

# Chronic Pain and the Nervous System

PAIN IS A COMPLEX PHENOMENON, AND CHRONIC PAIN RESULTING FROM AN ACCIDENT OR POOR BIKE FIT CAN BE DEBILITATING. SOPHIA AULD LOOKS AT THE PROBLEM OF PERSISTENT PAIN, AND POSSIBLE RESOLUTIONS.

**YOU'VE PROBABLY HEARD** stories about people who've suffered horrific injuries being able to save themselves or their loved ones. Like the surfer who swims to safety after being bitten by a shark, or the father who races through flames to rescue his family. And yet a trivial injury, like a gravel rash, can be really painful.

These mismatched responses to injury prove that pain is more complicated than a stimulus-response reaction to tissue damage, as was once believed. Cyclists can suffer injuries from crashes, and are especially prone to pain in the knees, back, wrists, shoulders and neck. While most injuries heal in six to twelve weeks, some people will experience pain long after their injuries have healed.

Pain is defined as persistent or chronic if it continues beyond about three months. One in five Australians live with persistent pain, and it doesn't respond well to usual treatments. Often health professionals are unable to pinpoint the cause of chronic pain, and tests such as X-rays, MRI scans and blood tests will be normal. This can be incredibly frustrating, especially if you've spent thousands of dollars on tests and treatments, only to be left wondering if the pain is 'all in your head'.

Regardless of what tests have shown, all pain is real. Several factors, including genetics, gender and previous episodes of acute pain, play a role in the

development of chronic pain. But the most significant factor is a change in the nervous system. Before we consider how the nervous system changes, here's an overview of how it works.

## YOUR AMAZING NERVOUS SYSTEM

Your nervous system is an intricate structure. It uses chemical and electrical signals to control everything your body does. From breathing to breaking into a sprint, from planning how you'll tackle the next hill to digesting that protein bar, your nervous system executes every detail. It is one continuous system, from the top of your skull to the tips of your toes. However, for ease of understanding, it is broken down into two parts according to their location.

## THE CENTRAL NERVOUS SYSTEM

Consisting of the brain and spinal cord, the central nervous system integrates information from the entire body and coordinates all activity. These structures are vital for sustaining life, and are encased in strong bony structures (the skull and spinal column) for protection.

The central nervous system contains grey and white matter. Grey matter comprises nerve cell bodies and their immediate connections, and is a pinkish-

## RADIAL NERVE

Stand comfortably with arms by your sides. Turn one arm inward so your forearm faces towards your body and flex that wrist. Keeping the shoulder down, tilt your head towards the opposite shoulder until you feel a stretch in the neck or arm. For a nerve glide, flex and relax the wrist 10 to 15 times.



grey colour in the living brain. The white matter contains longer nerve fibres that connect areas of grey matter to each other. The white colour is a fatty sheath, which speeds transmission and nourishes and protects the nerves.

## THE PERIPHERAL NERVOUS SYSTEM

This includes all the nerves that are outside the brain and spinal cord. These nerves connect the central nervous system to your sensory organs (like the eye and ear) and to other organs, muscles, blood vessels, and glands. The peripheral nerves include the 12 cranial nerves (originating from the brain), the spinal nerves and roots (originating from the spinal cord), and the autonomic nerves, which control automatic functions like breathing, sweating, heart rate, and digestion. The central and peripheral systems both play a role in chronic pain.

## PAIN VS NOCICEPTION

Nociception is the medical word used to describe the nervous system's reaction to noxious stimuli, including things like heat, cold, inflammation and pressure. A threshold level of sensation must be reached before a nociceptor fires off. From there, the information continues to the brain, where the perception of pain may be generated.

A pain experience is therefore an output of the brain, which explains why tissue injury or pathology and pain are not necessarily related. Other brain inputs, like the need to escape that shark, can override nociception and stop the pain output. This also explains why pain can be experienced differently in different contexts—such as back pain that is worse at work (stressful environment), than out with a bunch on a breakfast ride (positive environment).

Many factors influence the likelihood of a pain output, including stress, hormonal variations, environment, and

## MEDIAN NERVE

Take the arm to be stretched to shoulder height, palm facing up and wrist flexed. Tilt the head towards the opposite shoulder to increase the stretch. Flex and relax the wrist as above for the glide.



beliefs about pain. Thoughts are nerve impulses too. They are real and powerful. That's why techniques like visualisation and mental rehearsal are effective for improving sports performance.

Negative thoughts are also powerful. So, if you're thinking along the lines of 'I'll never race again after this injury', or 'My back is stuffed', you're contributing danger signals to your nervous system, and increasing the likelihood of a pain output.

Knowledge is power, and the better you understand the neuroscience of chronic pain, the better you can manage it.

## SENSITISATION OF THE NERVOUS SYSTEM

A crucial key to understanding persistent pain is the notion of bioplasticity. Over the past couple of decades, neuroscientists have debunked the belief that the nervous system is a fixed entity. In fact, it is highly capable of adaptation in response to the demands placed upon it.

A growing body of evidence

**“AS A DEFENCE MECHANISM, PAIN IS A NORMAL EXPERIENCE. But problems can arise if the nervous system becomes overprotective.”**

## ULNA NERVE

Crazy mask stretch. Pinch the tip of the thumb and first finger together. Then turn your arms as shown and place the opening between them around your eyes, with the other fingers going down the side of your face. Move your elbows back and forward for the glide.



is revealing how changes to the nervous system contribute to persistent pain. As a defence mechanism, pain is a normal experience. But problems can arise if the nervous system becomes overprotective. These changes occur in the peripheral and central nervous systems, making the nerves increasingly sensitive, meaning they signal pain more easily.

The good news—bioplasticity has led to your problem, and bioplasticity can get you out of it. Here are some strategies for using neural plasticity to help manage, or better still prevent, a chronic pain problem.

## KEEP HEALTHY

Looking after your general health will not only help you perform at your peak, it will help with pain too. Keep your immune system in top form by getting enough rest, eating well and learning ways to manage stress.

## POSITIVE THINKING

Negative beliefs about pain will feed into the pain experience, making it worse. Replace thoughts like 'This knee is bugged', with ones like 'I'm doing things to recover from this injury'. Positive thoughts will also lead to positive actions, such as doing the exercises your therapist has prescribed.

## MOVEMENT IS MEDICINE

While pain can tempt you to drop physical activity, heading for the couch is probably the worst thing you can do. The body is designed to move, and staying active is crucial to recovery. You don't have to smash out a tough ride. Just do something that gets you moving without aggravating your pain. Make it something you enjoy for even bigger pain-busting benefits—take your dog for a walk along the beach, kick a footy round the park with your kids or go for an easy ride with your mates. Being out in nature and around people you like also helps your pain.

## SCIATIC NERVE

Lie on your back with both knees bent. Use your hands to bring one knee towards your chest, then extend that knee until a stretch is felt. Ease the leg in and out of the stretch to glide the nerve.



## FEMORAL NERVE

Lie on your stomach, making sure your hips stay pressed into the floor. Bend one knee until you feel a stretch. Pull the ankle towards your buttock to increase the stretch. For flossing, flex and extend the knee through an arc of about 45 degrees.



**“...because cycling involves prolonged arm and hand positions, CYCLISTS OFTEN SUFFER PAIN IN THE NECK, SHOULDERS, WRISTS AND HANDS...”**

## STRETCH THOSE NERVES

Just like other tissues, nerves can become tight. The sustained spinal position of long hours in the saddle can leave your nerves stiff and irritable, potentially causing pain in the arms and legs. Nerves should be able to slide and glide freely through the surrounding tissues.

Try these stretches to help release nerves that are tethered. Use a nerve glide or 'flossing' action, by easing in and out of stretches 10 to 15 times. Nerves are sensitive to stretch, and can be easily irritated, so start gently and never force into discomfort.

Nerves of the arm: because cycling involves prolonged

arm and hand positions, cyclists often suffer pain in the neck, shoulders, wrists and hands. These stretches help relieve tightness in the nerves originating from the neck and extending down the arms.

Nerves of the leg: sitting in the saddle involves prolonged positioning of your lower back. Try these stretches for the nerves originating from the lower back and extending down your legs. **BA**

*Seek medical attention if your pain is severe, unrelenting, or accompanied by fever, sickness or loss of appetite. For individualised assessment and advice, always see your healthcare professional.*