INTRODUCTION
Myofascial force transmission, i.e. the transmission via non-tendinous connective tissue structures [1], is known to occur between synergistic and antagonistic muscles. However, in vivo motion involves changes in length and relative position of muscle groups. Therefore, effects of the lengthening of anterior crural muscles (tibialis anterior and extensor hallucis longus muscles (TA+EHL) and extensor digitorum longus (EDL)) on myofascial force transmission between anterior crural and antagonistic peroneal muscles were investigated.

METHODS
Male Wistar rats were anaesthetized and the anterior crural and peroneal compartments were exposed. Distal tendons of EDL, TA+EHL and peroneal muscles, and the proximal tendon of EDL were severed and connected to force transducers. Peroneal muscles were kept at a constant muscle tendon complex length. For anterior crural muscles, length-force characteristics were measured for: 1) distal lengthening of EDL exclusively, 2) distal lengthening of all anterior crural muscle group (EDL + TA+EHL) (Fig. 1a-b). By doing so, the effect of the added lengthening of TA+EHL is studied.

RESULTS AND DISCUSSION
For peroneal active force, the added lengthening of TA+EHL muscles resulted in significantly enhanced active force decrease of peroneal muscles (Fig. 1c), despite them being kept at a constant length. For lengthening of EDL exclusively, peroneal active force decreased by 6%, whereas for the added lengthening of TA+EHL, peroneal active force decreased by 25%. The only connections between the anterior crural and peroneal compartments are extramuscular myofascial connections, such as the anterior intermuscular septum, the collagen reinforced nerves and blood vessels (the neurovascular tract) and compartmental fasciae, which apparently are capable of the transmission of force. The added lengthening of TA+EHL is thought to significantly increase the loading of these extramuscular myofascial connections with respect to lengthening of EDL exclusively. This yields a stiffer connection between anterior crural and peroneal compartments and increases the force transmitted between peroneal muscles and anterior crural muscles.

CONCLUSIONS
Extramuscular myofascial force transmission between antagonistic muscles located in adjacent compartments increases as a group of adjacent synergists is lengthened. A likely pathway are the distal fasciae near PER which exert a distal load on these muscles. The force transmitted this way is redistributed throughout the nearby compartments. Part of this force reaches anterior crural muscles via the neurovascular tract exerting a proximal load on them. These effects are expected to be enhanced for natural movement around joints and should be taken into account when studying muscles within their physiological context.

REFERENCES