

ASSESSMENT OF DENERVATION AND REINNERVATION CHANGES OF THE SKELETAL MUSCLE WITH IN VIVO MRI

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In comparison with other imaging modalities MRI offers superior distinction among various soft tissues, being the reason it was used for precise determination of muscle tissue, its borders and surface area. We used MRI for semiquantitative measurements of the skeletal muscle *in vivo*. The study was performed on Wistar male albino rats. After measuring the surface of the normal plantar flexor muscles we denervated the sciatic nerve of one hind leg by crushing it with a pair of fine forceps. The surface of the denervated muscles was assessed once weekly until it regained its normal value. The measurements were performed on a superconductive magnet operating at 2.3 T, with a hole diameter of 22.5 cm. Multislice multiecho imaging technique was used and T_1 - weighted images (TR=600 msec, TE=34 msec) with continuous 3 mm slices in the coronal plane were recorded. Average time of the measurement was 25 minutes.

The denervated muscle group atrophied and reached its smallest circumference in the second week after nerve injury. Following the regeneration of their nerve and the reestablishment of nerve muscle connections, the dependent muscles gradually regained their former dimensions so that in the fifth week their circumference was normal. We would like to emphasize that the change in surface area of the plantar flexor muscles closely parallels the change in their tetanic contraction force

(1,2,3). The results of our experiment suggest the possibility of semi-quantitative skeletal muscle size measurements on coronal MRI images, which correlate with their functional state.

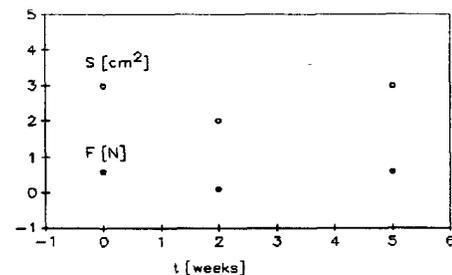


FIG.4: Time dependance of muscle force and surface area of the left plantar flexor muscles before and after denervation

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