

Phantom Limb Pain Cured with Mirrors

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I was intrigued by a recent article in the New York Times¹ about a new treatment for phantom limb. While the following does not necessarily pertain to soft tissue, it does relate to the central nervous system which obviously affects all tissues. Phantom pain is defined as pain referred to a surgically removed limb or portion thereof.² At present the mechanisms underlying phantom limb and related phenomena are still hypothetical.²

Ten years ago a patient traumatized an arm in a motorcycle accident, resulting in a paralyzed arm that the patient held in a sling. A year later the useless arm was amputated. For the next nine years the patient still felt the paralyzed arm pressed against his body and felt a severe ache. Dr. Vilayanus Ramachandran, a professor of neuroscience at the University of California at San Diego, felt that phantom limb occurs when the brain modifies its sensory maps after an amputation. The brain region mapping the arm no longer gets input from the arm but it continues to be constantly stimulated by inputs from adjacent body parts. These stimuli fool the brain into thinking the arm itself is still there. In this case, during the first few weeks after the accident the patient's brain would send signals to his arm to move, and though his eyes confirmed the arm was there, it didn't move.

Dr. Ramachandran thought that the patient had developed a learned paralysis. "His brain constantly got information that his arm was not moving," even though it was still there. The doctor thought that if true paralysis can be learned could it be possible to unlearn it?

He created a simple box with mirrors so that when the patient placed his right arm into the box, the patient saw a mirror image of his missing left arm. The doctor asked the patient to make symmetric movements with both hands, as if he were conducting an orchestra and the patient got excited saying, "Oh my God, my wrist is moving, my elbow is moving!" As soon as the patient closed his eyes the arm became frozen again. The patient took the box home and called the doctor three weeks later exclaiming that the pain was gone. All he now felt was his fingers and lower palm dangling from his shoulder. Dr. Ramachandran thought that he permanently altered the patient's body image. He reasoned that the pain disappeared because a sensory conflict was solved. His vision was telling him that his arm had come back and was obeying his commands. But he was not getting feedback from the muscles in his arm. Faced with this type of conflict over a protracted period, the brain may simply gate the signals. It says: "This doesn't make sense. I won't have anything to do with it." In the process, the arm disappears and the elbow pain goes away. He felt that the fingers survived because they are over-represented in the cortex, much more so than the rest of the arm.

This mirror technique recently helped a phantom limb pain in which a patient felt his fingernails were digging into his hands, causing excruciating pain. Dr. Ramachandran is experimenting with this technique with stroke victims, where swelling in the brain in the early stages could cause learned paralysis. He feels that while destroyed tissue could not be revived, other circuits might be re-

established with the use of mirrors.

References

1. Blakeslee S. How do you stop agonizing pain in an arm that no longer exists? A scientist does it with mirrors. *New York Times*, Vol. CXLIV, March 28, 1995: C3.
2. Jensen TS, Rasmussen P. Phantom pain and related phenomena after amputation. In: Wall PD, Melzack R. *Textbook of Pain*, 2nd. ed., New York, Churchill Livingstone; 1989:508-519.

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Editor's Note: Dr. Hammer will conduct his next Subluxation Myopathology (SM) seminars May 20-21 in Seattle, Washington and October 7-8 in Bloomington, Minnesota. You may call 1-800-359-2289 to register.

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