

Behind the Breakthrough

Season 1 — Episode 9

Dr. Kristin Musselman Transcript

CHRISTIAN COTÉ

00;00;00 Welcome to Behind The Breakthrough, the podcast all about groundbreaking medical research and the people behind it at Toronto's University Health Network, Canada's largest research and teaching hospital. I'm your host Christian Coté and today's guest is Dr. Kristin Musselman, physical therapist and award winning scientist at UHN's Toronto Rehabilitation Institute where she's pioneering the field of spinal cord research to help injured patients walk again. She'll join us in a minute. But first here's the backstory on Dr. Kristin Musselman. Growing up in Carlton Place Ontario in the 90s Kristin says in her teen years she had life all planned out. She was going to be an accountant but at age 16 those plans took a dramatic turn. After her grandfather suffered a stroke. During his recovery she visited him every day and was fascinated with how the rehab team and therapists worked to help her grandfather recover some speech and movement. She was intrigued with how a damaged neurological system can be coaxed back to life. As for her career plans Kristin decided accounting was out. Rehab therapy was in. Over the course of her education and training which included a fellowship at the prestigious Johns Hopkins School of Medicine, Kristin was introduced to spinal cord injured patients and today is pioneering research to help them regain function including the ability to walk again. Dr. Kristin Musselman scientist at Toronto Rehabilitation Institute, welcome to Behind The Breakthrough.

DR. KRISTIN MUSSELMAN

Thank you very much for having me.

CHRISTIAN COTÉ

00;01;28 If you don't mind Kristin let's start with the actual injury. Can you walk us through the different kinds of spinal cord injury.

DR. KRISTIN MUSSELMAN

00;01;36 Sure. Spinal cord injury can be very different from person to person so it depends on how much damage was done to their spinal cord. So some people have a complete injury or consider that a full injury where they don't have any sensation or movement below the level of the injury and prognosis in terms of movement for those people is not great. So they often are in a wheelchair to get around after their injury. On the flip side there's also what we call incomplete injuries or partial injuries. So that's where some of the spinal cord where the damage has occurred is still intact. And so they have some movement and some sensory function below their level of injury. And for those people their prognosis to regain movement is better.

CHRISTIAN COTÉ

00;02;19 What's the scope then of spinal cord injury in Canada?

DR. KRISTIN MUSSELMAN

00;02;22 There's roughly 86,000 Canadians who are living with a spinal cord injury and each year about 4,300 new cases. So it's not a very common condition. So it's a low prevalence condition but it's a very costly condition. It's estimated that on a yearly basis the cost the economic cost of spinal cord injury is roughly two point seven billion dollars for those new injuries. And that's the economic cost but there's of course a huge cost for the individual as well as their family.

CHRISTIAN COTÉ

00;02;50 What typically has been the approach to rehab or treatment for partially spinal cord injured patients?

DR. KRISTIN MUSSELMAN

00;02;56 In the past several decades ago our approach to rehab for these two different types of injuries didn't really differ. So we were teaching people after spinal cord injury how to perform their daily activities using what parts of their body were still able to move and function. When I entered the field as a physical therapist we were experiencing the shift in the way that we approached rehabilitation for those with partial spinal cord injuries. And we were shifting away from that focusing on compensation to you know using assisted devices, to looking more at trying to help their nervous system recover and actually help them regain movement in areas of their body that were affected by the damage.

CHRISTIAN COTÉ

00;03;36 And we're talking here when you were entering the field late 90s early 2000s, my understanding is this I guess we could call it a paradigm shift came about as a as a result of a research discovery?

DR. KRISTIN MUSSELMAN

00;03;49 Absolutely. So at that time research had shown that the nervous system is actually quite plastic are malleable and that in response to certain triggers that could be drugs or that could be exercise that the nervous system actually could change and reorganize. And so that's called neuroplasticity and it's what drives that recovery of function after something like a spinal cord injury or other damage to the nervous system like a stroke.

CHRISTIAN COTÉ

00;04;13 So let me get this straight, what you're saying is that the brain even after injury can be retrained to regain a certain function?

DR. KRISTIN MUSSELMAN

00;04;21 There's a lot of redundancy in our nervous system which is great for us. If we've had damage because then those redundant pathways or extra pathways can help pick up some of the activity that was previously in the ones that are now damaged.

CHRISTIAN COTÉ

00;04;35 Ah I see, OK.

DR. KRISTIN MUSSELMAN

00;04;36 Yeah. I mean it's not unlike if you went to the gym and you lifted weights for your muscles and your muscles would get stronger. So you exert some effort you're doing practice you're actually strengthening the connections or the neural pathways you know the connections between your brain and those neural pathways that then go out to the muscles in your body.

CHRISTIAN COTÉ

00;04;55 Was there some skepticism at the time about this discovery?

DR. KRISTIN MUSSELMAN

00;04;59 I wouldn't say skepticism necessarily. You know the evidence was clear it was more I think the challenge of now what are we going to do with this information. So how are we going to use it to benefit the patient.

CHRISTIAN COTÉ

00;05;09 How to translate it. So what kind of walking are we talking about you know with this retraining?

DR. KRISTIN MUSSELMAN

00;05;14 Really it's the full range. So, in terms of walking some people will relearn to walk more on a therapeutic basis so more for exercise or activity short distances maybe within their home. But then we also have individuals who are able to achieve full community walking after their injury

CHRISTIAN COTÉ

And this, I'm curious, in terms of this retraining of the brain like this last forever like it doesn't go away this relearning?

DR. KRISTIN MUSSELMAN

Well it has to be maintained. So, it requires continual effort. Really it's the exercise, the exercise of the movement practices what's key to helping the nervous system rewire and adapt so that exercise and movement practice needs to be ongoing.

CHRISTIAN COTÉ

And I'm curious if you know what percentage of partially injured spinal cord patients could this rewiring work for?

DR. KRISTIN MUSSELMAN

00;06;03 So about 75 percent of those with partial spinal cord injuries can regain some walking function. So it's most it's the majority of those individuals.

CHRISTIAN COTÉ

00;06;11 Wow. So how did this discovery then this research discovery of neuroplasticity impact patients with spinal cord injuries?

DR. KRISTIN MUSSELMAN

00;06;21 It's impacting the way that their rehab is structured. So we know that for those that have the partial injuries if we want to see that neuro recovery we need to expose them to certain exercise and movement practice. It's not just any exercise there's certain ingredients that are really key in order to see that neuro recovery. So we need to do practice that is specific to the movements that you're trying to improve. So in the case of walking you need to help them experience the actual task of walking. But also that it's intensive. We need thousands of repetitions in order to be able to improve. And also it has to be challenging. So if somebody is practicing a movement that's actually quite easy for them that doesn't stimulate that neuroplasticity. It has to be something that is challenging

CHRISTIAN COTÉ

And is there a set period of time for this to take?

DR. KRISTIN MUSSELMAN

So we do think there's probably an optimal window in terms of their potential for neuroplasticity and in the spinal cord injury research area it's been a bit more difficult to pinpoint that but as a general rule the earlier after injury probably the more responsive the system is to change.

CHRISTIAN COTÉ

00;07;24 And as you mentioned in late 90s early 2000s you're about to enter the field, how did all of these developments shape where you decided to focus your research?

DR. KRISTIN MUSSELMAN

00;07;35 Yeah it was an exciting time having this shift in the way that we were approaching rehab. So as I entered the research field part of what motivated me to pursue you know walking retraining and balance retraining after spinal cord injury is just seeing what we knew in research, what was happening in clinical practice, and the difference between those two so that gap.

CHRISTIAN COTÉ

00;07;54 The gap, yah.

DR. KRISTIN MUSSELMAN

00;07;54 Yeah. And so wanting to contribute to getting those that new knowledge implemented into clinical practice

CHRISTIAN COTÉ

Give us a sense then Kristin of what you have found in your research.

DR. KRISTIN MUSSELMAN

At the beginning of my research career we were very focused on walking retraining and helping people get that ability to walk in their communities and we found that having people on treadmills although it helped them get those steps and generate those steps they weren't necessarily translating it into their everyday life. So they were learning to walk on a treadmill quite well but not necessarily learning to walk in their daily life.

CHRISTIAN COTÉ

00;08;26 What would be the difference?

DR. KRISTIN MUSSELMAN

00;08;27 I mean when you're walking in your daily life you've got other things that are going to require your attention. You know other people, you have to avoid obstacles. So it is a different task. And so what we've learned is that the way we train has to be very specific to the context where.....

CHRISTIAN COTÉ

00;08;43 ...they're going to return to in the community.

DR. KRISTIN MUSSELMAN

00;08;44 Exactly so early in my career we shifted away from using the treadmill to doing more real world training. So actually training people in everyday environments so out of the lab out of the clinic training in grocery stores on the streets in their homes.

CHRISTIAN COTÉ

00;08;59 So some of your lab work or research work would be out in situ in the community

DR. KRISTIN MUSSELMAN

00;09;03 Yeah.

CHRISTIAN COTÉ

00;09;03 With patients?

DR. KRISTIN MUSSELMAN

00;09;04 Yes.

CHRISTIAN COTÉ

00;09;05 And you're monitoring them going to buy groceries.

DR. KRISTIN MUSSELMAN

00;09;08 Exactly. And trying to engage them in challenging tasks in those environments. So we've done that and we did see some improvement in their walking function. They were using it a bit more in their daily life. But one thing I did notice after a few years is that when we'd follow up with them after training was finished for a few months I started to see that the gains decrease or they weren't using their walking quite as much as we had hoped or anticipated. And I realized the piece that we were missing was the balance so that...

CHRISTIAN COTÉ

They weren't as confident?

DR. KRISTIN MUSSELMAN

.....they weren't without having the therapist there or being in that environment where they felt a bit more safe. They weren't engaging in daily walking as much. And it came down to being afraid of falling and not feeling that they're stable enough so that's shifted my research to focus more on that balance control while they're walking so now that's what we're focusing on so it's still walking training but the emphasis is more on how can you maintain your stability while you're walking. And so we actually have programs now where we're destabilising people as they walk so....

CHRISTIAN COTÉ

Safely.

DR. KRISTIN MUSSELMAN

....safely of course. Yes in our harness, yeah. But actually having them repetitively experience that losing their balance and having to recover so that hopefully that will increase their confidence and they'll be able to use their walking in a more functional way once they're done the program.

CHRISTIAN COTÉ

00;10;28 This is still say early stages? Or have you come to any conclusions yet on how to apply in rehab, this issue of balance?

DR. KRISTIN MUSSELMAN

00;10;35 Well, Yeah. We just finished our first pilot randomised control trial so we looked at two different groups a group that receives more traditional balanced training after a spinal cord injury and one group that gets this you know constantly kind of losing their balance and having to recover. And both groups have improved in terms of their balance control. But one thing that we're finding is the group that had to constantly relearn to prevent themselves from falling. They're experiencing less falls after the training is done. So we've been tracking falls for six months after a training program so they're not falling as much, but they're also reporting that they are taking more risks in their daily life and doing things that you know they know is maybe a bit risky but is important to them for their daily function and feeling confident in performing those activities.

CHRISTIAN COTÉ

Are these dangerous risk through taking what could potentially injure them?

DR. KRISTIN MUSSELMAN

No it could be something like they are walking from their living room to the bathroom without a gate aid now so they're not using their walker. They feel confident that they're able to do it because they know that if they do lose their balance they know how to prevent a fall.

CHRISTIAN COTÉ

So you're also then teaching them how to cope with a fall or prevent a fall?

DR. KRISTIN MUSSELMAN

00;11;47 Yes. So when we destabilize them we're trying to retrain those balance reactions. It's an automatic reaction but it still needs to be trained you know following those principles of neuroplasticity again. So lots of repetitions. You know it's a challenging situation and it's specific to the task they're doing.

CHRISTIAN COTÉ

00;12;04 Describe what you've come up with in terms of treatment? And rehab to help them restore walking.

DR. KRISTIN MUSSELMAN

00;12;10 Sure. So some of the training programs that we are currently investigating use something called Functional Electrical Stimulation.

CHRISTIAN COTÉ

00;12;17 That's a mild electrical stimulus.

DR. KRISTIN MUSSELMAN

00;12;20 Yes. So it's a low level electric current that gets applied either to peripheral nerve overtop of the muscles. And the idea is is that current will help muscles contract that maybe can't contract strongly or can't contract at all on their own. And so you incorporate your stimulation into your movement practice so you get muscles active when they need to be. And so we're incorporating FES into our balance training programs and walking training programs.

CHRISTIAN COTÉ

00;12;46 What's it doing?

DR. KRISTIN MUSSELMAN

00;12;48 Just as an example in our research where we actually are causing our participants to safely lose their balance as they try to take a step to regain their balance because that's what's the natural reaction, sometimes we use the stimulation to help them actually get that step if they're not able to pick up their foot and place it in a safe position on their own. So we can use the stimulation to actually help elicit that reaction.

CHRISTIAN COTÉ

00;13;11 What's it like then to be able to design research, gather data and then actually be able to apply it you know apply your findings directly to patient care so that they get benefit?

DR. KRISTIN MUSSELMAN

00;13;24 It's great. And so we are very fortunate with where we work and that we have patients on our research teams that advise us, so advise my group on how we should approach a certain type of training what they think is going to work what's not going to work. And so as we're kind of brainstorming new ideas we are working with those patients from the beginning to learn about what they feel are the major issues and how they think the problem could be resolved which is crucial. And then of course being able to actually implement the training and

work with the patients to see what gains they're able to make which is very different from person to person is a very rewarding experience as well.

CHRISTIAN COTÉ

00;14;04 What kind of reactions do you get from patients?

DR. KRISTIN MUSSELMAN

00;14;06 Yeah I think they have a lot of pride in what they accomplish. So I mean if you're participating in a training program you're working hard they're spending at least three hours if not more a week with us and physically working hard. So when they see those the effort they put in pay off they have a really good sense of accomplishment but something else that I've learnt is they'll be happy about those accomplishments but then they look to the next one. So to many people who are living with spinal cord injury they feel that their rehab is going to be a lifelong process. And they're always sort of moving on to the next goal which I think is fantastic. They're very motivated.

CHRISTIAN COTÉ

00;14;40 I understand in the course of your research you discovered that once partially spinal cord injured patients return home they're at greater risk of injury due to falls, what's happening there?

DR. KRISTIN MUSSELMAN

00;14;52 Right. So this is some of our recent work where we've really realized how much of a problem falls are for people's spinal cord injury at something that's kind of gone under the radar in this population which I think partly because they have many other issues that they're dealing with related to their injury. Could be pressure injuries or bowel bladder issues. But what we've learned through our research is that people spinal cord injury fall a lot so they actually fall more than those with stroke with Parkinson's disease much more than just the aging older adult population as well.

CHRISTIAN COTÉ

00;15;25 What's behind that?

DR. KRISTIN MUSSELMAN

00;15;27 I think it's the complexity of the condition that they're living with - so spinal cord is a very complex condition that affects pretty much every function in your body sensory, motor function, and your autonomic function which controls things like blood pressure heart rate. So I think it's the complexity of the condition. One of the things that we did to try to look at this issue of Falls is we've been tracking

falls and people with spinal cord injury in Canadians, we've tracked over 200 individuals with spinal cord injury for at least six months or a year and looked at their falls and you know it's as high as 78 percent of those with partial spinal cord injury will fall at least once in a given year and some of those falls don't result in injury at least not physical injury. But one thing that we're finding is even if there's no physical injury it does result in fear. So after you've had a scary fall whether you know if you and I had a scary fall as well we might be a bit more cautious in how we move after experiencing that. And so it's that fear of falling which then leads to restricting their activities that actually is probably the bigger problem amongst those with spinal cord injury not so much the physical injuries.

CHRISTIAN COTÉ

00;16;34 It's a bit of a catch 22 there though I guess? You've restored some ability to move again. You've restored function but then that brings a new set of problems.

DR. KRISTIN MUSSELMAN

00;16;45 Yes. So we know that in those with spinal chord injury if they're more mobile - so those who are walking quite a bit - they actually are the ones who are at the greatest risk of falling but luckily they tend not to have the physical injuries. So those who are in wheelchairs after spinal cord injury tend to have more significant physical injuries after a fall. Those who are ambulatory do not. But yeah it can play into that fear of falling and so one thing that we feel are at least our research is suggesting is that you know preventing falls is sort of a lifelong issue after spinal cord injury. And so it's not just providing education after the injury. It's something that clinicians we should be addressing on an ongoing basis with our patients.

CHRISTIAN COTÉ

00;17;27 I see ya, exactly. Is it well known that for those who are partially injured they can regain motion?

DR. KRISTIN MUSSELMAN

00;17;34 It's becoming increasingly known. Yes both among I mean clinicians would know that especially those who are graduating from there their formal education in the past 10 years but the patients themselves are becoming quite aware of what is possible and starting to seek out those opportunities. So even if they've been injured for 15, 20 years they're looking for community based rehab programs that will provide them with the opportunities to try to achieve that neuro recovery.

CHRISTIAN COTÉ

00;18;01 That's what I was wondering. Are they aware of this potential for them to regain mobility? And are there barriers to rehab access for them?

DR. KRISTIN MUSSELMAN

00;18;10 Yes so they are aware increasingly becoming aware but yeah there are some barriers just in the community environment. There's not a lot of clinics that offer this kind of intensive approach to rehabilitation. So that's one issue with access. And then if there is a clinic it's also the cost. So often these interventions are not going to be covered by insurance. So they're looking at paying out of pocket and that can be prohibitive for some people with spinal cord injury.

CHRISTIAN COTÉ

00;18;39 How do we fix that issue?

DR. KRISTIN MUSSELMAN

00;18;42 Yeah that is a great question and I wish I had had the answer to it but I think we're moving in the right direction. So I'm this year been working with the Rick Hansen Institute to assemble a group of we're calling key stakeholders so we have a roughly 40 individuals from across Canada. They're people with spinal cord injury, frontline clinicians, hospital administrators, researchers, policy advocates to basically tackle this issue about how can we improve access to these activity-based therapies, these therapies that we know will help promote neuro recovery for those who are living with spinal cord injury. So we've started some planning we have some priorities that we're going to be tackling over the next five years. It's going to take some time but we are moving on it.

CHRISTIAN COTÉ

00;19;28 So important. I get the sense that and correct me if I'm wrong but it sounds like anything you approach in research you want a payoff in terms of being able to apply it to patient benefit?

DR. KRISTIN MUSSELMAN

00;19;42 Yes. And I think in my case being a therapist by background I mean that's naturally what I gravitate to. So I'm interested in finding - it could be a testing method or an assessment - that will help us predict something like predict the likelihood of falls or it's an actual intervention that helps people with spinal cord injury regain something - could be upper limb arm function, it could be walking, it could be balance.

CHRISTIAN COTÉ

00;20;06 You're listening to Behind the Breakthrough – the podcast all about groundbreaking medical research and the people behind it at the University Health Network in Toronto - Canada's largest teaching and research hospital. I'm your host Christian Coté and today we're speaking with Dr. Kristin Musselman,

award winning scientist at UHN's Toronto Rehabilitation Institute and a pioneer in the field of restoring the ability to walk in partially injured spinal cord patients. Kristin I'm curious - you had a thriving physical therapy practice going on out West, you were teaching and then in 2014 you decide to pick up a move to Toronto Rehab, what was the motivation behind that career move?

DR. KRISTIN MUSSELMAN

00;20;43 I think it was the resources that Toronto offers so being able to work in Canada's largest spinal cord injury rehab hospital is ideal for the work that I do. Also the facilities that we have here as I mentioned – ‘CEAL’ - the challenging environment assessment laboratory at the downtown Toronto Rehab location, also Lyndhurst is very well equipped with research equipment for especially for a functioning hospital. But I think the other thing is that Toronto does attract fantastic graduate students, international researchers interested in coming and visiting, spending time working with you. So I think it's a combination of all the resources that Toronto has to offer.

CHRISTIAN COTÉ

00;21;26 I'm curious also with the scope of the problem in Canada in terms of spinal cord injured patients, do you feel pressure to come up with solutions?

DR. KRISTIN MUSSELMAN

00;21;35 I wouldn't say I feel pressure. I'm definitely motivated and excited to come up with solutions and I think maybe the reason I don't feel pressure per se is that in Canada we have just an amazing network of researchers, people with lived experience, research trainees – so students, postdocs - who are all working in this area. And so really it's a big joint effort and we're fairly well coordinated and so I think that maybe takes the pressure off and I feel like I'm part of a larger movement to improve things.

CHRISTIAN COTÉ

00;22;08 I read a story where you were talking about your research you said "I like when things don't work." What did you mean by that?

DR. KRISTIN MUSSELMAN

00;22;16 Well I think it's because usually it ends up being more interesting than what I had planned to do. So I think yes things don't always work in research and I think if you're looking at a career in research you have to embrace that failure. You have to be okay with failure. You have to recognize it. And learn how to adapt in those situations.

CHRISTIAN COTÉ

But still failure is failure - how do you approach that? You know philosophically?

DR. KRISTIN MUSSELMAN

00;22;41 I think it's just changing the way you view it. So we're using the word failure. But to me that's not necessarily a negative word. So failure is a learning opportunity. So if something doesn't work out I feel like it almost always leads to something that probably is more interesting than what I had intended as a outset with the study. But I think identifying those situations is key and being willing to adapt as a researcher you have to be very flexible and change direction as needed.

CHRISTIAN COTÉ

00;23;09 I looked at your CV before we sat down here and I see lots of achievements and awards - but I'm curious to know what's the journey been like for you to get here?

DR. KRISTIN MUSSELMAN

00;23;19 It's been fun. You know it's hard work. A lot of perseverance. I think I've moved my family across the continent four times. I'm not exaggerating. So there's been some sacrifices that way but it's been a really rewarding and fun journey. I've gotten to work with amazing people in many different provinces or and in the US as well. I would do it all over again if I had the opportunity.

CHRISTIAN COTÉ

00;23;44 That's great. I'm curious, when you talk about those moves, what kind of support do you need from home?

DR. KRISTIN MUSSELMAN

00;23;49 A lot of support. I do have to acknowledge you know my parents for example so I have two small children my parents moved with us several of those moves when I had small children to be able to provide the childcare so that I could focus on the research and the academic piece. So having the support of family is huge.

CHRISTIAN COTÉ

00;24;07 Do you ever have doubts or fears? Does that ever creep into your work?

DR. KRISTIN MUSSELMAN

00;24;12 That's an interesting question. I'm for sure earlier on in my career as a grad student we always joke about - you have those ups and downs but also early on as an independent researcher you can have some doubts and fears but once you get

yourself established I feel that I don't experience that anymore. But I think one thing that does help whether you're still a student or as you are transitioning into your own independent career is having a support network of other researchers who are around the same stage as you are. So having those opportunities to share how you're feeling with somebody who's probably experiencing the same thing you are is really important.

CHRISTIAN COTÉ

00;24;50 And was there or is there still a mentor in your life who's helped compress a lot of your learning? Or is really stood out in terms of providing you guidance?

DR. KRISTIN MUSSELMAN

00;24;59 Yeah I've been very fortunate to have you know many mentors both as a clinician and also as a researcher. I mean probably the two that would really stand out are the ones who were formal mentors. So part of my formal training. So I worked with Dr. Jeannie Yang from the University of Alberta and I did my masters with her and also my PhD. And then after that went to Johns Hopkins School of Medicine and worked with Dr. Amy Bastian. Both of those being formal mentors they were very and still are very invested in my career and my progress today. They still remain close mentors who I stay in touch with and really taught me everything I know.

CHRISTIAN COTÉ

00;25;37 What's your approach now to mentoring younger people younger students?

DR. KRISTIN MUSSELMAN

00;25;42 The approach in my lab is - so we're all researchers who are equals just at different stages of our career and so through that lab culture that I try to create it becomes a very collaborative environment where I mean I know I can learn from my students, they can learn from each other, and they can learn from me. And so we operate in that kind of model which so far seems to be working well.

CHRISTIAN COTÉ

00;26;08 So it's check your ego at the door when you enter Kristin's lab?

DR. KRISTIN MUSSELMAN

00;26;12 Yes there's no egos in a lab.

CHRISTIAN COTÉ

00;26;14 What's your advice to young people entering the field these days?

DR. KRISTIN MUSSELMAN

00;26;19 I think first is try to find a topic that you're passionate about which you know you may not know when you first enter the field but as you're finding your way through find that passion and be open to changing directions in order to find that passion because you need to love what you do to be in this business you absolutely need to love what you do. Find a mentor who that you can have a very close and strong relationship with. That's really important. I think my first or second day of grad school at the University of Alberta I went to an orientation session and they said your relationship with your grad school mentor is going to be the most important relationship in your life. Aside from your marriage and although I think that's a bit of an exaggeration there's a lot of truth to that though too. And so finding a mentor that you connect with is really important. And I think the third thing would just be to embrace failure. So don't think about failure as we typically think about failure but think about it as a learning opportunity. And it means that your growing and you're improving, if you're failing.

CHRISTIAN COTÉ

That's so important because we're not really taught that growing up or even as adults how to cope with failure.

DR. KRISTIN MUSSELMAN

No it's very much a learned thing, but grad school and academics will teach you that quickly.

CHRISTIAN COTÉ

00;27;32 What drives you every day? What brings you into work?

DR. KRISTIN MUSSELMAN

00;27;36 The people in my lab. So the graduate students the postdocs the staff. So I love mentoring. It's a very rewarding experience. And you get to know some really amazing people very well. So there's that for sure. And also working with the patients. So I love that I'm able to see patients almost on a daily basis, be part of their journey and getting their insight into the whole rehab process is always fascinating.

CHRISTIAN COTÉ

00;28;02 When I was backgrounding what you do it just seemed such a profound moment when the fact that people who had been partially paralyzed can regain the ability to walk again, what's the impact on you?

DR. KRISTIN MUSSELMAN

00;28;18 It's definitely very rewarding to see them succeed so both as a clinician and a researcher that's true and I think that's in large part the reason I was drawn towards a career in neuro rehabilitation. I think it also helps motivate us to keep trying, to keep thinking of different solutions or creative ways to help address some of the challenges that they're having. At the outset.

CHRISTIAN COTÉ

00;28;43 We mentioned in your back story your grandpa and we mentioned how his suffering a stroke inspired you to embark on this career path, what do you suppose he would say about the work you're doing?

DR. KRISTIN MUSSELMAN

00;28;56 It's a good question. I've actually never thought about that before. I'm sure he would think it was you know helpful, useful. He was very pragmatic type of person. So having I'm sure experience physical therapy himself and having had gone through that process I'm sure he would see the value in what I was doing.

CHRISTIAN COTÉ

00;29;15 He'd be proud of you.

DR. KRISTIN MUSSELMAN

00;29;16 Yeah. And actually before he passed away I had become a physical therapist so he knew I had achieved that goal and he had a large part to do with it.

CHRISTIAN COTÉ

00;29;23 So what's next for you?

DR. KRISTIN MUSSELMAN

00;29;24 I think one thing that I'm quite excited about is some of these initiatives with the Rick Hansen Institute to try to actually impact system level change for rehab for Canadians with spinal cord injury. So it's going to take some time. Like I mentioned it's multiple year projects but actually changing the way that we rehab and trying to integrate our best practices into our current system is what really motivates me.

CHRISTIAN COTÉ

00;29;50 Dr. Kristin Musselman, scientist at UHN's Toronto Rehabilitation Institute. Thanks for speaking with us today and continued success.

DR. KRISTIN MUSSELMAN

00;29;57 Thank you very much.

CHRISTIAN COTÉ

For more on the podcast go to our web site - www.behindthebreakthrough.ca and please let us know what you think. We crave the feedback. That's a wrap for this episode of Behind The Breakthrough, the podcast all about groundbreaking medical research and the people behind it at University Health Network in Toronto. I'm your host, Christian Côté Thanks for listening.