Neural Pain Pathways

by Brad Fanestil, MD

Contains liberal plagiarization (with permission) from Howard Schubiner, MD, clinical professor at Michigan State University School of Medicine, and founder of The Mind Body Medicine Program at Providence Hospital in Southfield, Michigan.

We used to think that all pain was due to physical injury in the body, and that was simply reflected in the brain. But we now know that our brains actually generate all of our internal experiences, including pain. Pain is nothing more than our brain's alarm mechanism for alerting us to danger. If our brain thinks something should hurt, then the "danger-alarm mechanism" in our brain will activate certain neural pathways to construct the experience of pain. This experience of pain can vary from slightly annoying to excruciating, depending on how much danger the brain perceives itself to be in. We know the danger-alarm mechanism is more sensitive in people with a history of adverse childhood events or other emotional trauma (such as previous medical trauma). The more one has pain, and the more severe it is, the more likely it is that the pain itself will further activate this danger-alarm mechanism. This leads to a vicious cycle of pain leading to fear leading to more pain. This is why chronic pain often gets worse with time, and often begins to involve more and more areas of the body over time. Many people with chronic pain problems are perceiving routine normal sensory input from certain areas of their bodies as dangerous, and their brain is then constructing the experience of pain.

My brain receives dozens or hundreds of sensory inputs per second and decides in a split second whether such input is dangerous or not. This is way below my level of awareness and completely outside of my conscious level of thought. For instance, as I type this sentence my brain is receiving input from my left elbow, which happens to be resting on the table, that there is some pressure from the desk on the elbow. Even though the nerves in the elbow that sensed the pressure were functioning just fine, I was not consciously aware of that pressure until I typed the previous sentence. The "pressure" information was indeed being sent, via the spinal cord, to my brain. But my brain received that sensory input and essentially made this decision: *"Thank you very much, elbow (via the spinal cord), for this information about pressure on the elbow, but I'm in the middle of typing right now and I don't need to know this, so I'm not going to allow that piece of data to reach my conscious brain right now."* However, another person with a history of trauma who has an overly-sensitized danger-alarm mechanism might receive that same pressure-on-the-elbow information, and their brain (again, in a split second, and completely outside of this person's conscious awareness) might make the following decision: *"Thanks for the info elbow, let me just quickly review my personal history about pressure to various areas on my body and – HOLY CRAP!! This is potentially dangerous based on previous sensory input! I need to turn on an alarm to let John know that we are in trouble and he needs to take action!"* Boom. Neural pain pathway activated.

The concept of neural pathways in the brain is one of the major new understandings in neuroscience in the last decade. The more you practice a neural pathway, the better you get at it. This can really help when you are skiing or swimming, or learning to ride a bike. But you really

don't want your brain practicing pain. And it is important to realize that these neural pathways that develop in the brain are completely outside of our conscious awareness. When we learn to ride a bike we do not learn to activate our right hip muscles while stretching the left hip and flexing the ankle just so. Just as the bike riding neural pathways form without conscious thought, pain neural pathways can form without conscious thought. This can make them difficult to control. But another major new understanding in the last decade is the concept of "neuroplasticity", which is our understanding that these neural pathways can be turned on and off. This is good news for people with chronic pain or other problems for which traditional medicine has not discovered an answer.

If you are riding a bike on asphalt, there is no way that your brain will let you "forget" or "turn off" the complex neural pathway that keeps you balanced because your brain knows that to turn off that pathway would be dangerous. But if I were to construct a giant bike-riding room with the world's cushiest and softest padding, you could teach your brain to turn off or temporarily forget the bike-riding neural pathway. Your brain would let you fall on these pads, because it would feel safe. In the same way, your brain will not turn off the pain pathway coming from your back/abdomen/arm/neck/head/foot until you can convince your brain that there is no danger coming from this area. Right now there is some part of your brain that continues to perceive danger from your area of pain. Your job now is to convince your brain that the sensory input it is receiving is not dangerous, so it can turn off the alarm.

For some people, just understanding that there is no actual tissue damage is enough to resolve their pain. Other people will need some specific coaching or encouragement in order for their brain to really accept that 20 years of very real pain is not actually due to a problem in the back. I believe that with specific techniques most people with chronic pain will be able to get rid of it by educating themselves, and convincing their brain that there is nothing to fear.

Online resources to understand and treat chronic pain:

1. 3 minute whiteboard video about how neural pain pathways can cause chronic pain:
   https://youtu.be/D36yy63CHq4
   You can also find this video by going to www.tmswiki.org and look at Day 1 of the free Pain Recovery Program.

2. 22 minute talk by Dr. Howard Schubiner about Neural Pain Pathways:
   https://www.unlearnyourpain.com/MS%20Lecture
   You can also find this on Dr. Schubiner's website: https://www.unlearnyourpain.com/
   Click on the link to this talk.

3. 24 minute VERY ENTERTAINING video about how our brain processes pain:
   https://www.youtube.com/watch?v=RYoGXv22G3k&t=288s
   You can also search YouTube for "Lorimer Mosely Mind in Body" to watch Lorimer Mosely explain the role of the brain in chronic pain

A new class of mind-body treatments for chronic pain and other symptoms is now emerging. These treatments have great promise, although we are only beginning to scientifically investigate them. Below are some resources for those interested in trying one of these approaches:

1. Alan Gordon at the Pain Psychology Center in LA has developed a free treatment program: http://www.tmswiki.org/forum/painrecovery/

2. This app is a guided mind-body therapy program for chronic pain, developed by former pain sufferers: https://getcurable.com/CU

3. *Unlearn Your Pain*, by Dr. Howard Schubiner: https://www.unlearnyourpain.com/ This web program is also available as a book.

4. Website created by Paul Hansma, a physicist who recovered from chronic shoulder pain using these approaches: http://activelifescientific.org/

5. A collection of resources that collectively describe a brain-centered (non-biomedical) perspective on back pain: http://www.pain-ed.com/public/resources/

6. The Podcast, Like Mind Like Body, is a weekly program to reinforce the idea that changing the way you think can change the way your body works: https://www.curablehealth.com/podcast

Psychotherapy is relatively more costly, but is likely the most powerful and effective approach to take for people who are not having success with self-guided methods of education and treatment. For access to a psychotherapist using this approach, I recommend: www.painpsychologycenter.com/ This is Psychotherapy for chronic pain provided over videoconferencing.

These books can help people with chronic pain to understand the role of neuroplasticity and what they can do to re-train their brains:

1. *Back Sense: A Revolutionary Approach to Halting the Cycle of Chronic Back Pain.* By Douglas R. Johnson, Michael Urdang, and Ronald D. Siegel

2. *They Can't Find Anything Wrong.* By David Clark

3. *Crooked: Outwitting the Back Pain Industry and Getting on the Road to Recovery.* By Cathryn Jakobson Ramin

4. *Back In Control.* By David Hanscom, MD
This is a complex-deformity spine surgeon's take on chronic back pain.

5. *The Divided Mind.* By John Sarno, MD
   Dr. Sarno, who died at age 94 in 2016, is considered the originator of the idea that pain is actually in the mind. His book was written in 2008 and does not refer to the new neuroscience that supports his ideas. The book has nevertheless helped thousands of people resolve their longstanding pain issues.

6. *Unlearn Your Pain.* By Howard Schubiner, MD

Expressive Writing

Expressive Writing is an easy treatment that is highly effective for many people, even before you have completely educated yourself about sensitized neural pain pathways.

Directions:

For 20 minutes once a day try stream-of-consciousness writing about your feelings and emotions. You have to acknowledge that you are *having* feelings and emotions, which for some people can be difficult. If you *can,* let yourself feel your emotions. Don't hesitate and don't worry if it is legible or grammatically correct. Just get the stream-of-consciousness thoughts out through handwriting and onto the page. Then destroy the page. Do not keep it. Just get it out.

Negative emotions such as fear and anger essentially tell your danger-alarm mechanism that things are bad, and it had better remain hyper-vigilant. Getting the negative self-talk and unproductive repetitive thoughts out of your subconscious and onto a page, (then discarding what you wrote) can sometimes very rapidly reduce hypersensitivity in your nervous system.

Somatic Tracking

Practice this exercise whenever pain, distress or negative sensations or thoughts occur throughout the day. And when you find yourself reaching for your usual strategies to get away from the pain or distress (your avoidance strategies), take just 2-3 minutes and do a somatic tracking exercise to mindfully explore and examine your pain or discomfort. *Then*, if needed, you can do your avoidance strategy.

Remember, pain (or anxiety or nausea or dizziness) is your brain's alarm signal. This exercise, when performed mindfully, is teaching your brain that the pain or distress is not dangerous to you, and that you are safe and in control of the situation. By simply examining the painful sensations mindfully and without emotion, your brain is learning that the pain or discomfort is nothing to be afraid of. Without the fear, the pain loses its power.

The goal of the exercise is not to get rid of the pain. In fact, the more you try to "get rid" of the pain, the more you are telling your danger-alarm mechanism that you are in trouble, and the more likely it is to continue to run the alarm pathway (of pain or anxiety or discomfort). The goal of the exercise is to teach your brain that it is safe and in no danger, but you don't actually care whether the pain changes or gets better or gets worse while you are tracking it.

Directions:
When you notice pain or distress or other negative thoughts, take 2 minutes (or more if you like):

1. Notice them with interest, but with less reactivity. Almost like a hiker who reached the top of a ridge and is just interestedly examining the landscape on the other side. Pay attention to how the pain moves around or changes in quality, but do so without emotion.
2. Accept them as happening right now, but realize that this thought or body sensation is transient, and caused by the brain: "Just a thought. Just a sensation. Just neurons firing."
3. Remind yourself that since these are just sensations, they are not in any way threatening to you. These sensations are not dangerous and cannot harm you.
4. Tell yourself "I don't need to do anything about this right now because this is not harmful, and it will pass."
5. Tell yourself: "I'm OK. I'll be fine. There is actually nothing wrong with my [back/head/stomach/chest] because I am healthy and strong." "I am safe, and there is no danger from these nerve impulses. I am safe. I am not in danger."