

Skeletal muscle morphology in patients with RLS

Britta Wåhlin Larsson, PhD, ¹ Fawzi Kadi, Prof., ¹ Jan Ulfberg, Ass. Prof., ² Karin Piehl Aulin, Prof. ³

¹ Department of Sport sciences, Health Academy, Örebro University

² Sleep Center, Capio läkargruppen, Örebro Sweden

³ Karolinska Institute, Danedrys Hospital, Stockholm, Sweden

Background: Restless legs syndrome (RLS) is a sleep disorder that affects daily life due to symptoms such as sleepiness and fatigue. We hypothesised that the skeletal muscle could be affected as symptoms from skeletal muscle are common.

Objectives/Methods: The overall aim of the study was to investigate aerobic capacity and structure of skeletal muscle in patients with RLS and an age matched control group to provide information regarding the underlying mechanisms. The specific aims were to investigate muscle fibre composition, capillary network, capillary proliferation and signs of local inflammation in the musculus tibialis anterior of RLS.

Results: RLS patients had a lower predicted VO₂ max expressed in mL/min/kg compared with the control group. Fibre type composition and muscle fibre cross sectional area in the tibialis anterior muscle was equal in both groups with a predominant proportion of slow type I fibres (oxidative) and a smaller fibre area in slow type I fibres compared to fast type II fibres (glycolytic). The distribution of fast fibres (I/IIA, IIA) did not differ except for the group IIX and IIA/IIX where the RLS group had a significantly higher percentage. The capillary network, measured as LC/PF-index (length of capillary/perimeter of fibre), was larger in the RLS group compared to controls. Vascular endothelial growth factor (VEGF) and proliferating endothelial cells were analysed by double-immunofluorescence staining and were presented to a greater extent in the patient group compared with the healthy controls. Based on normal amounts of T-cells and macrophages in the histological picture it was also demonstrated that local inflammation was not present in the tibialis anterior muscle of RLS which was also supported by the absence of expression of major histocompatibility complex class I molecules (MHC class I) on the surface of the tibialis anterior muscle fibres.

Conclusion: The low predicted VO₂ max together with higher percentage of type IIX and IIA/IIX muscle fibres indicates a low central capacity in the patient groups. The increased capillary network together with an expression of VEGF and the absence of inflammation indicate the occurrence of local hypoxia in the tibialis anterior muscle in patients with RLS.