



# - It's All In Your Head -

## The Treatment and Management of Phantom Limb Syndrome

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### Introduction:

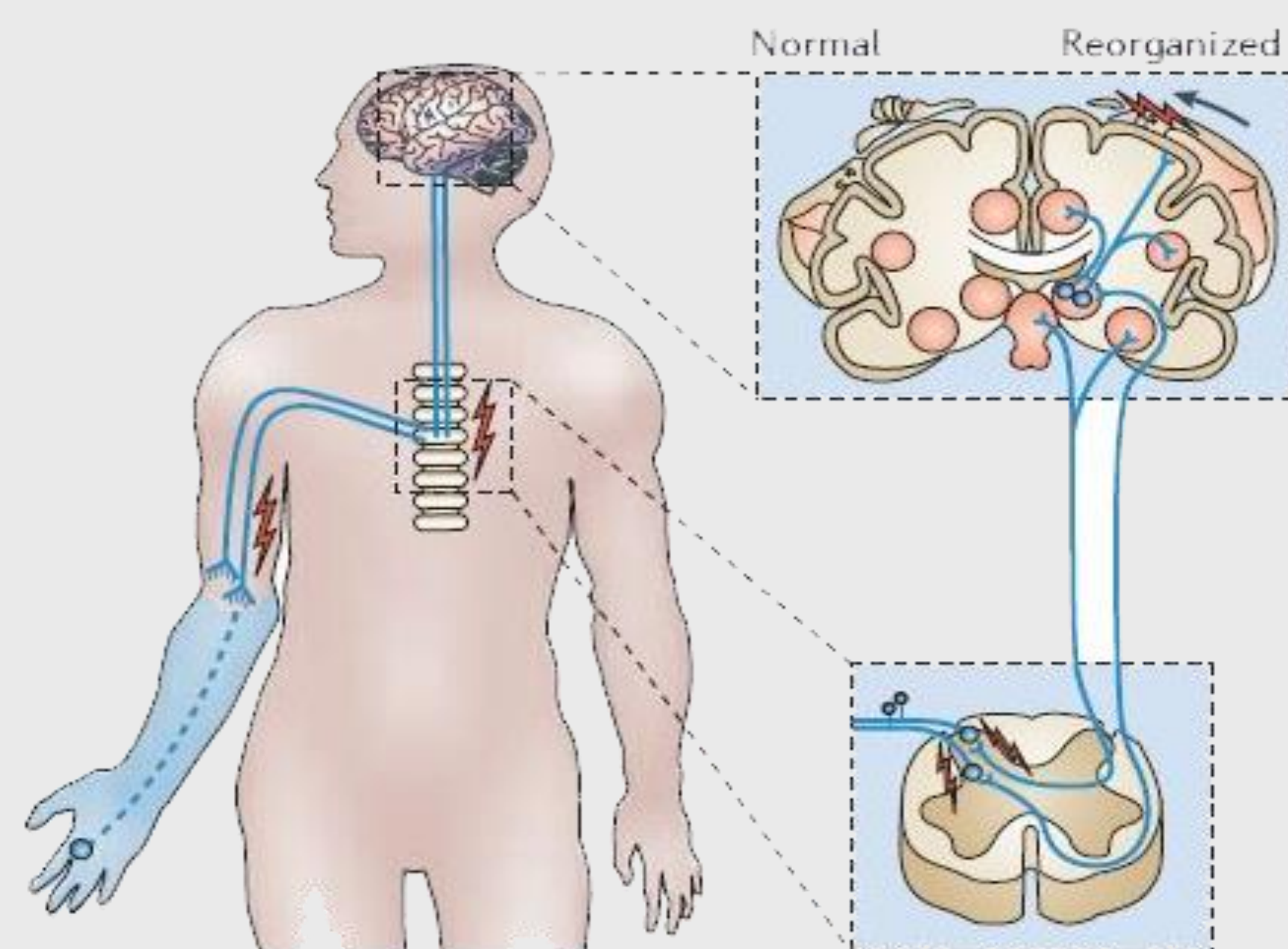
Phantom limb syndrome, the ability to feel sensations and even pain in a limb or limbs that no longer exist. Phantom limb pain (PLP) is characterized by both nonpainful and painful sensations.

Nonpainful sensations can be divided into the perception of movement and the perception of external sensations (exteroception), including touch, temperature, pressure, vibration, and itch. PLP occurs in 50%–80% of limb amputees and is known to be highly fluctuant, the pain sensations range from burning and shooting pains to feelings of tingling “pins and needles.” While phantom limb syndrome occurs only in amputees, phantom sensations may be perceived in people who have survived strokes but lost function of certain body parts or who have spinal cord injury or peripheral nerve injury.<sup>1</sup>



### Mechanism:

In the 1990s researchers found that neuroplasticity—the ability of neurons in the brain to modify their connections and behavior—could explain pain phenomena that had been observed in association with phantom limb syndrome. Phantom limb pain is considered to be caused from functional cortical reorganization, sometimes called maladaptive plasticity, of the primary sensorimotor cortex. In which local brain regions, each dedicated to performing one type of function and reflected in the cerebral cortex as “maps,” can acquire areas of the unused phantom map.<sup>2</sup>



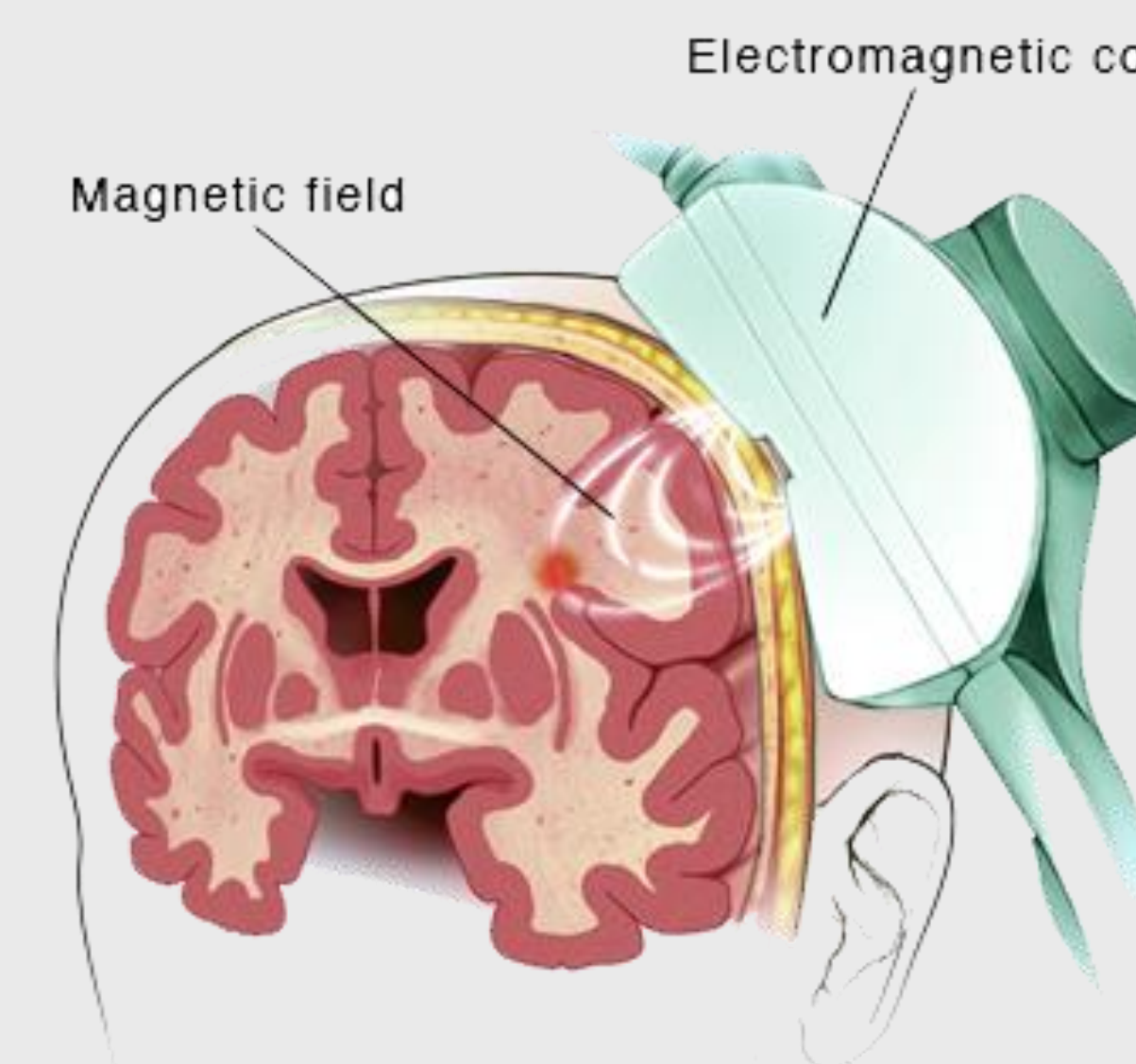
### Treatment:

A number of different therapies relying on different principles have been proposed for the management of PLP including: Pharmacotherapy, Surgical/Invasive procedures, and adjuvant therapy. However, specific treatment guidelines are yet to evolve and most successful measures use multidisciplinary approaches in the management of pain and in rehabilitation.<sup>3</sup>

**Pharmacologic Approach** - Acetaminophen and NSAIDs were the most common medications used in the treatment of PLP. The analgesic mechanism of acetaminophen is not clear but serotonergic and multiple other central nervous system pathways are likely to be involved. NSAIDs inhibit the enzymes needed for the synthesis of prostaglandin and decrease the nociception peripherally and centrally. The following pharmacologic treatments have been tried for PLP - amitriptyline, doxepin, topiramate, carbamazepam, clonazepam, ketamine, methadone, lidocaine, morphine, fentanyl, propranolol, fluoxetine and milnacipran. The vast majority found that PLP intensity was reduced.<sup>4</sup>

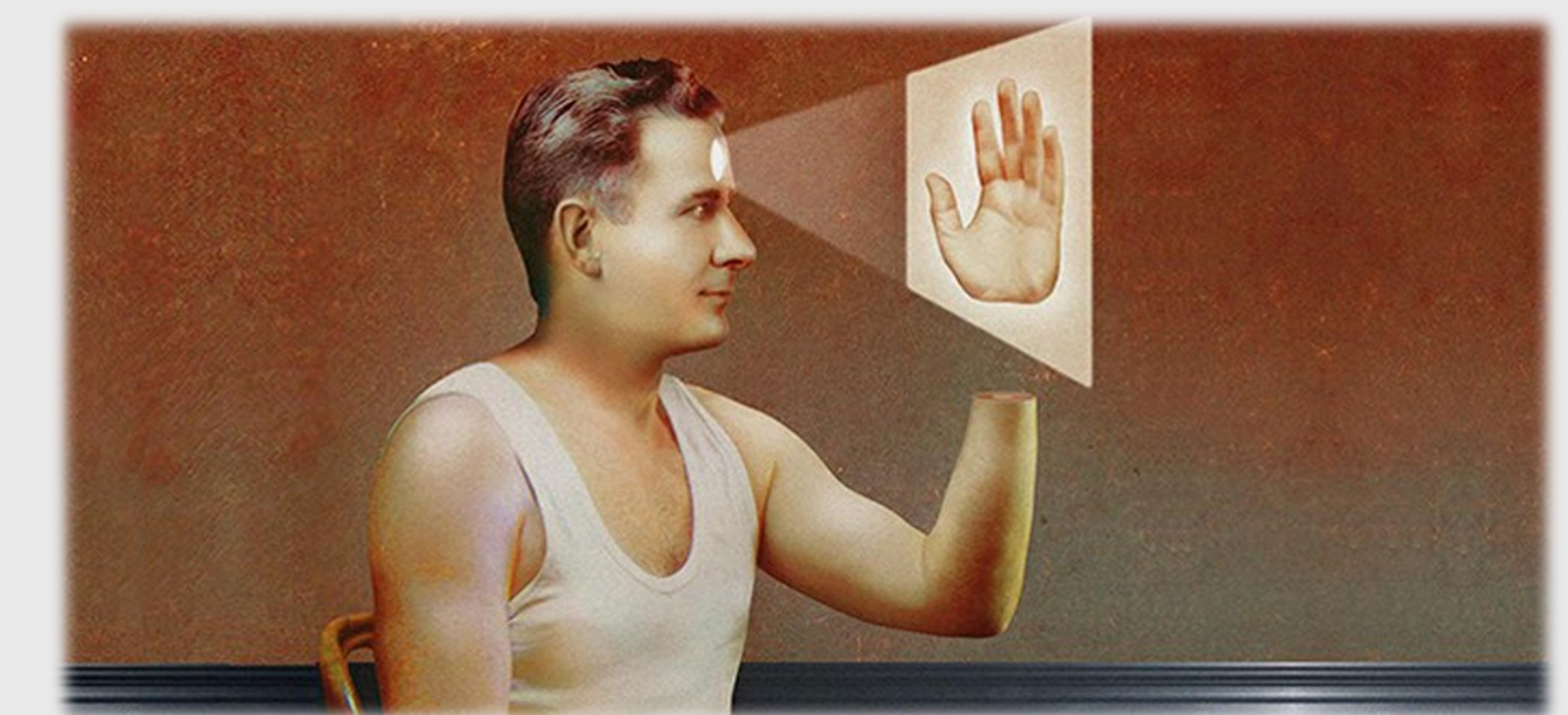
**Mirror Therapy** - The principle of mirror therapy (MT) is the use of a mirror to create a reflective illusion of an affected limb in order to trick the brain into thinking movement has occurred without pain. It involves placing the affected limb behind a mirror, which is sited so the reflection of the opposing limb appears in place of the hidden limb. Over 20 studies in the last decade have tested the efficacy of MT and the results were mixed due to the level of evidence being insufficient.<sup>5</sup>

**Repetitive Transcranial Magnetic Stimulation (rTMS)** - Transcranial magnetic stimulation is a method in which a changing magnetic field is used to cause electric current to flow in a small region of the brain via electromagnetic induction. During a TMS procedure, a magnetic field generator, or "coil", is placed near the head of the person receiving the treatment. One high-quality double-blind, placebo-controlled trial (n=54) using repetitive transcranial magnetic stimulation to stimulate the primary motor cortex of traumatic amputees found a significant reduction in pain (≈30%) at 15 days; however, there was no longer a statistical difference at 30 days.<sup>6</sup>



### Conclusion:

The vast amount of research over the past decades has significantly added to our knowledge of phantom limb pain. The paradigms of proposed mechanisms have shifted over the past years from the psychogenic theory to peripheral and central neural changes involving cortical reorganization. As of yet no decisions can be made for the first-line management of PLP, as the level of evidence is too low, so this subject remains open for further research.



### References:

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