



Getting Some Exposure

Over the course of the week I've spoken a fair bit about pain.

We've covered anatomy, we've talked about the pain pathways, production of pain and what can affect it.

I haven't talked much about what that means for you, the patient, in regard to taking action.

That will be the focus of today.

First, I want to make one comment. Obviously this isn't a 'how-to' guide on what you should do to 'cure' your pain. Everyone is different and the only way we can really know how manage and improve someone's pain is to develop a plan *specific to you*.

This is just a general guide to the approach, and apologies, it is a bit of a long one, so stay with me.

With that said...

Pain is good.

With all its complexity discussed over this week, and mountains more which could be talked about, it's important not to forget that.

If you currently have pain, you've probably just made a strange face at your screen, and are tempted to stop reading. Please don't. At least not until I've explained.

Pain is rarely pleasant, but it is vital. It is an extremely important process, and you would be worse off without it.

If you don't believe me, do a search for *congenital analgesia*.

These people are born without the ability to feel pain (as well as heat, cold, or any real nerve-related sensations). While this may sound great, never having to feel pain, it isn't quite as simple as that. Imagine never being able to feel if you have a broken bone, or a cut, or a bruise, or a burn. Might this be problematic? What if you couldn't feel the fact you have appendicitis?

Pain is important to our very survival.

Pain is also important for the treatment of pain.

Yes, you read that right.

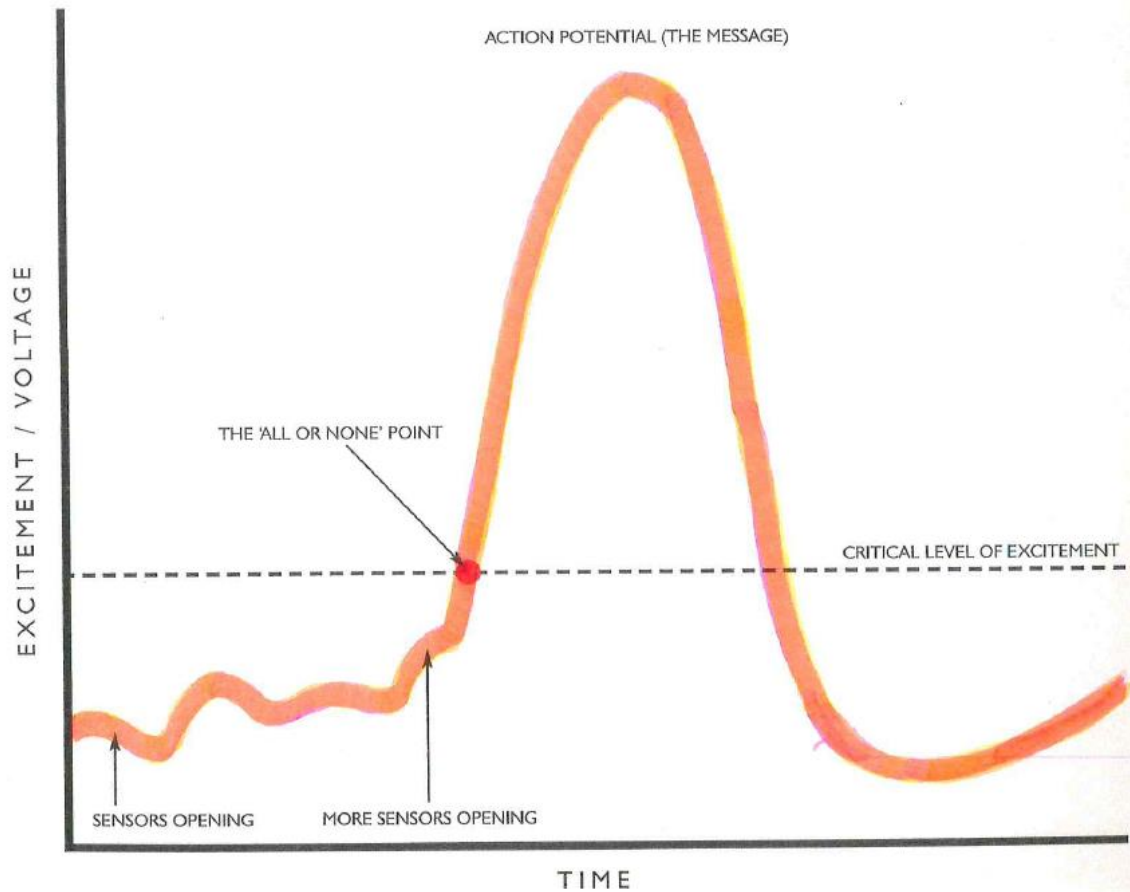
Pain is important for the treatment of pain.

I will explain this from the start.

Sensitivity to pain

When we experience an acute injury or pain, we know that nociception (the signal from the tissues) must be considered threatening for it to cause an output of pain. Once this occurs, and the threshold for activation of pain happens, the sensitivity of that tissue increases. Pain causes peripheral sensitization (an increase in sensitivity, or lowering of firing threshold) through changes in the nerves. Put simply, peripheral sensitivity will make the neural tissue be more easily stimulated and thus more easily painful.

Think of the firing of a nerve to look like this picture:



Excitation potential of a neurone⁽¹⁾

In this picture, we see what happens when one of those nerves we spoke about earlier actually fires. A stimulus is provided to the nerve, causing the neurones to become more excitable until they reach a certain threshold (the 'all or none' point in the picture).

Then they fire, which sends a signal along the nerve and eventually up to the brain. *If* this danger message is sufficient, it can contribute to the production of pain (but this also applies to many other sensations, such as heat and pressure). The signal still needs to be analysed in the brain before that happens.

So naturally, after sustaining an injury to your back, or knee, or ankle, for a period of time afterwards, they become much easier to irritate. As you can see above, and from the what we've talked about this week, this has less to do with the amount of damage sustained and more to do with the sensitivity of the area and the potential danger associated with it.

Taking it down a peg

So if we know this, what do we do about it? How do we decrease that sensitivity to get ourselves moving again?

Graded Exposure

This is a term which I think in the physio world has become synonymous with chronic pain. While this is indeed a fundamental aspect of helping those with chronic pain, it also applies to acute pain. In fact, it applies to a lot of things in life.

Essentially, graded exposure is about gradually exposing your body or body part to increasing levels of stimulation to improve its capacity to tolerate them. Most often it is related to movements, but it can also incorporate everything we have spoken about over the last few days such as context, positioning, location, intensity and frequency

If I want to talk about this in a non-therapeutic context, as I often try to do, I usually use the gym as an example.

Imagine you are someone who has never been to the gym before, and you have decided you would like to get into lifting weights. Great idea!

Where do you start?

Are you likely to go in and begin lifting as heavy weights as your body can tolerate until you can't move? What would happen then? Other than the risk of injury, you are probably going to overload your body so much that you might not be able to move for the next few days. You certainly won't be back in the gym for a bit.

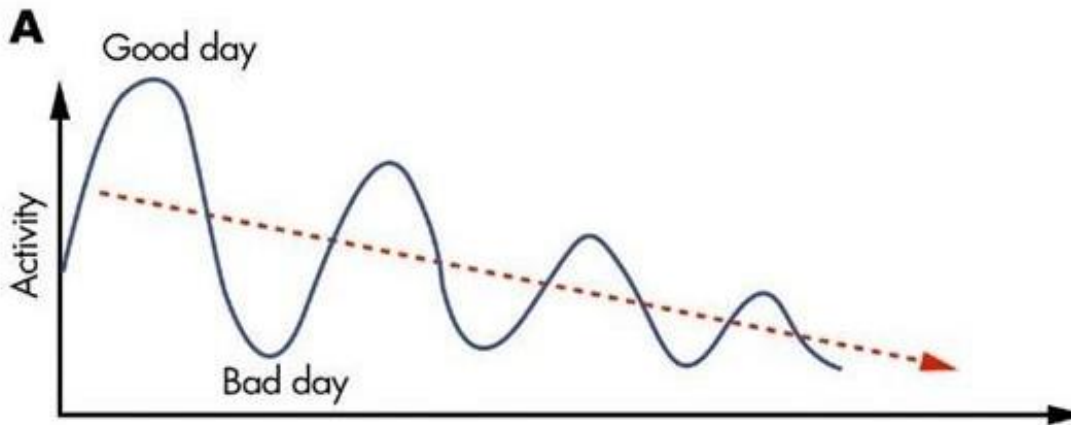
Would you start with weights that are really easy for you, where you can't feel anything? Maybe if you were trying to learn some new movements you might, and this is worthwhile, but generally not. If you don't perform weights which are challenging, you're not likely to improve.

What you need is to perform realistic, varied and increasingly challenging weights in order to slowly progress to reach your goals. Basically, graded exposure.

In a simplified way, this is no different to how someone with pain, either acute or chronic, would go about improving it.

Basically, *using their pain as a guide to improve their pain.*

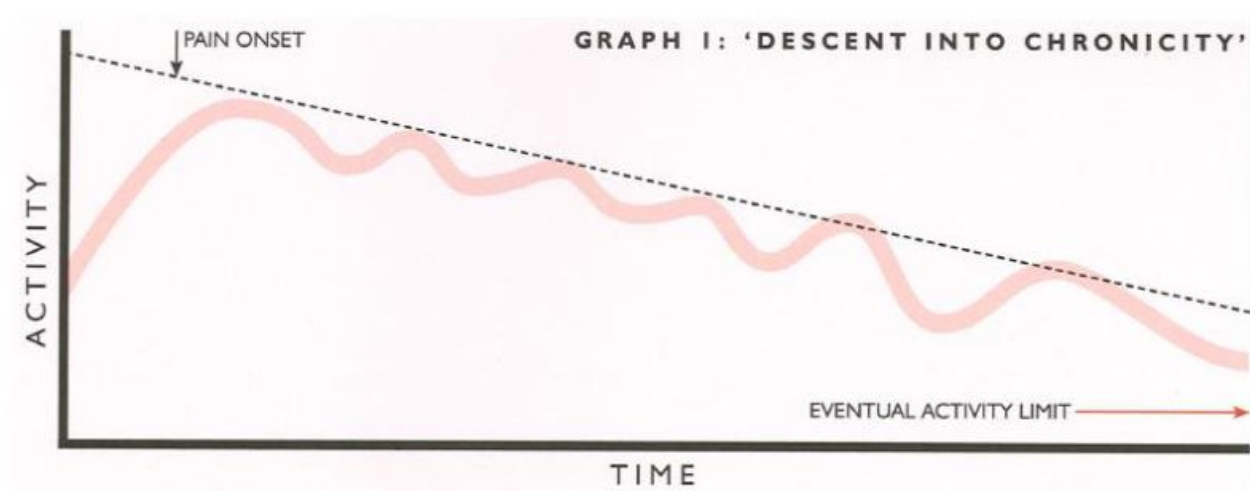
One of the biggest problems for people is figuring *how much* they need to be doing. Let's take our weightlifting example and apply it to pain. Some who become aware their pain may not be because of tissue damage tend to push themselves too hard, thinking the message is 'ignore your pain', which isn't the case. These are over-trainers from our first example. Their course looks something like this:



The 'Boom-Bust' cycle⁽²⁾

What we can see here is someone who pushes themselves as hard as they can, often through their tolerable level of pain and activity, as usually pays for it later. Maybe for the next day or two they may be unable to do anything due to pain. Then they begin to feel better. Often the thought process then is "I'm having a good day, I better do as much as I can, because tomorrow I might not be able to". So they push themselves again. And the cycle continues. Eventually they become more and more sensitized as their body is trying to limit them, their tolerances decrease and their functional ability declines.

Conversely, we see this:



The descent into chronicity⁽¹⁾

In this image, we see the person who undertrains. Their natural response is to stop the activity whenever pain starts. Over time the amount of activity at which pain is experienced reduces, eventually

leading to a much lower functional capacity. This appears to be more common in those people afraid of the possibility of re-injuring their tissues⁽¹⁾.

As you can see, both of these can lead to decreased overall function over a period of time. Both are common presentations for people suffering from chronic pain. For anyone reading this who is suffering from chronic pain, the first picture might look a little bit familiar.

So what's the best approach?

Let's look at another image taken from *Explain Pain* (very good book which I've referenced quite a bit, we have a copy here, feel free to come and have a look):



The 'Twin Peaks' model (1)

This is a model I tend to use quite a bit when I'm talking to people, although I will usually hand draw it so I can explain as I go. As far as I'm concerned, this is the basis for all of our rehab work, whether we are focusing on pain or some other measurable outcome.

What you see on the left is the model for pre-injury tissue. We see the top line, the 'tissue tolerance' (TT) line, which is the point beyond which tissue damage occurs. Below that is the 'protect by pain' (PBP) line, which is fairly self-explanatory. This is the point where pain usually begins as a protective mechanism to *prevent* tissue damage. This is when the brain begins to recognize threat or *potential* danger.

There is a little comment right at the top which says 'superhuman effort'.

Now, this isn't the point you need to reach to reach in order to prove you are an above-average human being. What this means is that when we put in a massive effort which moves us past the TT line before the PBP mechanism can stop us, we sustain tissue damage. Anyone who has walked onto a footy field and tried to bang one from 50, only to feel their hamstring fail has been here.

After Injury

The second peak is obviously after such an injury has occurred. Here we see some additional lines. The two of most interest to start with, are the NTT (new tissue tolerance) and NPBP (new protect by pain) lines.

If you compare these two lines to their predecessors, you notice something rather interesting. The NTT line is now lower than the TT line, but only by a small amount. This means that while your tissues may be more susceptible to injury, they are only *slightly* more susceptible. But if we look at the NPBP compared to the original PBP line, we see it is *a lot* lower.

Now pain is likely to be brought on long before you get anywhere near tissue damage.

It's being extra cautious because possibly it feels it failed the last time and doesn't want to do so again.

This is the case for all injuries. Usually with general management, acute injuries (like the hamstring tear) will gradually improve if we follow a gradual approach of exposing it to more strenuous activities until it has recovered. Pain will often go with that.

But what about those people who suffer from chronic or persistent pain?

Where the pain seems to linger and limit well beyond the time when tissue healing would have finished?

This is where this model comes into its own.

There are two other lines on this mountain as well. The BL (baseline) and the FUL (flare-up line). The baseline is the point at which someone can perform an activity before they have a flare-up of the pain (at the point of the FUL). This would vary for a lot of people. For some it might be closer to the NPBP line, and for others, closer to the NTT line.

For those who suffer with chronic, persistent pain, a lot of the time this is because the NPBP and FUL have remained low. This can happen for a number of reasons, but central sensitization is one of them (which I mentioned in one of my earlier articles).

To put it simply, this is when the central nervous system (the brain and spinal cord) becomes sensitized to a point where pain is produced without any relation to tissue damage. As though your alarm system is so wound up it goes off very easily. Think of it as that car alarm that seems to go off when anyone gets within 10 feet of the car.

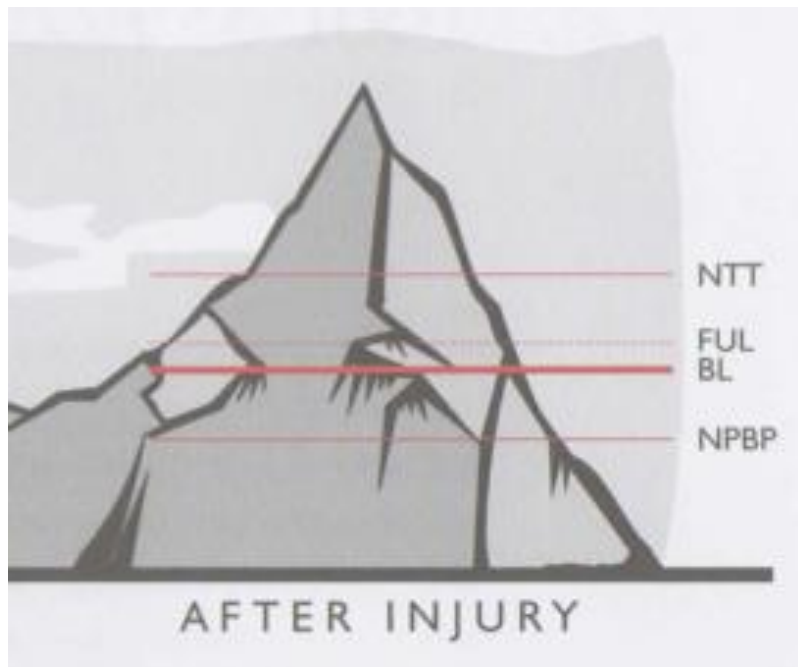
As I said, this model is important for these people. It is the key to functional improvement. Particularly because even just small activities can result in increased pain

To better explain, I'll use an example.

Let's take a person who suffers from persistent lower back pain. Quite a common thing. We'll call this person Jim. Now Jim sustained a lower back injury a number of years ago. He was lifting a heavy object, felt a twinge in his back, and has had pain ever since. At first it was quite severe and very limited. It improved to a certain degree, but never went away. Over the years he has seen many health professionals and had many different diagnoses. He has tried a lot of different treatments.

Now Jim has lower back pain constantly. It fluctuates and some days are better, but it is never completely gone. Some days he feels as though he could do anything, while others he struggles to get out of bed (similar to the 'boom-bust' cycle above). He can't work because of it, and is generally frustrated with often not being able to do simple tasks without his pain coming on. It's not always sore at the time, but he pays for it later on.

Let's take a closer look at our second peak:

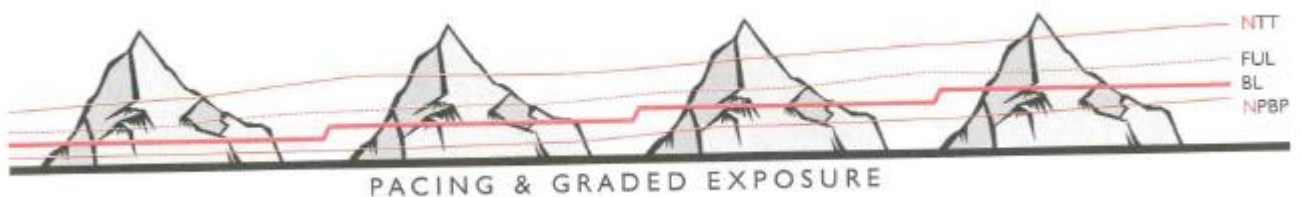


The 'After Injury' Peak⁽¹⁾

What we need to establish for Jim, is where that baseline sits. If we are able to develop a movement strategy or activity he is able to perform comfortably, we can use that to improve his capacity.

Once that baseline is established, we can set out a management plan whereby we incrementally increase that activity (for example by increasing and the duration, intensity or frequency) so his tolerance improves and all those lines go up.

This would look something like this:



Pacing and Graded Exposure⁽¹⁾

It would be a slow process, but over time we would hopefully see increases in his activity with minimal flare-ups. As I said earlier, this is particularly relevant to those who suffer from persistent pain, such as central sensitization, but also for anyone experiencing injury or pain. Management of tendon problems,

acute lower back pain, muscle tears and soft tissue injuries all work off this theory, it's just the application which differs.

It also applies to our weightlifting example.

How would someone go from a young kid who has never stepped foot inside a gym or gone for a run to an Olympic weightlifter or marathon runner.

Graded Exposure.

References

1. Butler, DS and Moseley, GL, 2006, *Explain Pain*, Noigroup Publications, Adelaide
2. Princess in the Tower, 2017, *Pacing for Pain Management*, <http://princessinthetower.org/pain-management/pacing-for-pain-management/>
- 3.