

Module 2: Lecture 1. Brain-changes in (chronic) pain

Introduction

Brain changes, as the organization of the primary somatosensory cortex (S1) and the primary motor cortex (M1), are seen in people with (persistent) pain. Measurement tools and interventions are suggested to assess and target pain and these changes. For example, applying the Quantitative Sensory Testing (QST) battery in clinical practice provides the opportunity to quantify functions of the somatosensory nervous system. It allows to further investigate the aspects of the experienced sensation, as pain, indicated by the patient. A few studies investigated the possibilities of measuring these tests in clinical practice. Besides the QST battery, also tests to assess the sensoric-discrimination dimension are investigated for in clinic. Moreover, sensoric-discrimination interventions are suggested for sensoric mapping and thereby target the pain and restrictions.

Learning Outcomes Mapped to EFIC Pain Physiotherapy Curriculum

By the end of this session, participants should have an understanding of:

1. The theoretical constructs of pain with brain changes and applies these in a case with (persistent) pain.
2. The participant performs the tests to quantify the somatosensory system.

Preparation

1. Read the recommended literature.
2. Prepare a case where possible brain changes are present and try to highlight this.

Content

Theoretical approach: Brain changes (somatosensory and motor cortex) will be linked to (persistent) pain and possible indicated feelings/experiences of the patient.

Practical approach: Both diagnostic and intervention tools to assess, evaluate and target pain and brain changes are demonstrated and practiced.

Follow up / suggestions for processing and practice

After specifying the indication of the patient regarding experiencing differences in sensations, pain and restrictions, specific tools can be advised and conducted to assess and target these experiences.

The advice is to:

1. Theoretically explain the construct to be measured and target.
2. Practically teach:
 - tests from the QST battery (Pressure Pain Threshold, Temporal Summation, mechanical allodynia) and sensoric discrimination (Two Point Discrimination Threshold, Graphesthesia test).
 - interventions to target experienced differences in sensations (discrimination therapy, sensoric mapping), combine sensoric function with motor function.

Additional literature:

Van Griensven H, Schmid A, Trendafilova T, Low M. Central sensitization in musculoskeletal pain: Lost in translation? *J Orthop Sports Phys Ther.* 2020;50(11):592–6. DOI: 10.2519/jospt.2020.0610

Meier ML, Vrana A, Schweinhardt P. Low Back Pain: The Potential Contribution of Supraspinal Motor Control and Proprioception. Vol. 25, *Neuroscientist.* SAGE Publications Inc.; 2019. p. 583–96. DOI: 10.1177/1073858418809074

Zhu GC, Böttger K, Slater H, Cook C, Farrell SF, Hailey L, et al. Concurrent validity of a low-cost and time-efficient clinical sensory test battery to evaluate somatosensory dysfunction. *Eur J Pain (United Kingdom).* 2019;23(10):1826–38. DOI: 10.1002/ejp.1456

Tsao H, Galea MP, Hodges PW. Driving plasticity in the motor cortex in recurrent low back pain. *Eur J Pain.* 2010 Sep;14(8):832–9. DOI: 10.1016/j.ejpain.2010.01.001

Louw A, Farrell K, Landers M, Barclay M, Goodman E, Gillund J, et al. The effect of manual therapy and neuroplasticity education on chronic low back pain: a randomized clinical trial. *J Man Manip Ther [Internet].* 2017;25(5):227–34. Available from: <http://dx.doi.org/10.1080/10669817.2016.1231860>

Goossens N, Janssens L, Brumagne S. Changes in the Organization of the Secondary Somatosensory Cortex while Processing Lumbar Proprioception and the Relationship with Sensorimotor Control in Low Back Pain. *Clin J Pain.* 2019;35(5):394–406. DOI: 10.1097/AJP.0000000000000692

Video's developed by the Pain Unit.

Video's developed by Sabine (TPD, graphaesthesia)