CONCUSSION: UNDERSTANDING MILD TRAUMATIC BRAIN INJURY

Moderator: Doris McMillon **Panelists:** Dr. Aditya Bhagwat, Dr. James Kelly, and Lesley LeMasurier

Voiceover

In a micro-second, out of the blue, comes a trauma that changes our life forever.

Doris McMillon

Hard knocks can come with serious consequences. Find out more about the effects of concussion and how they can be treated next on Brainline.

Voiceover

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Doris McMillon

Welcome to Brainline. I'm Doris McMillon. This web cast is the first in a series of discussions we'll be having about preventing, treating and living with traumatic brain injury. Today's program looks at concussion or mild traumatic brain injury, mild TBI for short.

Joining me are Lesley LeMasurier, a senior at the University of Colorado. She's a former Alpine ski racer who was training with the U.S. Ski Team when she suffered the fifth in a series of concussions that ended her career.

Also with us is Dr. Aditya Bhagwat, a board certified clinical neuro-psychologist currently working the Defense and Veteran Brain Injury Center at Walter Reed Army Medical Center in Washington, D.C. Doctor Bhagwat, thanks so much for joining us.

Dr. Aditya Bhagwat

Thank you.

Doris McMillon

We're also very pleased to have Dr. James Kelly on our panel. Doctor Kelly is Professor of Neurosurgery and Physical Medicine and Rehabilitation at the University of Colorado, Denver School of Medicine. He is a Fellow of the American Academy of Neurology and has worked with many professional athletes.

I want to thank you all so much for joining us. And we'd also like to welcome our studio audience. Each year more than 1.5 million people experience some form of traumatic brain injury with cases ranging from mild to severe. Mild TBIs are also known as concussions, and that's what we're here to talk about.

Doctor Kelly, let me start with you. Most people with a concussion, let's say about 85%, are fine after a few weeks. So why is it important to talk about concussion?

Dr. James Kelly

Well, concussions really happen so commonly that still huge numbers of people have them. Even if only 15% have lingering symptoms, that's still a huge number of people in this country and worldwide. And so the concern we have is some may be glossed over or misunderstood, and if we can apply treatments relatively early, even those people can have improved outcomes or recover more quickly.

Doris McMillon

All right. Exactly what is a concussion or mild TBI?

Dr. James Kelly

A concussion is at the mild end of the spectrum of traumatic brain injury in which perhaps an individual has a biomechanical injury, a blow to the head or a whiplash type mechanism injury, and they may or may not be rendered unconscious, meaning coma, for a very short span of time.

But they may have a stunning blow, be confused or something at the time or have a gap in their memory and that is reflecting brain dysfunction. It's a biomechanical effect on the brain tissue itself that sets in motion a series of changes in the nerve cells themselves that cause disruption of function.

Doris McMillon

Okay, so what really happens to the brain?

Dr. James Kelly

A series of things happen. The force itself actually shakes the brain inside the skull. A wave propagates mechanically through the brain tissue and sets off an irritation that actually causes a discharge of chemicals, an electrical discharge across the cortex.

There can also be, if the force is great enough, biomechanical damage that shears the nerve cells. It doesn't do it necessarily instantaneously but the cells themselves swell, especially the part called the axon. And so there can be microscopic damage that we can't see on scans that actually affects the anatomy and the function of the brain cells.

Doris McMillon

Okay, so is it fair to say that that's what's happening neurologically?

Dr. James Kelly

Yes.

Doris McMillon

Okay. How can I tell if I've had a concussion? Do I have to lose consciousness?

Dr. James Kelly

No. It's absolutely not the case that one needs to lose consciousness. And the individual who's had the injury may assume that they've lost consciousness because they can't account for some span of time. That's really memory gap. That's amnesia. That's not necessarily unconsciousness.

So if, in fact, somebody can't account for some span of time or there's a span of time even that they feel foggy and they can't really track what's going on, even without unconsciousness that can be a concussion.

Doris McMillon

So what are some of the other signs of mild TBI?

Dr. James Kelly

Well, right off the—off the bat the signs that people would exhibit would be often in coordination or they would look confused. If we were to do mental status testing right there as we do with athletes on the—on the field, we can tell that they're not making sense, they can't track what's going on or they have memory problems.

Separately then are the symptoms that an individual would express, if they're able to tell you, they have a headache, they'll feel dizzy, nauseated and so forth.

Doris McMillon

So if somebody says after sustaining some kind of trauma how many fingers do I have, you know, we laugh about that but that's for real, isn't it?

Dr. James Kelly

Well, that's a good example because that is used often, but it's not a very good test of whether someone's had a concussion or not. A much better test would be to ask them

to remember something and ask them a minute or two or three later what was it that you were asked to remember.

If they can't remember something like that, they're in amnesia or they're not processing information properly.

Doris McMillon

Let's talk about the confusion and then the nausea. Can you expand on that a little bit more?

Dr. James Kelly

Well, when we're looking at what is the threshold of injury, did somebody really have a traumatic brain injury or not, you need to decide what's the threshold. So if somebody actually has a span of time of confusion where they're not making sense or they're walking in the wrong direction or something after a blow to the head from whatever cause, that may represent confusion right there at the time.

And that's the outward sign that you're really seeing and that may be all there is at the time.

Doris McMillon

How long does that confusion last?

Dr. James Kelly

Well, for most people it's transient, it's momentary. It can be seconds, minutes, it can go on for hours, but that usually bridges to more serious injury and other signs that evolve with time.

Doris McMillon

What about the nausea?

Dr. James Kelly

Nausea, we think, is partly due to the swelling of the brain and the release of neuro-chemicals with the injury itself that actually cause that experience internally for the person.

Doris McMillon

And I know we were talking about light headaches.

Dr. James Kelly

Well, there's headaches that can be quite intense right at the time and, in fact, headaches, whenever we survey individuals who've had concussions, that tops the list of what they experience. Many other things are part of the picture of the syndrome, if you will, of concussion, but headaches seems to be the common denominator, the thing that really tops the list in civilian and sports and military experience when somebody's had a concussion.

Doris McMillon

Now what about mood changes? Is that something that you see?

Dr. James Kelly

Yes. Mood changes can occur acutely during that confusional state. Sometimes big, strapping athletes will be crying or be so mixed up in their confusional state that they can't make sense of what's really happening at the time and so they look bewildered and have a whole variety, a range of emotions.

More commonly, down the road there's a kind of sadness, a creeping sense days and weeks later if the symptoms persist, that can truly be depression. And so there are mood elements that have to do with the dysfunction of the brain and there are also reactions to the dysfunction of the brain. And those become merged in terms of mood issues down the road.

Doris McMillon

Do they go away?

Dr. James Kelly

For some people they go away spontaneously, for others they need help. They need help both in terms of counseling and in terms of medications.

Doris McMillon

Okay. What are some of the most common causes of traumatic brain injury?

Dr. James Kelly

Causes in the civilian world typically have been historically motor vehicle collisions here in the United States, and that still is high on the list. But now with increased data gathering, we're actually seeing that falls has crept up to be a serious problem and that occurs in two age groups – in toddlers who are learning to walk and in the elderly who are beginning to have balance and coordination problems.

Doris McMillon

So either end of the spectrum.

Dr. James Kelly

Either end of the age life cycle.

Doris McMillon

What about… I think when we talked earlier you mentioned young men between a certain age.

Dr. James Kelly

The other peak incidence then is between 15 and 25, and more men than women, males than females in that age group who are more risk-taking, engaged in various activities that have to do with outdoor sports or various other kinds of things that run the risk of traumatic brain injury.

And so there is that age group in which the behavior itself and linked to motor vehicle collisions is really a significant incidence.

Doris McMillon

Okay, Dr. Bhagwat, let me come to you. Let's take a step back briefly and then talk about the full range of traumatic brain injury from mild to moderate to severe. What's been the impact of TBI in the military since the wars in Iraq and Afghanistan?

Dr. Aditya Bhagwat

It's had a pretty large impact. Numbers now are around 20% of soldiers who are service members have suffered some type of traumatic brain injury anywhere on the spectrum from mild to severe. It's also raised awareness of TBI in the military in general so that actually we're better at tracking them and spotting them as well.

Doris McMillon

What's the difference between concussion, which Dr. Kelly talked about, and then some of the moderate to severe TBI cases that you see?

Dr. Aditya Bhagwat

Well, we—actually we see—the majority of what we see, even coming back, are mild concussions, but there is—they run the spectrum from mild to severe. The moderate and severe are really a different animal from the concussion we're talking about. They're often more severe loss of consciousness, more severe alteration of conscious like Dr. Kelly was talking about. You can see findings on imaging much more often, contusions or

bleeds such as hemorrhages in the brain. They're more symptomatic at the time and recovery can take longer as well.

Doris McMillon

What are some of the causes of those TBIs and are the causes the same for mild TBIs?

Dr. Aditya Bhagwat

It depends on the TBI, the type you're talking about. It can be a matter of severity. Like in a car accident someone could have or an MVA in theaters someone could have a mild injury from that or a severe injury. But some of the more moderate and severe injuries we see are more from penetrating injuries as well such as shrapnel from an improvised explosive device exploding or gunshot wounds to the head.

Doris McMillon

Okay. Anything else?

Dr. Aditya Bhagwat

There are also… I mean, you see also the falls and you see motor vehicle accidents. You can have other just combat-related injuries.

Doris McMillon

What might some of those injuries be?

Dr. Aditya Bhagwat

You can have people… I mean, if there are explosions nearby, like the blast injuries that we've talked about, there are primary blast injuries. Even just being near an explosion, a large explosion, can cause an injury.

Doris McMillon

Okay, the IED?

Dr. Aditya Bhagwat

IEDs.

Doris McMillon

Okay. All right. Is there a neurological difference between a concussion that a football player might sustain from a collision compared to the concussion that a soldier sustains when a bomb's exploding?

Dr. Aditya Bhagwat

That's a great question and the answer is maybe. That's where a lot of research is going into right now, to finding the effects of what we call the primary blast injury which is just the force of the blast itself, the wave coming off the—of the blast.

A lot of the folks that we see also have secondary and tertiary injuries, which means the shrapnel injuries, things flying from the explosion and striking them or them being thrown—the individual being thrown into something. I recently interviewed someone where—a soldier who had an RPG explode near him and…

Doris McMillon

An RPG?

Dr. Aditya Bhagwat

A rocket-propelled grenade.

Doris McMillon

Okay.

Dr. Aditya Bhagwat

…where he was thrown against a wall which caused him to lose consciousness.

Doris McMillon

Oh, my goodness! Okay. Are the symptoms the same?

Dr. Aditya Bhagwat

They are similar. They're very similar. They have… Like Dr. Kelly was saying, headaches are the number one—one of the number one symptoms. We have vertigo and dizziness problems, the nausea, some of the photo and photophobia sensitivity to light and noise.

Doris McMillon

Do you see the mood changes as well?

Dr. Aditya Bhagwat

We see the mood changes as well. And, of course, in our population they've also been through very many traumatic experiences, so there's that overlay as well.

Doris McMillon

Okay. What's the military currently doing to try to identify people who might have sustained a mild TBI?

Dr. Aditya Bhagwat

It's a very strong program actually for identifying TBI now. Not only in the wounded that actually come to—come to the hospitals but all returning soldiers that come back get screened one way or another. Often times it's by their physicians or they also have to fill out a questionnaire that asks about symptoms. And anyone who's reporting symptoms that might be due to a TBI will get referred for a full evaluation.

Doris McMillon

Okay, so once you find them then tell us how the diagnosis works.

Dr. Aditya Bhagwat

The diagnosis for us… it's based on mechanism of injury and what the symptoms were during the injury such as loss of consciousness, alteration of consciousness. Cognitive and neuro-psych testing are a piece of that as well but it's really based on the interview and medical records that go into it because while neuro-psych testing is very efficient and it's very good at finding—it's very sensitive to brain dysfunction…

Doris McMillon

Uh huh.

Dr. Aditya Bhagwat

…it's not very specific necessarily. So if you test someone and they have deficits on testing, it doesn't automatically mean they had a brain injury. There are other factors that could be effecting the testing as well.

Doris McMillon

Okay.

Dr. Aditya Bhagwat

So the interview is very important.

Doris McMillon

And generally what are you finding out in the interview?

Dr. Aditya Bhagwat

Well, we talk to the soldier or a service member and try to find out from them what they remember of the actual incident. We can also use collateral information from people that were in their unit that have come back that might have seen the person. And like Dr. Kelly was saying, they might not remember what happened to them but we get reports from others that can tell us what happened.

Doris McMillon

All right. Doctor Bhagwat, thank you so much. In just a moment we're going to talk to Lesley LeMasurier about her experience as an Alpine ski racer, but first a report on sports and mild traumatic brain injury. Garrick Utley is reporting and you might recognize Dr. Kelly. He worked with the hockey player in our story. Let's take a look.

VIDEO

Garrick Utley

Head injuries can happen to anyone, but thrill seekers like Randall Chestnut are most at risk. He's always loved extreme sports – skiing, rock climbing and above all mountain biking.

Dr. Randall Chesnut

When you're skiing downhill on a bumpy, muddy course, it's hard to let the daily troubles of the world stay in your mind.

Garrick Utley

It's young adults who sustain brain injuries most frequently. They drive too fast, play too hard, take too many risks.

Dr. Randall Chesnut

I'm not sure it's the risk that's the appeal of sports that some people would call extreme; I think it's the challenge.

Garrick Utley

But when we met Chestnut at this hospital in Portland, Oregon, it wasn't because he'd injured his head (though he did break his neck once while rock climbing); it's because Dr. Chesnut is Director of Neuro-trauma here and one of the top neurosurgeons in the country.

Dr. Randall Chesnut

Traumatic brain injury is the leading cause of death in patients between 15 and 45 in the most productive years of their lives.

Garrick Utley

For those who survive, a brain injury can undermine everything that makes us human – our ability to think, to learn, to remember and to relate to the people we love. He looks at first like any other Dad teaching his three year old son how to skate.

Pat LaFontaine

All right, you have to skate over to Daddy.

Garrick Utley

But this father in Greenwich, Connecticut, knows his way around the ice.

Pat LaFontaine

Good job. All right, here we go.

Garrick Utley

It's Pat LaFontaine who might be the best American-born hockey player ever. He played 14 years in the NHL and scored 468 goals. He'd still be playing now except for one problem. During his career Pat sustained at least six concussions.

Pat LaFontaine

You play with injuries, you play sick. It's kind of a ritual of a hockey player that you don't complain. You know, you're there and play and overcome the adversity and the injuries and just push through it.

Garrick Utley

But then came a concussion that even Pat couldn't ignore.

Pat LaFontaine

I remember trying to make a drop pass to one of my teammates who was cutting behind me and just at the last second I looked up and that was it. It wasn't til later that I found out that the player who hit me was 6'6", 235 and the only part of my body that was hit was my head. And I had lost my helmet and my forehead had slapped off the ice.

Garrick Utley

Sports are a major cause of brain injury from youth leagues up to the pros. Studies show that every year seven to 10% of all football players sustain a concussion. Most of us think a concussion means being knocked unconscious, but neurologists define it much more broadly as any change in mental status resulting from trauma.

Dr. James Kelly

The players commonly will withhold information about the symptoms they're having in order to get back at it. I even know of one young high school football player who died after having told a teammate don't tell the coach that I have a headache and I feel like I'm gonna throw up. And in the second half of that football game he died.

Garrick Utley

After his concussion, LaFontaine tried to soldier on. He played six more games but his symptoms soon got worse.

Pat LaFontaine

I couldn't sleep, I started getting headaches—migraine headaches and I became very symptomatic. I was wiped out physically, I was emotionally depressed and… A total personality change.

Garrick Utley

How was this being manifested, felt in the family?

Pat LaFontaine

At one point I was reading a story to my daughters and had trouble focusing in on the words, and then skipping over words and then having to look at my daughters and say that Daddy—Daddy's just gonna have to read this story another time.

Garrick Utley

Over the next six months his symptoms receded and Pat yearned to play again. Doctor Kelly told him bluntly of the risks, but then he cleared Pat to play.

Dr. James Kelly

When I examined him in some detail, I couldn't find anything I was worried about. And as a physician, those are the individuals that I can say honestly to, "I think it's okay to go back but you understand you run a statistical risk of this coming back and maybe even being worse even with a relatively lesser force".

And then it's up to the individual.

Garrick Utley

Pat played 67 more games for the New York Rangers but then in March 1998 he banged into a teammate and got hurt again. It was a lesser collision this time; Pat wasn't even knocked out but the effects (headaches and chronic sleep problems) lingered for months. This time Dr. Kelly told Pat it was time to quit.

Dr. James Kelly

One additional concussion could, indeed, tip him over the threshold into a permanent condition of memory deficits and difficulty with concentration and organizing his thinking. And it's just not worth the risk because it has taken so long for him to recover from relatively mild forces.

And I don't think that his brain can tolerate much more.

STUDIO

Doris McMillon

Doctor Kelly, that report was done a little while ago. How is Pat LaFontaine today?

Dr. James Kelly

He's actually fine. He recovered fully again from that last concussion that was mentioned. I had nothing that could be found on detailed examine or on scans. He's now working in the civilian world, the non-sports world and doing very well.

Doris McMillon

Great. That's a good report. Joining us now, Lesley LeMasurier is one of Dr. Kelly's patients. By 18 years old she had already experienced four concussions. One was the result of a car accident, the others were caused by her sport of choice, Alpine ski racing. Lesley, how did you get started in skiing?

Lesley LeMasurier

Well, actually, my whole family learned to ski about the same time. I was about six years old and it was just something different that we wanted to try. And we all enjoyed it and we started skiing full time at Wintergreen Resort down in Virginia.

Doris McMillon

And so what'd you like about it?

Lesley LeMasurier

I just liked that it was different and challenging and fast, and it was all around very fun and I just really enjoyed it.

Doris McMillon

Now to those of us who aren't skiers, ski racing seems so out of control. I mean, was fear a part of the process for you?

Lesley LeMasurier

Not when I was younger. When I was a little kid, it was just so much fun and I loved it. And as I got older and started crashing more and more often, there was a little fear involved. But for the most part as a kid I was—just loved doing it.

Doris McMillon

So how did you feel about the crashing part in the early days?

Lesley LeMasurier

It was just part of the sport really. It was just something that came along with the sport. You're gonna fall if you're gonna go at high speeds and so I didn't—I wasn't too scare of it. It just… When I started injuring myself, that's when there was a little more fear involved.

Doris McMillon

Now tell us about your very first concussion.

Lesley LeMasurier

My first concussion, actually, was in pre-season training. We played soccer a lot and it actually came about during a soccer game. I got—took a knee to the side of the head and it was just—it was a mild concussion. I didn't lose consciousness but I was very dazed and confused and I just had a headache. And so I was out for about a week, out of—out of training.

Doris McMillon

So the—any other last effects from that one?

Lesley LeMasurier

Not really. Nothing… I mean, I had a headache but they all sort of went away and I went back to training.

Doris McMillon

Okay, now you experienced two more concussions. What were doctors telling you and your parents?

Lesley LeMasurier

Not a whole lot, actually. My parents knew nothing about the brain or brain injury and they were actually in Virginia. I was in Vermont going to school at the time, so they were kind of at a distance. And the doctors just said, you know, be careful and…

Doris McMillon

That was it.

Lesley LeMasurier

But it wasn't… You know, skiing isn't a careful sport.

Doris McMillon

Right. Tell us, if you would, about the crash that you experienced when you were training when the—with the U.S. Ski Team.

Lesley LeMasurier

It was a fairly major crash. I had actually been dealing with symptoms for about two years. I had migraines and was having a hard time sleeping and trouble focusing. And basically I just crashed so much I actually had a broken leg and some torn ligaments in my other leg at the same—at that time when I entered the race, but I was just pressured to basically compete and perform.

And I lost—I was unsteady on my left side and lost my balance and tore through three safety nets and barreled into the woods. And when I stood up, my helmet was in two pieces at my side.

Doris McMillon

My stars! Now you said you felt pressure. You felt a lot of pressure from your teammates, pressure from yourself?

Lesley LeMasurier

All around. I mean, there was pressure from every angle, really, from coaches, teammates, you know, family members.

Doris McMillon

Did you tell them that you weren't feeling well?

Lesley LeMasurier

It was actually something I sort of protected. I was a little bit in denial about the way that I was feeling and it… You don't wanna everyday say that you feel sick cause you're gonna start sounding like you're a complainer or making it up. So I just kind of protected that—you know, how bad I was actually feeling.

Doris McMillon

Uh huh. And what was going on in your mind during all this time?

Lesley LeMasurier

That's when the fear started to really creep in, I think, because I couldn't explain, you know, what I was feeling to myself. I just—I had migraines, my heart rate was very high and I was having trouble seeing. My eyes hurt. Couldn't read without getting a migraine.

Doris McMillon

Now you said—you said your heart rate was high. How did that manifest itself?

Lesley LeMasurier

Well, during training we would train with heart monitors on when we were, you know, running or any type of workout on land. We would wear heart rate monitors and work out in zones. And I basically couldn't stay in the zone. I just was so much higher than all my teammates and was not recovering.

Doris McMillon

Now let me ask you this. You wear a heart monitor to check your heart. If the rate of your heartbeat goes up high, that's a problem right?

Lesley LeMasurier

Right.

Doris McMillon

And did anybody else know that?

Lesley LeMasurier

It was discussed but they just thought because of the other injuries that maybe I was just out of shape. And…

Doris McMillon

You were out of shape? Okay. I'm gonna move on past that one. I think you said about no blood, no break, keep going.

Lesley LeMasurier

Right.

Doris McMillon

And that's what you did.

Lesley LeMasurier

Right. The pressure… When the pressure's on, I mean, just basically there's no blood, no break, I'm gonna keep going period. That's what—that's what athletes do. They push through adversity and push through the pain and just try to perform.

Doris McMillon

And that's what you did?

Lesley LeMasurier

Correct.

Doris McMillon

Did you win?

Lesley LeMasurier

I didn't.

Doris McMillon

Okay.

Lesley LeMasurier

I ended in MRI scans and was in the hospital basically.

Doris McMillon

All right. That's a—that's quite a story. Doctor Kelly, what should we do as parents, as coaches, you know, if an athlete does suffer a brain injury like Lesley did?

Dr. James Kelly

Take it seriously, certainly that kind of injury but even less clear injuries like the ones that Lesley described earlier, because then I think that we have to acknowledge that those were concussions and maybe closer monitoring and so forth could have protected her from additional problems down the road. And so a parent or a coach needs to identify a healthcare professional even if it's the—the—the primary care family doctor to start with in order to identify the nature of the problem and get additional specialty help if necessary.

Doris McMillon

Now do you find that some athletes like Lesley just try to just ignore a brain injury, just keep on going, work through it?

Dr. James Kelly

More commonly than not. Yes. The athletes… And it's admirable in some ways that they are serious about their sport and they wanna get back at it, but it can be very harmful under these circumstances. And so we really need to get them onboard with the idea too, not to deny the symptoms.

Doris McMillon

Well, in light of the fact that these symptoms can be long term and long ranging, I mean, how do you change the mindset?

Dr. James Kelly

Well, you know, I've been trying this my whole career and it's been with limited success. I really do think that the athletes like Pat and Lesley are better at convincing other athletes than I've ever been. They really do listen to each other under those circumstances.

Doris McMillon

Okay. Let me turn to Dr. Bhagwat. You know, I can imagine these feelings of not letting the team down. I mean, nobody wants to do that. But would it be significantly more intense on the battlefield? How does this issue play out during a war?

Dr. Aditya Bhagwat

I'm sure it would be… You hear from the docs in theater about the troops who are injured in any way wanting to return to be with their comrades, but we are more aware of it now. Commanders, the medics, even the phys—service members themselves are aware of TBI.

There's an instrument in theater now that can be used called the MACE to identify TBI…

Doris McMillon

And that is?

Dr. Aditya Bhagwat

It's the Military Acute Concussion Evaluation and people are trained on how to use it. So anytime there's an incident, whether it's an explosion or a car accident, that can be brought out and the soldier can be assessed quickly.

Doris McMillon

Okay. All right. And that's key.

Dr. Aditya Bhagwat

It's key…

Doris McMillon

Right.

Doris McMillon

Now, Dr. Kelly, you treated Lesley.

Doris McMillon

What's her prognosis and do her multiple concussions make her more vulnerable?

Dr. James Kelly

Well, to the first question, we've talked about this in the last year or so, that the persistence of her symptoms and some subtle findings on examination suggest that it would be unwise for her to return to that level of competitive skiing. And we've talked openly about that before.

The risks are just too great. But in terms of continued improvement and getting around things, even just today I was learning that some things that I heard before she was struggling with are now resolving. And so continued improvement is—is—you know, is part of the picture.

Doris McMillon

Okay. So she should not and will not ski competitively again?

Dr. James Kelly
Well?

Lesley LeMasurier
Correct.

Doris McMillon
Correct. Lesley says no question. So how long do the cumulative effects last?

Dr. James Kelly
Well, there's a greater risk earlier on after a concussion. The sooner after a concussion there's another risk or exposure, the more likely there's really going to be a repeated concussion under those circumstances. But we've been studying individuals in the sports community for years and after there have been at least two or sometimes three concussions at some span, they have perhaps, you know, a decade or two decade or a lifelong increased risk of concussions from those earlier concussions.

We really don't understand why. There may be some anatomical underlying change that's still there that we simply can't see that makes it more vulnerable—the brain more vulnerable. But we do know statistically the risk is greater if people have a history of concussions.

Doris McMillon
Okay. Lesley, let me come back to you for a moment. Talk about that heart rate situation again. What were your symptoms?

Lesley LeMasurier
Basically, it would just… You know, if I was working out, it would just be so high for so long and it wasn't recovering when it was—when I was just, you know, walking around trying to bring it down in order to do the next exercise, and it led to exhaustion. And then I was also suffering from, you know, trouble sleeping at night.

So it was just this cycle of I wasn't sleeping at night and during the day my heart rate was incredibly high when I was standing. And then I would just be so exhausted and have migraines.

Doris McMillon
What would happen… Like I think you mentioned when we talked earlier about just walking across the campus.

Lesley LeMasurier

I was… When I would just walk, I would be out of breath and, you know, sweating, and it was like I was out for a jog when I was basically just walking to class. It was—it was kind of… I would be embarrassed, you know, walking with my friends and here I am…

Doris McMillon

Breaking a sweat.

Lesley LeMasurier

Yeah. Exactly.

Doris McMillon

Yeah. Okay. Doctor Kelly, let's talk about the invisible symptoms.

Dr. James Kelly

Well, actually, that particular problem is something that I think physicians haven't really paid attention to well enough over the years. Lesley's condition I've seen in many athletes and other individuals. It's called positional or postural ortho-static tachycardic syndrome.

Doris McMillon

Now you wanna translate that?

Dr. James Kelly

And that means that the heart rate goes up when you stand. And so the best way to test it is to have the individual lying down for a few minutes so that the plumbing is horizontal, so to speak, the heart isn't working very hard, and then you—you just—you take the blood pressure and pulse and then you ask the individual to stand up, wait a couple of minutes and do it again.

And under those circumstances it was very clear that Lesley's pulse went pathologically high. It wasn't just the usual bump that we would get.

Doris McMillon

Right.

Dr. James Kelly

It was way high. Thirty beats a minute more just by standing.

Doris McMillon

Wow!

Dr. James Kelly

And that is one of those residual effects of a concussion that I think without doing that kind of testing you just don't know about.

Doris McMillon

Doctor Bhagwat, how does the invisibility of mild TBI impact the people that you see at Walter Reed?

Dr. Aditya Bhagwat

Well, at Walter Reed I think one of the goals that we have is to not have it invisible. To make it as visible as possible we have a lot of information disseminated about TBI. Almost every service or every service in the hospital and surrounding areas will know about the possibility of TBI.

We screen very thoroughly every patient that comes through for a possibility of TBI. And let's say a person has a wound that likely might not have caused the TBI. If they report to their physician any symptoms that seem like they could be related, he'll still get thoroughly evaluated by us.

Doris McMillon

And so you don't miss it at all if you can.

Dr. Aditya Bhagwat

If we can. Sure.

Doris McMillon

Right.

Dr. Aditya Bhagwat

Absolutely.

Doris McMillon

All right. Well, thank you so much. I'd like to thank everyone. And now I'd like to talk about treatment for concussion. And, Dr. Kelly, Lesley came to you after multiple concussions. What treatment did you recommend for her?

Dr. James Kelly

The commonest treatment that seems to be effective is helping people become pain-free or reduce their pain and have them sleep better.

Doris McMillon

Uh huh.

Dr. James Kelly

It's uncommon, in my experience, for people with lingering symptoms from a concussion to be sleeping normally. Usually superimposed on that concussion effect is sleep deprivation that protracts the course of recovery. And so if we can help them sleep better in a predictable every night pattern and get deep, restful, rejuvenating sleep, the concussion symptoms often resolve. And so that was the first approach that we use.

Doris McMillon

Well, how do you determine what the right course of treatment is in the case of mild TBI?

Dr. James Kelly

It has to be individualized. Every individual's version of their concussion and how it is they're affected is a little bit different one from another. And so even though there can be common themes and there are common symptoms and even findings on exam, it's usually the case that somebody will benefit from one thing a little bit more than another.

The pain relief, the sleep issues, there may be mood medications that are necessary if it's a long time out from the injury and so forth. So depending on that particular person's concussion effect, we may tailor it differently.

Doris McMillon

How different is the quality of treatment across the country?

Dr. James Kelly

Actually, we're getting better at it nationwide in all areas little by little, but we've still got a long way to go. Even identifying concussions in sports or in the emergency departments of our country we have still a long way to go to get everybody on board with just identifying a concussion and dealing with it in a—in a serious way rather than just dismissing it.

But I think much, much more information is out there now than had been even 10 years ago. And the major physician organizations are really coming on board with making sure their membership understands this.

Doris McMillon

Okay. Doctor Bhagwat, would you follow the same course of treatment in the military population?

Dr. Aditya Bhagwat

In general, yes. It's symptom-driven. Now our service members are often different from sports concussions because they often have other traumatic injuries, whether they be amputations or other internal injuries, as well as psychological trauma from post-traumatic stress disorder.

But, again, the treatment is target-driven, so we look for pain, try to control pain. Early education, intervention's very important teaching them what a concussion is, what the expected symptoms are and the expectation for recovery down the road.

Doris McMillon

Okay. Are there any other unique challenges dealing with mild TBI in the military?

Dr. Aditya Bhagwat

I think significant is the overlay of pain and the other injuries and the psychological issues that come through not just from the traumatic experiences but from being away for so long and seeing all the things that they've seen. So I think that complicates the picture.

Doris McMillon

Okay. And then the other wounds that they may be dealing with themselves.

Dr. Aditya Bhagwat

Right. Right. All the rehabilitation that takes place, especially for our amputee population. There's a long rehab process that's involved as well. A lot of pain, multiple surgeries, all these things can help also to perpetuate the symptoms that might have started with a concussion, then get perpetuated from all these other injuries.

Doris McMillon

I see. Are there any special rehab protocols?

Dr. Aditya Bhagwat

We have early intervention rehabilitation-wise. We have a multidisciplinary team that tracks every TBI patient, involves everyone from neurologists, physical therapists, occupational therapists, speech therapists, psychologists, neuro-psychologists, a whole gamut of people are involved in treatment.

And we start that treatment early at Reed itself—at Walter Reed, and then we also work with the VAs, we work with community-based organizations. So there's a thorough treatment blanket.

Doris McMillon

Doctor Kelly, what do we see in the general population?

Dr. James Kelly

Actually, the same basic picture in terms of symptoms, although the symptoms that people under the circumstances in the military express are very much as we've just heard from Dr. Bhagwat. The civilian population tends not to have as much post-traumatic stress disorder, although it certainly can happen.

And so the—again, targeting the nature of the problems that the individual expresses is key to this whole thing.

Doris McMillon

How do you determine whether or not someone has had a brain injury, and then how would that affect treatment?

Dr. James Kelly

Well, again, we have to look at what actually happened to the individual at the time. And it's absolutely critical to get as much information about that as you can. So in my clinic, for instance, I'll try, if I can, to get the paramedics information, I'll try to get eyewitness reports.

I'll call individuals who actually have been living with that individual or watching that person at work to look at the whole spectrum of change in that individual over some span of time and try to get that information in to determine whether a concussion occurred, how bad it was, how much of that is what I need to address versus another professional in some other area of medicine.

Doris McMillon

Doctor Bhagwat, what are researchers up to these days that you think might help people who have mild TBI?

Dr. Aditya Bhagwat

Looking at the symptom picture and what is—what are ideal treatments for mild TBI, I think something more important is just information dissemination, which DVBIC does a lot of to get information out there, teaching early on what the effects are and the expectations for recovery.

We're also looking at what is the symptom picture and what treatments work best with which types of symptoms.

Doris McMillon

How can we best address the psychological affect of brain injury?

Dr. Aditya Bhagwat

The same way with any other psychological affect. Early intervention with psychotherapy, cognitive behavioral therapies can be very useful. I think the more knowledge the patient has, the more power they have.

Doris McMillon

And, Lesley, I know Dr. Kelly said it's probably a good thing that you talk to your peers and folks that you participated with athletically. Does that help?

Lesley LeMasurier

Yes. I mean, it helps for me to talk about what's happened, but it also helps… surprisingly, still very little known is about it, among, you know, my family and friends and teammates and, you know, I'm just constantly teaching them more and more about TBI. It's just a constant learning process.

Doris McMillon

Quickly, how did your parents and friends respond once they figured out that there really was something wrong?

Lesley LeMasurier

There were a lot of questions that were answered at that point because they didn't know what was going on. I basically changed completely as a person. I was very, you know, angry and upset and frustrated and just always looked sick and felt sick. And so a lot of those questions were answered and they've been very supportive.

Doris McMillon

Well, we've talked about mild TBIs, who's at risk and the causes, we've discussed symptoms and treatment. Now let's look to the future. How can we best prevent brain injury? Here's more from Garrick Utley.

VIDEO

Garrick Utley

For professional athletes and for the rest of us, the biggest risk is having repeated concussions based closely together.

Dr. Randall Chesnut

As long as you're gonna be slamming into each other, you're gonna get hurt. We just need to make it so that when people have a concussion, they don't go right back out and play again. You can play for 10 years, have five concussions and do fine. If you play for 10 years and have five concussions in one season, you may never be the same.

Pat LaFontaine

Wanna go on the swing set?

Garrick Utley

Pat feels fine now, but Dr. Kelly says we need to take concussions much more seriously.

Dr. James Kelly

So we are advocating that at least some form of standardized mental status or neuropsychological testing be performed in athletes before their return to play.

Garrick Utley

Prevention is still the best approach to brain injury.

Dr. Randall Chesnut

I'm not going to advocate that we not do sports with some element of danger; however, those sports should be done as safely as possible. If you're gonna ride a bicycle, wear a helmet. If you're going to ski hard, consider wearing a helmet. Maybe someday if you're gonna drive your automobile we'll be considering wearing a helmet.

Pat LaFontaine

Okay, you gotta put your helmet on, though.

Garrick Utley

Helmets and seatbelts are essential, but they're no guarantee.

Dr. James Kelly

I played football and I wrestled and I recognize now how unsafe those activities were that I engaged in. And I simply would not allow my son to be subjected to those risks now.

Garrick Utley

And Pat LaFontaine, whose career was cut short by six concussions, would he let Daniel play professional hockey?

Pat LaFontaine

Well, if he—if he continues to show the love of the game and enjoys it. Seeing him and seeing his face and his competitiveness, I have a feeling he's gonna play sports. And watching the enjoyment he gets out of just skating, he might be out there playing. But if he chooses to play at that level, I don't think I'll have a problem.

Dr. James Kelly

What people don't really fully acknowledge is that the brain is truly the organ of the psyche and that the things we think, the things we feel, not just memory and concentration and all those sorts of cognitive functions, but the true core parts of us, who we are, emanates from the brain. And injury to the brain changes who we are.

STUDIO

Doris McMillon

You know, Dr. Kelly, some people will think it's pretty drastic not to allow your child to play certain sports. Why such a hard-line stance?

Dr. James Kelly

Well, in my case my son made it easy. I mean, he never did play the sports without helmets that I did as a kid. On the other hand, he's a pilot and flies gliders and airplanes now, so there's a different risk that he's taking…

Doris McMillon

Right.

Dr. James Kelly

…in a different way with the hopes of a military career. And so there are things that I think all of us as parents need to do to protect our kids in whatever realm we have control over and guide that. And certainly helmets in high risk activities are a part of that picture.

Doris McMillon

Well, Pat, in the piece that we just saw, said, you know, even though he knows what the risks are, if he son wants to play, then he'd probably let him go ahead and play.

Dr. James Kelly

Well… And he and I've talked about that at some length and I think if you really look at the risks an individual has even at that elite level of sport, it's still the kind of thing that he would allow under the circumstances for his child growing up, taking more precautions than he ever did.

Doris McMillon

Well, let's talk about making sports safer.

Dr. James Kelly

That's really what this is all about, as far as I'm concerned. And those of us who've done sports research in concussion for our academic work are really interested mainly in making those sports safer, not exposing problems, not causing trouble, but truly trying to make it safer for the athletes to play.

And so some of it has to do with helmet design, a lot of it has to do with rule change and behavior change and reducing risks and so forth, as Dr. Chestnut was talking about.

Doris McMillon

Are there any sports you feel should be outlawed?

Dr. James Kelly

Well, I, my whole career, have gone along with the American Medical Association and the American Academy of Neurology in calling for a ban on boxing. But as you can see, we haven't been very successful in that either.

Doris McMillon

No.

Dr. James Kelly

But for me I don't consider that a sport in the same way all the others are that we talked about. If the intention is to produce brain injury in somebody else before he produces it in you, I don't consider that a sport.

Doris McMillon

Well, could you say what you mean? Okay. In addition to wearing helmets, what are some of the other ways that we could prevent mild trauma?

Dr. James Kelly

Again, rule changes in sports would be one important thing. I think that what's happened in certain sports is that there's actually a tendency toward more violent collisions, and I've seen that over my academic life in hockey and football as just two examples.

And I think that if we can change some of that behavior, we can reduce the incidence. I think that if we can keep kids from taking unnecessary risks in life in many other ways, and parents have a big obligation and opportunity under those circumstances to protect their kids…

Doris McMillon

But they tell you the kid's gotta live, he's gotta play.

Dr. James Kelly

Well, I think that we can actually lop off the extreme ends of that and still give them plenty of room to play.

Doris McMillon

Okay, let's talk about baseline testing in the general population. What should we do?

Dr. James Kelly

Baseline testing in the general population may ultimately happen down the road. I don't see any society now that we've been looking at other nations that's actually had much affect in doing that. We're able to do it in specific sports. The pro ranks mostly do that now.

Many of the big colleges pre-season test their athletes. By baseline, what we're talking about is some battery of cognitive and other tests that can be done before the individual's at risk of some kind of concussion. And those are the kinds of things that our neuron-psychologist colleagues have driven forward.

And we've learned a lot because then we can use those same instruments if a concussion does occur to track the recovery and guide that.

Doris McMillon

Okay. In addition to wearing helmets, what else do you think we need to do?

Dr. James Kelly

Again, I think largely it's behavior change. It's convincing people to not take risks as we have been in our society.

Doris McMillon

Okay. Doctor Bhagwat, what are the challenges of conducting baseline testing in the military?

Dr. Aditya Bhagwat

I think there are challenges in the military and civilian world to do it. If you just think of the numbers of how many service members there are, just the volume of testing that would have to be done to do it efficient—efficiently, yet do it well, is difficult.

It's also you wanna do baseline testing, the goal is to really find them at their optimal level so that if there is an injury, you can see a drop. But getting these many people tested when they're at their optimal level… If you have a person who maybe has the flu but is in line and gets tested, then you're not gonna get their optimal function. So…

Doris McMillon

Okay. What are some of the other prevention efforts in which the military is involved right now?

Dr. Aditya Bhagwat

I think the biggest prevention efforts for these would be the gear that they have, the type of gear they wear, the type of helmet design that we were talking about in sports as well, but in the military as well, that can absorb maybe more of concussive forces.

Doris McMillon

And that's even changed a lot, hasn't it?

Dr. Aditya Bhagwat

Oh, sure. absolutely. Absolutely.

Doris McMillon

How do you—how successful do you think that a broad prevention campaign has been in the country, and then why is it so hard to get someone to wear a helmet or a seatbelt? Doctor Kelly's smiling too. You can both answer.

Dr. James Kelly

Well, we've tried real hard to get just motorcycle helmets on the books as laws and in two of the states I've lived we've had very little success on even getting that to happen. And that seems a pretty logical thing to do and most states do have some type of helmet law.

But then there are people who object to that and don't want that kind of restriction. They don't wanna be told. They'll choose to do it and so forth. So in our society where we have individual freedoms that are so important to us, that debate has to go on and I think that it'll go on for years because we really need to have more effective societal controls under the circumstances that don't limit individual freedoms.

Doris McMillon

Doctor Bhagwat?

Dr. Aditya Bhagwat

I was thinking also maybe there's a subset or a good set of the population that maybe minimizes what the effects with concussion might be and just don't think it's that big of deal. Just getting your bell rung once in a while may not have that much of an effect on your life.

They see it happen in sports. They don't see the outcome sometimes to these athletes, what happens with repeated concussions. So I think until they've experienced it it's kind of a—maybe it's no big deal.

Doris McMillon

Now, Lesley, you said that your helmet was kind of torn in two. Imagine if you hadn't been wearing it.

Lesley LeMasurier

I don't wanna imagine that. I was traveling, you know, about 70 miles per hour when that happened and I don't wanna imagine what would have happened had I not been wearing the helmet.

Doris McMillon

Okay. Well, I see that we have people in the audience who have some questions to ask. Thank you so much. Go ahead with your question.

Audience Member 1

My question is for Lesley. How would you recommend talking to a 20 year old who's not really interested in wearing their helmet on the slopes?

Lesley LeMasurier

Well, basically, they don't wanna be in my position ever where I'm watching from the lodge and I'm not thinking—I'm looking at 20 year olds thinking, "Oh, they look nerdy in their helmets". I'm thinking, you know, they look like they're about to go do what I wanna do.

And I… You know, even though I was going 80 miles an hour and was wearing a helmet, injury will still occur, you know, if you're wearing a helmet. So you should—you should take that extra precaution. If you're not wearing a helmet, you—I wouldn't—you know, just like I just said, I wouldn't wanna imagine what would have happened had I not been wearing the helmet.

It would have been much more severe. So I would just say, you know, suck up your pride and wear the helmet.

Doris McMillon

Thanks so much. And I think we have another person who has a question. Please go ahead.

Audience Member 2

Will heading a soccer ball give my child a concussion?

Doris McMillon

Doctor Kelly? Doctor Bhagwat?

Dr. James Kelly

The Institute of Medicine a few years back pulled a panel together and the research we were able to use at least several years back indicated that heading the ball, as best we could tell, if it's done right in the usual manner of propelling the ball in the other direction by the plan, does not produce concussion.

And even just last year the Swedes did a very nice study looking at individuals heading the ball and then doing spinal fluid analysis, spinal taps, looking for evidence of leaking from nerve cells that they had already seen in boxers, and they found none in the soccer players who were heading the ball.

So while it may not be a zero risk, we're not seeing evidence of our kids' brains being injured by heading the ball in soccer.

Doris McMillon

What about the neck?

Dr. James Kelly

Well, the important issue is doing it right. And so if we can tighten the neck muscles and propel the ball so that the blow that the ball produces is damped, if you will, physically by the mass of the whole body…

Doris McMillon

Uh huh.

Dr. James Kelly

…then things work out, we don't have a problem. But if even inadvertently, especially a youngster's head is hit by a ball that they don't see coming and the head moves, concussion can occur under those circumstances. So it's not as if soccer itself as a game with collisions and all has a zero risk of concussion, but heading the ball, when done properly itself, apparently does not.

Doris McMillon

Okay. But just another note on helmets. If football players have to wear them, why shouldn't soccer players wear them?

Dr. James Kelly

Well, there have been some attempts at making soccer helmets and those haven't really worked out very well because what you're really looking for is something that would prevent the collision kind of concussion in soccer from another person's knee or heading each other because you're trying to head the ball. And that kind of helmet interferes with heading the ball and playing the game and so forth, and so it just hasn't worked out.

Doris McMillon

Okay. Let's take another question.

Audience Member 3

Does having a concussion make it more likely that someone will get Alzheimer's or Parkinson's disease?

Doris McMillon

Doctor Bhagwat?

Dr. Aditya Bhagwat

I think there's no data to say that one concussion in a lifetime will increase the risk but repeated concussions can increase your risk. And, of course, we've also shown that having one concussion can increase your risk for having another. So repeated concussions can increase your risk, especially if you have other loading for that risk anyway, like family members or…

Doris McMillon

Okay. Doctor Kelly?

Dr. James Kelly

The issue really is a combination of genetic predisposition, as Dr. Bhagwat's mentioning, and the exposure to concussion. There is some evidence even with one severe brain injury and the predisposition genetically. Those individuals are worse off much like an Alzheimer's picture down the road with just that combination.

But the interesting thing would be in boxing again with people who have a lifetime, a career of multiple blows to the head. And we know very well about what that looks like, which is very similar to—a little different in terms of the cellular change but it's very similar to either Parkinson's or Alzheimer's, a combination of those for many boxers who've had long professional careers.

Doris McMillon

It's kind of what we've seen in Muhammad Ali.

Dr. James Kelly

Correct.

Doris McMillon

Right. Okay, let's take another question.

Audience Member 4

Hello. If I were to have a concussion now and recovery fully, what are the chances that I'll have problems down the road with issues like memory or mood?

Dr. James Kelly

Your statistical risk of concussion is increased but long-term risks down the road we don't know. It's not a very satisfying answer. I can't say for sure that when you're my age you might have more problems with memory and so forth. We just don't have that kind of long-term data just yet from a single concussion or even a couple.

But it looks like the individuals who have multiple concussions or a much more severe injury who—are more likely to have those problems down the road and many, many individuals with a single concussion just fully recover and don't have a lifelong problem.

Doris McMillon

Doctor Bhagwat, did you wanna…

Dr. Aditya Bhagwat

No, I would agree with that. I think a single concussion, the likelihood is within a few days, weeks you'll recover completely, and then we don't have the data to show that down the road you're at increased risk.

Doris McMillon

Okay. Well, let's take another question. Thank you so much.

Audience Member 5

With senior citizens I'm wondering how you can tell the difference between the natural consequences of aging and a possible concussion, for example, memory loss.

Dr. Aditya Bhagwat

Well, again, Dr. Kelly had mentioned before, we have to look at—there has to be an injury for there to be a concussion. If the person has fallen or has been struck in the head for some reason, then you can look at the effects of concussion. And in terms of memory loss, if it was a concussion, there would be other symptoms that would go along with it – headaches, nausea, dizziness, maybe light sensitivity.

If those are—if none of those are there and there was no mechanism of injury, the person didn't strike their head, then you would look at, you know, one of the other options like a dementia or something.

Doris McMillon

All right. Okay. One of the things that we talked about earlier, of that spectrum of toddlers falling and hurting themselves and seniors falling and hurting themselves, what do we do—how can we help the seniors in terms of not falling and then sustaining TBI?

Dr. James Kelly

That's actually a part of a program that's of major interest to geriatricians and internists and neurologists, and there's actually a group that's taken on that specifically to look at how do you prevent falls, what are the causes of falls. Is it balance problems?

Is it that they're just not paying attention and it's really a cognitive problem and they didn't see that there was a curb there, whatever. Is it vision? And so if, in fact, we can look at what the multiple organ system issues are and in an individual's case address those, once again tailoring to the individual, we can probably prevent at least some of that.

And so that's part of the concern right now for those physician organizations and there may be other groups involved as well.

Dr. Aditya Bhagwat

No, that's right.

Doris McMillon

Okay.

Dr. Aditya Bhagwat

I mean, I don't think there's a way to prevent 100% of falls. But looking at these factors and trying to reduce them…

Doris McMillon

Okay. Let's take another question.

Audience Member 6

Lesley, what's your recommendation for young athletes like you who are forced to give up the sport they love at such an early age?

Lesley LeMasurier:

Well, it was—it was hard to give it up. It was—it was hard to accept that, you know, I wouldn't be skiing any more. But I basically—it didn't happen overnight but I found other things. You know, I was in school at the time so I just focused on academics and focused on, you know, finding other avenues, you know, working out, just doing, you know, mild

activity and playing tennis and playing golf. But it's been a process definitely and I would just recommend that, you know, they find other outlets, other things to do. They're not gonna probably ever have that thrill if they were thrill seekers but, you know, they can find other avenues.

Doris McMillon

Get a different thrill now.

Lesley LeMasurier

Right.

Doris McMillon

Okay. Let's take another question and then we're gonna be wrapping it up in just a moment. Thank you so much.

Audience Member 7

We hear a lot about brain health and brain exercises these days. Would those be helpful to a person who has sustained a concussion?

Doris McMillon

Go ahead.

Dr. Aditya Bhagwat

I think they would be. That's part of the rehab process with… Speech language pathologists and OT, occupational therapists, would use tools like that. I don't think it would hurt the general population to do more of those things as well with or without an injury.

Doris McMillon

Doctor Kelly.

Dr. James Kelly

It really is important and the team approach then to the rehabilitation of those issues for a given individual does include specialists that specifically use those various cognitive tasks, homework and various things that actually do enhance the opportunities for individuals to improve in those ways that the—the—the specific cognitive problems they've had would indicate they've—they need help.

Doris McMillon

All right. Thank you so much. In closing what I'd like to do is get a final thought from each of my terrific panelists. Doctor Bhagwat, let me start with you.

Dr. Aditya Bhagwat

I think most—one of the most important pieces is the education piece, that the public get more awareness. I wanna thank you for putting on this show. Hopefully many people will watch it and learn more about concussion and not ignore it.

Doris McMillon

All right. Lesley.

Lesley LeMasurier

Going off that, you know, I ignored it and tried to protect, you know, the symptoms and not talk about them and I ended up just injuring myself so much more and putting myself at—in greater risk for, you know, worse injuries or possibly even death. And so I hope that if people are feeling these symptoms, athletes, anybody, that they do seek help if they have had a brain injury. That these can be because of the brain. It's not just you, it's not your attitude, it's not that you're bringing this upon yourself. You may have something wrong with your brain like I did.

Doris McMillon

All right. Doctor Kelly.

Dr. James Kelly

I'd like to emphasis, as you've brought up in this show too, the importance of prevention strategies. Our very best treatment for brain injury is preventing it in the first place.

Doris McMillon

All right. Well, you guys have been a terrific panel and I wanna thank again Dr. Bhagwat and Dr. Kelly and also many thanks to Lesley LeMasurier for sharing her story. I'm Doris McMillon. Thank you so much for watching us on Brainline.org.