Season 2 – Episode 2 – Dr. Stephanie Protze
Transcript

CHRISTIAN COTÉ:
This is 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 joining us on the podcast today,dr. Stephanie Protze, an award- winning scientist at UHN's Mcewen Stem Cell Institute. Dr. Protze is pioneering the creation of new heart cells torestore the heart's pacemaker function, that will one day eliminate the need for electronic devices to do the job. Welcome to the podcast, Dr. Protze.

DR. STEPHANIE PROTZE:

Thank you. It's my pleasure to be here.

CHRISTIAN COTÉ:
Before we get started, Stephanie, would you mind giving usa quick biology lesson, how the heart works and where the pacemaker cells fit into this story?

DR. STEPHANIE PROTZE:

Of course. So, as we all know, the job off the heart is to pump blood through the body, to supply all the other organs with oxygen and nutrients. But how does the heart actually do that? How is that pumping coordinated? There are special cells in the heart that can generate the force to pump the blood. But then if those cells would beat to their own rhythm, the heart would beat very slowly and just bobble around. The reason we have an organized heartbeat, as we do, is thanks tothe pacemaker cells of the heart, and those coordinate and they initiate the heartbeat.

And there you can imagine them like a tremor that is giving the beat rate. And the way it works is for them to send very small electrical signals that activate the heart cells. It's like an electric circuit. The rest of the heart is following that signal. Now, it's not quite that simple because there's not just one pacemaker in the heart. There is a sinoatrial node and the atrioventricular node. I'm sure you might have heard of them as sa node and av node.

CHRISTIAN COTÉ:

I haven't. But now I know.

DR. STEPHANIE PROTZE:
And the sa node is really the primary tremor that initiates your heartbeat, while the av node follows that primary tremor,but it's really important because it connects your upper heart chambers

With the bottom heart chambers and if that connection is broken, you'renot properly initiating the heartbeat and the pumping of blood.

CHRISTIAN COTÉ:

When pacemaker cells in the heart become damaged because of disease or old age, I imagine,what is typically on offer topatients for treatment?

DR. STEPHANIE PROTZE:

So, the current standard of treatment for patients is the implantation of an electronic pacemaker device. This electronic pacemaker consists of a battery pack that gets implanted into your chest and then usually at least two or three leads that are inserted into your heart and those leads are then taking over the electric activation of theheartbeat.

CHRISTIAN COTÉ:

There's about two hundred thousand Canadians have electronic pacemakers. What's life like for them? Do you do you have asense of that?

DR. STEPHANIE PROTZE:

First of all, an electronic pacemaker is great for these patients because it does save their lives, because without the pacemaker, their heart would simply beat too slow. But on the other hand,an electronic pacemaker also comes with a couple of disadvantages. Those leads that i mentioned that inserted into the heart, they can get infected or dislocated and then patients require surgeries.

In addition, it's a battery driven device, as i mentioned before. And these batteries need to be replaced every five to ten years, which also requires a surgery. And now, if you think about pediatric patients, this all obviouslybecomes even more complicated because they do require multiple battery replacements throughout life and in addition, these leads of the pacemaker cannot really adapt to the growth of the heart in children. So,they require additional surgeries to refit those leads.

And last but not least, the pacemaker activates the electrical activity of the heart differently than the natural pacemaker system and that leads to a process that we call remodeling. In easy terms, what that means is that the heart changes its structure and function, and that can in the long run result in heart failure. And that's obviously something we wouldlike to avoid.

CHRISTIAN COTÉ:

So, this brings us to your research and let me see if i have itright. You grow pacemaker cells in the lab, then implant them into the heart and hopefully the heart accepts them and they grow to regeneratethe pacemaker function so it works naturally. Do i have that right?

DR. STEPHANIE PROTZE:

Yes. In a nutshell, that's what we're doing.

CHRISTIAN COTÉ:

So that's the ideal. So, first off, can i ask, how did you evercome up with this idea?

DR. STEPHANIE PROTZE:

The idea actually developed rather organically at the beginning of my postdoctor fellowship in dr. Gordon Keller's lab hereat UHN. I first initially joined his laboratory because of his expertise in stem cells and how to turn them into heart cells, because that's what i wanted to work on. And soon after I joined, I realized that we actually don't know yet how to turn a stem cell into a pacemaker cell. And obviously, these pacemaker cells, as i just told you, are pretty important for heart function. So, that's where the idea of my project to generate pacemaker cells was really born.

CHRISTIAN COTÉ:

Let's start with the heart stem cell. You could just make itgrow into a pacemaker cell? Sorry, I'm probably butchering this, but if youcan explain that process.

DR. STEPHANIE PROTZE:

Yeah. So, we're actually using a very special startingmaterial that stem cells that we're using as a pluripotent stem cell.

CHRISTIAN COTÉ:

Pluripotent. What does that mean?

DR. STEPHANIE PROTZE:
So, they are very unique, because pluripotent meansthat this cell type has the potential to turn into any cell type of the body.

CHRISTIAN COTÉ:

I see, ok.

DR. STEPHANIE PROTZE:
It's a little bit like magic. I agree. But we can alterthem in the petri dish and can turn them, for example, into liver cells, blood cells, but also heart cells.

CHRISTIAN COTÉ:

So how did you learn to coax this pluripotent heart stemcell into a pacemaker cell?

DR. STEPHANIE PROTZE:

We know how to do this from studying developmental biology and that's not something I've done myself. That's decades of research by other scientists that have used classical developmental models and i found out the signals that are needed throughout development to turn an initial stem cell into a heart sell. That is something that might sound very simple, but in the lab, to give youan idea, it's a process that took us about five years to figure out the protocol, how to turn the stem cell into a pacemaker cell. And that's thework that's been officially published for the first time and the first version at the end of

my postdoctoral fellowship in 2017 in the journal nature biotechnology.

CHRISTIAN COTÉ:

Wow, that's amazing. Ok, this is purely in the lab in a petridish, correct?

DR. STEPHANIE PROTZE:

Yeah.

CHRISTIAN COTÉ:
Ok, now you have this ability to generate pacemaker cells,correct?

DR. STEPHANIE PROTZE:

Yeah.

CHRISTIAN COTÉ:
How do you test to see if they help a damaged heart wherethe pacemaker is not functioning properly?

DR. STEPHANIE PROTZE:

to test the functional ability of these pacemaker cells that we are making, we actually like to do this both in vitro in the petri dish where we generate them, but also in vivo with animal models. Soin the petri dish, we can test if they have a typical pacemaker character. For example, we check do they expect the correct genes? Are they expressing pacemaker genes? Do they have the appropriate electric activity? As I mentioned, they need to initiate this electric activity for theheartbeat. And we will also obviously check that beating rate. We can justlook down the microscope and we can measure the contraction.

For animal models, what we want to see is that these cells can actually engraft in the heart and connect with the host heart. And for this properconnection, what we need is for the pacemaker cells to electrically communicate with the host heart tissue, because that is required for themto play their role of being the drummer and to regulate the heartbeat. The exciting finding we had so far in a rodent model is that when we end engrafted these cells. They did actually electrically connect and were able to regulate the heartbeat of the host.

CHRISTIAN COTÉ:

Wow, okay, so this is simply a matter of you inject a bunch ofthese pacemaker cells and you wait to see if they take, so to speak. I guess you're saying graft to the heart and then start to grow and work.

DR. STEPHANIE PROTZE:

Yeah. So, it's basically two steps. If we look if they take, we can just check are these cells still there after a week or two weeks? But that doesn't tell us if they are functioning. So, the for the functioning, that's where the electric coupling is important. And there wehave a pretty neat way of telling because we can tell if these cells start to be the drummer so we can literally have assays where we can see and look at the heart of the host and see, yes, our pacemaker cells are actually regulating the heartbeat now.

CHRISTIAN COTÉ:

So, in these animal models, like how many cells does it taketo inject into the heart?

DR. STEPHANIE PROTZE:

So, we think that we need about five million cells for, actually I'm jumping ahead here. That's what we believe we would need for humans in the animal models because we use smaller rodent models, we only use about a million to two million cells. And that's actually a really small cell, though, is if you think of other cell therapiesthat people are trying to develop, probably a lot of us have heard about the cell therapies for heart attack, where we trying to replace damaged heart tissue. There we are looking at making a billion cells, which is obviously a completely different challenge.

CHRISTIAN COTÉ:

So, in these animal models, what are you finding? Like how,how are these injected cells doing?

DR. STEPHANIE PROTZE:

We're actually finding that they do engraft, that they stay there. We're losing some, but that's very normal. Everybody's seeing that in the field. And then we do see that there's a pretty good success rate as well. About eighty five percent of the engrafted cells do actually end up pacing the heart, which is pretty good success rate and obviously something we still want to improve because what we want is ahundred percent.

CHRISTIAN COTÉ:

And any challenges yet or you know, dead ends orstumbling blocks, so far?

DR. STEPHANIE PROTZE:

I think the biggest challenge we are facing is that our pacemaker cells are beating a little bit too fast. So, as i mentioned, we are using this very special starting cell and the result is that the pacemaker cells we are making there what we call immature. And so, they represent more the developmental status of a fetus or a newborn. And theheart of a newborn beats about 120 to 160 beats per minute.

CHRISTIAN COTÉ:

Hmm.

DR. STEPHANIE PROTZE:
And this is exactly the speed that our cells are currently spontaneously beating at. And that's obviously a little bit too fast. If you think about your own resting heartbeat, that's about 60 beatsper minute. So you really wouldn't necessarily want a pacemaker cell that's going that fast. So, we're currently figuring out how to slow downthose cells to make them more amenable for human.

CHRISTIAN COTÉ:

Right. You're talking about an arrhythmia here.

DR. STEPHANIE PROTZE:

It's a bit different than arrhythmia. I know that in general, if you think about a fast heartbeat, you think about arrhythmia and plain speaking, it is an arrhythmia and for an adult human a heartbeatof 120 in rest would be too fast. So, yes, that is something you have to overcome.

CHRISTIAN COTÉ:

So, you were hinting at this earlier in terms of the numberof cells you think it might take for humans. When do you know, Stephanie,you're ready for that next step to be able to take your research to try with humans?

DR. STEPHANIE PROTZE:

For that obviously, we want to do proper testing in additional models. And here we want to move to preclinical animal models. And the model of choice for us is the pig, because the pig is used forcardiovascular drug testing in general, and that's because the heart of the pig is very similar to the human heart.

And what i personally want to see and which we haven't shown yet, is thatthese pacemaker cells can in this pig at least pace for a month. Well, that'sone of the hurdles I want to overcome. And then to make sure that these cells don't show any adverse effects like arrhythmia, as you just mentioned. So, we got to somehow figure out to make sure that these pacemaker cells don't pace too fast. And if we achieve that, then we know we're a whole lot closer.

But, before moving to any clinical trials, the other thing we definitely will be checking is that these cells do not induce any tumor formation because of the special starting cell they're using. That's a concern in thefield, but it's also very common now that we will check in the heart, butalso in the rest of the body that there's no tumor formation.

CHRISTIAN COTÉ:

So, I don't mean to put you on the spot, but everybody always wants to know. Okay, so when do you think you might see you areready to take this to clinical trial?

DR. STEPHANIE PROTZE:

We started at the pig studies and we're in the processof increasing the amount of animals we can use. So, this is all still very new. I think in the next five years we have some more answers and we need obviously to figure out how to slow it down a little bit. So that's to overcome this challenge. So, i think before we can move to any clinical trials, it will be another good 10 years.

CHRISTIAN COTÉ:

Okay, fair enough. You mentioned when we talked before our interview, when we were preparing for this, that your lab is in its infancy, so to speak, you're training your team. For those of us unfamiliarwith this part of research, what are the challenges to a lab startup?

DR. STEPHANIE PROTZE:
We're actually just up and running since two years, and it's actually a challenge. For example, to run those kind of preclinicalstudies as a startup lab. That's not really what you can pull off with a few people and just starting off a lab. I'll be honest, it's a it's a stressful time, but it's also a very exciting time. So, I really started from scratch. You have to fill the lab with equipment like nothing is there. You have to purchase the equipment, set it up, get it running. In parallel you have to train your staff, as you mentioned.

And I took the approach to start out with a technician, which I'm so very happy i decided to do so because she's now helping me just the everyday operation of the lab, purchasing and so on. But she's also my hands in the lab because I'm obviously getting more and more busy, is sitting at the deskfor grand writing, administrative stuff and meetings.

So that was definitely a good decision. And we have now two graduate students that are part of the lab and we're currently looking for a postdoctoral fellow to join us. So, things are getting productive. And that's good because I think the biggest challenge everybody's facing starting a lab is to get that first publication out that has my name on itwith senior authorship.

CHRISTIAN COTÉ:

Well, that's what i wanted to ask. I mean, you're so young,yourself still. But would you have any wisdom or advice to pass on to young people just entering the field in terms of lab startup?

DR. STEPHANIE PROTZE:

Hmm. I think you've got to find your own way. You gotto do it the way you feel comfortable with. Don't look too much around what other people are doing. Listen to advices. But in the end, make your own decisions and learn to be confident, find your inner voice.

CHRISTIAN COTÉ:

And I imagine this requires you seeking outside funding likeseed money from investors. How do you go about that? Because I'm guessingselling your work to convince people to invest in you was not likely part of your PhD training?

DR. STEPHANIE PROTZE:

Absolutely right. That's not part of your PhD training nor your post-doctoral fellowship. This is something you kind of have to learn as you go. So, I'll take these one step at a time and learning as you go approach. I started with writing smaller grants like public funding agencies smaller grants, and then you slowly increase to writingthe bigger, five year grants. And I highly recommend, to reach out to mentors. So, i was very fortunate having people helping me with the grantwritings, giving advices.

It's a learning curve, and yes you learn like you learn anything else in yourresearch career. Yeah, very key is to build up a network of mentors for that. And in addition to that government funding, the other funding sources that our research field and especially the translation to the clinic depends on is industry funding. And that's even more complicated. That's something you're really not prepared for depending on where your training. I was really fortunate that i was a postdoctoral fellow in Dr. Keller's lab and was able to witness the startup of Bluerock therapeuticshere in Toronto, which was basically based out of the research of Dr. Keller and dr. Michael Laflamme's lab at UHN.

CHRISTIAN COTÉ:

Bluerock. Yes.

DR. STEPHANIE PROTZE:
Yeah. And I was also fortunate because I was a postdoc at the time that they supported parts of my own lab startup package. So now this comes as a benefit for my own trainees that they canactually experience industry, supported research and get exposed to this industry environment as a potential future career path, because for not everybody's going to end up in academia and a lot of people in the future will probably move to industry.

CHRISTIAN COTÉ:

I've heard that one sort of rule of thumb when you're approaching outside investors is you need to tell them a story to convincethem to invest. And you do tell them a story.

DR. STEPHANIE PROTZE:

I think I am not telling them a story I like, we usuallydo the way that we bring them to the lab and let the science speak for themselves and show them the exciting stuff we're doing. I think my personality is excitable enough that people get drawn into it and then you show them the scientific facts as well. Telling a scientific story, I would like to call it.

CHRISTIAN COTÉ:

You're listening to behind the breakthrough, the podcastall 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 we're speaking with award winning scientist Dr. Stephanie Protze, who's pioneering the production of pacemaker cells to regenerate damaged hearts and eliminate the need forelectronic pacemakers. Her groundbreaking research is funded in part by the Mcewen stem cell institute and the Toronto General and Western Hospital Foundation.

So, Stephanie, we'd like to ask all our guests about their science origin story. And I understand for you it goes back to a high school field trip to

Dresden. You were born and raised in Pirna, Germany, but you took a fieldtrip to the Max Planck Institute I understand, what was about that trip that sparked your connection to science?

DR. STEPHANIE PROTZE:

I really still have fond memories of that trip. To give you a bit more background, I was always fascinated by science. I enjoyed thescience classes in school much more than German classes or English classes. So, I chose biology as a major and part of that, we ended up doing the school trip to the Max Planck Institute that you mentioned to the next bigger city in Dresden. And during that visit, I saw the axolotl for thefirst time.

CHRISTIAN COTÉ:

Which is?

DR. STEPHANIE PROTZE:
The axolotl, is this is amazing salamander that canregrow its entire limbs and parts of the body.

CHRISTIAN COTÉ:

Wow!

DR. STEPHANIE PROTZE:
Exactly. It sounds pretty science fiction, right? That'swhat I thought. I was like 16 years old and I was totally blown away by theresearch that the team there was doing. And this idea to work on something that, you know, one day maybe we can apply to the human to regenerate organs. And I think that was really one of the key moments that hooked me to the vision of becoming a scientist and doing research myself for work.

CHRISTIAN COTÉ:

You then went on to actually do your PhD at the Max Planck research school in Dresden, and you decide to uproot yourself andcome all the way to Toronto for your postdoc. What's the story behind what drew you to Toronto?

DR. STEPHANIE PROTZE:

Yeah, that's totally correct. I was lucky to get a spotin the top PhD school in Germany, which happened to be just next door, the Max Planck institute close to home. But, once I finished my PhD in Germany, Iknew that it's time to get out and explore science around the world. And at that point, all I knew was that I wanted to keep studying heart deceases and heart regeneration. I also knew that I would want to like tostart working with these special stem cells, those pluripotent stem cells.And with that in mind? I applied to labs around the world, including the lab of the person who really spearheaded the research and still is leading the field, Dr. Gordon Keller, of turning those stem cells into heart cells.

CHRISTIAN COTÉ:

Dr. Gordon Keller, he's in the McEwen stem cell institute correct?

DR. STEPHANIE PROTZE:

Exactly. Dr. Gordon Keller here at UHN in Toronto. And when i got an email back from Dr. Keller offering me a position in his lab, I did not really have to think twice. And I packed my bags and came toToronto.

CHRISTIAN COTÉ:

Okay, and we have to let everyone know here to make this journey halfway around the world even more interesting. You had an added challenge, didn't you? Because your studies up to that point were inyour native German. How did you manage a postdoctoral fellowship here in Toronto and you had to learn a new language?

DR. STEPHANIE PROTZE:

Absolutely. English isn't my first language. And moving to Canada, the English speaking is an additional challenge. But luckily, during a career as a researcher, you get to slowly grow into that.So that I still remember as an undergrad student when we had to read original research papers in English. It took me like a whole afternoon to read one paper just to translate it and to understand what they actually describing.

My graduate study, so my PhD at the Max Planck Institute was already English speaking. And i think that was one advantage because I got to slowly grow into it while i was still in Germany and then obviously movingover to Canada kind of gave the final push and the full transition.

CHRISTIAN COTÉ:

Wow, all right. So, you complete your post doctoral fellowship under the leadership of Dr. Gordon Keller. I understand you'reinterviewing at places all over the world to begin your career and you decide to stay in Toronto. What was behind that decision?

DR. STEPHANIE PROTZE:

Yeah, there were a couple of factors that actually led to that decision. I originally thought I would move back to Europe. That's how I started out looking for jobs. But then while I was traveling around the world, also in America, not just in Europe, for interviews for the faculty positions, I realized that Toronto was actually a perfect research environment. And to be honest, I took this for granted while I was postdocing. I didn't really look around. I wasn't really questioning it. But during the interviews, I noticed that hardly any other place really has this multitude of different research areas as Toronto can offer, which as a p.i. now gives me these exciting collaboration opportunities andsupports that I can explore beyond my own research expertise through those collaborations.

And another huge benefit i found of Toronto and UHN itself are the research facilities. Again, i took them for granted while I was postdocing,because they're really helpful for us as scientists to offer us all the

Latest technology that we would like to use without having to establishthen ourselves in the lab.

CHRISTIAN COTÉ:

So, I'm curious, what is this Toronto reputation with regardto stem cell study and innovation that you were starting to realize as youwere doing your interviews around the world?

DR. STEPHANIE PROTZE:

I think one thing that I was already aware of, I thinkmost of you are aware of, is that obviously stem cells were discovered in Toronto by till and Mcculloch in the 60s while they were working with bone marrow stem cells.

So, Toronto has a strong stem cell reputation. And what it still has as amazing scientists working in the field of stem cells. Well a lot has happened on the stem cell field, we're still leading our scientists here in Toronto and they have the potential to deliver many new breakthroughs and also hopefully clinical firsts in the next years. And I think that environment is something I decided I would like to stay in. The other big benefits that I forgot to mention about, the reason why I decided to stay was not just the obviously the research environment, there were actuallytwo other factors i didn't mention.

One is philanthropic support for research, which is something we actuallydon't do in Europe. This was very new to me when I came here. But throughout my postdoctor fellowship, I was supported through philanthropic support from the Mcewen institute.

And that was something that i could see how that helps running a lab. In Europe that's really just not typically done. So that was another reason to stay in Toronto. And in addition, the idea to be able to work close withindustry partners and startup companies, which is also something that seems to work a little bit better over the pond than it does in Europe.

CHRISTIAN COTÉ:

But we're lucky we were able to keep you. That's great. Your work is all lab based. And I'm curious then how do you stay connectedto the needs of patients that urgency in terms of the daily work you do?

DR. STEPHANIE PROTZE:

I was always interested in doing translational research. I was never really drawn to the real, real basic science. I alwayswanted to do something that I can see that it can clearly help patients in the future. And in the end, I still trained as a basic scientist, and for that reason I'm very aware that I have to reach out to clinician scientists within the institute. And the Mcewen institute we have clinician scientistsat UHN obviously and also around the world through collaborators to discuss with them what is really needed from the patient perspective. And also, to realize a lot of the approaches we're using in the lab are more

Likely to be beneficial for patients or able to be translated to the clinic.And obviously working at a research hospital like UHN, it's definitely a huge benefit to stay connected to that.

CHRISTIAN COTÉ:

And yet the rigour of science, which we've heard about youknow, from you, requires time. So how do you reconcile the need for new discoveries for patients with the time it takes for science to unfold?

DR. STEPHANIE PROTZE:

That is definitely something I'm struggling with a little bit because as you might be able to tell, I'm not a very patient person. And science is definitely not moving fast. So, I always try to remindmyself that to make big achievements and to have real impact takes time. Like Rome wasn't built in a day. It's a very European thing, but that really fits to that. I also always try to make sure that when we communicate ourresearch to the public, that we're not overestimating, that we're not overstating, because we want to make sure to be honest to ourselves, but also to future patients to be able to keep that scientific rigour.

CHRISTIAN COTÉ:

And when you hit a dead end in the lab, like when you havesay, a failure, how do you navigate that?

DR. STEPHANIE PROTZE:

Having to deal with failure is a very important thing,you've got to learn as scientists. Obviously, if you're trying new things andthese things might work out, but they are just as likely to fail. So, during my years of training, I learned how to see a failed experiment as part of the process. It is actually important to every now and then have a failed experiment to move on, to develop next steps and new ideas. Because I knowthat is an actual struggle learning to handle failure. Now, being a mentormyself, I'm trying to give that way of thinking to my students and to train them to accept failure as part of the scientific endeavour.

CHRISTIAN COTÉ:

And what's your advice to younger students? Like how doyou mentor them?

DR. STEPHANIE PROTZE:

I think generally my biggest advice to them is that ifyou're excited about the work you do and you're motivated, you can achieve everything you want. And I know that sounds very idealistic, but I think it's my own experience and I'm not telling them that it's going to be easy, nor that it will happen fast. But if they're not giving up and continuing to work hard, it's possible to achieve whatever dreams they have.

CHRISTIAN COTÉ:

Last year you participated in an event called "science in the6ix." Where you and several other UHN researchers gave three minute elevator pitches to a live audience. The premise

of all this being to challenge you to be able to explain your research to a mass audience. Whatwas that experience like for you all?

DR. STEPHANIE PROTZE:

To be completely honest with you, I initially was hesitant to participate in that because it sounds a little bit scary to get up there on a stage and try to explain your research in lay terms. But the team of the Toronto western foundation did a great job in helping us scientists and everyone in the team to explain the work we do in easy terms to make it exciting for the public. So, in the end, it was a great event. I'm happy I did it and I'm very happy that now it's out there for the public towatch.

CHRISTIAN COTÉ:

That's correct. It's on the YouTube page, which we can put inour podcast package when we broadcast this. I'm curious, though, what's your take on the value of communicating what you do in a way that's accessible to a mainstream audience?

DR. STEPHANIE PROTZE:

I think to communicate what we do in the lab is more important than it ever has been, like the times science can hide behind the black curtain I think is really over. And obviously because grant money comes from taxpayers money. So, in my mind, that makes total sense that weexplain to the public what we're doing in the lab. And I'm actually hoping that by reaching out and explaining it, we get them excited about it and actually more motivated or interested in supporting research.

CHRISTIAN COTÉ:

That's great. So, what drives you each day? What makes youthink you can improve things?

DR. STEPHANIE PROTZE:

I think what gets me up and to the lab every morning is my curiosity for the unknown and this interest in scientific progress that I always had even back in school days. I think on the bigger picture, it's really this vision of being able to one day help patients and move what we're doing from the bench to the bedside and to improve a person's life that right now has heart rhythm disorders.

CHRISTIAN COTÉ:

So that decision several years ago to leave your homeland,what do you think of that decision today?

DR. STEPHANIE PROTZE:

I think when I had to make a decision to stay or take aposition in Europe two years ago, I kind of made the final call on, I'm going to stay. I'm happy living in Canada. I'm happy with the environment providedhere. And two years later now I'm still happy. Even with all the complications that COVID has brought, it doesn't make it easy to communicate with family back in Europe, I'll admit that. But I'm trying to be optimistic that I can travel back more easily in the future, because obviously it was always the idea it's easy to just go for a quick

visit. But part from that, I think I'm very confident that staying here was the rightdecision and is supporting the career that I want to have and the progress I want to make with our research.

CHRISTIAN COTÉ:

So, what's next for you?

DR. STEPHANIE PROTZE:
Right now, what's next for me is heading to the lab. Because every now and then I'm still getting my hands into the cell culture, and today is one of these days. On the bigger picture, I think the next goal is to really build a big enough research team that is able to actually test those biological pacemaker approaches that we have already in the pipeline and to move these preclinical studies ahead that I mentioned and also, to have a team that is able to develop additional newapproaches to treat heart rhythm disorders in the future.

CHRISTIAN COTÉ:

Dr. Stephanie Protze, award winning scientist at UHN's Mcewen stem cell institute, thanks for sharing your amazing work with usand continued success.

DR. STEPHANIE PROTZE:

Thank you very much, Christian.

CHRISTIAN COTÉ:

For more on the podcast, go to our website www.behindthebreakthrough.ca and let us know what you think. We'd love to hear from you. Dr. Protze's research is made possible in part thanks to generous donor support. If you'd like to contribute to this groundbreaking medical research, please go to www.tgwhf that's tgwhf.ca/podcast. That's a wrap for this edition of 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 research and teaching hospital. I'm your host, Christian Coté. Thanks for listening.