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MYOSIN ISOZYMES AND FORCE-VELOCITY RELATION IN FAST RAT MUSCLE

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The force-velocity relations of 43 extensor digitorium longus (EDL) muscles of 90 day old male (n=24) and female (n=19) rats were measured in vivo after anaesthetising the animals with Thalamonal. Direct stimulation of 100/s for 0.3 s duration was used; shortening was affected at 8 different velocities under the control of an ergometer and the tension was recorded on a fast U.V. recorder. The velocity constants (B) were computed using a form of Aubert's equation

$P=P_o e^{-V/B}$ (Aubert, 1956)

They varied between 0.9 and 2.55 muscle length/s.
The myosin isozymes of the muscles were separated by electrophoresis of native myosin in a non-dissociating media into 3 zones : HC-LC1f-LC1f (FM3) ; HC-LC1f-LC3f (FM2) ; HC-LC3f-LC3f (FM1) ; i.e. only the fast type isomyosins were found in EDL muscles. The relative amount of FM1, FM2 and FM3 were measured by computer planimetry and the concentration of LC1f relative to the total concentration of the alkaline light chains (LC1f+LC3f) was computed as (FM3+1/2FM2)/(FM1+FM2+FM3) : it varied between 0.43 and 0.71 .
Although the individual variations of the velocity constant and the proportions of LC1f were large , we observed no correlation between them.
These experiments provide no support for the hypothesis that the variations in power or maximum velocity of fast muscles is controlled by the relative proportion of the two alkaline light chains, LC1f and LC3f.