

Dr. Andrea Furlan 0:01

[Your Complex Brain theme music] It's an invisible disability. I had patients that they told me, "I wish I had an amputation, cancer, or a scar, something that it could show, and people believing me and take me seriously," so it's really sad. It happens a lot.

Dr. Anuj Bhatia 0:15

What causes this transition from short-term to long-term pain? Why do some people have it, and others don't? These are the kind of questions which motivate folks like myself to try and find some answers to me prevent this from happening. And, when this happens, can we treat it?

Heather 0:32

[theme music continues] This is Your Complex Brain, a podcast all about the brain, the diseases that impact it, and the path to finding cures. I'm your host, Heather Sherman, and I have the great pleasure of working alongside the team at the Krembil Brain Institute in Toronto, Canada, a leader in brain research and patient care. In each episode, we'll take you behind the scenes into our clinics and research labs to meet the game changers of the future. We'll also empower you with the latest research to help you take charge of your own health. You'll hear directly from people who are living with brain disease, as well as their loved ones and the care teams who support them. Join us on a journey to unravel the mystery of your complex brain. [theme music continues then fades out]

Lara Pingue 1:22

[bubbly, pensive electronic music] My name is Lara Pingue. I'm 45 years old. In 2018, I injured my back and that set off a multi-year campaign of dealing with chronic back pain. It was an ordinary day. I do remember, when I think back, that in the weeks leading up to this morning, I had kind of a nagging back pain, and it wasn't the first time that I had ever dealt with back pain. I mean, I was 41 at the time and it's unusual for anybody to reach the age of 41 without some sort of creak in their back or little aches here and there.

My career involves sitting for hours and hours at a time, like many people. I remember one time standing up and feeling like, "Oh". Something just went kind of wrong, and I remember walking or limping around downtown looking for a back massager, and I thought that would really solve it. And so, these things happen from time to time. I would pick up my child and feel a little, "Eh," a tweak, and I kind of assumed what I always assumed, which is I was ignoring my core muscles. I was sitting too much. I was crossing my legs. I wasn't exercising enough, and all those things were true.

But, in August 2018, I went down to my kitchen, and I was just making breakfast, and I sneezed, and I felt something really electrifyingly painful in my lower back, and I remember thinking, "This is not what I've ever felt before". [music fades out] However, I had two young kids, I had a full-time job, and so I took some Advil and I carried on. [light electronic music] The pain didn't go away. In fact, it got worse, and I remember thinking, "Well, why is it travelling?" I started feeling it kind of in my hip joint, in my leg, and then it became electrifying. I would describe the pain as an electric zing, going up and down to my toes in my left leg. I've since learned that's sciatica; that's a nerve that's being hit.

After weeks, I went to my doctor and, you know, I remember the look of my doctor's face being very much, "I've seen this before. This is not surprising." She gave me a prescription for anti-inflammatories and said, "Come back in 12 weeks if it doesn't go away." Twelve weeks, when you're in this kind of pain, is an eternity, but I thought that it would resolve, and so I took the prescription, I filled it, and it didn't help. [music fades out] I had a very active lifestyle before. I was a runner. I've been doing yoga off and

on for 20 years. I walk to the GO train to get to work, so movement was always a part of my life, and now it was gone because everything hurt.

[driving electronic music] I went back 12 weeks later, and I said, "It's worse. Like, this is not... I can't bend. I can't tie my shoe. I can't sleep. This electric zinging in my leg is really impacting my entire life," and she said, "Okay, we'll do an MRI," and we did. It showed a herniated disc in the L4-L5 disc region that was impeding my nerve or touching my nerve on the left side, and that explained perfectly what I was feeling on my left leg. And, I said, "Well, so now what?" and she said, "Well, here's a prescription for pregabalin". It's prescribed for people who have seizures for epilepsy, it's prescribed for people with mood disorders like anxiety, and it also is known to help nerve pain, and that's what I had. And so, I started taking that, and that was not without its side effects. So, I just felt a little bit out of it all the time, tired, unfocused, and it did help with the pain to some degree, but it wasn't enough really to make me think, "Okay, I've solved it. This is what I'm going to do to deal with my back pain". [music fades out]

[gentle electronic music] I was very eager to treat this aggressively. I wanted to start running again, I wanted to get my life back, I wanted to sleep through the night again, and I was willing to do whatever that took. So, of course, I was doing physiotherapy, I was seeing a chiropractor through my office, I was on this drug, and I said to my doctor, "I want to see a surgeon too," and I had a few acquaintances who had had a herniated disc and had success with surgery. So, it's a discectomy – that's the procedure where they take the disc that's been ruptured or the disc that is squeezing and hitting your nerve, and they remove it, and so that nerve is no longer touching. I was very happy to pursue surgery. I wasn't scared about it. I just wanted to get it done, and I remember I was at Union Station after work, and I got a phone call from a surgeon's office and it was the secretary and she said, "Lara, we got your referral through your doctor. We have your MRI. If this doctor can help you, would you consider surgery?" and I said, "Absolutely," and she said, "Okay, you have an appointment."

It felt like winning a lottery, which is kind of an indicator of how desperate I was, that I was going to see a surgeon about this back pain, and he said that I am the candidate. The MRI matched my symptoms. It was no mystery what was causing this pain, and so we booked a surgery date. In the meantime, I'm still progressively pursuing other options. Through my physiotherapist, I was directed to a pain specialist. He sat down and he just listened, and the fact that he just kind of listened and took the time was such a healing experience for me, and I can't really explain why, except I understand now that I think that he legitimized. He believed me. [music fades out] He knew what I was going through, and he said that, "We can give you a steroidal epidural," so that is to put a steroid with a big, huge needle right into your spine. I think it's like an anti-inflammatory and the idea is it would take away some of the pain, and, potentially, just let me heal and feel back to normal. I said, "Sure, sign me up."

And so, [sighs] within weeks, I had that. I felt better and I called my surgeon and I said, "I need to cancel my surgery," and about four months later, I called him, and I said, "I need the surgery." The epidural did work for some time and, if other people asked me if I would recommend it, I would, because [sighs] pain is so individual. I never know. I can only tell them my experience. I can't tell them that, "It will absolutely work for you," or, "It will absolutely not work."

[bubbly, pensive electronic music] June 2019, I had a discectomy. The recovery was not great. I was out of work for seven weeks. The swelling on my back looked like I had a baseball growing out of my lower back. That was the degree of the swelling. I remember thinking, "Well, this isn't good." I expected to have kind of a "hallelujah" moment in the recovery room and that just wasn't the case. I was in a lot of pain. That was surgical pain. But, in the weeks after that, it became clear that it wasn't the answer I was

looking for, unfortunately. And, I'm aware of the success rates and the failure rates and that some people do have success with discectomies, and I just wasn't one of them.

In 2020, when everybody kind of went home during the pandemic, that's when you started hearing—or I started hearing—about back pain a lot, because people were hunched over their laptops, people were working at ergonomically disastrous work-from-home office setups. But, for me the effect was a bit of the opposite because I could roam around my house, I could do squats during Zoom calls – with the camera off. [music fades out] I could go for walks during the day. I had a sit/stand desk at home. I started incorporating movement more aggressively into my routine, and I started lifting weights, and I found that helpful. I think it was because I was targeting my core muscles and, slowly but surely, things kind of got back to normal, or as normal as they were ever going to be. [light, uplifting electronic music] So, right now, I still can't sit for eight hours. Even being on this call, I'm mindful of how I'm sitting and the length that I'll be sitting in this position. It's kind of like this something that I'm living with forever now, and I have good days and bad days. When the pain was at its worst, it was like an alarm going off, a screeching, loud alarm bell going off, and now it's like a hum, but the sound is always there and that's how I kind of described living with chronic pain.

I don't want to be known or identified by this pain. I don't want to be defined by it, right? But, I want people to know that this is what that looks like. I go to concerts, I go to movies, I have friends, I have a full-time job, I have a busy, active family. Life kind of carries on, right? And, I think it's really opened my eyes to the fact that you really don't know what anybody is going through. This is what chronic pain can look like. It can look like nothing, but it's not. It's not. It's something I think about every day. Maybe chronic pain isn't what you think it is. It's not visible. Believe people when they tell you they don't feel well. There is a stigma, still, about chronic pain. You know, "How bad could it be? Oh, well, I hurt my back once, too." Everybody thinks they've experienced this. Very few people have, to the same degree, although one in five Canadians deal with chronic pain, and I think it's in our best interests to pay attention and make treatment available and de-stigmatize that treatment and the way we address people with chronic pain. The sooner we kind of pay attention to those who live this way or are battling something like this, I think the better off we'll all be. [music fades out]

Heather 12:32

[pensive, driving electronic music] Imagine, like Lara, you're a mom-of-two, young, active, and healthy. You play tennis, you ski, and you run. You spend your days juggling work and family and time for yourself. And then, one day, you hurt your back. At first, it feels like an inconvenience, but the pain only worsens. What you see, initially, as a minor setback, morphs into a way of life, impacting your family, your job, and even your mental health. [music fades out] More than 8 million Canadians like Lara are currently living with the effects of debilitating chronic pain, but there is hope. [Your Complex Brain theme music] In today's episode, we delve into the connection between chronic pain and the brain. How do you study and treat something that you often can't even see?

I'm thrilled to welcome two of the top experts in this field to the podcast today – Dr. Anuj Bhatia is an anesthesiologist and pain medicine physician. He is the Director of the Comprehensive Integrated Pain Program at UHN and a clinician investigator at the Krembil Brain Institute. Dr. Andrea Furlan is a senior scientist at the Kite Research Institute and a physiatrist with the Toronto Rehabilitation Institute at UHN. With more than half a million YouTube subscribers, I think we can officially call Dr. Furlan a bonafide influencer. She's also recently released a new book called Eight Steps to Conquering Chronic Pain, which I happen to have right here. Thank you both so much for joining me today.

Dr. Andrea Furlan 14:16
Thank you for inviting us.

Dr. Anuj Bhatia 14:18
Pleasure to be here.

Heather 14:21
Dr. Furlan, congratulations on your new book, first of all.

Dr. Andrea Furlan 14:24
Thank you so much.

Heather 14:25
We are going to talk more, in detail, a little bit about the book later, but first, can you tell us how did you become interested in helping patients who are dealing with pain, because when we last spoke, I think you mentioned a personal connection right back to your early childhood?

Dr. Andrea Furlan 14:39
[laughs] Yes, I never had chronic pain, but we all have pain. I remember, in my teenage years, I suffered from terrible menstrual cramps and, every month, I had a few days that I could not participate in normal activities. No matter what I was taking, medications or hot packs, they didn't help, and I had to miss school. I had to sometimes miss exams. And then, I decided to become a physician and, when I was in medical school, I was very intrigued by people with pain, and especially chronic pain, and then I chose physiatry because it's a specialty that we help the person with physical disabilities, and then I became a pain doctor. So, that's my journey – more than 30 years that I graduated from medical school, and I've been helping people with chronic pain.

Heather 15:31
Dr. Bhatia, what about you? How did you become interested in helping patients who are living with pain?

Dr. Anuj Bhatia 15:36
So, Heather, as you mentioned, I'm an anesthesiologist, and the reason anesthesia exists is because surgery cannot be done unless pain can be taken care of. That's the reason anesthesia came into existence. Anesthesia probably is the single biggest advance in surgery as we know it, because it has allowed operations to happen that wouldn't be possible, otherwise. So, as an anesthesiologist, I have an innate interest in treating pain. Most anesthesiologists see pain in the short-term context, so we see patients who are having surgery. Either we're trying to prevent them having pain or trying to treat it when they wake up for their surgery. And, the other group of patients is who have trauma, like fractures, coming into the emergency room at a hospital. So, these are what we call short-term or acute pain.

Unfortunately, some of these individuals go on to develop long-term pain. As an anesthesiologist, we are often involved, caring for these patients in their initial stages of pain, but many of us become curious as to what causes this transition from short-term to long-term pain. "Why do some people have it, and others don't?" And, these are the kinds of questions which motivate folks like myself and my colleagues to try and find some answers to, "Can we prevent this from happening?" And, "When this happens, can we treat it?" And, the first story you mentioned in the beginning, the lady with the back pain that never

really went away, is not very different from having surgery and having pain that should go away in a few weeks, but doesn't, so that's where my interest in chronic pain comes from. I think the desire or the urge to treat pain is inbuilt into an anesthesiologist. The perspective is a little bit different, in the sense that we're trying to see things that can maybe be more effective in the long term, in preventing it and, of course, in treating it.

Heather 17:15

Right. And then, to complicate things, when we talk about pain and chronic pain, you know, a lot of patients talk about the stigma that often comes along with it because you can't see pain. Tell me about that. I mean, what is life like for a lot of the patients that you see?

Dr. Anuj Bhatia 17:28

Going with the same analogy as the surgery or the fracture, it's quite easy to get empathy from other people, you know, when you have a large wound on your body with a huge dressing, or you have a plaster cast on your arm. You know, you naturally draw empathy from people because they can understand why you have pain. Unfortunately, folks with low back pain or as Dr. Furlan was talking about, migraines, it's not something that's obvious unless you have facial expressions that indicate you're in severe pain and, actually, a lot of people do a great job of camouflaging their pain. It's very hard for other people to understand that you may be in pain, and if they know you have pain, why you may be having that pain, because there's nothing obvious. What you can't see is difficult for the mind to interpret, so that is one of the biggest challenges, and I'll tell you one of the reasons for the stigma of chronic pain – often, most people who are lucky enough not to have it find it quite hard to understand, and this extends not just to other people. I'm talking about the health care providers, as well. Many health care providers struggle to understand why somebody should be in ongoing pain. Dr. Furlan and I deal with colleagues on a daily basis, trying to make them understand why our patients are having pain, and why we need to take this seriously, you know, to investigate and to treat it. So, this is a very natural reaction to something that's not in front of you, that's not obvious, that's not explainable, to just saying, "It doesn't exist".

Dr. Andrea Furlan 18:45

Yes, and I'd say that the person with chronic pain, they hide their pain a lot of times, but also, there are times that they exaggerate because they need to show that they are in pain. Some situations, I have patients that they come to see us, and they say, "Oh, I didn't take my pain medications this morning because I wanted you to see me in pain so you would be believing me," and I say, "That's not necessary. I would believe in you," but it's an invisible disability. I had patients that they told me, "I wish I had an amputation, cancer, or a scar, something that it could show, and people believing me and take me seriously," so it's really sad. It happens a lot.

Heather 19:24

How does that make you feel to hear that from a patient?

Dr. Andrea Furlan 19:27

It is a sense of powerlessness. They feel hopeless. They waited so long also to see us. Like Dr. Bhatia and myself, we have long waitlists. Sometimes, patients wait a long time to be referred, and then once they're referred, they wait in the waitlist. And, they come to us with that expectation that, "Oh, you are the pain doctor, so you're going to take my pain away". [laughs] "You have the magic wand." The first thing that I tell them is, "What are your expectations? What do you want me to do?" because I don't have a magic wand, and that's sad to say because, sometimes, I can help them to relieve their pain a lot,

but the majority of times, it's not. They are going to have to live this as a chronic disease for a long time. They already had changes in their pain system, which involves their nerves, their brain, their spinal cord, and those changes, sometimes, they cannot be reversed that easily, so it's almost like giving them a sentence of what their future will look like. But, I also want to give them hope, that there are things that we know help them to reduce the pain intensity, but also to increase their resilience to pain. So, we spend a lot of time talking to our patients. Dr. Bhatia and I, I think most of what we do is education, conversations, clarifications, expectations. It takes a long time to talk about those things with our patients.

Dr. Anuj Bhatia 20:53

I totally agree and, you know, I was thinking of the fact that some people hide their pain well, and many others exaggerate it because nobody believes them, and to, you know, get some help, and get some empathy. One of the problems with pain is that we don't have what's called a pain-o-meter. You know, high blood pressure can be measured with a device. If you have diabetes, high blood sugar can be measured with a device. Unfortunately, in pain, we don't have a device yet that can actually tell how much pain you are in, and we have some simple questions. You know, we ask people, "On a scale of zero to 10, if zero is no pain in the ten is the worst pain you can imagine, where is your pain?" So, we try to partly objectify a thing that is actually a very subjective, emotional, and sensory experience, you know, but it is only half as good as we would like it to be. So, that is the challenge. We don't have that device to measure pain, which means that patients can't go and tell, or make others believe that they have pain, and that is a big challenge of pain. I absolutely agree with Dr. Furlan on that.

Heather 21:48

Well, the title of the episode is Chronic Pain and the Brain, so maybe we can just backtrack a little bit to talk about the different types of pain and really what's going on in the brain. For example, you know, if I step on a nail or if I burn myself on a stove, you know, that momentary sensation of pain, what's actually happening in the brain? And then, when does it go from normal pain to acute pain? Dr. Furlan?

Dr. Andrea Furlan 22:09

Yeah, I love to talk about that. [laughs] You have to stop me from talking, here. [Heather laughs] Yeah, that is fascinating because, even giving a number from zero to 10 is so variable among individuals, even in the same individual, you may stimulate them with the same intensity and, one day, they will give you a one or two or three, and the other day, they will give you a seven, eight, or nine to the same stimulation, just by changing some things in the environment. So, that's the power of the brain. I am fascinated every time that I read neuroscience of pain, it's fascinating because the brain has this ability of changing the meaning, the suffering, the intensity of pain. They did some experiments that are published, that they changed the colour that you present to the person before they did the painful stimulation. Before they did the stimulation, they presented red colour, and then they did this stimulation with a probe that caused pain. These people, all of them, reported higher pain scores in the magnitude of five, six, seven, eight. But, on another day, when they presented them with a blue colour, the same people, with the same stimulation, reported lower pain scores.

What the person tells us that is pain is not just a sensory, biological phenomenon that is coming from the tissue that is hurting, or damage or disease. It is a combination of many factors, previous experiences with pain, your memory, your expectation. Who is around you? What are you expected to do? What are you expected to feel? So, if you have someone beside you, and this person says, "No, this is nothing. This is just a little, you know, break in your skin, you're not supposed to feel pain, and you're okay, you're fine," they will feel less pain. [upbeat electronic music] There is also experiments showing

that, if you have someone holding hands with you, especially if that person is caring for you and sending you messages of safety, the person will feel less pain.

So, because of this, it's so complicated to measure pain because, if someone gives you a number, what does that number really mean? And, the other thing is that the number has nothing to do with how much harm is happening. A person may feel 9, 10 or 11. Sometimes, they tell us, "Agh, my pain is 11 out of 10." That's impossible, but they want to, you know, express how much suffering they have, but there is no damage to their body. [music fades out] The injury, the disease is healed. Now, there are other people that have a very high pain tolerance and pain threshold because they're more resilient, their brain is more resilient to pain, and they may have a very severe condition like a heart attack and they say, "I'm having a 0.5 pain". I'm a physiatrist, so I see a lot of people with amputations, and amputation could be an amputation of an arm, a hand, a finger, a leg, a foot, but also amputations of the breast, post-mastectomy. Like a wisdom tooth removal, that's an amputation, because you remove a body part, and they continue feeling pain in the body that doesn't exist anymore. So, that is clearly – there is no damage, [chuckling] because you don't have that body part anymore, so nothing can be causing harm in that body part, but they continue feeling pain, that sometimes is a pain 7, 8, 9, or 10. So, it is really complicated to give a number to pain. [laughs]

Heather 25:53

What do you make of that?

Dr. Andrea Furlan 25:56

It's the brain. It's the brain. The brain is a phenomenal organ that associates all of the sensations with a meaning. So, I talk about this in my book. The first chapter of my book, even before the first step is about, "What is pain?" and what pain is not. So, I think everybody needs to understand this, because we all are going to feel pain one day or another in our lives, except for some people who have a genetic disorder that they are unable to feel pain, but that's very, very, very rare. Even if children in middle school should learn about the pain system, what the brain is able to do, the modifications, because they will have pain—there will be a tooth, you know, a tummy ache, a bruise, a fracture, an appendicitis, or something more serious—and people need to learn about the pain is the alarm system of our body—it is, yes—but the amount of pain that they're feeling, there is no direct correlation between, you know, "If my pain is 9, it must mean that I have a very serious disease, and if my pain is 1, this means that my disease is not so severe". No. So, that's the first thing I think kids need to learn. There is no correlation at all.

The second thing they need to learn is that a lot of our environmental factors, our mental state or emotions, our past experience or predictions of the future, or expectations, who is with us, who is not with us, people who are alone. Loneliness predicts if they're going to feel more pain or not.

Heather 27:35

Is that right?

Dr. Andrea Furlan 27:37

Yes. Yeah, people who are lonely... They do this in experiment. Believe it or not, brain scientists do amazing things with people. [laughs] And so, there are experiments that show, if you are lonely or feeling alone—you may be surrounded by a lot of people but, if you feel that you are abandoned—you feel more pain, you suffer more, and then your pain scores will be higher.

Heather 27:57

These are people that feel physical pain.

Dr. Andrea Furlan 27:59

All pain is real. We don't like to make the distinction between physical pain, emotional pain, or psychological pain, because all pain is real and, in laboratory, what they do is they provoke physical pain because that's how they study pain, but then they ask the person to give them numbers and, you know, "How much are you suffering?" so then they manipulate a lot of things around them. That's how we know. But, there are a lot of pain that you cannot find the physical cause anymore, because that is healed. The body heals. The body is amazing. Scars don't hurt, but people may have memory of those scars and those memories are created in the brain and they stick to the brain for many, many years. So, the person will continue feeling pain, despite sometimes not having anything wrong with their body part where they feel pain.

Heather 28:49

That's incredible. Dr. Bhatia, could you tell us about the difference between normal pain versus chronic pain? At what point does pain become chronic?

Dr. Anuj Bhatia 28:59

So, if you, you know, go back to the analogy of stepping on a nail that you mentioned before, you know, what we call as a trauma happening—you know, it could be a fracture, stepping on a nail—you'd expect, over the next few days, two weeks, the body will heal itself, as Dr. Furlan was talking about. So, you should stop feeling pain in that period of time. Most people believe this period lies anywhere between six to 12 weeks, depending on who you ask. For many years, there was a debate as to, "What is chronic pain?" and there was no consensus in the medical and the scientific community. But now, International Association for the Study of Pain—or IASP, as it's called—has agreed that anything beyond three months should be considered as chronic pain, and this has been a long journey to get them to, you know, admit to this, that this is chronic, at least at three months. Some people would even argue and say maybe at six weeks, but the general distinction is within six weeks, there's an expected duration of pain. Between six to 12 weeks is what's the transitional period or subacute pain, as people call it, and then beyond 12 weeks or three months, is when pain becomes chronic in terms of the initial healing that's happened, but your circuit system, the nervous circuits, you know, in your body are still sending the pain signals up and down and affecting the nerves around your toe, in the spinal cord and in the brain. So, it's not just the brain. It's the brain, the spinal cord, and the nerves going all the way to your toe.

Heather 30:20

Well, I know that you're both scientists, you're both clinicians, and there's a lot of work being done, particularly in functional MRI, looking at how pain is actually manifesting and tracking in the brain. Can you tell us a little bit more about that, Dr. Bhatia?

Dr. Anuj Bhatia 30:32

[upbeat electronic music] Sure. So, when I talk to my patients about pain and try and explain to them what's happening with the circuits, I always give the analogy of the upside-down tree. I see your brain as the roots, right on the top of the body. The trunk is the spinal cord, and the branches that are coming off are the nerves. And, these branches, they give even more branches, like the leaves that come at the end of a branch. So, your nerve endings are those little leaves, right? And, the way the signal goes is, imagine a drop of water falls on the leaf. It gets absorbed through the leaf, through the branches, through the trunk, and down into the roots, and that's how it flows, and that's how a pain signal flows. So, in a

normal sequence of events, when you have something that's responsible for pain—and you know, the stepping on the nail, or the fracture again—you know, their signals will go from the tip of that branch to the trunk, you know that we call it kind of the first set of neurons and, at that level, you know, when it touches the trunk, there is what we call as processing of pain. So, the body has some innate mechanisms to stop you or reduce the amount of pain you're feeling, so those will kick into action.

So, there is two-way traffic going on. There is traffic of the pain signals, going from the toe towards the trunk, which is the spinal cord. At the same time, the spinal cord, itself, is trying to dampen down that pain stimulus, so you feel less pain. Then, through the spinal cord is what we call the second set of neurons. The pain travels up, all the way to the roots – the brain at the top. Once it gets to the brain, that's kind of the third set of neurons, which is really, the bulk of processing happens. [music fades out]

So, in a normal sequence of events, every part of the body is mapped out to the brain. So, the toe has a little area in the brain. The thumb has a different area, as does the lips, as does the neck, right? And, you know, each area is perceived in a different part of the brain and handled accordingly. So, as pain dies down, that area should stop lighting up, which is what really functional MRI—or functional magnetic resonance imaging—is, but what happens in chronic pain, we noticed that not only that area lights up, you know, corresponding to the part of the body it should. Other areas, that are around that, light up. So, we call this expansion of the processing, and areas which are linked to your emotions, like depression, anxiety, they also seem to light up, which is really an interesting phenomenon and something we had no idea until we did the studies.

I am personally not a neuroscientist, but I am privileged to work with a lot of clever neuroscientists at University Health Network, and we have done experiments in our patients, before and after treatment, and shown that the amount of your brain that's lighting up on the fMRI actually changes in the treatment you are given. Respond, you know, gives you a treatment response, you get better or not, and there's a difference, firstly. Secondly, in terms of predicting responses, people who tend to do well with treatments may have a different way of their brain lighting up versus those who don't respond to the treatment, and that's really interesting as a scientist to see how different people handle the same stimulus in a different ways. And, an example may be low back pain, You know, low back pain sounds like one syndrome, but it is not. It's like 100 different syndromes for 100 different people. So, lots happening in the brain, stuff is happening in the spinal cord, and stuff is happening where the pain starts, like the back of the toe, and different people process it differently.

Heather 33:32

Right. And, the different types of pain that people feel may sound similar as they're explaining it but, as you mentioned, and especially as you can see it on an fMRI, it's so hard to know which treatment to offer to these patients. So, is that getting you closer to better understanding what could be most effective and for whom?

Dr. Anuj Bhatia 33:48

So, I think there's a lot of the pain scientific community that has been focused on this, you know, trying to predict response, you know, because that's like the Holy Grail of pain medicine. If we could only predict which treatment would work for which kind of pain, you know, sort of finding the right antibiotic for the right bug, that's kind of the final destination of pain medicine. But, what we have been successful is in finding certain patterns that predict how well you will do with a particular treatment, and I'll take an example of a study we published some time back. Ketamine is a medication that is sometimes used for people whose pain is not settling down. It's often used as an anesthetic, as well, but it can work quite

well for certain patients with certain kinds of pain. Having said that, it doesn't work for everyone, even for that kind of pain, and we did a study in which we showed that, if you have certain patterns in your brain, the way your brain handles the pain, you are more likely to respond to ketamine and, if you don't have those patterns, or if you have different patterns, you are less likely to respond to ketamine, which is a small step forward, but does add to our understanding that maybe, if we can do this for ketamine, perhaps we could do the same for Tylenol, as well, or your treatment like injections or treatments like physical therapy or mental health therapy. So, there may be, you know, a way to find what we call as personalized medicine. The right medicine for the right patient at the right time – that is really the target. So, we are making some progress. Are we there yet? No, but I think we will get there.

Heather 35:11

Exciting. Often, when we talk about chronic pain, opioids are part of the conversation. So, Dr. Furlan, I noticed that this week, the landmark clinical trial that you've been a part of was published, and they found that, after one year, one in five people were able to stop taking opioids without their pain increasing. Incredible. So, tell us more about that.

Dr. Andrea Furlan 35:29

That was a randomized trial that I'm a co-investigator on, that was conducted in the UK, where 608 people were randomized. Those who were randomized to the intervention group, they received education about it's possible to reduce the dose of opioids. We will do this with your physician. It's not forced. This is voluntary. There was also a nurse there was going to call them to offer support, and they also got some support from a person with lived experience of tapering opioids. There was also given some seminars, so they learned about self-management, they learned about meditating, they learned about relaxing, they learned about what opioids do to the body, and then they started reducing the doses, and it was amazing because about 29% in the intervention group was able to stop taking opioids, and 7% in the usual care group. But, what was surprising was that, while some people got some worsening of the pain, but the majority, it didn't make any difference, and they were telling, "Why was I taking that medication, because my pain is the same? But now, I have less side effects, my sleep is better. I don't have constipation, I don't have sleepiness during the day." They were less fatigued, so I think it shows that there are a lot of people who are taking opioids that actually don't need to take them. I'm not against opioids. Don't take me wrong. There are some types of chronic pain that opioids make a big difference in their quality of life but, when the pain is something that has already healed, and it's more musculoskeletal, and you need basically exercises or lifestyle modifications, the opioids are actually not helping.

Dr. Anuj Bhatia 37:17

[gentle, upbeat electronic music] I totally agree there with Dr. Furlan. You know, even before this study, I'm sure Dr. Furlan would agree, she and I have seen several patients who we've counselled to actually reduce their opioids, and the patients are very skeptical when we have that first conversation, you know, like, they are convinced that their pain will get worse as they start reducing their opioids. But, if you do it right, you will slowly you support them, give them, you know, the physical therapy, the psychological supports they need, the majority of patients are able to significantly reduce their opioids or come off the opioids without their pain worsening. And, you know, there are various reasons for that. You know, one is maybe they were taking too much when they didn't need it. Two, we know that a lot of opioids can, itself, cause more pain, and, in the scientific lingo, we call this "opioid induced hyperalgesia". It basically means opioids are just worsening your pain and making it worse than it actually should be. So, there are many reasons, but these are common stories to all pain physicians who spend time talking to their patients and counselling them, and I totally agree, there are patients who

benefit from opioids. There are some who benefit from low-dose, long-term opioids, but especially with high doses of opioids and inappropriate use, many patients can come off, or reduce their doses, to more safer levels, without the pain getting worse. [music fades out]

Heather 38:30

And, I know that you're also a big fan of technology, and in fact, part of a team that developed a digital health platform, right in-house at UHN, which allows you to monitor treatments and pain levels of your patients over the long term. So, can you tell us a bit more about that?

Dr. Anuj Bhatia 38:43

For sure. So, this one, in an effort to understand pain a little better, you know, we've been talking about how pain is way more than just the sensory segment. It's the environment that affects pain. It's, you know, where you are, who you are with. So, in the same sense, pain actually has effect on multiple domains. You know, it makes you feel worse, you could feel depressed, anxiety, or you may catastrophize, "This is never going to get better.". You may actually reduce your activities because you're worried that the activity would actually worsen your pain and cause more hurt.

So, in other words, pain is affecting your physical activities, your mental health, your quality of life, your ability to engage in social roles, maybe a job. It may be just going to the park, or take your dog out for a walk, so there are some tools that have been developed to track how pain affects these domains and, similarly, how the treatments that are being done affect these domains as well. And, in the past, we have been—to use a strong word—negligent in ignoring these outcomes. You know, we've been focused on how your pain is and, you know, writing prescriptions, but now we know that we really need to have a holistic idea of how a patient is doing. And, one of the ways—this is not the only way—one of the ways of doing is to use certain questionnaires that have been validated in studies and can give you some idea— at least, the trend of it can give you an idea, which way is the patient going, overall – not just their pain. Are they doing more or less activity? Is their mood worse or is it better? You know, have they returned to work or not? Things like that.

So, all we did was use some of these questionnaires, which, you know, people way smarter than I have developed over the years and put them together on a digital platform so the patient can access that through an app anytime on their phone, or, you know, go and use a web link and actually enter the data. And, as a healthcare provider who cares for these patients, it's really helpful when I see them in these little snapshots, I call them, you know, once every three or once every six months, to kind of understand where is their life going and, when I say life, I really mean how pain is affecting their life. So, it's been quite useful to understand, other than the research perspective, which is obviously, you know, looking at how treatments work and don't work, I think talking to the patient and using this to inform the conversation saying, "Hey, it looks like your mood was better, but looks like you're doing less in terms of activity, so what's going on there?" Dig a little deeper, and you will find what's going on. You know, as Dr. Furlan said, maybe there's something's changed around them, maybe somebody was with a partner who's no longer with them. You know, these things could have affected their pain and their activities. So, it's an attempt to try and understand how pain is impacting people over time because, at the end of the day, it is a chronic disease, just like diabetes, just like heart disease, just like high blood pressure; it is no different.

Heather 41:23

Right. And, you're not only looking at the pain levels, per se; you're looking at quality of life.

Dr. Anuj Bhatia 41:28

Exactly.

Heather 41:29

Dr. Furlan, this brings us right back to your book, *Eight Steps to Conquering Chronic Pain*. How effective are alternative therapies and lifestyle modifications, many of which you talk about in the book? How effective are those in helping to manage chronic pain over the long term?

Dr. Andrea Furlan 41:43

The most effective strategies for chronic pain are not the same as we use for acute pain because, as Dr. Bhatia explained, well, chronic pain becomes the disease of itself, with all those modifications. I love your analogy, Dr. Bhatia, of the tree, the leaves. I may start using that in my own patients. [Dr. Furlan and Heather laugh]

Heather 42:06

It's a good one.

Dr. Andrea Furlan 42:06

Yeah, to explain that there are those changes that happen in the pain system, because the pain system is the alarm system of the body, like the alarm system of a house, and this pain system may be malfunctioning and making a lot of noise when there is no more smoke, fire, burglar. [chuckles] Nothing wrong with the house, but the alarm continues making the annoying noise, constant. That's what chronic pain is. So, we know that, for chronic pain, if we try to use the same things that we use for acute pain, like Tylenol, acetaminophen, anti-inflammatories, or injections, or even opioids, they are not going to work the same for chronic pain, because now the pain system is malfunctioning. It's almost like trying to, if there is a noise in your house and you suspect that there is smoke, you call the fire truck, they come, there is nothing wrong, they go back, but the alarm continues making, you know, that annoying noise. You now have to call the alarm company to fix the alarm system. So, I and Dr. Bhatia, we are the doctors of the alarm system, [laughs] although Dr. Bhatia also treats a lot of acute pain, so he's also the fire truck. He's also the fireman. [all laugh]

Heather 43:22

He does all the things. [laughs]

Dr. Andrea Furlan 43:24

He does everything, yeah. You can call him for any kind of pain. So, for chronic pain, we know that lifestyle modifications are the best strategies to retrain the pain system to increase the person's resilience to pain, to decrease the suffering that they feel from pain, to decrease the sensitivity that these people have to pain, the fear that they have to pain, because if they are fearful of a flare up, every time that they have a flare up, they end up in emergency... I have a lot of patients that they do this. They go to emergency multiple times in a month because, every time that their pain goes to an 8, 9, or 10, they think that something's wrong with their body. They go to emergency, they are investigated all over again, sent home saying, "There's nothing wrong with you," but they don't believe. So, for those patients who have this kind of chronic pain that is really fearful, the only treatments we have include lifestyle modification, and that includes simple things. [glitchy electronic music] It's not complicated, but simple things like start moving your body. Motion is lotion. You need to move because you're just paralyzed by this fear. You need to live again. You need to get out of this couch. You need to eat healthy. Even just eating junk, and we know processed food is very pro-inflammatory, they need to start a diet that is rich

in anti-inflammatory things, like stop all the processed food, eat your Omega threes, vegetables, fruits. [laughs] So, those are the advice that my grandmother would give to anyone, like exercise, eat healthy, sleep well, you know, pay attention to your sleep routine, relax your mind, don't worry too much. Do your relaxation, go for your walk, meditation. Those things are what will help those people with chronic pain, so that's what I put in my book. Basically, my book is just a recipe for common sense. [laughs]
[music fades out]

Heather 45:31

It's so hard though, when you're suffering. I mean, even those small and simple things to do, I guess your advice would be to just start small and do one at a time and just do what you can to get started?

Dr. Andrea Furlan 45:41

Absolutely. Yes, of course, I talk in my book about retraining the pain system with some strategies that we now know. I also talk about medications. When do you use medications? Especially for chronic pain, we tend to use medications that are a little bit different, like antidepressants, anticonvulsants, and some patients don't understand, "Why am I being prescribed this medication?: because when they read the monograph of the medication they say, "But this is for epilepsy," or, "This is for people who have seizures, and I don't have, so the doctor must have made a mistake". So, we need to explain to them why are we prescribing these medications, because they do act in the brain, the pain system, regulating the neurotransmitters.

I tell them about alternative modalities like acupuncture, massage, TENS application, spinal cord stimulators, that Dr. Bhatia does on my patients, and those things that help your inner pharmacy to release your own medications because another factor that perpetuates the person with chronic pain is their inner pharmacy is basically on vacation. [chuckles] It's closed. They are unable to release their own endogenous opioids or cannabinoids. Their dopamine levels are out of whack because they are using some other things that stimulate dopamine. Dopamine is the neurotransmitter of pleasure, the things that we release when we do something well and we get a pat on the back saying, "Oh, well done" and that is the boost that everybody needs to get motivated. However, there are some external things that also boost some dopamine, like addictions to substances. If they use substances to get a boost of dopamine, that is very dangerous. So, some people use alcohol, they use cocaine or even opioids to get a boost of dopamine. Other things that can also give them this pleasure and motivation can be video games, shopping. People get addicted to those things, and then it creates a mess in their brain because they don't have the energy or motivation to do the other things that are important to them and, in our patients with chronic pain, because they are so hopeless and depressed and they don't have motivation, some patients, they feel invisible. Nobody calls them to go to a party, nobody calls them to help around the house, so they're almost like invisible people in the house. So, imagine living like this. Like, if you get a little bit of boost of dopamine, with any not-so-healthy things, you will become dependent, addicted to those things. So, it's really hard to break those habits, and one of the best ways to increase endorphins, and cannabinoids and dopamine is exercise. But, it hurts in people with chronic pain, and so they need to start that initial phase where exercise will hurt initially, but they need to believe that, if they trust the process and keep doing it, they will end up feeling better.

Heather 48:56

Dr. Bhatia, you know we talk about this whole idea of neuroplasticity, that the brain is always rewiring and reworking from some of these lifestyle modification perspectives. Is it ever too late in terms of the brain's role in pain?

Dr. Anuj Bhatia 49:09

Oh, thank you for asking the first simple question today. [Heather laughs] It's never too late is the answer. I think there is always hope for patients with pain and, as Dr. Furlan pointed out, it's really, you know, it takes a village, right? So, you really need to focus on everything else around and, you know, I loved her advice about you know, get moving, motion is lotion. That's a good way to put it. And, you know, with that, we often encourage people to pace themselves, as well. You know, we have some patients who will say, "Great, I'm going to start moving now. I'll listen to you, and I'm going to run a half marathon in six months from now," and you have to, you know, "Hey, hang on a sec. We're not talking about doing marathons here!" [Heather laughs] [gentle electronic music] All you want to do is pace yourself because guess what will happen if you try and overdo it on a few days? You will just collapse and then your pain will be even worse than before".

So, I think the message is, if things are done right, you know, from a physical activity point of view, pacing yourself, having realistic goals, I think that's the way forward. And, similarly, you know, other health professionals, for example, psychologists can help teach you ways you can try and cope on days when things are not going so well, and that's the nature of pain. You know, pain ebbs and flows. There will be bad days, there will be good days. The question is, "How do you manage the bad days?" and that's where the mental health professionals come in, teaching you strategies that you can use on your own. The eventual goal is self-reliance, you know, not reaching for that opioid medication or that alcohol bottle, really finding it within you to manage to exercise, to making your brain stronger, and that goes back to, you know, pain is brain, right? I think that is really the key and everything else we do, the ketamine I talked about before, or the spinal cord stimulators, or the injections, these help, and different things for different people, but the basic principles remain the same. It's not just one treatment, it's, you know, multiple treatments together in the right mix.

Heather 50:55

And, most importantly, I guess, never give up on yourself when you're dealing with this.

Dr. Anuj Bhatia 50:59

Absolutely. Absolutely.

Heather 51:01

Dr. Furlan, what's your message to anybody listening today who may be suffering themselves or who may know someone or love someone who is?

Dr. Andrea Furlan 51:07

So, my message is a message of hope. Never lose your hope. It's never too late to start. Start with knowledge, learning about this disease, "What is chronic pain?" because it's almost like diabetes. Let's say that the person never heard about diabetes, has no idea what it is. They go to the doctor and the doctor will tell them, "Well, now you need to start getting injections every day. You have to inject yourself, you have to exercise, and you have to change your diet". [music fades out] Do you think that they would do it if they don't even know what they're doing for themselves, if they never heard about insulin? They will not do it. They will not adhere to this treatment, so I think if the patients understand why we are asking them to do these things, that I'm telling you to exercise, not because I want to get rid of you and send you to the physiotherapist and never see you again – this is because exercise is the best method that we have to retrain your pain system. You're going to make connections between your body and your mind. You're going to tell messages to your brain that your body is actually functioning. You don't need to be fearful of this pain. Then, your pain will start getting less and less because now your

pain system doesn't need to create these danger signals. It doesn't need to make so much noise in your brain to alert you that something is wrong because, actually, there's not a lot that is wrong. You might have a little bit of arthritis here and tendinitis there, but these are minor things that you could be feeling, like a one or two or three, but your brain is feeling seven or eight or nine. So, with exercise, mind/body exercises too, relaxation, meditation, mindfulness, cognitive behavioural therapy, all those things, they work to retrain your mind how you interpret pain.

Heather 52:56

And maybe we stop saying, you know, whether somebody has a high pain tolerance, and we call it pain resilience.

Dr. Andrea Furlan 53:01

Yeah, yeah. They're more resistant to pain. I tell this to my patients. I tell them, "You know, everybody's trying to reduce the pain that you have by giving you medications, pills, injections, even surgery. I'm here to help the person that has pain. If I can improve you, your resilience, you will still have that pain, but now, if you're a better person, you have more buffer in your life, that same intensity of pain, now, will have less significance in your life because your life is so full of meaning and you are a better person, more resilient. Then, you may not need those pills, injections, or surgery anymore".

Heather 53:44

[light, gentle electronic music] Beautiful. This is such important information and I'm so grateful to be able to speak with both of you about all the exciting advances in this area. Thank you so much for taking the time today.

Dr. Andrea Furlan 53:54

Thank you for inviting me today.

Dr. Anuj Bhatia 53:55

Thank you. It was an excellent discussion, Heather.

Lara Pingue 54:01

There's a lot of anger that comes with experiencing chronic pain. You want to blame somebody, you blame yourself. Your body feels like it's betrayed you, and I remember thinking, "It's just really unfair". Like, I took care of myself, I do take care of myself, I eat right, I exercised, you know, I slept well, and this still happened to me. My message to other people would be, you know, I believe you and I sympathize with you, and it won't last forever. [music continues then fades out]

Heather 54:44

[Your Complex Brain theme music] Thank you to Dr. Anuj Bhatia and to Dr. Andrea Furlan for joining me on the podcast today. Thanks also to Lara Pingue for sharing her story. If you'd like to hear more of Lara's story, please head to our website, uhn.ca/krembil and click on the show notes for today's episode.

This episode of Your Complex Brain was produced by Jessica Schmidt. Our executive producer is Carly McPherson. Thanks also to Dr. Amy Ma, Twayne Pereira, Suzanne Weiss, and Megan Andheri for their production assistance. [theme music continues]

I hope you enjoyed today's episode, and if you did, I would love for you to tell your family and friends about Your Complex Brain, and don't forget to leave a review on your favourite podcast app. Thanks for listening. We'll be back in two weeks with another exciting episode. Have a great day. [Your Complex Brain theme music continues then fades out]