

## Neuromotus Information Sheet

### What is Neuromotus?

Neuromotus is a treatment technique used to reduce the symptoms of phantom limb pain. Phantom limb pain (PLP) is a debilitating condition that affects 50-80% of amputees [1,2]. Its presentation is unique to the individual with varying intensity, pain description, duration and frequency but it often negatively impacts on a person's quality of life [2,3].

There are many treatment options for phantom limb pain, for example; pharmaceutical (pain medication), mirror therapy, acupuncture, invasive surgery and psychological approaches such as hypnotherapy [1]. Most of these have been proven to reduce pain however, from clinical experience, no one treatment seems to suit all.

Neuromotus is a new non-invasive treatment option which instead of relying on visual imagery to create an illusion of the absent portion of limb, (as with mirror therapy) it uses a concept called phantom motor execution [3]. Phantom motor execution is the process of moving the phantom limb by activating the appropriate motor area of the brain through muscular activation in the residuum [3].

### Who is it for?

Neuromotus is appropriate for any level of amputation, upper or lower limb, providing you have the ability to contract muscle in the residuum.

### How does Neuromotus work?

Small electrodes placed on the skin over specific muscle groups in your leg or arm detect muscle signals controlled by the motor area of your brain and allow you to take control of a virtual limb on the computer screen and start to re-train the movements. It is believed that re-establishing this link between the brain and the movement of your phantom limb can have a positive effect on reducing the intensity of your PLP.



The first clinical trial showed a 47% reduction in overall PLP, 43% reduction in intrusion of PLP on day to day activities and 61% reduction of sleep disturbance after 12 treatment sessions [4]. These results were based on upper limb amputees but there is an ongoing research project replicating this study with the inclusion of lower limb participants.

### Pace Rehabilitation Neuromotus Treatment Packages

The treatment requires a commitment of 12 sessions. It takes time for the treatment to influence the phantom limb pain therefore you need to ensure you can commit to a minimum of once weekly treatment prior to starting.

We offer three treatment packages; after an initial assessment you will be guided as to which we feel will suit you best:

- **Package 1:** 12 sessions provided at Pace Rehabilitation
- **Package 2:** 6 sessions provided at Pace, followed by a 3-week home loan
- **Package 3:** Top up session with therapist at Pace, followed by 3-week home loan (only available following completion of package 1 or 2)

### How to find out more

To find out if you are suitable or to book in for a telephone triage please contact us on either 0161 428 5500 (Bredbury) 01494 790 490 (Amersham) or alternatively via email at: [info@pacerehab.com](mailto:info@pacerehab.com)

Further information can be found at: <https://integrum.se/phantom-pain/>

### References

1. Richardson C, Kulkarni J. A review of the management of phantom limb pain: challenges and solutions. *Journal of Pain Research* 2017;1861.
2. Herrador Colmenero L, Perez Marmol JM, Martí-García C, et al. Effectiveness of mirror therapy, motor imagery, and virtual feedback on phantom limb pain following amputation: A systematic review. *Prosthetics and Orthotics International* 2018;42(3):288-98.
3. Max O-C. The Stochastic Entanglement and Phantom Motor Execution Hypotheses: A Theoretical Framework for the Origin and Treatment of Phantom Limb Pain. *Frontiers in Neurology* 2018.
4. Ortiz-Catalan M, Guðmundsdóttir RA, Kristoffersen MB, et al. Phantom motor execution facilitated by machine learning and augmented reality as treatment for phantom limb pain: a single group, clinical trial in patients with chronic intractable phantom limb pain. *The Lancet* 2016;388(10062):2885-94.