you will, per engagement risk of concussion than boys. And I've seen so many young female athletes in basketball in particular more having concussions than boys do at the same age levels. And I don't really understand why that is. People talk about, gee, they're just not as skilled. And they collide with each other because they're not slick in getting away from each other. I don't know if that's true or not.

People talk about how the neck muscles of the male athletes are stronger and can reduce the amount of head movements when there's a bodily contact of some kind that the girls don't have. The truth is I don't know. And I'm concerned about that. Because a lot of times these female athletes aren't even wearing helmets in the very same sport that the men are. And I don't understand that. I think that our concern has to be elevated.

Dr. James Kelly
Well, my advice to parents would be to take this whole thing seriously if your child has a concussion or you think they've had a concussion. Look into it in some detail. And make sure in your community you know what is the route to the proper health care professional in order to get that care that you need? For the athlete, specifically again it's take this seriously. Make sure that you don't take risks that are unnecessary. Protect yourselves. And the other part of it is the concern that I have about collisions.

I think that we should aggressively go after that as an issue and say this is inappropriate. We need to

not do that. You can tackle somebody without knocking him out of the stadium. And the pro players that I do have access to, I'm trying to convince to do that with limited success. Because that's what's celebrated in their world too. But once they understand the actual bodily damage and the long-term effects on them and the others and the fact that they're modeling what is the wrong behavior and the adverse influence that has on youngsters, once they get onto that, these people are really very serious about it. And many athletes have come onboard with saying exactly what it is we need them to say.