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### Calcineurin regulates the changes in fiber types in the mechanically overloaded soleus and plantaris muscles of mice

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**Purpose:** Using reverse-transcriptase chain reaction (RT-PCR) and immunohistochemistry, we investigated the downstream pathway of calcineurin signaling to regulate the changes in fiber types of the soleus and plantaris muscles subjected to mechanical overloading.

**Methods:** Adult male mice (12 weeks of age, 40 g) were used in this experiment. Compensatory enlargement of the soleus and plantaris muscles was induced in one leg of each mouse by surgical removal of the ipsilateral gastrocnemius muscle. These mice were injected with either Cyclosporin A (CsA, 25 mg/Kg, intraperitoneally, n=30) or vehicle (n=30) once daily for 2 weeks. Mice were killed after pentobarbital administration in groups of six at 2, 4, 7, 10, 14 days post surgery.

**Results:** In the soleus muscle, mechanical overloading increased the percentages of the fibers expressing slow myosin, but was not after CsA injection. The up-regulation of myocyte enhancer factor 2B (MEF2B), MEF2C and peroxisome proliferator-activated receptor gamma co-activator-1 (PGC-1) in the mechanically overloaded soleus muscle was lost in the CsA group. In the plantaris muscle, the decrease in IIB MHC mRNA after surgical ablation was not detected in the muscles of CsA-injected mice. CsA administration blocked the increase in NFATc1, NFATc2 and MEF2A mRNA in the plantaris muscle after surgical ablation.

**Conclusion:** These results indicate that calcineurin signaling regulates the conversion of fast to slow fiber or IIB to IID/IIA fiber through different downstream pathway.

**Key words:** calcineurin, myocyte enhancer factor 2 (MEF2), muscle hypertrophy, NFAT

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### Effect of excessive calcium intake on growth in weaning rat.

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**Purpose:** The purpose of this study was to investigate the effects of excessive dietary calcium intake on bone mass, body weight and mitochondrial volume density (MVD) of skeletal muscle in weaning rats.

**Methods:** Twelve female rats (3 weeks olds) were randomly divided into two groups based on calcium content of their feed (C group; 0.74% calcium and E group; 2.24% calcium content) for two weeks. MVD was estimated by using the point counting method.

**Results and Discussion:** Excessive calcium intake showed no changes in serum calcium concentration. Feed intake and body weight in the E group significantly decreased when compared with the C group. The soleus muscle mass and femur weights decreased by 27.1% ( $38.0 \pm 4.2$  to  $27.7 \pm 3.4$  mg) and 18.1% ( $3262 \pm 249$  to  $2673 \pm 257$  mg) due to excessive calcium intake, respectively. On the other hand, excessive calcium diet did not change the MVD of soleus muscle. Data suggest that dairy dietary excessive calcium supplementation could inhibit the growth in muscular and skeletal system in weaning periods. Furthermore, the calcium effects obtained here could be related to induce calcium imbalance.

**Key words:** femur, mitochondrial volume density, skeletal muscle