

# Before and after the spotlight

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## Paper Presentation

# The potential relevance of altered muscle activity and fatigue in the development of performance-related musculoskeletal injuries in high string musicians

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### NEW INSIGHTS

Based on these results it may be possible to identify compensatory or less effective motor strategies used to maintain performance.

### NEW IMPLICATIONS

Recognising aberrant muscle activities, and if such muscle activities are correlated with less efficient muscle activation patterns, may help in developing targeted PRMD prevention and management strategies

### KEYWORDS

PRMD, electromyography, muscle activity, muscle fatigue, high string musicians

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### Biography: Dirk Möller

Dirk Möller (born 06/13/70) has a degree in sport sciences (Dipl.-Sportwiss.) and physiotherapy with advanced skills in manual therapy (International Federation of Orthopaedic Manipulative Physical Therapists, IFOMPT) and medical exercise therapy. He has worked for a long time in several physiotherapy practices and rehabilitation hospitals. Since 2012, his focus has moved to Osnabrueck University of Applied Sciences. He works as a lecturer in several study programs for physiotherapists and musicians. Since his time at the University he is one of the heads of the physiotherapeutic MotionLab and a member of the interdisciplinary research team focussing on musicians' health. He is PhD candidate, his topic is muscle activity in conjunction with the development of playing-related musculoskeletal disorders.

His area of interests includes musicians' health from physiotherapeutic perspective, applied biomechanics (especially electromyography and motion capture), human movement studies and the combination of manual therapy and sports science.

**Background:** Muscle fatigue has been reported as a risk factor for the development of performance-related musculoskeletal disorders (PRMD) in musicians. However, little research exists to support this claim. The aim of this study was to investigate whether changes occur in muscle activity patterns during high string performance over a prolonged playing period, and whether this is influenced by PRMD.

**Methods:** High string musicians were divided into a PRMD and a non-PRMD group. They played a chromatic scale pre and post and a self-chosen "hard" (Borg scale 16-17) piece of music for one hour. Electromyography data recorded from arm, shoulder and trunk muscles was analyzed: the amplitude to measure muscle activity characteristics and the lower frequency to measure muscle fatigue. Differences between and within groups and the frequency spectrum were analyzed using linear mixed models.

**Results:** Fifteen musicians participated (7 PRMD: 22.8 years, 2 male/5 female and 8 non-PRMD: 34.3 years, 2 male/6 female). Changes in muscle activation patterns were observed between and within both groups, however changes varied significantly depending on group affiliation. Significant low frequency spectrum changes between groups were observed in overall muscles of the right arm ( $p=0.04$ ) and left forearm flexors ( $p=0.05$ ) following one hour of playing.

**Conclusions:** Muscle activity and frequency spectrum shifts differ in high string musicians with and without PRMD, suggesting possible differential muscle fatigue effects between the groups.