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Presentation Abstract

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Title:	Differences in motor unit behavior following endurance and strength training
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Authors:	*C. VILA-CHÃ[1,2], D. FALLA[1], M. V. CORREIA[2], D. FARINA[1]; [1]Ctr. for Sensory-Motor Interaction , Aalborg Univ., Aalborg E, Denmark; [2]Univ. do Porto, Faculdade de Engenharia, Porto, Portugal
Abstract:	**Aim:** Strength and endurance training are two common forms of motor training which induce distinct adaptive neuromuscular responses. There is a considerable debate on the neural adaptations which accompany strength training and little is known about the effects of endurance training. This study investigated changes in motor output and motor unit behavior following 6 weeks of either strength or endurance training. **Methods:** Twenty-eight sedentary healthy men (age, mean ± SD, 26.1 ± 3.9 yr) were randomly assigned to one of 3 groups: strength training (ST); endurance training (ET) and; control (C; no exercise intervention). The training was performed three days per week, over a period of 6 weeks. Maximum voluntary force (MVC), time-to-task failure at 30% MVC, and rate of force development (RDF) of the knee extensors were measured before and post training (week 7). Additionally, motor unit behavior and muscle activity were studied with intramuscular and surface EMG recordings from the vastus medialis obliquus (VMO) and vastus lateralis (VL) muscles during sustained isometric knee extensions at 10% and 30% MVC. The surface EMG was recorded also during MVC and explosive isometric contractions. **Results:** In the ST group, the percent change post-training in MVC and RFD was significantly greater (13.8 ± 3.6% and 19.8 ± 5.9%, respectively) compared to the ET ($P < 0.05$) and C group ($P < 0.05$). In contrast, the time-to-task failure increased significantly only in the ET group (percent increase: 19.8 ± 5.9%; $P < 0.05$). For the isometric submaximal contractions (30% MVC), the average rectified value of the surface EMG of VL and VMO increased post training for both ET and ST groups ($P < 0.05$). For the same contractions, strength training but not endurance training resulted in a significant increase in the mean motor unit discharge rates for the VMO (1.22 pps; P = 0.002) and VL (1.59 pps; P = 0.001). On the contrary, mean discharge rates were reduced following training for the ET group

(VMO - 1.12 pps; P = 0.03 and VL - 1.09 pps; P = 0.04) despite an increase in surface EMG amplitude. Only the ST group showed an increase in the ARV of the VL and VMO ($P < 0.05$) during the maximal and explosive isometric conditions. No change was observed for the C group in any of the conditions.
Conclusion: Endurance and strength training induce distinct adaptations in the neural control of the vasti muscles. Strength training was shown to increase the discharge rate of vasti motor units during isometric knee extension contractions whereas endurance training resulted in a reduction in motor unit discharge rates.

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Keyword(s): MOTOR UNIT

ENDURANCE TRAINING

STRENGTH TRAINING

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