

# You Are Not Alone With Your Phantom Pain

By Keira Roche

*An experienced Phantom Limb Pain (PLP) sufferer wonders why it is called "Phantom" when it feels all too real. This article is written from a review of the psychological standpoint of what some people say about Phantom Limb Pain (PLP).*

## A Definition of Phantom Limb Pain

Phantom Limb Pain is a pain sensation which is felt by the limbless person to be somewhere within the amputated limb i.e. the limb which no longer exists, hence the term Phantom.

It is important to distinguish between "Stump Pain" and "Phantom Limb Pain", especially as the "treatments" differ greatly. Unlike Phantom Pain, Stump Pain originates in the residual limb (stump). It is often described as a sharp burning pain, which can easily be confused with Phantom Pain, which is described as crushing, burning, itchy or shooting pains, or contractions (Phantom Contracture), such as a clenched fist. One of the causes of Stump Pain is nerve damage in the residual limb. After surgery, the nerves try to heal themselves, which can result in abnormal sensations caused by neuromas (nodules at the end of the nerves located in the residual limb). These neuromas may continue to generate impulses, which travel up the spinal cord to the brain.

According to research by Nikolajsen and Jensen (1 April 2000), between 60% and 80% of amputees experience PLP, but only 5% to 10% experience truly agonising pain. Other researchers' varying claims are that as little as 2%, to as many as 95%, of amputees experience phantom *sensations*. Individuals born with limb absence can also experience phantom sensations, but this occurs less frequently. Sensations have a sense of presence, size and shape. Some feel that the missing limb moves on its own, whilst others experience it as a rigid fixed state. PLP and sensations can occur at anytime following an amputation, from an immediate occurrence to several years later.

At one time, it was thought that the neuromas were responsible for Phantom Pain, as well as Stump Pain. Surgeons cut the nerves and allow the nerve-ends to retreat higher up, so that they are not irritated by weight transmission in the residual limb. However, many patients still experienced Phantom Pain after surgery. It became apparent that Phantom Pain was, and is, a more complicated phenomenon.

In the United States, Sherman and Jones received 7,000 responses to a questionnaire sent out to amputees regarding PLP. Over 80% of respondents said that they had enough PLP to cause real problems for a least a week of the year. Most had episodes of pain lasting from a few seconds to several weeks. Approximately half the reported PLP was associated with other avoidable effects; from wearing an artificial limb (such as stump irritation, ill-fitting sockets), exhaustion, back-pain and stress, as well as changes in the environment, such as cold and humidity. Almost no respondents reported that their PLP went away completely in the years after the amputation.

## Causes and theory

The exact cause of phantom pain is still unknown. One school of thought is that phantom pain is generated from the spinal cord and the brain. It is believed that, post-amputation, the brain region responsible for sensation begins to function differently, leading to the perception that the amputated body part still exists. Psychologist Melzack talks about the neuro-matrix; the brain's map of the body, more frequently referred to as "body mapping". This is the "matrix of wholeness" established in the brain, which will continue to operate even in the absence of sensory inputs and therefore create an impression of having a complete and whole body, even when a limb has been removed. Nana Dawson-Addoh refers to this as the brain's sense-of-self (I – Function). Although the limb no longer exists, the amputee perceives the limb as still being an essential part of their body image. Melzack maintained that the neuro-matrix is pre-wired by genetics, indicating that the brain is predisposed to believing all of its limbs exist and therefore it sends signals to this effect. Because there is no signal or sensory feedback from the amputated limb, the brain increases the intensity of the signal, thereby inducing Phantom Pain. The Phantom limb is perceived to be over-flexed and this causes cramping (Phantom Contracture). The brain's idea of self therefore becomes distorted by the amputation of the limb.

Another theory is that phantom pain may also result from a miscommunication between motor-commands sent from the brain to the absent limb, as there is no sensory feedback from the limb to confirm that the motor command has been carried out. V S Ramachandran questioned whether amputees suffering from Phantom Pain were suffering from rearranged body maps (neuro-matrix). From this, he formulated his cortical re-mapping theory. He examined the reorganised Sensory Homunculus (the blueprint representation of the body's surface) of amputees. The Sensory Homunculus, which acts as a switchboard, is strangely human in shape and is often referred to as the "little person". If you wiggle your toe, a signal is sent from the skin receptors through the nerve pathways (central nervous system) to the corresponding part of the homunculus.

Ramachandran noticed that in upper limb amputees, touching the face brought on phantom sensations, because the signals had been rewired to the next-door part of the brain, which happens to be the part that listens to signals from the face. Ramachandran found that signals from the amputated limb are transferred to a neighbouring part of the homunculus. These are known as "referred feelings". A good example of how the homunculus can be confused and transfer feelings is the "Brain Freeze", felt in your forehead when you drink an ice cold drink, as the nerve "wires" from the roof of the mouth are neighbours to the nerve wires for the forehead. When a nerve is cut during surgery the raw end of the nerve is very sensitive to stimuli. Chemicals from cut or bruised skin can cause these nerve endings to fire off signals, so even minor pressure can be enough to send powerful signals to the homunculus. The homunculus doesn't know the nerve has been cut, so it reports the feeling as coming from the amputated limb and not the severed nerve ending.

Ramachandran created a method of using mirrors to provide the brain with the missing visual stimulation. The reflection of the intact limb is optically superimposed on the location of the amputated limb (Phantom Limb), tricking the brain into thinking that the Phantom Limb is real. Ramachandran's patients have been able to shift their Phantom Limbs out of painful or awkward positions using this technique. This so-called Mirror Box technique is just one of the many treatments for Phantom Limb Pain. Through research, we now know the causes of several types of Phantom Pain. Burning and tingling phantom pain is caused by decreased blood flow to the end of the stump, while cramping phantom pain is caused by spasms in the stump.