

AXIS

program

Module 3 - How Pain Affects You

You have learned that pain is produced as a result of all of the incoming electrical or danger signals which reach your brain.

Example: Mum Watching Her Son Play Footy

Think about the mother that runs onto the football field when her little boy gets tackled. Her little boy may only have a small injury, but mum doesn't. Mum watches him get tackled, remembers the footy player on TV that they took off on a stretcher, and her visual system, memory system, fear and anxiety system, and the "I need to look after my little boy" system all light up, resulting in mum receiving an amplified version of how bad her little boy was hurt.

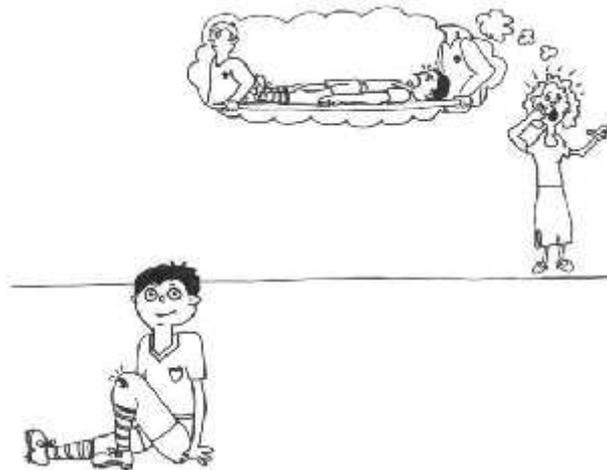
Mum is like your over sensitised, overprotective nervous system and brain. The little boy is like your back injury/discs/muscles – injured, but not as much as his nerves and brain might think.



The outcome is that mum runs onto the field screaming “please don’t hurt my little boy” and drags him off. The problem is that mum’s response is not the most appropriate response for her son. Her son wants to keep playing.

Similarly, your brains response to your sensitive nervous system is to be overprotective. The brains response is however not appropriate for the injured muscles which need to move and stretch to get stronger.

The image of her little boy being hurt is very stressful for mum. Chronic pain can be thought of as a type of stress to your body. Along with the pain itself, other issues are often a cause of stress when you have chronic pain.



How Does Your Brain Create Pain?

You have heard of “No Pain No Gain”.

Another saying is “No Brain No Pain”

Considering the example of mum protecting her little boy, we will now discuss the brain’s role in creating pain.

Pain Is Felt In The Brain!

As we have discussed, the electrical signals sent from your old injury are all processed by the brain. Due to the sensitivity of the nervous system, the brain gets an amplified version of what is actually happening. The challenge for the brain is to construct as sensible a story as possible, based on all the information that is arriving.

When you experience pain, many parts of your brain are active. Pain can often be associated with a particular place or time, such as sitting at your desk for an hour, or doing the vacuuming. Memory of

previous pain becomes a problem, as you can start to expect pain if you are doing this activity that has caused pain before. This can lead to anxiety, stress and fear relating to that activity.

One of the most important things that we have learnt is that in a pain experience, many parts of the brain are involved simultaneously. These brain parts include areas used for sensation, movement, emotions and memory. In chronic pain, more and more of these areas of the brain can contribute to your pain.

The exact parts and amount of brain activity between people and even between occasions in the same person is different. Every pain experience is unique.

There is not just one pain centre in the brain as people used to think. We refer to the pattern of brain activity that causes pain as the Pain Matrix.

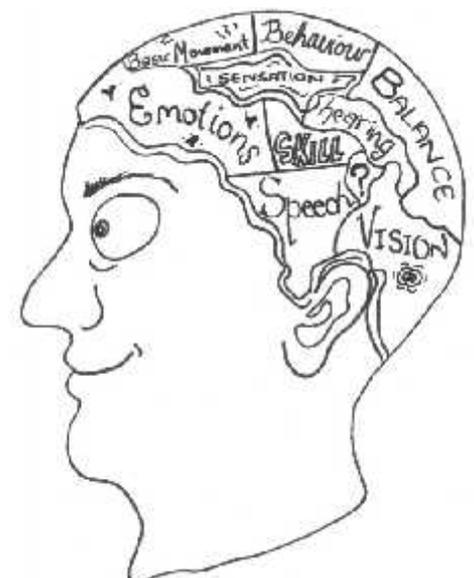
When pain persists and is having a huge impact on your life, it is difficult to see how it can be serving any useful purpose. But even when pain is chronic and nasty, it hurts because the brain has somehow concluded, often completely subconsciously, that you are threatened and in danger – the trick is to understand why this is happening.

In these situations, the brain concludes that a threat remains and that you need all the protection you can get. There are many explanations for why this occurs. Many of them involve changes in the way the nervous system sets off the alarms that set off the electrical signals in the first place. We've covered the changes that occur to the sensors in your nerves near your injury, but changes can also happen in the brain.

Basically, your brain gets better at interpreting all of the incoming electrical signals from your body and produces pain as a response to these signals. Also, more and more areas of your brain which are involved in sensation, memory, emotions and movement are all activated to help produce more pain.

Again, as the brain can be trained or conditioned to using more of its capacity to produce more pain, it can be trained to use less capacity and produce less pain.

By understanding how the brain works during chronic pain, this task will become easier.



Pain Is Stressful

The image of her little boy being hurt is very stressful for mum. Chronic pain is a type of stress to your body. Stress hormones which can circulate through your body are one of the things that your nerves can become over sensitive to. This is how stress can make your pain feel worse.

Along with the pain itself, other issues are often a cause of stress when you have chronic pain.

Some of these stresses associated with chronic pain include:

- Inability to work
- Loss of income
- Side effects of medication
- Less social contact
- Unable to participate in interests/hobbies
- Doctors giving you different opinions

As you probably know, stress can give rise to physical effects. These effects may include:

- Increased heart rate
- Increased blood pressure
- Muscle tension
- Inability to sleep well at night
- Sweating

These additional problems which can accompany pain can make you pain feel worse, and make it harder to deal with. They are like pain side effects. To manage chronic pain well, you have to be able to manage these additional problems.

Stress Uses The Nervous System As Well

A part of your nervous system is responsible for these physical reactions to pain. You may know this as the “fight or flight system”.

When your body recognises a threat, your nervous system produces a sudden response to prepare your body to either quickly run away from the situation, or to stay and fight the threat. Your blood starts to pump, your muscles tense so they are ready for action and your pupils dilate so you can see well.

Think of the nature documentary when a bunch of zebras are all calmly drinking by the lake. Suddenly, when the zebras see a lion out of the corner of their eye they spring to life and start running (Flight) to hopefully escape the danger.

Think of another type of stress, maybe something less life threatening, like having an argument (let's call this a Fight). Did you notice your heart pumping a bit harder and your palms getting sweaty? The

same thing may have happened last time you had a job interview. This is your body's stress system causing physical reactions in your body.

This system is normal, as long as the stresses are short lived. Once the lion has gone, the zebras go back to the lake. After your interview, you probably took a deep breath and felt a lot calmer.

But what happens if the stress doesn't go away. If you wake up every day with the pain still there, these physical responses to stress keep going. Your body isn't designed for these long term stresses.

The opposite of the "flight or fight" system is called the "rest and digest" system. If you are continually stressed, the rest and digest system does not get a chance to operate. If you have chronic stresses, whether they be ongoing pain, work pressures or family problems, it is more likely that you might have trouble eating or sleeping.

The rest and digest system also helps you to recover from injuries. When we manage chronic pain, we need to find ways to turn down the flight or fight system, and turn on the rest and digest system.

Zebra's happen to be pretty good at this....



More Information About Zebras and Lions

I bet you haven't seen a nature documentary about the zebra with a stomach ulcer and high blood pressure due to stress. Unfortunately, they seem to be eaten by lions before that happens.

Zebras are very good at forgetting the threat as soon as it goes away. Once the lion goes, its back to the waterhole. Their stress response is short lasting and the "rest and digest" system is the dominant force controlling their life. Consequently, they do not have long lasting physical problems due to stress. You would imagine that if the zebra was constantly worried and stressed about when the next lion would appear, they wouldn't eat, drink or sleep.

Unlike zebra's, our brains are highly complex structures that can think, remember, analyse information and communicate. We are much more highly evolved.

As a result, when we are faced with a threat, we do not quickly forget it, but our memory holds onto it, we think about it at night and create thoughts and ideas about how the threat is going to affect us in the future. This can lead to long term stress.

Long term stress can also give rise to psychological effects. These include anger, anxiety, depression, poor concentration, negative thoughts, catastrophic reactions, withdrawal from activities.....

These can complicate the chronic pain cycle.

Fear, Stress and Chronic Pain

Because human brains are highly complex and sophisticated, you can remember a great deal of information. Memories are associated with thoughts and emotions. You can probably think of both good and bad memories.

Often people avoid doing a movement because they remember that the last time they did a particular movement it hurt. You might associate a particular movement or activity with having pain, so you will be less likely to do that activity because you don't want to get pain. Or people remember the location where they hurt themselves, say at work, and are fearful of doing that same work activity. These memories, fears and anxieties can affect the sensitised nervous system and cause your pain to be exacerbated, because more parts of your brain, such as your memory and emotion areas are also being used to create pain.

So pain can become associated with memories, places, activities, movements and thoughts. Sometimes you might anticipate pain if you are going to do a certain activity. If you need to hang out the washing, or sit at your desk for an hour, you might expect that you will end up in pain, because that is what happened last time.

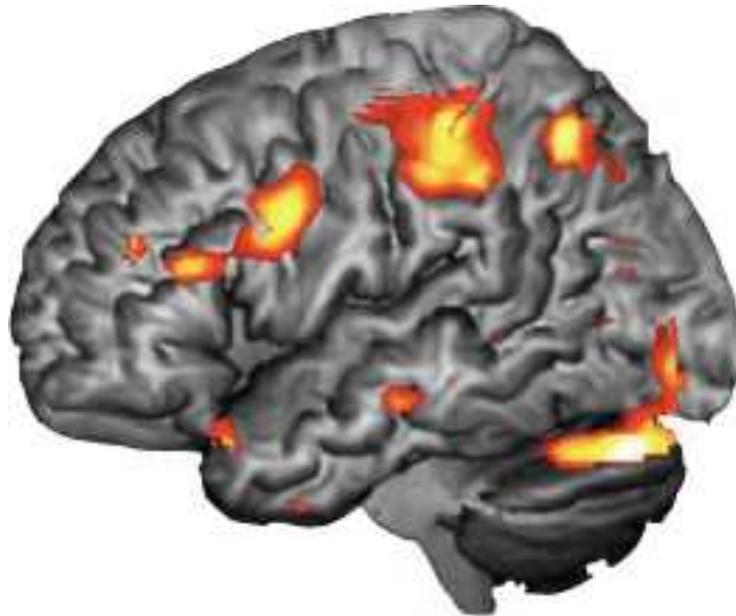
What happens then is that your stress and anxiety worsen, which send stress hormones around your body which your sensitised nerves respond to. You will tense up your muscles and stiffen up more to try to protect yourself. These responses can make your pain worse, and also make your movement and flexibility worse.

No Brain No Pain

All of this activity in your brain when you are in pain can be seen on very specialised brain scans called functional MRI scans.

In a healthy person, if you cause them pain, they should just have nerve activity only in the part of the brain that looks after sensation.

People with chronic pain have nerve activity in lots of different parts of their brain, including not just the sensation area, but also brain areas involved with memory and emotion. The more parts of your brain are active, the more pain can result.

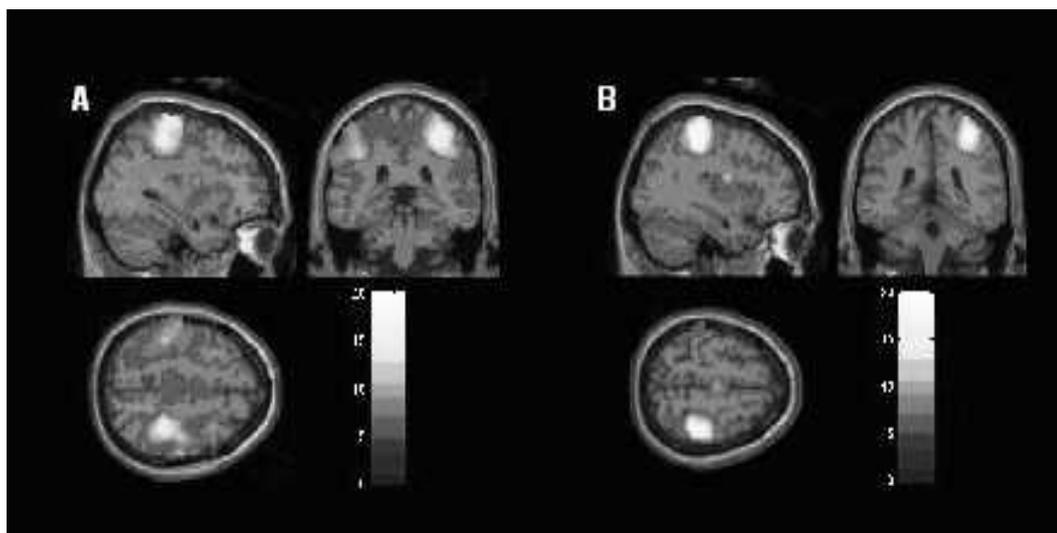


Neuroplasticity In The Brain

Your brain is constantly changing and evolving. Your pain has caused these changes in your brain which is actually making your pain worse.

The good news is that just as the brain can change for the worse, it can also be reversed and head back to normal. If we can reduce that overall level of activity in your brain that is causing your pain, your pain can gradually get better. For example if you can have less activity in the emotion and memory areas, your pain can improve. You may still feel some pain due to the sensation part of your brain, but your overall level of pain will be less.

In research on chronic pain sufferers, scientists have found that the brain activity that is seen on the functional MRI scans visibly reduces after rehabilitation. See the scan illustrated below, and the difference between the original scan (A) and the scan after rehabilitation (B). The reduction in activity on these scans correlates with the patient having less pain.



Key Points - Module 3

Pain is constructed in your brain. It is the outcome of all of the incoming messages from the nervous system together with memories, emotions and thoughts of previous pain experiences.

In chronic pain your brain also becomes sensitised and overprotective. The outcome is that you will often reduce your activity, or stiffen up in an attempt to protect the injury.

If your brain thinks that you are in danger or under threat, it will continue to produce pain.

Pain is a type of stress. Other stresses such as work and family problems can make your pain worse. Stress causes hormones to circulate through your body which are detected by your sensitive nervous system.

Stress causes physical reactions such as increased heart rate and tense muscles. These reactions can aggravate your existing pain.

Long term stress prevents the “rest and digest” part of the nervous system from working.

Fear of previous pain and activities can contribute to your pain. This can make you anticipate pain, and prevent you from being active. This can result in a worsening of the chronic pain cycle and lead to general weakness and deconditioning.

Functional MRI scans have proven that parts of your brain which control fear, memory and emotions are active in people with chronic pain. Also, this additional brain activity has been found to reduce after successful rehabilitation.