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## RANDOMISED CONTROLLED TRIAL

# A tailored exercise program versus general exercise for a subgroup of patients with low back pain and movement control impairment: Short-term results of a randomised controlled trial

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**Summary** *Background:* Exercise is an effective treatment for patients with sub-acute and chronic low back pain (LBP). Patients with a movement control impairment (MCI) can be diagnosed as a subgroup of patients with LBP. Unknown is which exercise intervention is most beneficial for this subgroup.

This study assessed the short-term effect of a specific exercise program targeting movement control impairment versus general exercise treatment on disability in patients with LBP and MCI.

*Methods:* In a multicentre parallel group randomised controlled pragmatic trial, patients with sub-acute and chronic LBP were included. Further inclusion criteria were disability of  $\geq 5$  points on the Roland–Morris Disability Questionnaire and  $\geq 2$  positive tests out of a set of 6 movement control impairment tests.

A total of 106 patients were randomly assigned to either tailored movement control exercise intervention (MC,  $n = 52$ ) or a general exercise intervention (GE,  $n = 54$ ); both 9–18 individual treatment sessions, over a maximum of 12 weeks. The primary outcome was disability

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measured with the Patient Specific Functional scale (PSFS). Secondary outcome was the Roland–Morris disability scale (RMDQ). Measurements were taken pre- and posttreatment.

*Results:* No significant difference was found following the treatment period. Baseline-adjusted between-group mean difference for the PSFS was 0.5 (SD = 0.5;  $p = 0.32$ ) in favour of MC exercises. The Roland–Morris Disability Questionnaire revealed a significant, but not clinically relevant, between-group difference of 2.0 points (SD = 0.8;  $p = 0.01$ ).

*Conclusion:* Disability in LBP patients was reduced considerably by both interventions. However, the limited contrast between the two exercise programs may have influenced outcomes.

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## Introduction

Societal cost of treatment and absence from work due to low back pain (LBP) are a major economic burden (Airaksinen et al., 2006); in Switzerland, an estimated fourteen billion Swiss Francs (15 billion US dollars) are spent annually on direct and indirect costs due to LBP. In 2007, 41% of the working population in Switzerland reported LBP during the previous month (SNF, 2009). In most cases a specific diagnosis cannot be identified and the condition is labelled as non-specific low back pain (NSLBP) (Grob et al., 2007). Due to the heterogeneity of this patient group, it has been recommended to focus research on defining and treating subgroups (Foster et al., 2011).

Within the spectrum of NSLBP, a subgroup of patients with a movement control impairment (MCI) can be identified. These patients present with mechanical pain, related to movement and positioning of the spine, in combination with an impairment of control during movement of the lumbar spine. To allow a more specific categorisation, the condition is further classified based on the direction of the reported control deficit, i.e. flexion, extension, frontal plane or multidirectional, as described by O'Sullivan (2005). The rationale of MCI is based on the concept of repeated mechanical overload of tissues in the lower back. The clinical diagnosis of these categories showed a good reliability (Dankaerts et al., 2006; Fersum et al., 2009).

Definition and treatment of subgroups requires plausible explanations for concepts or models to underpin targeted interventions. The identification of subgroups requires clinically feasible and reliable screening procedures (Foster et al., 2011). The validity of the clinical diagnosis of the subgroup with MCI and its functional representation is gaining increasing support (Dankaerts and O'Sullivan, 2011; Fersum et al., 2010). To further improve the screening procedure for MCI, six active movement tests have been identified in a previous study which showed substantial intra- and interrater reliability and represent the clinical classification as described above (Luomajoki et al., 2007); validity of the test series was supported by research, showing that two or more positive tests, out of a total of six tests, could distinguish

between patients with LBP and healthy controls (Luomajoki et al., 2008). Results of a case series, in which patients were classified as MCI by means of the set of six tests, showed significant improvement in disability and pain when patients were given tailored exercises that aimed to improve their control impairment (Luomajoki et al., 2010). However, the direct cause-effect relationship between MCI and NSLBP remains unclear.

While exercise as a treatment modality has been shown to be ineffective in the acute phase of LBP (<6 weeks) (Airaksinen et al., 2006; Hayden et al., 2005a, 2005b, 2005c), several studies support the positive effect of exercise on pain and function in sub-acute and chronic pain patients (Hayden et al., 2005c). The question remains which exercises are most beneficial for which patients. Specific exercise programs to treat MCI are widely used in physiotherapy practice. In these programs, the impaired control is addressed with individually tailored exercises, according to the classification based on MCI tests. The postulated rationale for a treatment program for MCI are manifold: A positive influence on mechanically induced pain is assumed, due to a decrease of the load on nociceptive innervated tissues. Furthermore, improved activity in daily life, due to decreased disability and prevention of LBP recurrences, due to increased awareness of body positions (Kavcic et al., 2004; Moseley, 2008; Solomonow et al., 2003, 2001) may explain a positive effect. However, evidence for the effectiveness of this treatment in a healthcare setting is still lacking.

A general exercise program has previously been tested in a sub-acute and chronic population in comparison with low-load stabilisation exercises plus general exercise (Koumantakis et al., 2005). Results showed that, in the short term, disability was reduced to a greater extent by general exercise alone. However, in this study patients with all types of NSLBP were included, not only patients with NSLBP and MCI.

Comparison of an individually tailored, specific MCI treatment against other active treatments for this subgroup is lacking. This article reports the short-term results of a pragmatic randomised controlled trial (RCT) in outpatient physiotherapy settings on disability in LBP patients with MCI, testing the effectiveness of an individualised exercise program targeting MCI versus general exercise treatment.

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