

Huberman Lab: Essentials: Control Pain & Heal Faster With Your Brain



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In this episode, Huberman explains:

- how to manage pain and accelerate recovery by leveraging protocols to modulate pain perception
- how pain interpretation is a complex experience shaped by internal factors (emotions and genetics) and external factors (context)
- how practical strategies like acupuncture, breathing techniques, exercise, and temperature modulation influences pain and accelerates recovery
- phantom limb pain
- recovery from traumatic brain injury
- the crucial role inflammation plays in the healing process

About Dr. Andrew Huberman

American neuroscientist, professor at Stanford University, and host of the

Huberman Lab podcast. His academic work focuses on brain development, function, and neuroplasticity, while his podcast translates complex science into actionable tools for everyday health and performance. He holds a PhD from UC Davis and conducted post-doctoral work at Stanford, where he has a lab and teaches medical students.

[What follows are quotes from the episode above. These quotes stood out to psychotherapist Emil Barna in his listening. They are not meant to be exhaustive nor representative of the entire episode. This resource must not replace medical and/or other professional advice.]

[I cannot recommend the following quote highly enough. But a brief commentary before we begin ... The more, I am confident to say, we get principles down pat, the more effective we'll be as 'healers'. Taking a 'first principles' mindset (i.e. stripping an idea down to its most basic parts [in therapy, I propose Polyvagal Theory, evolutionary psychology, and a basic understanding of neurobiology (in particular, neuroplasticity) and neuropsychotherapeutic principles (as taught by Dr. Daniel J. Siegel), to be a sufficient foundation from which to begin] and framing our understanding upwards) to determine fundamentals/assumptions, instead of reliance on tradition or dogma) gives you more leverage when it comes to therapy. This means you don't necessarily have to be trained in every modality under the sun (think about it, there are over 400 psychotherapies and training in just a handful will take years and years of clinical practice), but, instead, conduct deep reading into the topic/modality/therapy, deep research, get a good understanding of the principles that inform each, and adapt and applying these principles to the client before you—this, I know, gives you more edge. You can get after it quicker and see results sooner than feeling forced to dip your toes in and only apply when you have some (unregulated) certificate saying you can. Principles and practice before anything else, I think, gets better results ... hands down. Now, here's the quote.]

"Principles are far more important than any one experiment or one description of mechanism, and certainly far more important than any one protocol, because principles allow you to think about your nervous system and work with it in ways that best serve you."

"the simplest way to think about the **somatosensory system** is that we have little sensors, and those sensors come in the form of **neurons**, nerve cells, that reside in our skin and in the deeper layers below the skin. We have some that correspond to, and we should say respond to, mechanical touch. So pressure on the top of my hand, or a pinpoint, or other sensors, for instance, respond to heat, to cold, some respond to vibration. We have a huge number of different **receptors** in our skin, and they take that information and send it down these wires that we call **axons** in the form of **electrical signals** to our spinal cord and then up to the brain. And within the **spinal cord** and **brain**, we have centers that interpret that information that actually makes sense of those electrical

signals. And this is amazing because none of those sensors has a different unique form of information that it uses. It just sends **electrical potentials** into the nervous system. Pain and the sensation of pain is, believe it or not, a controversial word in the neuroscience field. People prefer to use the word '**nociception**'. Nociceptors are the sensors in the skin that detect particular types of stimuli. It actually comes from the Latin word nocera, which means 'to harm'."

[The famous construction worker case on the subjectivity of pain.]

"there's a famous case that was published in the British Journal of Medicine where a construction worker, I think he fell, is how the story went. And a 14 inch nail went through his boot and up through the boot. And he was in excruciating pain, just beyond anything he'd experienced. He reported that he couldn't even move in any dimension, even a tiny bit without feeling excruciating pain. They brought him into the clinic, into the hospital. They were able to cut away the boot. And they realized that the nail had gone between two toes and it had actually not impaled the skin at all. His visual image of the nail going through his boot gave him the feeling, the legitimate feeling that he was experiencing the pain of a nail going through his foot, which is incredible because it speaks to the power of the mind in this pain scenario. And it also speaks to the power of the specificity. It's not like he thought that his foot was on fire. He thought because he saw a nail going through his foot, what it was going through his boot, but he thought it was going through his foot, what it was going through his boot, but he thought it was going through his foot, that it was sharp pain of the sort that a nail would produce. It really speaks to the incredible capacity that these top down, these **higher level cognitive functions** have in interpreting what we're experiencing out in the periphery, even just on the basis of what we see."

"Your back is an enormous piece of tissue compared to your fingertip, but your back has fewer receptors devoted to it and the representation of your back in your brain is actually pretty small. Whereas the representation of your finger is enormous. So the, how big a brain area is devoted to a given body part is directly related to the density of receptors in that body part, not the size of the body part. You can actually know how sensitive a given body part is and how much brain area is devoted to it through what's called **two point discrimination**. You can do this experiment if you want. I think I've described this once or twice before, but basically, if you have someone put, maybe take two pens and put them maybe six inches apart on your back and touch while you're facing away, and they'll ask you how many points they're touching you and you say two, but if they move those closer together, say three inches, you're likely to experience it as one point of contact. Whereas on your finger, you could play that game all day, and as long as there's a millimeter or so spacing, you will know that it's two points as opposed to one, and that's because there's more pixels, more density of receptors. This has direct bearing to pain because it says that **areas of the body that have denser receptors are going to be more sensitive to pain than to others**. So just as a rule of

thumb, areas of your body that are injured, that are large ***areas that have low sensitivity before injury likely are going to experience less pain, and the literature shows will heal more slowly because they don't have as many cells around to produce inflammation.***

[Ramachandran and phantom limb pain. Robert Greene, in his book Mastery, discusses Ramachandran at length—see my notes about his path towards mastery in those notes.]

"Ramachandran, who is famous for understanding this phantom limb phenomenon and developing a very simple but very powerful solution to it that speaks to the incredible capacity of top-down modulation. And top-down modulation, the ability to use one's brain, cognition and senses to control pain in the body is something that everyone, not just people, missing limbs or in chronic pain could learn to benefit from because it is a way to tap into our ability to use our mind to control perceptions of what's happening in our body. So what did Ramachandran do? Ramachandran had people who were missing a limb, put their intact limb into a box that had mirrors in it such that when they looked in the box and they moved their intact limb, the opposite limb, which was a reflection of the intact limb, because they're missing the opposite limb, they would see it as if it was intact. And as they would move their intact limb, they would visualize with their eyes the limb that's in the place of the absent limb, so this is all by mirrors, moving around and they would feel immediate relief from the phantom pain. And he would tell them and they would direct their hand toward an orientation that felt comfortable to them. Then they would exit the mirror box, they would take their hand out and they would feel as if the hand was now in its relaxed normal position. So you could get real time in moments, remapping of the representation of the hand. Now that's amazing. This is the kind of thing that all of us would like to be able to do if we are in pain"

"plasticity can be very fast, that it can be driven by the experience of something, just the visual experience."

"pain is a perceptual thing as much as it's a physical thing. It's a belief system about what you're experiencing in your body, and that has important relevance for healing different types of injury and the pain associated with that injury."

"sleeping on one side, not on back or stomach seems to increase the amount of wash out or wash through, I should say, of the lymphatic system. The other thing that has been shown to improve the function of the lymphatic system is a certain form of exercise. And I want to be very, very clear here. I will never, and I am not suggesting that people exercise in any way that aggravates their injury or that goes against their physician's advice. However, there's some interesting data that zone two cardio for 30 to 45 minutes, three times a week seems to improve the rates of clearance of some of the debris after injury."

"this **glymphatic system** and the **glial astrocyte system** is the system that we want chronically active throughout the day as much as possible. So low level walking, **zone two cardio**, and then at night during **slow wave sleep** is then really when this glymphatic system kicks in. So that should hopefully be an actionable take away provided that you can do that kind of cardio safely that I believe everybody should be doing who cares about brain longevity, not just people who are trying to get over TBI."

"**Adrenaline** binding in particular receptors actually shuts down pain pathways. People who anticipate an injection of **morphine** immediately report the feeling of loss of pain. Their pain starts to diminish because they know they're going to get pain relief."

"**Placebo effects and belief effects**, as they're called, have a profound effect on our experience of noxious stimuli like pain. And they can also have a profound effect on positive stimuli and things that we're looking forward to."

"at Stanford [University], Sean Mackey [...] did a neuroimaging study [and] subjected people to pain. In this case, it was a heat pain. (People have very specific thresholds to heat at which they cannot tolerate any more heat.) But they explored the extent to which looking at an image of somebody, in this case, a romantic partner, that the person loved, would allow them to adjust their pain response. And it turns out it does. They could tolerate more pain. And they reported it as not as painful. That response, **[the] feeling of love internally, can blunt the pain experience to a significant degree**. These are not small effects. And not surprisingly, how early a relationship is, how new a relationship is, directly correlates with people's ability, they showed, to use this love, this internal representation of love to blunt the pain response. So for those of you that have been with your partners for many years and you love them very much and you're obsessed with them, terrific [...] you've got a installed mechanism for blunting pain."

"our representation of ourself is a representation of our internal workings, our viscera, our guts, everything inside our skin and the surface of our skin and the external world. Those three things are always being combined in a very interesting, complex, but very seamless way."

[Inflammation]

"dopamine can activate the vagus peripherally and norepinephrine can activate the vagus peripherally and reduce inflammation. What this means is that there are real maps of our body surface that when stimulated communicate with our autonomic nervous system, the system that controls alertness or calmness, and thereby releases either molecules like norepinephrine and dopamine, which make us more alert and blunt our response to pain, and they reduce inflammation. But there are yet other pathways that when stimulated are pro-inflammatory. One of the things that bothers me so much these days, and I'm

not easily irritated, but what really bothers me is when people are talking about inflammation, like inflammation is bad. Inflammation is terrific. Inflammation is the reason why cells are called to the site of injury to clear it out. Inflammation is what's going to allow you to heal from any injury. Chronic inflammation is bad, but acute inflammation is absolutely essential."

[Cyclic hyperventilation]

"**Wim Hof**, also called, aka the Iceman, has this breathing that's similar to **tummo breathing**, as it was originally called, involves basically hyperventilating and then doing some exhales and some breath holds. A number of people have asked me about it in relation to pain management. The effect of doing that kind of breathing, it's not a mysterious effect, ***it liberates adrenaline from the adrenals. When you have adrenaline in your system, and when the spleen is very active, that response is used to counter infection. And stress counters infection by liberating killer cells in the body.*** You don't want the stress response to stay on indefinitely, however, things like Wim Hof breathing, like ice baths, ***anything that releases adrenaline will counter the infection.***"

[Cold/heat for pain]

"I was taught, I learned that when you injure yourself, you're supposed to ice something, you're supposed to put ice on it. But I didn't realize this, but when speaking to exercise physiologists and some physicians, they said that the ice is really more of a placebo. It numbs the environment of the injury, which is not surprising, and will eliminate the pain for a short while, but it has some negative effects that perhaps offset its use. It actually can create some like clotting and sludging of the tissue and fluids, which is bad because you want the macrophages and the other cell types phagocytosing, eating up the debris and injury and moving it out of there so that it can repair. So that was surprising to me, which made me ask, well, then what about heat? Well, it turns out heat is actually quite beneficial. The major effects seem to be explained by heat improving the viscosity of the tissues and the clearance and the perfusion of fluid, blood, lymph and other fluids out of the injury area. So all of this might sound just like common sense knowledge. I always just thought it's ice, it's non-steroid anti-inflammatory drugs, it's things that block prostaglandins. So things like aspirin, ibuprofen, acetaminophen, those things generally work by blocking things like they're called the Cox prostaglandin blockers and things of that sort, things in that pathway. Those sorts of treatments which reduce inflammation may not be so great at the beginning when you want inflammation."

These notes were collected by psychotherapist and author Emil Barna in his efforts to assist with professional development and further education for himself and those who read them. You can find out more about Emil by visiting www.barnacc.com