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ABSTRACT

Two locomotory muscles, tibialis anterior (TA) and extensor carpi radialis (ECR) isolated from the naked mole-rat, *Heterocephalus glaber*, were used in this study. Both of these muscles were found to consist of oxidative fibres only. Muscles from the laboratory rat, *Rattus norvegicus albinos*, were used for comparison.

The two muscles from the mole-rat showed poor staining for myosin ATPase. However, with the SDH staining technique, the TA showed two types of fibres: small diameter intensely staining fibres and moderately stained fibres of slightly larger diameter. The former had a diameter of $45.59 \pm 8.34 \, \mu m$ in the deep and superficial regions of the TA and made up 65% of the total number of fibres while the latter constituted the remaining 35% and had a diameter of $54.19 \pm 10.10 \, \mu m$. On the other hand, all the fibres of the ECR muscle stained moderately for SDH activity and had a diameter of $73.28 \pm 12.90 \, \mu m$. No differences were observed in the staining characteristics of fibres from the deep and those from the superficial regions of the muscle. However fibres of this muscle had significantly ($p<0.05$) larger diameters than fibres from the TA muscle.
In the white rat, both the TA and ECR muscles consisted of fibres which were classified as fast glycolytic (FG), fast oxidative glycolytic (FOG) and slow oxidative (SO). Thus the rat muscles did not show the homogeneity seen in those of the naked mole-rat. Fibres of the rat TA had significantly larger diameters than those of the naked mole-rat. No significant differences in the diameters of fibres from ECR in the mole-rat and the FG and FOG fibers of the rat ECR were observed.

Muscles isolated from the naked mole-rat had higher capillary densities than those of the rat. For example the naked mole-rat TA and ECR had capillary densities of $1247.89 \pm 236.01/\text{mm}^2$ and $1162.50 \pm 183.43/\text{mm}^2$ respectively while the values for the same muscles were $912.78 \pm 232.12/\text{mm}^2$ and $869.17 \pm 82.12/\text{mm}^2$ in the rat. The mitochondrial volume densities were also higher in the naked mole-rat. The TA and ECR in the mole-rat had values of $21.08 \pm 5.44\%$ and $18.82 \pm 6.35\%$ respectively while in the rat the values were $9.286 \pm 4.32\%$ and $8.143 \pm 4.04\%$ for the TA and ECR respectively.

It is concluded that these differences may be adaptive and enable the naked mole-rat to live and perform various activities underground.