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Physical Therapy for Patients with Persistent Pain

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Presenter: William Rubine, MS PT
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- [Calista] Our course title today is Treating the Invisibles: Physical Therapy for Patients with Persistent Pain. And it is my pleasure to welcome and introduce Bill Rubine of physicaltherapy.com. Bill is a senior PT at the Comprehensive Pain Center at Oregon Health and Science University. He is a visiting instructor on the subject of chronic pain as well, at the University of Washington, Pacific University, and George Fox University Physical Therapy programs. He was written or co-authored two book chapters on pain and pain management and musculoskeletal presentation of peripheral neuropathic pain. So thank you so much for presenting for us today, Bill, and being part of our virtual conference week. And at this time I'm gonna turn the microphone over to you.

- [Bill] Hi, thanks Calista. Okay, can you see me? Hi, my name's Bill Rubine. I'm a physical therapist in Portland, Oregon at the Comprehensive Pain Center at Oregon Health Science University. I work all day with patients with persistent or widespread pain, neuropathic pain, CRPS, and fibromyalgia. And then I do some teaching, as it said, over there, and I usually take one or two students a day. So, I don't know, thank you, Michael, for setting this up, and Calista, and Kathleen for getting me through the technical part. And I'm gonna try to explain to you how to help these patients with persistent pain that's perpetuated specifically by central sensitization and what we now call nociceplasticity or nociceplastic changes.

These are the invisible changes that take place in somebody's central nervous system, and probably in their immune system, which you can't directly image or detect with a nerve conduction study or something like that. You have to use clinical tests and clinical reasoning and infer what's going on. So, it's a fun specialty, and you get to help a lot of really frightened and discouraged people, so it feels really good. All right, let's see here. Let's see if I can get... So, managing chronic pain is important for a lotta different reasons. The first one is, it's the most common cause of disability in Western society, the prevalence, as you can see on this slide, is greater than the prevalence of

diabetes, cardiovascular disease, and cancer put together. Chronic pain affects 100 million adults in the U.S. at a cost of between 560 and 635 billion dollars per year. So it's important from that perspective. From the individual perspective, pain is the number one reason that people seek medical attention or rehabilitation. Everybody understands the kind of pain that you get with obvious tissue damage. Like, if you skin your knee or you break your arm and then it hurts, and then over time it heals up, and the pain goes away. But not everybody understands pain that's spread like this, or gets severe, or lasts forever. These are real pain diagrams for my patients. It's also stressful for clinicians. Anybody who does outpatient ortho or spine is gonna see a couple of patients like this a year, I think, and even though you probably don't think that the person is just crazy and all making it up in their head, it does often feel for therapists, I think, that they don't really know what they're supposed to do. You don't know how to approach something like this.

And so, that's what I'm gonna give you in this lecture. Then there's the opioid epidemic. These numbers are bad and they are getting worse every year. So, if you think that chronic and widespread pain is stressful for patients and for therapists, you can see that it's probably also very stressful for doctors. Doctors are looking for an alternative to opioids. There's a pendulum in physical therapy that's swung from passive therapy to active therapy, which I think it's a good thing. But there's another pendulum now that's swung from giving people pharmacologic pain management to non-pharmacologic pain management, and we need to step into that role, I think, that's on the next slide. So there was this special article in the "Physical Therapy Journal" back in 2018 all about non-pharmacological management of pain. They have a good editorial in the beginning where they point out that a lot of different national agencies are making pain a top priority these days. And that's including the CDC, The Department of Health and Human Services, The National Institute of Health, The Department of Defense, The Department of Veterans Affairs, and they're all agreeing on for basic priorities, which are getting an improved understanding of how acute pain

transitions to a chronic condition. We're not gonna talk about that one much today. Ensuring better access to frontline non-pharmacological treatments. Developing viable means of fostering self-management of chronic pain, we're gonna talk about that a lot. And, advancing routine clinical implementation of effective strategies, we're gonna talk about that a lot. So hopefully this will help you with non-pharmacologic management of chronic pain. These are the learning outcomes. I'm not gonna read them to you, but, if you look at the work of the cognitive functional therapy people, they talk about three basic priorities for managing people with chronic spine pain. One, you need to understand the problem.

And that means that we should understand it, and the patient should understand it, and we should understand it in the same way. Two, we should be able to give them some kind of techniques to manage their symptoms. One of the hallmarks of these invisible, or nociplastic pain disorders, is it that people have severe flare-ups that last a long time, and they can be very distressing. So we need to give them some kind of pain management techniques to help them through these flare-ups. Otherwise, they have a hard time following through with their physical therapy. And then three, we need treatments that will help them get their lives back. The therapy needs to look like their life.

And so, these three priorities are what I've broken up into your learning outcomes here. We're gonna especially talk about a mechanism-based view of pain. There's five different mechanisms listed in these objectives, but we're really only gonna talk about nociplasticity and psycho-social factors. So you'll understand what that means. You'll get some good evaluation strategies, you'll get some good strategies for managing the pain and then some ways to structure exercise that I think are effective for people with a maladaptive changes in their brain, not just deconditioning or movement-related disorders. Basic points, one, pain does not equal tissue damage. If you only get one thing out of this whole talk, you should get this, you can have pain without tissue

damage, and you can have tissue damage without pain. That might be on the test at the end of this course. This is the picture that everybody puts, it says, and the point here, is that pain is not a doorbell. Mildly noxious stimuli don't always lead to mild pain experiences. And severely noxious stimuli don't always lead to severely noxious stimuli. There's all kinds of other factors here that affect the pain that somebody actually experiences consciously. Other factors besides just the noxious stimulus. What does come from a noxious stimulus are just action potentials which are called nociception. Nociception and pain are not the same thing. Pain is an output from the brain.

So what does that mean? It means that when the kid has his foot in the fire, the pain isn't coming out of the fire and going up his nervous system, and being perceived in his brain. It's just action potentials, like I said. Just nociceptive input ascending through his peripheral nervous system to the spinal cord, up the spinal cord to the brain, and then the brain has to interpret the whole experience and decide that it's pain. I'm gonna probably say that 100 times during this talk. That experience of pain that the person is experiencing is produced in the brain, not in the tissues. This is the definition of pain from the International Association for the Study of Pain.

You can read it for yourself. This is a good definition from the sense that, if somebody comes into your clinic, or comes into the healthcare system, and says that they are in pain, then they deserve to be cared for. Even if the scans are fine, even if we can't find anything physically, mechanically wrong with them, they still deserve to get care. So that's good, but as a clinician, it doesn't give me a lot of insight into how I should try to help that person. This definition of pain was made famous by Lorimer Moseley in 2003, it says, we can see what it says, the point of this is that pain is an unconscious involuntary response produced by the central nervous system when it concludes that there is a threat, or a danger, and that some kind of a response is required. So this gives me an idea about how to help my patients because I can retrain their brain to be

less sensitized to possible threats, less vigilant. This is an image of the Neuromatrix Model of Pain. I had to kind of write this myself real quick, to avoid copyright issues. But, what you'll see here is there's three basic inputs on the left hand side of your slide that go into the central nervous system, cognitive inputs, emotional inputs, and sensory inputs. Those inputs get processed in the central nervous system looking for threat, in terms of the context of pain, they're looking for a threat. And if the brain determines that there is a threat, an import threat, then it creates different outputs. Those outputs are on the right hand side of your slide. Pain, stress, motor, and emotional outputs.

The important point about this is that when somebody, when that threat detection system gets triggered, all these inputs are gonna be triggered at the same time at different levels depending on depending on the threat. There's more about that on another slide. The invisible problems that we're dealing with happen inside this circle, in the processing. Whether it's a functional movement disorder, or functional dizziness, or CRPS, or just chronic pain, the changes happen in the processing. Sometimes, the way I say this to patients, is when the inputs don't match the outputs, you have a processing problem.

David Butler compares this to an orchestra that is supposed to be able to play all different kinds of songs, happy songs, sad songs, fast songs, slow songs, but then it starts playing the I'm in pain and I'm never gonna be the same song so, many times, that pretty soon it starts off to play "Happy Birthday to You," I'm playing with my kids, and within a couple of bars it's playing my back is totally messed up, and it's never gonna be the same. So it's like an orchestra that should have a lot of different outputs available to it, but instead, it gets trapped into one, that's a good metaphor. Another thing about pain, another general principle is that this pain experience that I'm talking about doesn't just come from the sensory part of the brain, it doesn't just come from the emotional part of the brain, it's distributed all around the brain. Now, the theory that

pain is an output based on threat and salience, is a theory. It's the Neuromatrix Theory of Pain. But the observation that pain is processed in many different areas of the brain is an observation from an fMRI. It's not just a theory, and I think the point of this is, is that, these invisible changes that we need to reverse with our therapy are distributed throughout the brain. And our treatment needs to impact the patient's whole brain. Sometimes, when I'm looking at my patients I'm visualizing the fMRI of their brain and trying to light up all these different areas of their brain that you might see here. If I just have them on their back doing posterior pelvic tilts, with no kind of context for it, then I'm not sure that that's a super effective therapy. Every pain expert has their favorite optical illusion, and this is, I'm not a pain expert, but this is my favorite optical illusion.

But if you look at this you might see four concentric circles of squares that are slightly rotated about their center, or you might see four interlocking rings. If you see the four interlocking rings it's not because you don't want to go to work tomorrow, or something like that, or you had a rough childhood, or something like that, it's because your brain is unconsciously taking in this input processing it but processing it incorrectly, and then giving you this output that is inaccurate. And that's what's going on with the patients. Remember, they're gonna think that we think that their pain is all in their head, and they're just making it up. But you have to point out to them that that's really not what we're thinking.

And generally, what I'll do at my job, is I'll just pull up Google Images at the computer right while I'm working with them and show them this image. This is a good one because it doesn't give them a headache. Threats can take on a lotta different forms, the threat can be viral, it can be an actual physical threat, like a tiger. I had one patient who is terrified of stairs, this box down here represents stairs, or it could be a social threat. But anytime there's a threat, and the brain thinks it's worth reacting to, it'll react possibly with pain, with a stress response, an emotional response, a motor response, and a cognitive response. There's one other thing that I just want to point out, I don't

want to spend too much time on this slide. The people that we're talking about are unhappy, discouraged people. So, you just have to remember that pain, everybody tells them the pain was gonna go away, it didn't go away. He might feel mistreated, misunderstood or lied to by his doctors. He may think that everybody thinks he's making it up and it's all in his head. He can't predict what's gonna happen next anymore. He can't make money, he can't play with his kids the way he used to. He might be afraid that his wife is gonna leave him, he might be afraid he's gonna die before his time. We're dealing with people with painful medical diagnosis, but we're also dealing with people with a lot of feelings about the matter.

It's good to keep that in mind. I'm gonna go quickly through the physiology. I think it helps, because, when you're working with, you don't wanna think that this is just a fad. You wanna think that it's really true so that when your patients are being in pain you don't get too scared and back off. If you want more details you can easily find them in tons and tons of books. And I've got a lotta references in the reference section too. I'm just gonna try to get to the high points that you need for the rest of the two hours. So, nerves, sensory nerves transduce stimuli into action potentials.

Nociceptors transduce noxious stimuli into nociception in certain sensory neurons. Remember, there's A betas, A deltas, and C fibers. A betas typically don't transmit nociceptive input. A delta fibers and C fibers do. Peripheral nerves are made up of thousands of neurons, some sensory, some motor, and what they do is, they channel the input into different neural zones. I could talk a lot about peripheral nerves, but I think the main point for this context is, people can have neuropathic symptoms, but, if they're in a neural zone it's probably coming from lesion, or a disease, or an irritation in some peripheral nerve tissue. That's not exactly what we're gonna be talking about today. Let's see if there's anything else I wanted to say about that. I don't think so. When the sensory neurons synapse in the dorsal horn, this is a pretty good picture, once they start to synapse in the dorsal horn, a lot of modulation goes on of

nociceptive input. Some input gets turned up, they call that facilitation. Some input gets turned down, they call that inhibition. And most of it happens right here in the dorsal horn of the cord. Let me see. I want to talk about this a little more. So, there's six lamina here, in the dorsal horn of the spinal cord, and A beta fibers go to certain lamina, and A delta fibers go to other. When the system starts to get more sensitized, then the A beta fibers, which are typically non-nociceptive, will map over onto the lamina of the A delta fibers, which typically are nociceptive. Those inputs then will go to the brain as if they were nociceptive, and the patient will start to feel pain with just a light touch.

Also, there's a lot of interneurons in here that will go up a few levels, or down a few levels, or decussate across the side. So the patient can start perceiving pain, having it on different sides of the body, or in weird areas, widespread pain. When this happens in the spinal cord, they call it central sensitization. And there's good articles about this. Clifford Woolf wrote an article that was pretty famous, all about all the different details of central sensitization and here's the main point for me as a clinician. Everywhere they looked in the nervous system from the membranes, to the neurotransmitters, to the receptors, to gene transmission, to mapping, to whatever, if the system is trying to turn itself up it will, so we just need to provide experiences that drive that system to turn itself back down.

Now, I'm gonna use the term nociplasticity a lot. Central sensitization technically happens in the dorsal horn of the spinal cord, but there's a lot of changes that happen in the brain too. So for awhile they talked about central sensitization and super spinal changes, or they just lumped it all into to central sensitization, it got confusing. So they came up with this new term, nociplasticity, to just refer to all the maladaptive changes that happened in somebody's central nervous system that amplify nociceptive signals, and alter the pain experience in a maladaptive way. Once the nociception gets to the dorsal horn and starts to get modulated, it ascends through different ascending tracts

up to the brain. And gets dispersed to all those different areas of the brain that I already showed you. And here you can see it all spread around the brain again. Now, we're getting into the outputs that I was talking about before. If the brain makes a calculation that there's a threat and it needs to respond, it responds with different outputs, and one of them is descending modulation. Inputs coming up to the spinal cord are being inhibited all the time, just in, everybody as a baseline. That's the normal way that it works. In some cases that modulation starts to change so that the ascending signals are facilitated instead of inhibited, and then, people start to experience more pain. That's part of central sensitization.

So, the ascending inhibition is a regular normal output, but, sometimes the inhibition gets inhibited. Like the cases that we're talking about, and then people will have more pain than you would expect. Little things that really shouldn't hurt, or things that should hurt a little, hurt a lot. In regular cases this descending innovation is very powerful and the literature says that it's 60 times more powerful than opioids. Another output is motor recruitment. I don't wanna get too in the weeds with this, but anytime somebody's in pain, there's gonna be alteration of motor recruitment. And I think what the literature says is that there really isn't a standard way that everybody responds to pain.

But the way that I was trained off in the beginning was that slow motor units are inhibited and fast motor units are facilitated. So you'll start to see muscle imbalances that can perpetuate somebody's pain long after the tissues have healed. But again, I don't wanna get too much into this because it's not a nociceptive change, but I think this is a big part of how these motor outputs have a lot to do with functional movement disorders. A lot of people with functional movement disorders have a functional pain disorder, and vice versa. It's just a different output from the same basic nociceptive changes. The autonomic nervous system is made up of the sympathetic and parasympathetic nervous systems. The sympathetic's our fight or flight,

parasympathetic's our rest and relax. This is one of my patients and you can see how her foot turned red like that and got super cold. That's the sympathetic nervous system changing her circulation to make it like that. Obviously, because it thinks that somehow that's gonna help her protect her foot. The immune system also responds to pain. It makes people feel sick, it's supposed to promote wound healing. There's a lot of stuff in the literature these days about the immune system contributing to all kinds of nervous system functions, to synaptic function and learning, and a lotta stuff. But, I guess the point that I'm trying to make is that when people have a sensitive and sensitized nervous system, they'll have a lot of other symptoms, they'll feel sick and just wiped out all the time.

This article Chapman et al. "Journal of Pain," 2008, is probably one of the best articles in the whole reference list to just understand how pain is more than just a mechanical phenomenon and really more than just a sensitized nervous system phenomenon, it's a whole problem of homeostasis. The nervous system, the immune system, and the endocrine system all getting sensitive or tired. The endocrine system produces adrenaline and cortisol, it makes people feel stressed out or anxious. Sometimes this is adaptive. But if it's on all the time then it can become maladaptive, and that's what we'll see in our patients.

Oof, this slide, the point that I'm trying to make with this slide, is that the principle of neuroplasticity is that cells that fire, together wire together. And when some of those changes are gonna be brief but some of them are gonna be long lasting changes. And that might sound obscure or sorta faddish, but really, it's similar to what the psychologists have been talking about all the time with conditioning. There's classical conditioning and operant conditioning. Classical conditioning is when the response is not learned, it's just automatic, like salivating when you see food. And then, over repeated experience that response, that normal involuntary response gets conditioned to a different stimulus that wouldn't normally provoke it. And if you can imagine

somebody with a sensitive nervous system that's highly vigilant to threat than they can start having an involuntary response to threat, to all kinds of stimuli that really aren't threatening, they really aren't noxious. This is what you're gonna see happening in your patients. There'll also be a certain amount of conditioning, whereas if they, like, for several times when they did something they had horrible pain, then it's just a normal learning response to not wanna do that thing anymore. But these are the kinds of ways that when we say that cells that fire together, wire together, these are the kinds of responses that were looking at. It's not faking it or making it up, it's just the way nervous systems learn and the way they work.

There's another interesting thing. If a subject gets a noxious response when it, predictably, every time it does something, like you take a physical therapist, and put him in a room, and every time he wants to get a glass of water he gets an electric shock, that's an unhappy therapist. But, if you take that same therapist, put him in a room, and sometimes he can get a glass of water, sometimes he can't. He just gets these random shocks all the time, that's a really really unhappy therapist. So, when we talk about pain education down the road, we're gonna wanna take our patients who feel like they're suffering from random, unpredictable pain, and make it a little bit more understandable and predictable.

And then, even that will just help them start cope before their whole system is able to change. If you have any questions, by the way, feel free to type 'em in. I'm gonna start talking about mechanisms and exams. So we talked about nociplasticity, and now we're gonna talk about the different mechanisms that will perpetuate somebody's pain even after the tissues have healed that will produce widespread, unpredictable pain and ways to examine a patient to see if you think those things are going on. And also something about psycho-social factors. These are the five pain mechanisms that are currently recognized in producing a pain experience in a person. Now, if somebody has acute pain, then they've probably got all these different mechanisms working at once.

The system doesn't work all that well for acute pain. Although, we do know that severity of pain and different psycho-social factors like fear avoidance and catastrophization are important factors for somebody with acute pain developing chronic pain. But what we're talking about today are people who have pain for an extended period of time, even after the tissues should have healed. And so, something, one or more of these mechanisms hasn't returned to homeostasis, it hasn't returned to normal. This article by, I think it's Chimenti, actually, was in that "Physical Therapy Journal" from May 2018. And so, let me talk you through this stuff. Nociception as a mechanism is when the system is working right.

There is a tissue that's not working and there's a tissue that's being overstressed from one reason or another. It's producing a noxious stimulus, it's being transmitted to the spinal cord, it's making it through the descending modulation, moving up the spinal cord to the brain, and being perceived as pain. So that's what nociception means. It means there's really something there. Peripheral neuropathy is misfiring or sensitivity in the peripheral nervous system. Sometimes you'll get negative symptoms too. Nociplasticity, like I said before, is the mechanism of maladaptive plastic changes in the central nervous system.

Very similar, if you guys are already familiar with the functional movement disorders, or the CRPS, or the dizziness, or what was the other one? I can't remember. So I'll teach you about that. Psycho-social factors are psycho-social factors. And then moving-related factors is a new one. There was an interesting editorial in the "PT Journal" about how psycho-social factors and movement-related factors aren't really pain mechanisms. Which, and to a certain degree, they're not, but they are consistent reproducible factors that contribute to somebody having pain over a prolonged period of time, even after the tissues have healed. So I'm gonna go a little bit over the different symptoms that you'll hear about in your interview that might make you think that these are present in your patients. And then, we'll go on to the exam. So, primary

nociception, the symptoms will be predictable, they'll be reproducible. They'll be in a possible distribution, and it'll match the history. You assume it to be predominantly driven by the activation of peripheral nociceptive sensory fibers, like we talked about. It just seems to be there's something that's actually there. Peripheral neuropathy, there's something there with peripheral neuropathy too. Although, sometimes with the patients that don't understand the anatomy, the pain will seem widespread and unpredictable. If you understand about how nerves function, a lot of times it's not that unpredictable, but it'll have neuropathic characteristics, it'll be distributed in some kind of neural zone. Maybe radicular, maybe a peripheral nerve distribution, they'll be a history of an established lesion or disease in the nervous system, or you're gonna get them one. Often they're cold sensitive and they have flare-ups that are delayed. Many of these symptoms are similar to patients with nociplastic changes, except that they are confined to a neuro zone, more or less. And generally, there's something in the history to go along with it.

Now, central sensitization in nociplastic pain. Before 2018 I've never heard of the term nociplastic pain, but this is the term that we're using now. Now, you're gonna get patients like with the pain diagrams that I showed at the beginning. Their pain is diffused. There's no tissue that would ever explain it. They've been cleared for neuropathic pain. The pain is out of proportion to what they're doing, and they'll have flare-ups often that last for days.

That's kind of a hallmark of these cases, is the flare-ups that last for days. People with neuropathic pain have it too. These two cases have it. Other verbal cues that you'll hear sometimes with these patients is they'll say, "The mind of its own." "It feels weird." "It feels swollen." Things like that. Sometimes, they'll complain of numbness or weakness, all different kinds of problems in other systems that you'll see, like multiple sensitivities. So a lot of times they'll have a kind of phantom symptoms, like they'll feel swollen, they'll feel stiff, but when you go and actually look at the limb, it's not swollen

or stiff, but they do feel it. It's just that their sensory system, they're sensitized, and they're central nervous, they don't realize as much, they don't really apprehend what's going on in their tissues as well as they normally would. Phantom pain is kind of a special case. I just wanted to put it in there, it's very common. It has central peripheral and psychological factors. I put it in here because it is an example of nociplastic changes in the brain. And really, this is the kind of a case that drove people to develop the theory of the Neuromatrix Theory of Pain. This guy's got pain, these guys will have pain in their leg even where they don't have a leg down here. And not only will it be pain, but it'll feel like their leg.

So, if they're having that experience, it can't be coming from the tissue, 'cause the tissue's not there. For awhile people thought it was coming from the stump, but it's the residual limb, but it's not coming from the residual limb either. It's an experience that's produced up in their brain. The kinds a techniques that I'm gonna talk about work pretty well for phantom pain. Psycho-social factors. The idea of social factors used to kind of intimidate me. I thought maybe it was something that a physical therapist wasn't gonna be good at dealing with, but, it's really not that complicated. Depression means that the person feels sad and doesn't have any energy, and doesn't want to do anything.

Fear avoidance means they're afraid to do things, they're afraid that things are gonna damage their tissues. Catastrophization means that when they start to have pain, or something goes wrong, they react very very strongly. And kinesiophobia means that they are particularly afraid to move. I have a quote from the same patient with the red foot. She said, "I'd gone from being a hyperactive young woman "who loved sports and outdoor adventure, "who loved to play with her children, "and mountain bike with her husband, "to a dead slug on the couch." "I wanted to die so I could get out of everyone's way." "I wanted to cut off my leg "and throw it into the nearest garbage heap." "I hated my leg, I hated it for ruining my life." "And I was confident that I could

manage better "with a plastic one." That is psycho-social factors. She was a good writer. Movement-related factors, I really don't wanna talk about it very much, for sake of time. But, the idea with these, is that they move poorly. Anybody with any experience as a physical therapist has seen a lotta patients like this. And then when you try to cue them, the cue doesn't take, it takes lots and lots of queuing, and lots of practice. I could talk about this all day, but, I wanna stick with managing pain, and not talk so much about these. If the patient had movement-related factors that were predominant and less in nociceptivity, then the pain would be more confined to tissues that are suboptimally loaded by their poor movement. There might be a lotta them, but it would still, it would come and go. You'd see it relate to their movement. When they have predominantly nociceptive factors that pain is gonna come and go with all kinds of things. Not just movement, maybe stress, maybe nothing. Sometimes it's hard to tell.

There's more about this coming up. This is the part I really want to talk about. The first thing I wanna say, is when you see somebody with one of these pain diagrams, don't feel like you have to over-test sensitized or frightened patients, just because we're physical therapists. I did this lecture at George Fox and one of the students came by later when they were an intern OHSU and said this was actually the only slide that they remembered. So, if you're only gonna remember a couple of slides, remember that pain is not always the same as tissue damage, and not to over-test sensitized or frightened patients.

You don't have to test every little thing when they come in and they're miserable like this. But what can you test? So, if you want to confirm nociceptive changes the first thing you want to do is rule out neuropathic pain. In other words, there's no history of a disease or lesion of the nervous system. The distribution's not really plausible, and there's no relevant lesion or disease on their scans or in their medical history. This guy down here, Joe Nijs, that I'm referencing, is a really wonderful writer about working

with people with chronic pain and a great speaker. You should read all his articles. Anyway, this is from his work. So, first thing you wanna do, if you're wondering if nociceptivity is the dominant thing is rule out neuropathic pain. the second thing you want to do is rule in central sensitization. So you might examine their injury and see if the pain is disproportionate. Now, I'm friends with a woman who's a real senior expert therapist in Seattle, and when she gets somebody with a lot of fibro she'll do a gentle exam and try to see exactly what's going on in there. I typically won't, I'll be a little bit more hands off at the beginning and just start to see what they can do, and build 'em up from there.

I'm gonna talk you through that today. If you wanna do a tissue based exam in the beginning and see what's going on, or you want to back off and just start managing the sensitivity, and work your way in, you've got somebody to back you up either way you go. So, the next thing you wanna do is quantified sensory testing. I'm gonna teach you how to do that today. Is there diffused pain? Is there allodynia, hyperalgesia, or hyperpathia not in a neural zone? And then, do they hypersensitivity? This you'll measure with the central sensitization inventory, which I'll show you in a minute. The thing I wanna emphasize about this, is they have these symptoms, they have these signs, but they're diffuse.

Then you can also access for other supraspinal changes, do they have pain with these things? Right left discrimination, and all this stuff happens in the brain, so if they're having trouble with that, you know that they're pretty sensitive. And I see patients that wear these things fairly frequently. You probably heard about this in the CRPS lecture quite a bit. Okay, quantified sensory testing, we're coming up. Allodynia means that things that really shouldn't hurt, hurt. So you might test it with, technically, you test it with a camel's hair brush. I'll usually use a piece of Kleenex, or a cotton swab, or my finger. A lotta times I just use my finger, a brush is too hard to keep clean. Hyperpathia is also called temporal summation. I use a broken stick and poke them little by little, a

little bit every second to see if the pain ramps up. Dysesthesia means an unpleasant feeling that is not pain, but it's not pleasant. Cold sensitivity, you know what that means. Pressure sensitivity, or hyperalgesia, hyperalgesia means something that should hurt a little, hurts a lot. Secondary hyperalgesia means that something, it hurts on the other side. And two point discrimination means that they don't have a good sense of what's happening. Their sensory discrimination is inhibited so they have a hard time telling one from two, or big from small. This has to do with cortical changes that take place in their sensory cortex sometimes as a result of persistent pain, smudging.

So here's a table and then the video is gonna be coming up. Okay Kathleen, can you hear me? All right, here comes the video. So, I teach these things to my students and they frequently just look at me like they've never heard this before, or they've heard it but they never thought it really mattered much. Quantified sensory testing alone, isn't enough to say somebody has fibro or a chronic pain condition, but it helps to confirm. And it also is really good for setting the stage for patient education later. When you trying to explain somebody that their system is sensitive, it helps if they seem together, that it hurts just to touch their skin, or when you poke them with a stick, it ramps up. So here's the video. "Quantified Sensory Testing."

That's my students handwriting, thank you Lizzie. ♪ Doo da doo ♪ We're getting there. So there's me, there's Scott. The first thing I'm gonna do, is I'm gonna test him for allodynia. And we're looking for signs of nociceptive changes in sensory nervous system that would amplify his responses to these typical stimulus. Remember, there was the circle with the arrows pointing in and the arrows pointing out. This touch I'm gonna do is the input, and if his output is pain, then that's abnormal. So it's just a light touch, two centimeters, repeat it every second. Just like that, I'm doing right and left, upper quarter and lower quarter looking for pain. Does this hurt? Now, if he's got a regional pain problem like a chronic whiplash or something like that, then I might check

a regional thing. Like here I'm checking his neck, if he had back pain I might check his back. If the pain is widespread, then I'm looking at more widespread nociceptive changes. If the pain is confined to an injured region, or a neural zone, then I'm looking at a more discreet problem. It might not have really affected his whole central nervous system so much. These are typical tools. I don't actually use a tuning fork very much, it's too hard to keep it clean. I use cotton balls, like I said, or my finger, or I'll break the tongue depressor, and just get a sharp thing. Here we go. I don't see anything moving, there we go. The next thing is pressure evoked allodynia. In the textbook it says to press with your finger until it blanches. I typically do a pinch. Top and bottom, right and left, takes less than a minute, I've scanned him. That's about it. Next one is hyperesthesia.

You'll see me poke with a stick. Coming right up here. So, take your tongue depressor and break it, you want to get a sharp point. Feel it yourself, and then let him feel it, so he doesn't get scared. Just see it's sharp, but it's basically okay. Then you wanna just dent the skin like that, that's enough pressure. And then do it once or twice per second for 30 seconds. If you do it twice you've got an extra to back you up, if you do it once you've also got an extra to back up up.

Ask them for the first poke, does that hurt? Give me a number from 0 to 10. And then, after you've been poking for 30 seconds ask another number. If you get a big difference in the numbers, then that's your response. So the last patient I did this on, it was the first touch was a two, and then it went to a six, so I gave it that his score was a four. I don't think in the clinic that the scoring is all that important. I think that it's more important just to see if it ramps up, or if it doesn't, but you can. It's nice if you get a score and you see it get better later. Now, how do I get outta here and into the slides? Thank you, Kathleen. So do you guys out there think that you could do quantified sensory testing on a patient in a minute or two? And you think you know why to do it? If you feel like you don't know how to do it, you should ask me a question and then I'll

try to answer it. Because it's a quick, easy technique to see what's going on inside these invisible functions, inside somebody's central nervous system. And it's really really good for helping patients understand what's going on with them. Here's some screening tools that you can use. The American College of Rheumatology Criteria for Fibro, I use the most. It's got a nice picture, it's a one-page sheet patients can fill it out. It's got a widespread pain index, and then questions about other symptoms besides just pain. Then the Central Sensitization Inventory is two pages that you give them a score from zero to a 100. And if they get over a 40, then that's sort of the cutoff for central sensitization. When I did it, I think I got a 24. My student got a 54, Lizzie, the famous Lizzie. And she's still a functioning PT student, she's great, but she's got a sensitive nervous system.

These are good tools. These are screenings for psycho-social factors. There's an article out there, I wasn't able to find it, that says that many experienced therapists think they can identify patients that are fearful or catastrophizing, or depressed, but then if you really test them up against the screens, they can't test it that much, and I think that's probably true. The FABQ is the Fear Avoidance Behavior Questionnaire. The Obrero is a similar thing from Europe. The Tampa Scale for Kinesiophobia. I don't actually use that much, but you see it in the literature a lot. Same with the Pain Catastrophizing Scale.

The Start Back, we use it at my clinic all the time. It's just nine questions asking the person about how worrisome they're paying is, if they're having any pleasure in their life anymore, if they think it's gonna get better, if they think it's safe for them to move? The Start Back is a good screen. It was developed for patients with acute pain, but at this stage, the insurance companies want us to use it for every patient. And sometimes I'll get some good information from there. I don't hang my whole treatment on any one of these screens, but I use them to try to get some insight into my patients. The last time I use the FABQ on a guy I thought he was gonna score very high, and actually

didn't. So, we were able to have a helpful conversation about that, and then again, it doesn't really take all that much time. So when it comes to evaluating the structure and function of a patient with a sensitive system, somebody who's fearful or sensitized, the first thing that I do, is I'm like, all right, we're gonna see what you can do. There's a great article about this, this article here by Keenan O'Sullivan et al. in that same "Journal of Physical Therapy," is probably the best article I've ever seen about evaluating somebody with severe or chronic low back pain.

So what they say is to minimize pain provocation tests. I totally agree with that. If if I just have a guy with pain that comes and goes with an anatomical distribution, then I wanna do pain provocation tests. But if I know they have flare-ups and they have pain all over the place, then too many pain provocation tests, it's just not practical, it just flares them up. They're expecting me to do it, but I haven't ever had anybody complain that I didn't do it. So what you wanna do is, I'll get their goals, that's coming up in a minute, and then I'll start having them move, and watch how they move. I'm watching for their movement patterns.

I'm up looking for bracing, breathing, freezing, or just inefficient movement. And then I'm asking them how it feels. I guess I'm just reading off the slide to you, but this is really how you do it. And then, instead of poking on things to see if it hurts, I'm gonna try to find strategies to start making these things easier. This is really one of those reasons why I don't think it's a good idea for new students, right out of school to start doing chronic pain. Because you have to be able to observe them move you have to be able to talk to their body. And I think that takes a year or two to develop in most people. Of course there's gonna be exceptions, but a hands-off approach and using movements as an experiment, it's kind of a language thing. How would it be if you do this? What if you just reach down and show me what you can do? Don't have to force yourself, just to see what you got, what about if you move this way? What about if you move that way? Let's see what you can do. And then, what if you keep your chin down

a little bit, what if you relax your back when you come up instead of leading with your back muscles? You just start getting some insight into where they're at. Pain provocation tests really aren't necessary. Kabat's Test, we use all the time. Technically, Kabat's Test was first developed by the PNF guy. I think it was Dr. Kabat who tested people's toes, and strength, and then had them do isometrics in their neck. And if their toes got stronger, then he had them do neck exercises and then they started getting better. Then the tests got carried forward by one of my instructors, Greg Johnson, who teaches it all the time. With segmental strength testing, then work the neck or the abdominal series. And then repeat the segmental strength testing and look for it to improve. And then it got carried forward by Peter Edgelow, who is an expert in Thoracic Outlet Syndrome.

And we do it at the clinic all the time. Honestly, the evidence-base for this test. And this exercise is not extensive, and you can see a lot of eyes rolling at OHSU when some of us just have every single patient do neck isometrics. But if you're starting with somebody with chronic pain, who's sensitive and can't do a lot of physical exercise, then cervical isometrics just seemed to work and be a good place to start. So you can just take that as another therapist's opinion. But I would feel irresponsible if I didn't include it in here because I really do, do it all the time.

And so do a lotta my colleagues. You don't want them to stick their head forward like that, just a tall, and then push to facilitate the cervical flexors. If they're really deconditioned or have poor proprioception, then I'll have them do it lying on their back, or I might have them do it with their head and shoulders on the wall to help them stabilize their neck. There's a lot of talk in the chronic pain world about not giving a biomechanical explanation for everything. And I think that's true, we don't wanna use phrasing, or words that make people feel less safe in their body. So, I stay away from phrases like cervical instability, or something like that. But, people's necks are deconditioned and weak, and it's a good place to start. I think when you start

strengthening their neck, you end up facilitating the motive for all the way down. Anyway, it just seems to work. Then you wanna do an Explain Pain Assessment because we're going to explain pain to them. I've watched a lot of students try to do this, and you don't want the patient to think that our explanation is saying that this thing is all in their head. I'm sure that every other person in this Treating the Invisible Conference must have said the same thing. So, when it comes to pain, you just need to get an idea about who they are and what they wanna know. Because you want your educational intervention to be effective and not make them think that you're just putting 'em in a box.

What I've noticed is that there's a lot of companies, and really brilliant clinicians giving scripts, or, sort of preset ways to talk about pain. And I think that that's a good place to start, but I do think that they're on the lookout, patients are on the lookout for being treated like they're faking it? The more personalized you can make your education, the less likely you are to run into that. So these are some of the questions that they put forward into this book and explain pain supercharged on the subject. Then, you wanna get their goals. Goals should be meaningful, and measurable, and SMART. This is the PSFS down here, which I use a lot to write down their goals, and then I'll track this on a monthly basis.

So, a lotta times when you ask a patient about a goal they're like, "I don't know, "I just don't want to have pain anymore." I'm sure you guys have probably all experienced that in the clinic yourself. So then I'll say, okay, let's say they did a magazine article about you. Billy is better, his pain is better. In the old days, I used to say physical therapy was a complete success. Now, sometimes I reignited it a little bit, and say, okay, the first three months of therapy were a huge success. And then, what are you doing in the picture? They made a movie about you, what are you doing in the movie? And then, you'll start to get a feel for what patients really want to be able to do. That's how I get my goals. Then you rate it. Try to cut it down to a time, or a discrete action,

and then rate 'em on a scale of 0 to 10. Remember, we need to activate their whole brain, not just change their muscle tone in nociceptive cases. So, the better goal, the better our job, the more effective our therapy's gonna be. So, this is how I do it. If I don't get it done on the first visit, I'll get it done on the second visit. Then we gotta get their baselines. This is the first part of the two mountains picture, the lower line here is protected by pain. So I'm climbing up this mountain here, I'm starting to feel some pain in my achilles, maybe the fatigue in my body is starting to produce a noxious stimulus in my calf, and I'm getting this pain, and that pain is protecting me. It's still protected by pain line, but I'm not damaging my achilles yet, I could keep climbing. This is Mount Hood, by the way, I could keep climbing, but at a certain point I'm gonna hit that dotted red line and I'm going to actually tear my achilles.

Now, if I need to, I can probably still crawl up to the top of that mountain. But the point is that the pain comes on before the tissue damage. Now, when somebody is sensitized that protected by pain line has moved way down. Now I'm in pain before I even get out of the car, but I can still climb if I want to, I haven't even come close to damaging my tissues yet, but I'm getting up there. At a certain point I'm gonna hit this line called the flare-up line. Once I hit this flare-up line, even if I start climbing down, right away, I'm gonna be in pain for three or four days. I didn't tear anything, I didn't hit the tissue damage line, I just activated my central nervous system, it's gonna flare, that's the flare-up line, and then somewhere in the middle here, there's a baseline.

At baseline is something that you can do, it's gonna make me sore, there's gonna be a pain, but it's safe, it's not gonna flare me up. And it's not gonna damage my tissues. So we need to find their baseline, which, I'm gonna show you how to do in a minute. I think maybe even on the next slide, yeah, okay. So when you want to get their baselines, I was probably 12 years outta school, or 15 years outta school when I learned this, because before I used to think that the physical therapist was supposed to come up with the baseline. Like, I was just supposed to talk to the person for a few

minutes and guess, or maybe we would just talk about it. But it's better this way. First, whatever they wanna do, is have them do three trials, if you go back to that PSFS, the person wanted to walk, they wanna run 20 minutes. So if they feel like they're ready to run, then I'm gonna have her do a run and she can stop whenever she wants. She can stop when it stops being fun. Patients are gonna say, "Well, God, it wasn't even fun before I started." Then you could say, "Well, stop when it stops feeling constructive." "Stop when you think when you just feel like it." The main thing is that it's not came contingent. You don't wanna say, run until your pain goes up by two.

Their pain system is busted. And if we just direct their attention more and more to pain, it's not good therapy, I don't know what the word is, it's not effective. So don't do that, you wanna be non pain contingent, if the patient wants to stop after two minutes, the first time, then fine, they can stop after two minutes. Then the second time, maybe the two minutes went pretty well, so they run 10 minutes. That's the second trial. Then third time, they think the 10 minutes was too much, it flared 'em up, so they go down to five minutes. Leave it up to them. One of the things we're trying to do is encourage their self-efficacy. But once they've done their three trials we take the average and that's their baseline, and I'll write that down. If you wanna be conservative, you could go down to 80% of that and have that be their baseline.

Once I learned this, it made my job a lot easier, and I'm always excited when I get to teach this to people. I learned this from Joe Nijs by the way, thanks Joe, if you're out there. So, what I'm hopeful, once I get their baseline, I'm gonna get their goal. Here's the goal, here's their baseline down here, six minutes. Then I'm gonna get a date. How soon do you want to get to 60 minutes? How soon do you think you can get there? If the patient doesn't know, we might go back and forth. But, it's better for them to come up with these answers than for me to just come up with them like some old man with a white coat, you know what I mean? It's better for them to get it. So, if all's going well, then they're gonna have a piece of paper just like this that they can stick on their fridge

with their baseline, their goal, a date, a progression, and a line. And then the instructions we're gonna give them later is, if you're feeling really good, don't go up here, and if you're feeling really bad, don't go down there. You wanna stick to the line. So that's how you determine their baselines. This part of the eval. Remember Natasha, with the foot? This is just a paper that she left at the clinic because she used this to find her baseline, and you see she's got the basketball thing there? When I saw this, this is how I knew that I had her brain involved. We had a biopsychosocial approach going on, she had goals. You can just see they're there. And she had a good story. She said, well, I'll tell you that story when we get to the treatment part.

Sorry about this slide. Once you've done your eval, you've assessed their mechanisms, you've assessed their psycho-social factors, you can come up maybe with a pie. Some people use a pie diagram, some people use a radar diagram. I think that I first learned from the pie diagram. This is NOI style, the Neuro Orthopedic Institute style, but the thing is that the mechanisms really don't have to add up to 100. Any patient with persistent pain is gonna have more than one mechanism. The point is, what's the big one, where are you gonna start? So when I'm training a student, they're doing the history. Then we take a little walk around the clinic for a minute, and I ask him, what's the big mechanism, what's the big one? Is it primarily nociceptive, or does it seem like they have a irritated nerve, they have peripheral neuropathic pain, or does it seem more like they have central sensitization?

And then I asked them why, and what they should test. Which should be good homework for anybody doing this. This is a radar graft, it does the same thing. And then cognitive functional therapy has a great radar graph. It says tissues, movement, health, emotions, cognitions, I can't remember the other ones. Sensation and movement. And so, you can look at all these different things and get a feel for what are the big factors on a patient that you have to target. But, at a basic level you can just start with the pain mechanisms. The other things, homelessness, cancer, substance

abuse, whatever, are contributors. But they're not really pain mechanisms, but they're still important. All right, next, is how to manage the symptoms. So you've done your eval, and now you wanna manage the symptoms. They call pain, stress, anxiety, and fatigue the survival feelings. They really all go together, just like those different outputs that I showed you in the diagram at the beginning. And we need to be able to manage all of these things. I'm gonna talk a lot about pain and a lot about sleep. Sleep is kind of a popular topic these days, and it should be, because you can help patients a lot with sleep. And sleep will change if they try, then patients can change their sleeping faster. They can change their nociceptive processing. And so they can start to feel better pretty fast. I've had good outcomes with this. There's a free module from the Oregon Pain Commission.

That'll give you a good basic overview of how to do this. That link is down at the bottom of the slide. I've read this two or three times, it's really good. In Oregon, almost everybody has to read it. One of these days, this, or something like it, will be all around the country. So, if you're curious about more on this topic, or resources for people in your clinics, this is a good one. Formal pain education is one way to start. This is an image from Lewis Gifford who was a pain expert in London at the early parts of this whole movement, and apparently he drew this the first time on a napkin. So, here you can see the tissues, the environment, they're producing inputs that go into the central nervous system.

These inputs move up through the spinal cord, and through the brain where they get scrutinized, in British English, or processed, in American English, some signals get turned up, some signals get turned down. The whole thing gets interpreted in light of somebody's experiences, beliefs, et cetera, et cetera. And then the outputs are generated, and typically I'll draw a picture just like this on my lap, on a piece of paper sitting next to my patient on the table. The things I want you to know about this, for doing pain education on the fly, and I say this just based on having watched a lotta

students learn how to do this over the years, is, if you take the courses or study the whole big thing, I think that's great, but in the meantime, start with what the patient already knows they had. They have allodynia, they have hyperpathia, they have widespread pain, they have flare-ups, whatever, they have symptoms and signs that they have that you know they have, and that they know they have, start with those. And explain why people have feelings like that. They're not just crazy, they're just sensitized. If they have a phantom you'll explain the things that go into a phantom, if they have pain, just from watching other people move their back, you'll explain mirror neurons, and why people can have pain just from watching other people move. If they have widespread pain and allodynia and they get sick all the time, and the smell of chlorine flares them up, then you explain about that.

But, include those things in the beginning of your explanation, and why they occur. Then, at the end of your talk you wanna talk about the therapy that you're gonna ask them to do, and why you think it's safe, and why it's gonna help them. I know that might sound kind of basic, but, you see people get mixed up on this all the time. And I think it's because the physiology is complicated, and we're all just kind of wrestling with it. But if you just stick to those basic points, you will have a patient who's more relaxed and ready to follow through with their therapy. Which is really what you want. Aside from formal education.

There's just a lot of words, we say. There's the talk you give in the room is worth something, but they're constantly gonna be watching you for cues to see if what they're doing is right, if what they're doing is dangerous, if they should be scared. These are frightened people. So, you need to sort of use your verbiage all throughout the session that's very positive, and keep framing the problem as one a sensitivity, that's basically safe. There's often a picture in these talks of a iceberg, because the part that's over the iceberg is the stuff that you say to your patient. The part that's under the water is just all the stuff you have in your head that keeps you from freaking

out, or saying something. So, Lizzie and I, we're working with this 17-year-old woman with severe pain in her feet. And she was a toe walker, and she had CRPS in one foot, but she was walking, she was walking, walking, walking, and then I tried to see what would happen if she walked backwards, and she fell. Her knees just buckled, and she went down on her knees and came right back up. So of course, she looks at us. And Lizzie and I just didn't react at all, we were like, "All right, get up, come on, that's fine." And that was really good. That was A plus for Lizzie, and honestly, that was A plus for me. So there's lots of like unthinking just things that you say and ways you behave that are gonna have just as much an effect, or more than the formal pain education that you do either in a class, or in a room. And these are just some things that I find myself saying all the time.

Or that patients have sent me emails, that it was really good when I say that. Homeostasis is kind of a big word to use with patients. Try to moderate your language to the education level of your patients. "It's going to be okay." This is a good one. "A flare-up means you've come too close, not gone too far." That's pretty much a direct steal from this book "A World of Hurt," but that's a good one. It's going to get better, I must say that 5,000 times a week, and probably most of you do too.

But these kinds of things are good therapy, and I mean, it might sound obvious but when you see a patient, with pain all over their body like that, then it's hard to say that they're gonna get better, but they will, they will get better if they kinda go through the method. If they can frame the problem as one a sensitivity, and retrain their brains, and manage their symptoms, then they can get better. Perfect sequence, my wife calls this slide "Where the Pimento is Taking Over Your Life." So here, the red circle is the patient's pain, and the green circle is their life. After a fair amount of therapy and everything, their pain might not be any better, hopefully, it will be, but isn't always. But their life might be a lot bigger. So this is a good outcome, really. And this is a kind of a quick educational tool that you'll use sometimes they call it The Bubble, or something, I

don't know. Breathing and relaxation is a big one. I'm making a big deal about this in this presentation because when I was, I was a yoga teacher before I was a physical therapist, and then as a young therapist I believed that breathing and relaxation were good, but they just didn't excite me. They didn't seem as high a priority as the exercises, the physical exercises that I was giving the patients. But, as I got more and more experience as a chronic pain therapist and worked with other therapists, and doctors, and yoga teachers, and psychologists and stuff, it just finally got beaten through my skull that breathing and relaxation are worthwhile. They're worthwhile practices for patients to do, but if I don't believe it, then I don't think the patients are necessarily gonna believe it.

And when I'm teaching this in the school, that's what I tell the students. There's more than one way to do breathing and relaxation exercises. You can't teach it like the way you teach somebody to do a posterior capsule stretch for the shoulder, or something like that, but the important point is to make it a priority. This is probably gonna be on the test too. This is a nice, just a little handout that I give people sometimes, we use this in the hospital too. You can read it for yourself. This article down here, Bush et al. is one about deep, slow, steady breathing, which is pretty good.

This article by Mark Jensen is really good about all different kinds of breathing, and relaxation, and calming techniques. It's getting kind of old now as an article, but it's a good article, it's just an overview of how to look at all these things together. He introduced me to the idea that hypnosis maybe wasn't such a bad idea. So this is what I have to say, don't rely on a brief handout on diaphragmatic breathing. Don't just hand it to them at the last minute, and tell them they should do it. Practice it with them, watch them practice. Practice it with them, help them out here. Remember, these people have gone through plastic changes, so that their stress level is high, they are hypervigilant. They need a little bit more supervision for this stuff than somebody else might need. So this is just a quick, you'll see there's a box breathing that they use.

Inhale for four, hold for four, exhale for four, hold for four, but my teacher who's a big pain expert, thinks that holding the breath is sort of like a pain behavior already. So we don't use breath holding in this breathing a relaxation technique. We just use inhale, exhale, and pause. You can find thousands of breathing techniques, you have to find the one that works for your patient. So don't rely on just a handout. Don't just give it a minute at the end of one session. Watch them do it, do it with them. If they're having trouble doing it, try to help them problem solve it. Remember, a lotta people, when they start a new breathing technique, will feel a strain, if they feel out of breath and a strain in the middle of the technique, then let them stop and just breathe normally for a minute, and then go back to it. Include a rationale for breathing in your patient education.

And then, when they're doing their exercises is another time when you're gonna see this. The breathing, the pain education, all this stuff, is gonna come up during the exercises, that's the best time to bring it up. And if you do see an instance where they are holding their breath and feeling pain, and then you cue them to breathe, and their movement gets easier, and it kinda feels better, I think it's really good practice to just point that out to them so that they, that's a good learning point there. Manual therapy with these kinds of cases is problematic. I do it, it's on here, 30, 60. I do it, and I think that it is okay to do it.

People will argue about this on Facebook all night and for weeks to come, "Should we do manual therapy?" "Should we not?" I think that manual therapy is soothing and calming, and it can be good for teaching people how to move. And moving people where they have a hard time moving. Manual therapy is good, but, we shouldn't couch the whole treatment in biomechanical terms, that increases their sense of danger. Or that their fascia is not free enough, or little crystals in their muscles, or anything like that. You want to use your manual therapy as a tool to reinforce the other functional training that you're doing. I'll show you a slide. There is a way to fit everything together,

but it doesn't start and end with manual therapy. It really, I think, starts with goals and education, and active therapy with manual therapy helping along. This article by Nijs is pretty good. These bullet points are from there. Just cues for doing manual therapy on somebody who's got allodynia or hyperpathia. This book below, Diane Jacobs book, "Dermoneuromodulation," is a wonderful book about manual therapy and pain science. The first 2/3 or 3/4 of the book are manual techniques for treating pain in the skin. I don't know, I don't wanna get too in the weeds about this, and then the last part of the book is essays about pain science and how nervous systems evolved, and how they work, and why people feel pain, and how to work with them. I know Diane, but I'm not getting any money from her book, but I'm telling you, it's a great book if you're interested in combining your manual therapy skills with chronic pain. Let's see, I'm gonna have a note here. No.

That's just a drawing. She says, "Provide a comfortable treatment environment." That's obvious. "Listen, listen, listen, your patient's brain "will map you and how well you listen "right into its own pathways." Remember, we are examining the patient but the patient's examining us too. We need to be nurturing, and safe, and reassuring, and positive, and we need to take their fearful, painful condition and reframe it as a sensitive condition that can be ameliorated or reversed to some extent. And how often do we have to do that? We have to do it over and over and over again. And you want to do that in your manual therapy too.

Explain what you intend to do and why, explain how the treatment is likely to feel. Make sure they understand that they are in charge. Ask permission to touch them before you touch them, even though it may seem perfectly obvious to both of you, that physical contact is what you're there for. Another thing, while I'm thinking about it, a lot of these patients have trauma histories. So, if you're gonna treat a patient with chronic pain as a specialty you wanna try to get as informed about trauma informed care, you wanna get trauma-informed informed. This is a little bit out of my area of expertise, and my scope,

but what I do is, I just try to go slow. I ask permission a lot. And, I slow down, I just slow down. And I'm a little bit careful about my jokes sometimes. That's my 30 second take on trauma informed care. Trauma informed care and motivational interviewing are sort of the topics for talking with patients back and forth. Cardio, you guys don't need a slide about cardio. But the point I wanna make is, they should be doing cardio. If they can't use their legs, they can use the arm bike, if they can't stand up, they can use the recumbent bike. If they can get in a pool, that's great.

But if they don't wanna go to a pool or pool's not practical, you don't wanna emphasize the pool too much 'cause it just sets them up to say that they can't do it, and then they give up. So, but some kind of cardio. It's no fun if you're treating a patient for three or four months and then realize that they're not doing any cardio. But I say to them in plain English, is that people that don't do any cardio don't feel very good, they need to do cardio. Excuse me. I'm not sick, I just swallowed wrong. Unconditional positive regard is a psychologist's term. I think in plain English, it's kind of like unconditional love. But that might not be really appropriate for the medical setting, the professional setting, some of these patients are difficult. Their recovery can take a long time. We need to be very patient, very positive, very friendly. Remember, we're treating their whole brain.

We are helping them get their lives back. So, you just have to be positive all the time. I do a class, I don't know, several times a year now, for these medical students. It's not just me, it's the whole pain intercession. And one of the students came back to see me later and said that that was her, she's a doctor, she said "That was the best part of the whole pain intercession, "just being reminded of unconditional positive regard." I think if you're gonna specialize in these kind of cases you've got to be comfortable with this. Otherwise, it might not be such a good fit. Stress Management is just as important as pain management. Pacing, I'm gonna talk about in a minute. Mindfulness Based Stress Reduction has okay evidence base to it, when you look at it for chronic low back pain

the evidence isn't as good. But remember, cohorts with chronic low back pain, are heterogeneous, some of them have no susceptive pain, some of them have nociceptive pain. They usually rule out radicular pain, but, there's a lot of different kinds of people that go into a chronic low back pain group. If you look at that the outcomes for MSBR and mindfulness in general, on fibromyalgia. The results are better. Because, it helps to reduce stress, it helps to improve sleep. It's more of a centrally acting treatment, than just pure exercise. So I'm not a MSBR certified guy or whatever, but these kinds of treatments are good. I just refer out for this kinda thing. if I can't refer out, then sometimes it helps to just direct their attention. Mindfulness is directing your attention, skillfully directing your attention.

So, when people are in severe and persistent pain they're gonna have a habit of directing their attention towards their pain. So, distraction can be one thing. But you can also start to lead them towards experiencing strong sensations without reacting so much to the pain. Or to see the pain as a wave. Remind them that the pain is gonna come. It's gonna come up, but then it's gonna go down. Panic, anxiety, they're also waves, they'll come up and come down, and we can cue our patients to ride these waves to stay with the exercise, stay with the sensation, stay with the breathing, and more skillfully, manage their attention in the midst of movement and exercise, which of course is our specialty.

So where as a mindfulness-based person, or a psychologist, might be doing this with the patient sitting in a chair, I might do some of it with him sitting in a chair. But I'm the guy who's going to practice doing this while they're climbing the stairs, or practicing rolling on the floor, or whatever it is that I need them to. Direct their attention towards things besides their pain levels, direct their attentions to, one thing that comes up a lot is the task. During that functional movement disorder talk, the most interesting thing I learned about was directing them towards the task. Less towards words interception, less towards their pain or their disorganized movement, and more towards the task.

And I try to frame more and more what I'm doing towards a task when I'm doing active therapy with chronic pain patients. But, they can also have an interceptive attention. I don't think they should be constantly distracting themselves with music, or video games, or anything like that, they can learn to have a more skillful attention rather than just looking to see how high that pain number is going. And then, expressive writing. I'm just gonna say, lots of people use it for anxiety and fear. I've used it, I think many people have used it just writing down your stuff, but the old pain experts use this with their chronic pain patients, and I've seen it work with patients myself, for pain and for sleep. What you do is you sit down and just write whatever's going on in your head for 10 minutes.

And then tear it up, don't save it, don't read it to anybody, don't hold back, don't try to make it pretty. Just get your stuff out onto the paper and then throw it out. I don't have a citation for this, if I did, it would just be somebody else's opinion, it wouldn't be worth any more than mine. But, if you're dealing with people with chronic pain, anger, stress, anxiety, you can suggest it to them. Some of them will take it up and they'll get a lot better. And if they don't like it, they don't have to do it. Just make sure they don't try to read it to their wives or anything like that. Expressive writing. Pacing is another helpful thing for helping patients manage their pain. So here you see two typical poor pacing decisions.

This person does way too much, then they flare-up, and they don't do anything, then they feel guilty, so they go do way too much, this person. Meanwhile, their pain tolerance, their pain threshold is gradually going down, they're gradually getting worse. This person never really wants to get into a lotta pain, so they do stuff, but they stay below that pain threshold. So they maybe don't have as many flare-ups as the person on the left. But pretty soon, their life is like as big as a postage stamp, and they're not really doing anything. So these are both typical examples of bad pacing. When I explain this to my patients they are invariably nodding their head like this. And the truth

is, you don't have to be a chronic pain patient, have bad pacing, lots of people have poor pacing. But the pacing that we wanna train them in is like this, sore, but safe. They're gonna nudge their pain threshold, move up. Do a little more, it hurts a little bit, well, you've got a painful condition it's gonna hurt a little bit, but it's not flaring up. You can do it. Sore, but safe, keep trying it out. This is the pacing that we want, plan your rests in advance. Take a break, whether you think you need it or not. All these pain management techniques you wanna be careful from queuing your patient to just relax and do good things for themselves when they're in pain. You don't want to give the central nervous system a cookie every time it flares up. It's like, that's not how you train an animal, or a central nervous system.

So whatever pain management techniques your people are using, I try to get them to do it on a regular basis. Resting, breathing, relaxation, modalities, which we'll talk about in a minute, whatever kind of thing their plan is. And their plan should ideally be written on a piece of paper just like their exercise plan. The pain management techniques are just as important as the active exercise techniques. If you want your patients to hang in there through the long run. Sleep. Sleep is important, there's a lot of people writing about it. Here's some sample questions that you can ask them. So I'm gonna recommend a lotta stuff, but if I was only gonna recommend one thing about sleep, it would be this article by Joe Nijs from 2017.

It has a table with very specific questions and things that you can do based on their answers to the questions. So here's some samples of these questions, how much sleep do you get? Do you feel rested? Is your condition impacting your sleep? Which, generally it is. How would you rate it? These are some questions. What's the problem? Is it falling asleep? Waking up in the middle of night and can't get back to sleep? Waking up early, snoring, and moving your legs? I have a case study that had this, and I'd missed it. But they still caught it, so that was good. How much time do you spend in bed over the course of the day? What about light? These kinds of questions are

useful. If you download the article you'll have a quick little table, that I just pull it out with my patients, and just go through it with them right there at the table. Here's some measures, I tried a couple of them with one of my patients and they're good. They'd be good if you were doing a longitudinal study or some kind of research, but they're not as helpful in the clinic as just using that article from Joe. What are the kinds of interventions that we're gonna do? And I should say that PTs can do this. The article I read said that PTs with a little bit of extra training can do this, but I mean, I just did it. I just started asking him questions and making suggestions. I still think though, if they have an option of going to cognitive behavioral therapy for insomnia, and they're not getting better with their PT coming up with a few suggestions, then obviously you should send 'em if they can go.

The kinds of interventions you're gonna do though, are strengthening their circadian rhythm. Increasing their sleep drive. Help them get into a routine. This kind of thing actually helps quite a bit with the patients. Limiting screen time. Everybody knows about not drinking coffee before you go to bed, but there really is, you can see, there's a lot more to it. Cognitive behavioral therapy can be super helpful. And then the physician referral is important because they could have sleep apnea or restless leg syndrome, which, we can't help with very much. But they might not necessarily tell us unless we ask specifically.

So ask them, and then make a referral if they need it. So here's a case study. This is Melissa, she first showed up with back and shoulder pain, and global pain from fibro. You see she's got a pretty complicated medical history, she did PT before, which felt good, but didn't change anything. She got to the scoliosis person first, I'm not exactly sure, just a low back therapist, who gave her a couple of exercises and told her to come and see me. I got her on the third visit and she started telling me about her troubles with sleep and pacing. So I give people exercises, I fine tuned of her exercises, but we went into, what is pain? Why do people have widespread pain? What

is fibro, what does that mean? And why sleep and pacing are important. Then we did some pain management strategies, which you see here. And a lot of it was about sleep. I also encouraged her to get back to psych, the psychologist, who's a great psychologist, for whatever reason, didn't think that he was gonna be able to help her a whole hell of a lot. So, really, all I had to do is just walk up there and be like, this patient really wants to get better. Most of her problems are family related to getting her family out of her bed, and family boundaries, and stuff like that. And so I got her back into psych, and that helped a ton. We got her a weighted blanket, we got more curtains in the room, we started just making sleep a high priority, getting her daughter out of her bed.

And by the fifth visit, which was a couple of months later, she had her daughter in her own bed and she was sleeping better and she was doing better. Here's her PSFS, like what I showed you before, and you see she only had six or seven PT visits. But her walking got better, walking the heavy dog didn't get any better, if she'd come to PT more that would have gotten better, but riding the bike got completely better. Her sleep got better. She got a CPAP. And then pretty soon she had a job, 30 hours a week. So this is a good example of a good easy outcome by a basic home exercise program, and sleep.

And maybe a little bit of referring out. I had a lot of functional movement disorder patients that get better with sleep. A lot of patients with these invisible problems are exhausted, they're just wiped out. And if they don't know. I'm not gonna say they don't know it, but it doesn't always make it to the top of their problem list in their medical history. But if you poke around in there, they're exhausted, and they're wiped out for one reason or another. And so, their central nervous system is starting to react, in whatever, a variety of ways. And if you start to prioritize sleep and managing stress, anxiety, and pain, then the system starts to quiet down a little bit, and a lot of these symptoms will just start to reduce, become more manageable. Mood is another

important thing. Just remember to encourage your patients to go out and do fun things, have a laugh with them yourself. You don't wanna tell your chronic pain patients that they shouldn't walk down the stairs because they're gonna throw their SI joint out. You want to encourage them to go out and have fun. Obviously, you want it to be safe, but they need to hear it from somebody in a position of authority, like pain specialist, or just a awesome physical therapist. These are just pictures I was trying out to see which different ones. There's me, my wife my birthday cake, my dog, my kids. TENS. TENS, I think had a bad rap for awhile. But TENS works well for pain management.

I'll generally use high rate the most. If they're on opioids I use low rate. The experts say to vary the rate back and forth so that they don't acclimate to it, like every couple of days. There's some of the units have a setting that will change the rate. That's gonna depend on the unit that you're using. But TENS is worth doing just because we don't want people in our clinic on hot packs and TENS for the whole session, doesn't mean we should throw the baby out with the bathwater. Obviously, most of the time they're gonna be doing TENS on their own, and not just doing it with me in the clinic. So you want the pads to be about the distance apart as the diameter of the pad. So if there two inch pads around two inches apart.

The strongest way to use TENS is gonna be right on the painful zone. If they can't tolerate it right on the painful zone, you could do it around the painful zone. And if there is no around the painful zone, you can do it at the base of the neck. So with fibro I'll typically either do the base of the low back, or somewhere on the base of the neck. Obviously not directly on the neck, which sort of helps with the whole body. The best way to do it is while they're exercising so they can do more exercise with less pain. I've had good success with this, the literature backs it up. This is the way to use TENS. They can also use it as part of their resting program, but they can use it to facilitate active therapy. And you don't want them to go to sleep at the TENS unit on it can burn their skin. Sensory retraining, I don't wanna talk about too much. If they have allodynia,

if they have pain to light touch, then you wanna do light touch, take the stimulus, break it down and start desensitizing them to it. What you'll see is sometimes with that kinda sensitivity their A beta fibers are mapped onto the different lamina with the A delta fibers and they did up allodynia there. That can be widespread. It can also be sort of in a neural zone for the region, you see that with a lot of peripheral neuropathic pain too. Sometimes they'll get sensory smudging in their homunculus. And so, when these sensory neurons get disorganized, then a lotta times their brain really doesn't know what's going on in the outside body. That raises the threat level, and little things that really shouldn't hurt, hurt. You might find allodynia, like I said, down here, or their two point discrimination will be off.

So here's the treatment for this. There we go. This is the white brush. I don't know who makes it, but they use it for autistic, children with autism and neuropathic pain patients. The easiest, simplest therapy for somebody with sensitivity to touch, is just touch. Tactile desensitization, just rub it. And they'll start to feel better, the sensitivity goes down. It's a lot like just walking barefoot on the sidewalk in the beginning of the summer. But, for some reason people love the white brush. This is a picture of a makeup brush on my daughter's back. once you want to get things harder, if you want to involve their brain, you can use localization training. Here's a picture here. So, she's got her hand behind the mirror and I'm gonna touch her hand somewhere.

There's these zones drawn on a picture here and she's got to say where am I touching her. So she's gonna have the touch, and then her brain has to figure out where it is, and find out if it was right or it was wrong. So now we've got a task. It's gonna start to decrease the threat, and hopefully your symptoms will start to improve, which, often they do. To make it even harder, you can do localization and a stimulus type. So, say, where the touch is touching you. And you have to say if it's one touch or two, is it a pen cap, or a wine cork? Is it a tiny little bathtub plug or a big bathtub plug on the back? They have to give an answer. This works well for couples, doesn't work so well

for people who live alone. And then here's an idea about the kind of dosing they did in the literature. You want a lot of reps, lots, and lots, and lots of reps. But if it seems all kind of complicated, it's fine to just get them doing this. This is a really good place to start. Another good one, while I'm thinking of it is, you have somebody draw letters on their back, like my daughter and I play this game sometimes. Take the brush or just your finger and write letters, big letters are easier than small letters, short words are easier than long words. Slow touch is easier than fast touch. And just see if they can read the letters, read the words, they're focused on the task. Maybe it hurts, but as long as it doesn't flare them up, it's good therapy. Oh, there is one thing I wanna say about this. So, how do you know when your therapeutic neuroscience education or pain education has had an effect? This is how you know. Role play it back with the patient.

You be the neighbor and let them be the patient, and ask them are you sure you should be lifting that box? Isn't there something wrong with your back? And make them say it out. Relaxation, eight minutes seems to be the minimum but they could do less. I don't wanna get too in the weeds with all this stuff. Ask me a question about this at the end if you're really curious about it. But, for the therapeutic neuroscience education, you make them educate you after a day or two, and then they can also talk about it while they're doing their exercises.

This is the fear avoidance model. They're gonna have flare-ups. It's not if, it's when, flare-ups and recurrences, don't be scared. This is when your spur-of-the-moment behavior and your verbiage matters a lot, just stay calm find out what happened, what could they have done differently? What did you learn about their case that they already didn't know? Were they doing the exercises? Were they doing their pain management? Work with them on their pain management plan and their flare-up management plan. Print the elements of a good flirt management plan. Or modified rest. Don't have to stop doing what you're doing, but don't add anything new, necessarily. if you do your

same tasks that you always do, but spread them out, if you want to. You can use ice or heat, take a position of comfort here and there. If you have medication, go ahead and take it. Some people do well with compression socks, or compression garments to reduce the pain. Stay positive, watch out for people right here at this point, you don't want them to start getting negative just because they had a flare-up. Everybody has flare-ups sometimes. Cue them, remind them to stay positive and not fall into too much negative thinking. They'll take a lot of their cues from you. Exercise. So I was just trying out some different pictures here. There's graded activity and graded exposure. Graded activity is things that really aren't that frightening. They're just the patient is deconditioned, they're kinda sensitive.

You need to start building them up. Graded exposure is when you do things that are frightening to the patient. Here we go. Things that are not necessarily physically demanding. Maybe they are, but the patient doesn't think they can do them. But that's important, because like it says here, they've got this learned, conditioned response that they don't think they can do things, and we need to change that. We need to take somebody who doesn't think they can climb the stairs with a laundry basket, and make them see that they can climb the stairs with the laundry basket.

The psychologist will talk with them about this in their office, the pain psychologist or whoever. But it's the physical therapist who's gonna give them a basket, not too heavy, not too light, and a staircase, not too high, not too small, and have them do it. So they walk out of there being like, "Huh, I can lift a laundry basket up the stairs." We want graded exposure to work for that. What the textbook says is have them rate their fear on a scale of zero to a 100 before the task, and then rewrite it after the task. I'm gonna move on a little bit. So here's some cues. Start low, go slow, be consistent. Repetition, relaxation, and consistency matter most. You don't want your exercises to be pain contingent. They should be time contingent, goal oriented. If you did 90 seconds yesterday, you can probably do 105 seconds today. Keep going going going.

You wanna be cognizant about flare-ups, check in about things, but you don't wanna be too attentive to pain behaviors. If I wanna know if they're in pain, then I'll ask 'em. But I don't pay a lot of attention to it. I just ask them if it's manageable. If the pain is manageable, then we're on. I want these exercises as much as I can to be goal oriented, task oriented. if they goal involves standing, then hopefully, I want their exercises to be standing, if not immediately, then pretty soon. If the goals are high load, then I wanna get high load, but if the goals are low load, then I think it's good to use low load exercises for people who have difficulty with low load activities. It doesn't have to all be lifting weights, and running on the treadmill. While they're exercising we need to talk.

So this was a woman who couldn't go up and down the stairs without her hand on the wall, and that was her goal. This was after the Functional Movement Disorders thing that I attended. I put the ball, in the spoon, in her hand, and she went up and down the stairs two minutes at a time to just lose her fear of being on the stairs. And then while we're doing it, we are talking about it. But it's good to use feared things and make use of stress to reprogram, to unlearn those pain memories. How many repetitions? Lots of repetitions.

And if they can't get their repetitions with the exercise, then they can start doing it as an imaginary movement and use motor imagery. For the dosing of most of my exercises. I try to get to two minutes. If they can do it for two minutes, and it looks and feels easy, then generally, I'll try to make it harder. If they can't do it for even close to two minutes, then I try to make it easier because I feel like we need reps. Motor imagery is really good for CRPS. I use it all the time. Motor imagery for fibro and low back pain, there's a little bit of research on it. I haven't had a lot of big home runs with it, and neither have my other pain buddies. But I still do use it. But what you can use here, is you can use mirrors to let the person see themselves do it to just reduce the threat level. You can also use, let them watch you do it, or if there's somebody else in

the gym doing it maybe have them watch them doing it. You're trying to do anything you can pull in to reduce the threat level in their central nervous system before and during their movement. And then start pushing it into different contexts. Maybe they can go walking outside, or different environments, different people around, different shapes, different things. Remember, because we're not just doing mechanical exercise right now, we're training them, we're doing functional restoration. And then when all else fails, you want 10 things that you can do. So I had a patient one time, they wheeled her in on a stretcher, she hadn't been out of bed for three years except to take a shower and use the toilet.

So we just started with 10 things that you can do. And the 10 things that you can do can be anything. You could be moving your finger like this, or turning your head, or doing a pelvic tilt, or whatever. You're just looking for things that you can do. Come up with a list of 10, and three times a day pick three of 'em and do each of 'em 10 times. You're just getting started, and then, you can always build it up from there. And the woman on the stretcher ended up getting better and never coming back. I don't know if I can really take the credit for that, but this is where I started her on a therapy that was sensible, and didn't flare her up, or do her any harm.

So that was good. So another thing, if you can't remember anything out of this whole talk is when all else fails, do 10 things that you can do. How much pain is okay? It depends on the patient. There's a good resource in this book called "A World of Hurt," called The Traffic Light, where they talk about if the pain lasts for less than 24-hours, they have a thing called a harm check. The harm check, better for the patient to choose their own harm check. If it's the back, they wiggle their back around, they move, they can be like, "Yeah, my back hurts." "But it's not busted, it's still working." So, that means that their harm check is okay. So if their pain goes up for 24-hours, well, they have a painful condition, things hurt. But their harm check is okay, they call that a green light. That amount of pain is acceptable continue with your activities and

your exercises. Maybe add a little bit more next time, whatever the progression that you worked out. If the pain last for over 24-hours maybe even over 48-hours, but the harm check is okay, you call that a yellow light. When you get to a yellow light, don't freak out and quit, but don't add more, just stay at the level, or maybe go down a little bit and keep going. This is where people get in trouble, 'cause they have that little bit of a yellow light flare and then they quit the whole thing. If the pain lasts, if the pain is severe, if the harm check isn't working. So now they can't move their back. They can't get out of bed, they can't stand, they can't move their arm, then they need to go see a doctor or call into the therapist.

So that's too much pain. When somebody has pain, and I expect them to have pain, then it really doesn't scare me at all, because I know they're just sensitive. But if the pain is different from what I expect, or they can't breathe, they can't seem to manage it, then that's too much pain. But I've had some patients with really severe pain, severe pain behaviors and I know they weren't damaging any tissues, pain does not equal tissue damage.

Pain does not equal tissue damage. And tissue damage doesn't equal pain. This is how I would put it all together. We're gonna make this right on time. I've got their bench baseline, I've got their goal, they're working on the line, as long as my patient is working on this line, we're gonna use pacing to keep them from doing way too much. And then we can use any of this stuff. Anything we can think of, if it helps them stay on the line, I like it. When they ask me how I feel about chiropractors, or acupuncturists, or massage therapists, whatever, this is what I say to them. If it helps you meet these goals and stick to your line, I love 'em. And if it doesn't, then I don't love 'em as much. And that's the way I feel about my manual therapy, and my exercises, the modalities, if it keeps them on that line it's good. So I'll draw a picture just like this for my patients, and generally that make sense to them. If all we're doing is massage and modalities for weeks at a time, I'm not so sure that's good therapy. But if it's contributing to this,

that's good therapy. You wanna find a team. Treating these patients on your own is not easy. At a minimum, you need a doctor to help back you up and keep them from quitting. And then you're gonna want a psychologist if you can find one, and anyone else that you can find that's interested in this material. There's groups happening here and there, and then there's countless groups on the internet. A few like-minded people that see pain as a function of sensitivity, and not just as a function of mechanics and biomechanics path of this. Any questions? Ooh, I see one, Diane asks, "What is the comparison "with these categories with the reflex?"

That's a good question. If somebody has the signs that go with reflex sympathetic dystrophy are motor changes, sympathetic changes, severe pain, allodynia, hyperalgesia, no history that otherwise would explain it, but it's in a region, generally it'll spread. You'll definitely have cases where the at RSD or CRPS spreads from one region to another. But it's regional where as you can have many of the same symptoms, but if they're more widespread, then you start looking. It's still nociplastic, but now you won't call it CRPS, you'll call it chronic pain. I don't know if that answers your question or not.

Because, you can have allodynia and hyperalgesia in a region accompanied with sympathetic outflow and not have fibro. It's just regional. But you can have whole body, or widespread pain. Generally, you won't see as much as sympathetic, you won't see that kind of color changes and trophic changes, but you might have a lot more chemical sensitivities and stuff. And that's a more widespread, nociplasticity and fibro. Then I think the treatments are the same. If somebody's whole back hurts when you touch it with a towel, you should touch it with a towel. If they just have a regional allodynia in their arm, then you should touch that with a towel too, and just work on the distribution and the dosing based on what they can handle. Does that answer that question? Any other questions? I think you'll see also, with with CRPS, or RSD, they'll have more of an impairment of motor. So with these patients you'll often see they all

have pain with imaginary movement. They'll have pain just watching somebody use the limb, if give them right left discrimination to do they'll frequently have pain and difficulty with that. Those are motor impairments in the motor system of central nervous system. Like in the supplementary motor area and other associated areas like that. And so, I'll use graded motor imagery more with my CRPS patients. Fibro, you don't see that as much. I don't think it's as much motor as it is a sensory and psycho-social, and just a general debilitation, and sensitivity to other stimuli. But I guess I'm kind of making that up, but that's how I think about it. CRPS and RSD, they're more sensitive to motor and that's why I think graded motor imagery works better. Any others? Let's see what else I got here.

So, how are we gonna help these people? We're gonna do a mechanism based exam to see if there's a peripheral neuropathic problem. They can explain these kind of presentations, or if there's a more regional problem with sympathetic components. And trophic changes like you'd see in CRPS, or if there's a more widespread pain that's predominantly nociceptive with these signs of central sensitivity that you find in quantitative sensory testing. Or sensitivity to other other stimuli, like chemicals, or food, or stress, or fatigue. Or if they have a primarily nociceptive presentation where they just have a weak low back, and a physical job, or they have a weak neck, you see this in whiplash a ton.

And if they've got long-term pain, there's gonna be nociceptive changes. But it doesn't have to be primarily nociceptive. So we're gonna do the mechanism based assessment to come up with a guess. We're gonna try to confirm it with our exam, then we're gonna give them some pain management strategies. If the pain management strategies really work, I take that to be a good confirmation that my mechanism based eval was on. Was successful, was accurate. If the pain management doesn't work, then I try something else and just start all over again. And then we're going to get him a functional restoration program, you might look at these pain diagrams and think that

these people could never exercise. But they can exercise, because pain is not the same as tissue damage. You just need to grade it slowly, and you also need to use the exercise to retrain their brain, use task-oriented, high repetition, safe exercises that relate to their goals so that to change their thinking. Because it's only natural to think when you've got pain all over like this that you can't do anything. But in fact, they can. This woman here on the top right, where it says lidocaine, is pole dancing now. I thought about putting the videos on, but I don't think it'll be professional. But she puts on a leotard and goes to a pole dancing gym, and pole dances, it's amazing, it's a great video.

People with these kind of symptoms can exercise and they can get better if you frame the problem correctly as one of sensitivity and help them manage their symptoms. You gotta remember whose job is whose. Our job is to set things in front of them that are safe and effective. Our job is to repeat ourselves over and over and over again, and explain that what we think is safe, and that it's gonna be okay. But they're the ones that have to follow through and take responsibility for their pain management, and their goals. It can be easy to kinda fall into a case of like, we have to save these patients, but we can't save these patients.

We can just put the material in front of them so that they can start to save themselves. I think probably every therapist has got caught in this kind of a relationship before. But you have to try not to. And then, use a lot of coaching. I'm not a 100% sure how much more time we have, but there's a great story about Cassius Clay. When he fought for the Heavyweight Championship of the World his coach with Angelo Dundee, it was his corner man, and Cassius Clay is out there fighting Sonny Liston. Everybody thinks that Sonny Liston is gonna cream him, but it turns out that Cassius Clay was actually a pretty big guy. And by the fourth round it looks like Cassius Clay is winning the fight. So Angelo Dundee put astringent on his gloves and start punching Cassius Clay in the face, and pretty soon he can't see, he's got alcohol in his eyes, and he can't see. So he

goes into the corner at the end of the fourth round and asks Angelo to take his gloves off 'cause his eyes are stinging, and he can't see. And Angelo says what are you talking about, man? This is the Heavyweight Championship of the World, you gotta go out there and fight. So Cassius Clay goes back out there and fights. And for the fifth round he's kind of keeping his arm out there, and just trying not to get clobbered, but after awhile he sweats the astringent out of his eyes, and he's be able to fight again. And by the seventh round Sonny Liston throws in the towel, and Cassius Clay's the Heavyweight Champion of the World, which is great. But for us, we are Angelo Dundee. We need to be in the corner, not catastrophizing, squirting water in these people faces and blowing them with a towel, keeping them in the fight. I think about that guy a lot. I got this all from documentary on Netflix if you wanna watch it yourself.

So, a couple of things. Pain does not equal tissue damage, don't over test sensitized or frightened patients. You want to manage all these different things as well as pain, manage 'em all. Use their goals to help design your exercise program and help them get their life back. Remember, with chronic pain, and especially spinal pain, the medical diagnosis isn't that helpful for coming up with an exercise program. Use their goals.

Obviously, it has to be safe, but use their goals. Let's see, do you think you can identify at least three key points of the biology of pain as it relates to understanding patients with persistent pain? I hope you can. You can, remember the nervous system can make itself more sensitive anywhere throughout the course that they can be sensitized. The nerve endings in the tissue, when there's inflammation, they can get sensitized at the dorsal horn of the spinal cord when descending inhibition gets inhibited and the A beta fibers get mapped over to delta fibers, and then all kinds of changes can go on in the central nervous system to amplify the nociceptive input to the brain, and make little things for a lot. Can you identify perpetuators in these different mechanisms? So you just wanna understand what these words mean. Nociception, peripheral neuropathy,

nociplasticity, abnormal movement, we didn't talk about that much, and psycho-social factors. If I was gonna write this again I probably would've taken out abnormal movement, but it is one of the big five. Two key evaluation strategies for patients on the five mechanisms. So that would be, quantified sensory testing and getting their baselines. If you can do a quick quantified sensory testing go through the clinical reasoning process for identifying central sensitization, or nociplasticity, and then do a gentle exam that identifies goals and baselines, you're halfway there. Come up with three pain management strategies. I would go with sleep management, pacing, and TENS. And then breathing and relaxation, deep breathing and relaxation. And then come up with three rated activity programs. Uh-oh, I didn't talk about that. Should be with three points of graded activity programs. It should not be pain contingent. It should be goal contingent or time contingent. It should be goal-oriented, task-oriented. The outline of the exercises should fit the tasks. And, you should be talking with the patient all the time using your graded activity and graded exposure programs to retrain the patient's thinking so that they think differently about their body and what they're capable of doing. Thank you guys. That was a lotta talking. Please, if you have any questions let me know, you can also reach me @rubine, you can probably reach me through continuinged.com. Thank you.

- [Calista] Thank you so much, Bill. And I don't see any questions in the question and answer pod, so we'll go ahead and wrap this up. Thank everyone for attending this week. And thank you, especially to Bill for sharing your expertise with us today on persistent pain. And have a great day everyone.