

2009

## Tactile Thresholds are Preserved yet Cortical Sensory Function is Impaired in Chronic Non-Specific Low Back Pain Patients

Benedict M. Wand

*University of Notre Dame Australia, benedict.wand@nd.edu.au*

Flavia S. Di Pietro

Pamela George

*University of Notre Dame Australia, pam.george@nd.edu.au*

Neil E. O'Connell

Follow this and additional works at: [https://researchonline.nd.edu.au/health\\_conference](https://researchonline.nd.edu.au/health_conference)

 Part of the [Medicine and Health Sciences Commons](#)

This conference paper was originally published as:

Wand, B. M., Di Pietro, F. S., George, P., & O'Connell, N. E. (2009). Tactile Thresholds are Preserved yet Cortical Sensory Function is Impaired in Chronic Non-Specific Low Back Pain Patients. *MOVE 2009*.

This conference paper is posted on ResearchOnline@ND at [https://researchonline.nd.edu.au/health\\_conference/13](https://researchonline.nd.edu.au/health_conference/13). For more information, please contact [researchonline@nd.edu.au](mailto:researchonline@nd.edu.au).



**Title:**

**Tactile Thresholds are Preserved yet Cortical Sensory Function is Impaired in Chronic Non-Specific Low Back Pain Patients**

**Authors & affiliations:**

Benedict M Wand<sup>1</sup>, Flavia S Di Pietro<sup>2</sup>, Pamela J George<sup>1</sup>, Neil E O'Connell<sup>3</sup>

1. School of Health Sciences, The University of Notre Dame, Fremantle W.Australia

2. Physiotherapy Department, Bunbury Hospital, Bunbury, W Australia

3. Centre for Research in Rehabilitation, School of Health Sciences and Social Care, Brunel University, United Kingdom

**Abstract:** (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

**Introduction**

A substantial amount of evidence points to an alteration in brain structure and function patients with chronic non-specific low back pain (CNSLBP) [1-6]. One interpretation of these findings is that the observed brain changes may represent a disruption of the brain's representations of the body part and the resultant body perception disturbance may underpin this clinical problem. The current study aimed to investigate sensory dysfunction in CNSLBP. Specifically we aimed to distinguish cortically mediated sensory dysfunction from peripheral dysfunction by comparing simple tactile thresholds with more complex cortically mediated sensory tests

**Methods**

We investigated tactile thresholds (TTH), two point discrimination (TPD) and graphaesthesia over the lumbar spine of 19 CLBP patients and 19 age and sex matched healthy controls as a way of investigating whether CLBP patients present with a perceptual disturbance of their lumbar spine. Differences in performance of the sensory tests was explored using the Mann Whitney U Test and one-way between groups multivariate analysis of variance.

**Results**

We found no difference in tactile threshold between the two groups ( $P=0.751$ ). There was a statistically significant difference between controls and LBP for TPD:  $F(1,36)=10.15$ ,  $p=.003$  and letter error rate:  $F(1, 36)=6.54$   $p=0.015$ . The data indicate that LBP patients had a larger lumbar TPD distance and a greater letter recognition error rate.

**Discussion**

Both TPD and graphaesthesia are dependant on the integrity of the primary sensory cortex [7]. These data support existing findings of perceptual abnormality in chronic back pain [8] and the preservation of tactile thresholds is suggestive of cortical rather than peripheral sensory dysfunction. Amelioration of these abnormalities may present a target for therapeutic intervention.

**Keywords**

Chronic low back pain; corte ; graphaesthesia; two-point discrimination

**References**

1. Apkarian AV, Sosa Y, Sonty S, Levy RM, Harden RN, Parrish TB and Gitelman DR. Chronic back pain is associated with decreased prefrontal and thalamic gray matter density. J Neurosci. 2004a;24:10410-10415

2. Apkarian AV, Sosa Y, Krauss B, Thomas P, Fredrickson B, Levy R, Harden RN and

Chialvo D. Chronic pain patients are impaired on an emotional decision-making task. *Pain*. 2004b;108:129-136

3. Flor H, Braun C, Elbert T, Birbaumer N. Extensive reorganization of primary somatosensory cortex in chronic back pain patients. *Neurosci Lett* 1997;224:58.

4. Grachev ID, Fredrickson BE, Apkarian AV. Abnormal brain chemistry in chronic back pain: An in vivo proton magnetic resonance spectroscopy study. *Pain* 2000, 89:7-18.

5. Grachev ID, Ramachandran TS, Thomas PS, Szeverenyi NM, Fredrickson BE: Association between dorsolateral prefrontal N-acetyl aspartate and depression in chronic back pain: An in vivo proton magnetic resonance spectroscopy study. *J Neural Transm* 2003, 110:287-312.

6. Schmidt-Wilcke T, Leinisch E, Gänßbauer S, Draganski B, Bogdahn U, Altmepfen J, May A: Affective components and intensity of pain correlate with structural differences in gray matter in chronic back pain patients. *Pain* 2006, 125:89-97.

7. Knecht S, Kunesch E, Schnitzler A. Parallel and serial processing of haptic information in man: Effects of parietal lesions on sensorimotor hand function. *Neuropsychologia* 1996; 34: 7: 669-687

8. Moseley GL. I can't find it! Distorted body image and tactile dysfunction in patients with chronic back pain. *Pain*. 2008; 15:140(1): 239-43