Neuromuscular fatigue occurs as an effect of either peripheral and/or central mechanisms. In experimental exercise protocols fatigue has mainly been studied during isometric contraction setups or in pre/post fatigue protocol conditions the majority of which involved submaximal exercise modes (reviewed by Cairns et al. 2005, and Knicker et al. 2011).

**Objectives**

The purpose of the recent study was to reveal central and peripheral fatigue measures during long lasting submaximum concentric eccentric contraction conditions for m. quadriceps femoris in isokinetic mode.

**Materials & Methods**

37 healthy male subjects (23.6 yrs age, 183 cm height, 78.5 kg weight) took part in the study. Isometric MVC torque, voluntary muscle activation, superimposed electrostimulation and resting twitch responses (m. rectus femoris, m. vastus lateralis) were measured with the subjects sitting upright on an IsoMed2000 (D&R Ferstl, Germany) dynamometer in three different knee angle positions (160 deg., 120 deg., 80 deg.) both before and after 50 fatiguing isokinetic (40 deg./s), alternating kneeflexions (eccentric) and knee extensions (concentric) at 75% of maximum effort over a knee angle ROM of 80deg. Bipolar Surface EMG readings (BioVision, Germany) were obtained from respective muscles.

**Results**

- decreased EMG median frequencies for all muscles in phase to the decline of torque
- slight increase in iEMG towards the end of the fatigue protocol

**Discussion**

Peripheral and central fatigue effects could be identified as a consequence of the underlying contraction protocol which caused severe declines of force output to be attributed to inhibition of MUAPs as the force decrease was accompanied by a pronounced downshift of the EMG median frequency due to a deteriorated excitation-contraction coupling and b. diminished motor neuron and/or muscle fibre excitability

The drop of the rate of MUAP and the related loss of force output could not be compensated by enhanced recruitment of MUs. The time course of fatigue related parameters reveals the firing rate as the main contributor to force loss. An initially pronounced drop of force output may occur due to type II muscle fibre fatigue.

Central fatigue could have developed in all structures above the neuromuscular interface and can have also involved motivational aspects.

**References**