

TRANSCRIPT 1007

Deconstructing Pain

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[00:00:09] Now, as Rolly said, what I'm going to be talking about is, um, is not necessarily a direct pain story. I will kind of interweave my own experiences with this presentation, but really it's to provide some **concepts around modern pain science**. And certainly what they did is the way I learned them in the way that they sort of impacted my practice is going to bleed through really, really, really quickly here.

[00:00:31] So we're going to talk about **deconstructing pain**.

A pain specialist

[00:00:33] And for those of you who don't know me, oh, there's a couple of people in here that I don't know. Most people I've at least have a little bit of familiarity with your name. So, um, I just see you, but for those who don't and you're like, well, why in the world should we even listen to you? I'm a fellowship trained pain specialist. So what that basically means is I did an **anesthesia residency at the University of Chicago**. I did a fellowship in pain

medicine at the University of Michigan, uh, passed all my boards, did all that stuff. I was in the Navy, was associate program director of the Navy Medicine Pain Fellowship program.

[00:00:42] And what that ultimately came out is, is when you're looking at a modern healthcare system, a quote unquote **pain specialist**, such as myself, are supposed to be the people who have the answers.

Lessons from group practice in the military

[00:01:14] Now, when I went into practice, I had the privilege of, of practicing in the military, and in the military, we had what was known as a group practice model. So we see individual patients, which is very different than most of the way that, that, that practices go. Usually you have your patient panel, you see your patient panel, you're kind of are involved with them. You may cross cover and see other physicians' patients on the side, but they're not really yours. In the military because we had all these deployments, and we had people, other clinical responsibilities. I may see a patient, one of my colleagues also fellowship trained with may see them on a follow up visit, or maybe they're doing a procedure. And then somebody else might like see them after that. So it was really kind of discordant care, but it also meant **you couldn't hide your results**.

[00:01:57] And this becomes very, very important because I've seen lots of people, particularly in the pain world, talk about how awesome and fantastic their results are. But when you see their patients or you talk to their patients, that fantastic outcome could be very, very. different in the way it's being presented to you. And what I also saw is that there was this vast kind of change in the way that we treated people. Some of us were very conservative. Other people were very aggressive. Everybody had the best interests of our patients in mind, but we **practiced very, very differently**.

[00:02:25] And what the other part I noticed it was is you never knew exactly what was going to occur. You can have the same person with a, quote, "same" type of pathology, and you can do the same procedure on them, and

you could have vastly different results. Different people could do the same thing on somebody else and have completely different results. And I found that very, very frustrating. So what I thought it was the military model. I thought it was this group practice.

Questions raised by solo practice

[00:02:49] So when I moved and came up to Corvallis, it was just me, the solo practitioner, very conservative in my approach, very standardly standard. I wasn't doing like crazy stuff. I was actually following all the evidence that we had. And what I found very quickly though, is that **my outcomes in pain were the same** that I was seeing in the military. Meaning you could do the same procedure on somebody on a different day and they'd have completely different results. You could see that, do something completely different and have a fantastic result. It was this inconsistencies that drove me crazy.

[00:03:20] And I also wasn't seeing people get better. The reason I went into medicine is I **wanted to see people improve**. I don't want to see them over and over and over and over again. I want them to get back out, out into their life, seeing their friends, their family, and not being, you know, if you're, if you know your physician by their first name, and they're a specialist physician, that's probably not the best thing because you're, you really want them out in the community. You want them out and kind of dipping their, their foot into the water to see you every once in a while, but not seeing you all the time or certainly getting worse and worse over time.

Looking at the data

[00:03:53] So I didn't, I, I now didn't have these other people around me. I couldn't say it was the military. And I'd asked her think, well, well, I'm a fellowship trained pain specialist. Let me look at the data on what I'm actually practicing with a critical eye. Not this idea that says, well, you know, I know that published story, but, but that's not true because I know in my heart, the procedures that I'm doing work. And when **I looked at a little bit more critical eye**, what I noticed was that all these high priced expensive interventional

procedures that I did have very, very, very little evidence to support them. And you say no or none. And if you look at most of the way that we treat persistent pain in the United States, almost everything that we do, the surgeries, the injections, the, the whatever type of therapy you want to look at, the **evidence** that support is pretty much minimal to non-existent. And that was very disconcerting to me.

Do I understand the problem?

[00:04:46] And the second part that I looked at, well, it's wait a second here. I'm a fellowship trained pain specialist. These procedures don't work. **Do we actually understand the problem?** Because if you are treating something and you are not getting people better and you're treating it all these different ways, and those don't seem to be working, the first thing that you need to do is take a step back and say, well, actually do I understand the problem that I say I'm treating?

[00:05:08] So I went back and started looking at the literature and research on pain and what I found. Was that there was vast amounts of good, good research in fields that were completely unrelated to what I had been studying. Lorimar Moseley, who became a mentor, you know, all this published data that said that there is something **so much more to pain** than what I had been taught.

Understanding pain changed my practice

[00:05:28] So that information, and when I really went deep into the pain literature and started exploring like how this stuff works, and what actually is the science of pain? And why is the neuroscience, the brain science that we're looking so critically important to the, to the **science of pain?** And that **fundamentally changed my practice**. I'd stopped doing interventions. I don't, haven't put a needle on anybody for over a decade now at least, and became very involved with clinical education.

Not scared of pain anymore

[00:05:51] But on a personal standpoint, it absolutely changed not only how I practiced, but it **changed my own personal relations with pain**. I'm not scared of pain anymore. I appreciate. I don't find it threatening. Instead, I find it a learning tool, and it has led me in so many different ways in my own personal life with how I experienced the world. I just can't tell you.

Four key topics

[00:06:14] So I have four key transformative topics when it comes to **pain education**, we don't have time for all these, and we're not going to be able to go into all, all of them in great detail, but I want to briefly put them here just so I can start to plant some seeds for future discussions and plant some seeds for maybe to help you kind of think about this stuff.

[00:06:31] Once you're away from this presentation. The first one is this concept of **pain and protection**. And the second one is **pain and construction**, which is really this deconstruction process that Rolly led into, but you can't separate those too much. So I have to introduce them both at the same time. The other two are about **pain and time**, how different time perspectives, and past memory, and future prediction, and have a huge impact on how we experience pain.

[00:06:52] And the last one is what I call **pain and power**, in the sense of empowerment and control, this perceived control and how important that is to your personal experience of pain and what you talked with. And if you're a, a clinician, how you're working with your clients in order to help them to feel more in control of their bodies and over their experiences.

What is pain?

[00:07:11] So first we're gonna start with, "What is pain?" And I, and sometimes, and this audience is a little bit different. Sometimes. I, I feel like people like laugh at me and say, Dr. Cuccaro, what do you mean? **We all know what pain is**. We've all experienced. It. That's the stupidest thing ever. Just tell us how to treat it!

[00:07:26] But fundamentally, do we actually understand what pain is? And more importantly, **what it is not**? Because if you understand on first principles, what pain is, you should be able to explain it in such a way that it starts to make sense. And you should also understand how and why we experience it.

[00:07:43] And if I had a lot of time, these are **two pictures I typically will use**. And I'll say in the audience, I'll go, **Pain or no pain**? And I'll flash the first one, and people will say, well, that's a **big old nail** through going through someone's foot. Obviously they have pain. And then other side, they'll say, well that guy's got a nail through his finger. Obviously he has pain. And then most of you know, this, but that picture with the nail, through the boot, a person that was screaming in pain, taken by ambulance to the emergency department who received fentanyl, which is an opioid a hundred times more potent than morphine, another strong anxiolytic. And only after he got those medications, could they cut it off? What they discovered was that the nail was between his toes.

[00:08:19] And the other guy with the nail through his finger. That was a work-related injury. Wasn't the first time he did this, this is something that he did with a nail gun. And he did not go to the emergency department, and he didn't get fentanyl. This is a YouTube video I pulled off where him and his friends are joking around, and they're pulling it and he's going, "Ow, ow, ow." And they're telling him to **stop being a big baby**, so that they can cut the nail and pull it through his finger.

[00:08:40] Now, we should be able to **explain both of these scenarios**, but the typical reasoning that we have, at least in the modern healthcare system, we can't. Because this person with the nail, through his boot. We should be able to call that acute pain. And almost everybody says, well, acute pain is there's **tissue trauma**, there's damage being done. This guy had acute pain. There's no tissue trauma. And yet, and if, unless we're saying he's lying, which I don't believe he was because if he was lying and he didn't experience pain, and we gave him a bunch of fentanyl, he would go into respiratory depression. We have to be able to explain that.

[00:09:17] On the same token, the other picture, which we would say, well, that's acute pain. He has a nail through his thumb. That obviously causes lots of pain. And there's a problem there. And again for him, he had minimal pain. So how can we **explain both of these scenarios** in a way that's aligned with the science that makes both times without saying that, oh, one person's lying, and one person's not. Or one person has real pain and one person has fake pain. And the only way that we can do this is to move away from the idea of thinking that pain equals damage or that some pains are equal to damage. And other pains are some, mysterious thing that we don't understand.

All pain is about protection

[00:09:56] All pain is about protection. And what we see then is if we understand that pain is a protective system, that is **this complex experience** that comes together with all these different inputs that, we'll get into this, start to make sense very, very quickly, because if you have that guy with a nail through his boot, and you're looking, and he's got a nail through the, through, through the middle of your boot, and you kind of feel something kind of on your foot, because if I put a pencil between your toes, you would definitely feel it, that your brain would see and go, holy smokes.

[00:10:28] Something could potentially be really, really wrong in my foot. There's a lot of protection that I need here. On the other token, though, you got somebody with a nail through his thumb. If you've had an injury before and you've successively recovered from it. And that past experience wasn't horribly traumatic in any way, shape or form, and a similar thing happens to you, there's not a lot of danger in that situation. Oh, I've done this before. I need to pull out the nail. You know, what kind of sucks, but it's not a big deal. So not a lot of need to protect. And so we see then that pain is all about this protective modality. And **as we increase threat, we increase the experience of pain.**

[00:11:06] Now, counter to that, a little outside this talk, then. If you know this and you know, pain is about protection, then safety becomes paramount. How can we **increase a sense of safety**? So if pain is about protection, how

does it actually do this? What are the biological processes involved that allows this really complex system to keep us safe, to keep our limbs safe, to keep us from burning our fingers and then rotting off because of infections?

Plumber thinking: flow

[00:11:32] And the way that it does that is not this way. Most people, when they talk about pain, they talk about this 'coming from.' In fact, the language that they use will be well, **"Where is the pain coming from?"** And very quickly though, you see that this fails to actually add up, because if you have somebody again with this acute pain in his foot and he has got a nail, but it's between his toes, where is the pain coming from there? It can't be from the foot. There's no damage. There's no significant inputs coming from the foot. The only place that makes sense for this person to be experiencing pain is in the brain itself.

[00:12:08] And similarly, the guy with a nail through his thumb, that is not pain coming from his thumb. If it was a directly one-to-one correlation that if we had input in the finger and the number of inputs in a finger directly correlated with the experience of pain, then all pain would be **modulated by the amount of tissue damage** that we experienced.

[00:12:27] And we know **that's not true**. You can have no significant tissue damage and extreme pain. You can have profound tissue damage and minimal pain. And the only place that makes sense again is in the brain that the, **our brains are central to this experience** of pain coming from thinking. I also kind of use is, I describe it as pain plus, because we want to believe that somehow there's this little pain plus particle, and that pain plus particle stimulates a little pain receptor.

[00:12:54] And then that pain receptor sends the pain down the pain pathways and into the brain almost unadulterated. And everything that we see in most healthcare systems are then designed to interrupt this flow. We think we can **stop the flow of pain plus**, or minimize the pain plus, or we can cut it out, or we can poke it, or we pop it, or we drug it.

[00:13:13] **But if this was the case**, if pain actually flowed down pathways like pus. Then when we cut, poke or drugged those pathways, we should have consistent and predictable results on how our pain is experiencing. We would have fantastic outcomes. We'd have fantastic data and pain would be amazingly easy to treat, particularly even the persistent pain, but this is not what we see.

[00:13:36] Usually I'll have a slide after this. We'll actually look at the actual data on how we're treating persistent pain. And it is absolutely atrocious. We do more surgeries. We do more injections. We **prescribe more drugs than anywhere else in the world**. And our outcomes with pain, particularly persistent pain are no better, if not worse, than anywhere else in the world.

[00:13:54] So this **simply does not work**. This idea that pain flows down these pathways, and the thinking here is very cause and effect. Somehow there's a stimulus. In a response, the pain is coming from and going to the brain. And again, we want to think this way. Our brains are actually designed to perceive the world in this way, but this simply does not work again.

[00:14:20] **If it was cause and effect**, every time you had tissue damage, then there would be a direct correlation between the amount of pain that you experienced and the amount of tissue damage that we have. That's not true. And if we had no tissue damage, we should not be experiencing pain. And yet from the vast amounts of persistent pain that we have in this country and in the world, **we simply know that's true**.

[00:14:39] And again, people do not lie about their pain. Their experienced pain, the pain is a hundred percent real, but is not associated with tissue damage. I also call this then **plumber thinking**, because we approach this idea of pain pus pathways, and this idea that we can **somehow interrupt the flow of pain**, same way that a plumber would look at your pipes. They're looking for a stop or a gap or something that they can kind of wizzle out so they can stop or start the flow there. But when we think in these linear processes in this cause and effect manner, it doesn't line up for how we can explain pain. It doesn't line up with how we see that treatments align with pain.

A different way to think about pain

[00:15:18] And it certainly doesn't line up when we're looking with overall outcomes. So we need to understand that there's a different way to think about pain and that's to understand what I saw, **construction of pain**. So when you look at the diagram on the left, which is uh, it's from Melzack and Wall, Ron Melzack's, **neuromatrix theory**. And it's a adaptation of that. What you see is when it comes to pain, you cannot think of cause and effect.

[00:15:42] Instead, what you need to recognize is there are **multiple inputs**. We have the **sensory** inputs that come from the periphery. We have this affective motivational component that comes from more long term memory in what we have learned. And then we have this **cognitive evaluative** input, which also comes from the brain, but is more forward thinking anticipatory, anticipatory, and is in a lot about threat and threat and danger appraisal. We also have immune modulators in there. We have endocrine factors in there. We have intrinsic neurosystems involved. We have simply exteroceptive and proprioceptive input, all these different inputs that tell you where your body is in the world and what are all the different stimulants is in the world. And what that you believe are important to how you navigate the world all come together to construct this experience of pain.

Firefighter thinking: dynamic process

[00:16:28] Now, this is very, very different thinking though. You can't just think again cause and effect. There is **no single stimulus** that directly correlates with an experience of pain. And this type of thinking then is not plumber thinking, but what I call **firefighter thinking**, because that **process of fire is dynamic**.

[00:16:53] All fire has to have three components in order for it to be constructed. You have to have a **fuel** source. You have to have a **heat** element, and then you have to have an **oxygen** supply. And it doesn't matter how complex or how simple the fire is. You always have to have these three

elements in order to construct that fire. And these elements are extraordinarily dynamic.

[00:17:18] And the reason then that firefighters learn this is because they recognize that this **dynamic process** can change very quickly. Uh, and that how it is constructed is going to have very, **very different treatments**. Meaning if you have a big fuel based fire, there's lots and lots of logs of wood. You still have oxygen and still have heat, but you may wanna target most of your modalities against that fuel.

[00:17:45] On the other hand, if you have a **complex fire** that maybe is more oxygen related, there's just tons of there's a hundred percent oxygen. Maybe you have somebody with a bunch of, O2 tanks nearby. The thing that makes more sense is turn off the oxygen supply. And in other scenarios, if we can somehow stop that process of combustion from going on, that may be the best way that we can address this.

[00:17:65] And so firefighters who may not understand **emergence**, which is sort of the science behind this, but they've really quickly recognized with this model is that, Hey, if we can **think in three dimensions**, we can very quickly start to figure out how these fires are constructed in that way. Then we can start targeting our therapies very effective to treat this specific fire that might be similar to others, but is unique because these dynamic interactions are unique to what is occurring right now.

Pain is a constructed process

[00:18:38] So in the same way, pain is a constructed process and you can fundamentally then simplify without what I call "dummifying" **pain** into this **idea** that there's **three critical dimensions** that you have to be thinking in, in order to understand how we experience pain and how our patients are experiencing pain.

[00:18:59] There's the **sensory** aspect, which is sort of like the wood to a fire. There's the **emotional** aspect that has to do with learning and memory and

past experiences. That's sort of the oxygen supply to a fire. And then there's the heat element. That's that **cognitive** element that's all about attention and appraisal. Does this matter right now? How much attention am I investing in that sensation? How much threat and danger am I experiencing? What's my environmental cues doing here in this moment? And so just like that fire then **pain is a dynamic process.**

Pain can change--and quickly

[00:19:31] It can change, and it can change very quickly. You can have acute pain, which we would call, which in, in a better terminology would be a greater amount of peripheral, nociceptive input. There is lots of nerves firing out in the periphery. This would be something like a **broken** arm, or a **burn**, or a cut, or a, a **tear** of your skin.

[00:19:52] When we have all of that fuel, all that sensory input coming in that sensory input alone is not pain. It is just fuel. That fuel then has to have meaning to it this past experience. **What does this sensation mean** to me? And then has to have that heat element that you're **actually paying attention** to it. And as we change, then the meaning, the oxygen, the heat, and those sensory inputs, pain can change dramatically.

[00:20:18] Now, **one example** is this, when you're thinking about, well, it's all sensation, Dr. Cuccaro. If it's something is burning, and that's my pain, then that is burning pain. No, you can have burning sensations with **different meaning** and have very different experiences from them.

[00:20:34] If you are an avid exerciser and you're moving around, what will happen is you're start getting, uh, your peripheral cells start to get tired. There's lactic acid and there's deoxygenation. And there may be a burning or an aching that's associated with that. But the meaning, because you're actively exercising, and maybe you're an athlete, doesn't mean that you're suddenly in a bunch of pain. That meaning, which is your body tissue saying, Hey, **something's changing down here.** You may want to pay attention that.

We're gonna put some different information up. That meaning then becomes, Hey, I'm getting a very good workout, or I'm pushing myself hard.

More than just sensation

[00:21:11] So when we're looking at construction, and we're thinking in three different elements, we're not just thinking about what are the tissue saying? We're thinking about tissues. And we're thinking about past trauma and experience: the memory, the harm, the fear that's associated with that sensation. And we're thinking about how threatening the brain is focused on any individual sensation or input. Now all of these then can change both acutely and chronically, and **I've sort of diagrammed things** out here. About where I see different aspects of these fitting. So again, sensation is probably the easiest element to it.

[00:21:48] That's what if you're a clinician and you know about nociception, those specific, **nociceptive inputs**, which are **not about damage**. They're about change in the tissues. And they don't fire when tissues are damaged. They fire when tissues are changing. So if you jump and you feel a sting on your feet, that does not mean you damaged your feet, but what those little sensory inputs are telling you is they're telling you, "Hey, something happened down here. Something has changed in my tissues. Is this important?"

Attention

[00:22:18] You still then have to put that attention on them. And that attention where you're focusing, investing that **attention is looking for threatened danger**. If you have a lot of anxiety or you have expectations of harm, or you believe that pain or sensations equal to damage, guess what? You're gonna invest more heat. You're gonna burn your attention into it, like a laser beam and add a huge degree of heat element to that experience.

Meaning

[00:22:42] And then the oxygen supply, the **emotional meaning**, past, has a lot to do with **what we've learned**. Are we afraid? Do we believe that pain equals damage? In which case there's lots of data that shows the more you believe that pain equals damage, the more pain we tend to experience because there's more threat and danger inherent than within that meaning.

[00:23:01] What have you learned? What have your clinicians told you, have they told you that your spine is disintegrating? Have they told you that pain is dangerous and you should not move? Have they told you again, that you need to be very, very careful with all of your movements because **you're so fragile?** In which case you're gonna be very sensitive to different threats to your body. But all of these things then coming together in order to construct that experience.

All pain is constructed

[00:23:26] And when we start looking at things in a constructed manner. When we start looking at pain like firefighters and not plumbers, then the whole spectrum of pain starts to **make more sense**.

[00:23:38] So we have somebody who's got a **broken leg**. There's lots and lots of sensory input there. That sensory input. The pain's not coming from that broken leg though. The only thing coming from that broken leg is a lot of sensory input. The brain still has to say, am I safe? Is this important? Is there something else that's the matter right now? And those inputs then can either amplify or diminish that experience of pain.

[00:24:04] In the same way. On the other spectrum, you may have somebody who has horrible **leg pain**, but that **leg may not be broken**. There's still sensory inputs coming from that leg. If you are sitting in the chair listening right now, there's still sensory inputs that are telling you you're sitting in this chair. Sometimes they may even tell you, well, we're sitting here, we've been sitting here for 15, 20 minutes. Now you may want to shift your body around.

[00:24:25] Some of those are unconscious. A lot of them are conscious, but those are still sensory inputs. Those **sensory inputs** alone though, are **not** the same thing as **pain**. And so when we start moving away from plumber thinking, though, to fire fighter thinking, we start appreciating all the different potential inputs.

[00:24:43] When we're limited to cause and effect, we start thinking, well, how can I interrupt the pain pus? We start thinking, well, what is damaged? And if nothing is damaged, we start throwing up our hands and going, well, your pain's all in your head. I don't know what else to do for you. Well, **all pain is in your head**. If I cut off your finger, your pain would be in your head.

What else is happening?

[00:25:03] Allow. This allows us to do though, is if you're a clinician and you understand, then that pain is a constructed process. You can have somebody that maybe does not have tissue damage, that maybe doesn't have a big tumor, that maybe doesn't have an inflammatory process. And instead of saying, well, this is not real pain. This is something else. You can say, well, what else is happening with my patient? What else are the **threats and dangers involved** in their life? And then you start seeing things like what they've been told. You start seeing things like external stressors. You start seeing things that, including financial stressors, marital stressors, stressors, past trauma. And if we had more time, we could talk about how past trauma, traumatic experiences change, how your brain sees threat. Not because that's a bad thing, but because if you are in a dangerous environment, You want a brain that can see threats very, very easily so that you are on top of your survival.

[00:25:58] So ultimately when we move away from pain pus thinking, even in what I would call acute scenarios and start seeing pain as constructed, whether it is acute, chronic, persistent, whatever, you start to be able to **explain pain in a way that makes sense**, that is aligned with the science and helps people feel, feel more in control of their pain again.

[00:26:18] We're not into this thing where we're saying, well, there's nothing else you can do. The only thing that you can do is learn how to live with it or manage it because we don't have any therapies for you. Simply not the case.

Pain and protection

[00:26:29] So key transformation concepts just very early on, the first one is pain and protection. When you stop thinking that pain equals damage and you move into understanding that pain is about protection, then the key modulator isn't to find what is damaged or not. Instead it becomes, well, how can I feel safe? And if we **increase a sense of safety**, even if you're in the emergency department with somebody with a broken leg, you're using soothing words, you're soothing medications that may actually provide a sense of safety to them, or you're providing assurance or positive expectations for them. We can start modulating these things in ways that don't, aren't limited only to medications or injections or any sort of, uh, what they call passive or direct modalities.

Pain and construction

[00:27:17] When we then also **understand protection** and we move into construction and we stop viewing things in the sequential fashion cause and effect. And we start looking at things into what is involved in this construction. We start able to align things like what are all those past experiences? How important are they to this current experience? And more importantly, how can we start reframing these things in such a way to help people feel more in control, more confident, and more importantly, have a sense of self that they can heal. And we're gonna hear some of this actually in, uh, our community member presentation this evening.

Pain and time

[00:27:53] Then finally the last ones, pain and time and pain and power, are more of this little Rubik's cube. You start understanding how the **brain operates in two, three different time perspectives** that there's this **past**

element, what we have **now**, and these **future** expectations. And we can start messing with those a little bit.

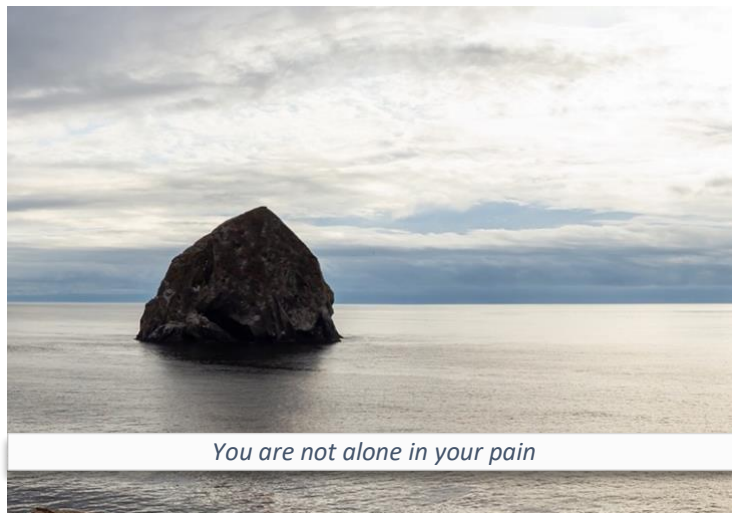
Pain and power

[00:28:08] And then there's pain and power about understanding if pain is about protection and then **threat is what makes pain increase**. That's the key modulator there. Well, how can we increase a sense of safety in individuals? What are the steps that we need to do to help people feel safe, to feel confident, and in control of their bodies again?

[00:28:28] Thank you everybody for having me.

About Pain Science Life Stories

Formed in 2018, the Oregon Pain Science Alliance (the Alliance) is an all-volunteer nonprofit 501(c)3 corporation. Our members come from the health care community, their patients, and others who follow pain science research. We seek to share current information on how pain experiences are formed in the brain and influenced by biological, psychological, and/or social factors, along with practices we have found helpful and consistent with pain science concepts.



The PainScienceLifeStories.com website provides access to our video archive featuring community member's and clinician's stories

describing their journey to embrace the insights of pain science research, and how their practices changed. Also included are links to other pain science explanations and practices we have found useful. We curate all archive resources with features to aid the user in finding answers to their questions.

The archive is not exclusive to stories we produce, so if you know of, or have a pain science life story, please use the contacts below to collaborate with us.

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