

# The role of paraspinal muscle spindles in lumbosacral position sense in individuals with and without low back pain.

Brumagne S, Cordo P, Lysens R, Verschueren S, Swinnen S.

Department of Rehabilitation Sciences, Faculty of Physical Education and Physiotherapy, Katholieke Universiteit Leuven, Leuven, Belgium. [simon.brumagne@flok.kuleuven.ac.be](mailto:simon.brumagne@flok.kuleuven.ac.be)

## Abstract

**STUDY DESIGN:** A two-group experimental design with repeated measures on one factor was used. **OBJECTIVES:** To investigate the role of paraspinal muscle spindles in lumbosacral position sense in individuals with and without low back pain. **SUMMARY OF BACKGROUND DATA:** Proprioceptive deficits have been identified in patients with low back pain. The underlying mechanisms, however, are not well documented. **METHODS:** Lumbosacral position sense was determined before, during, and after lumbar paraspinal muscle vibration in 23 young patients with low back pain and in 21 control subjects. Position sense was estimated by calculating the mean absolute error, constant error, and variable error between six criterion and reproduction sacral tilt angles. **RESULTS:** Repositioning accuracy was significantly lower in the patient group than in healthy individuals (absolute error difference between groups = 2.7 degrees,  $P < 0.0001$ ). Multifidus muscle vibration induced a significant muscle-lengthening illusion that resulted in an undershooting of the target position in healthy individuals (constant error = -3.1 degrees,  $P < 0.0001$ ). Conversely, the position sense scores of the patient group did not display an increase in negative directional error but a significant improvement in position sense during muscle vibration ( $P < 0.05$ ). No significant differences in absolute error were found between the first and last trial in the healthy individuals ( $P \geq 0.05$ ) and in the patient group ( $P > 0.05$ ). **CONCLUSIONS:** Patients with low back pain have a less refined position sense than healthy individuals, possibly because of an altered paraspinal muscle spindle afference and central processing of this sensory input. Furthermore, muscle vibration can be an interesting expedient for improving proprioception and enhancing local muscle control.

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