

STRETCH AND CONTRACTION SPECIFIC CHANGES IN PASSIVE TORQUE IN HUMAN M. RECTUS FEMORIS

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It has often been proved that the muscle resting tension can be reduced up to 30 % by repeated stretch procedures. (e.g. Magnusson et al 1996). It has also been suggested that, after a 60 minute break, resting tension will fully recover (e.g. Magnusson et al 1996). The dynamic nature of resting tension recovery and the effect of maximal contraction and submaximal activity on the process of recovery were investigated by means of the following test.

In n = 43 subjects lying on the left side on the experimental station (see Fig. 1) 24 s lasting stretch procedures of the rectus femoris muscle (rf) were produced before (pre-test, PT) and after (retest, RT) 15 min lasting treatments. The subjects were randomly assigned to one the four treatment groups:

- SG (n=11): 3x5 stretches (st1 – st15) of rf with 3 min rest after 5 reps.
- CG (n=11): 5x12 maximal isometric contractions of rf
- RG (n=10): 15 min rest without any activity
- AG (n=11): 15 min submaximal activity (walking, stairs climbing or squats)

During the PT subjects underwent 2 maximal (PTx1, PTx2) and 1 submaximal (PTs) stretch procedures of rf. In RT, only 1 maximal (RTx) and 1 submaximal (RTs) stretch procedures were performed. Throughout every stretch procedure of PT, SG-treatment or RT, passive muscle tension torque (PMT) at 9° below the maximal range of motion of RTs was quantified and calculated in per cent of the maximum value of 5- (CG, RG, AG) resp. 20 (SG) stretches.

In the course of PT PMT decreased from the first to the third stretch procedure to a value of 84,5% (p<0,01). In the retest PMT (RTx) of SG was 76,8%, whereas in CG, RG and AG treatment groups PMT amounted to a 92,1 % recovery (p<0,01). For SG RTs-PMT decreased to 69,5% while in the CG, RG and AG groups RTs-PMT declined to appr. 85,8 %. RTx and RTs in CG were significantly lower than in the other treatment groups. PMT of CG, RG and AG did not differ during RT.

Low PMT during the retest of the SG group has to be attributed the stretching load of the titin filaments in the course of the treatment. In contrast to this titin filaments don't seem to be under any strain during the treatment in the other groups and thus recover to the full extent after the few stretch procedures between pre- and retest.

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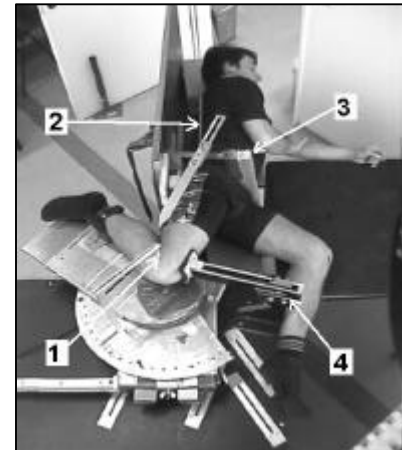


Fig. 1: Experimental conditions
 1: pointer to align the axis of knee joint with the axis of rotation disc;
 2: hip joint extension: 20°; 3: Pelvic strap, 4: Thigh strap

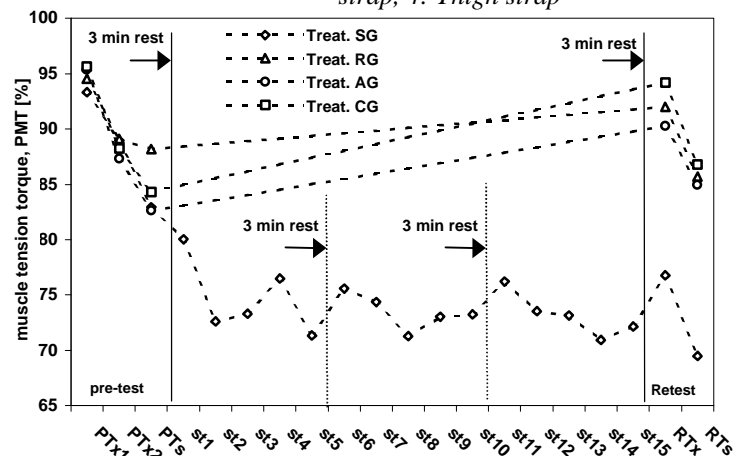


Fig. 2: The development of passive torque due to the treatments