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Erratum

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Isokinetic Contractile Properties of the Quadriceps with Relation to Fiber Type*

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Due to a deplorable mishap the formula for the prediction of fat free thigh volume on page 248, paragraph "Anthropometric Analysis", was published incorrectly. Please find the correct version on the reverse.

1979; Gregor et al. 1979; Thortensson 1976). Specifically, it has been demonstrated that a significant relationship exists between the percent of fast twitch fibers and the relative extensor peak torque and peak power developed within a given range of motion during an isokinetic contraction (Coyle et al. 1979; Thortensson 1976). The present study sought to expand this previous work by investigating the relationships between muscle fiber composition and work, power and rate of power production, three isokinetic contractile characteristics previously not studied. Furthermore, by investigating these properties at angular velocities up to $300° \cdot s^{-1}$ it was possible to compare the torque-velocity, power-velocity relationship of intact muscle with the established force-velocity, power-velocity relationship found in muscle tested in vitro (Fenn and Marsh 1935; Hill 1938).

Methods

Subjects. Fifteen active males volunteered as subjects for this study. All rights and privileges were honored in accordance with established human subjects protocol, and informed consent was obtained. Based on histochemical analysis, the subjects were classified according to their fiber type into one of three groups. These were established as greater than 60% fast twitch (FT), greater than 60% slow twitch (ST) and those intermediate (INT) to the aforementioned extremes. The average age, height, and weight of the subjects were 23.5 year (range 19–39 year) 181.7 cm (6.6 S.D.) and 77.4 kg (7.6 S.D.), respectively.

Histochemical Analysis. A biopsy was obtained from the vastus lateralis muscle of the right leg approximately one week prior to testing (Bergström 1962). The specimen was mounted in OCT and frozen in isopentane cooled to the temperature of liquid nitrogen. Ten-μm-thick tissue slices were cut in a cryostat at −20° C and muscle fibers classified histochemically as ST or FT on the basis of myofibrillar ATPase (Dubowitz and Brooke 1973; Padykula and Herman 1955).

Anthropometric Analysis. Leg volume was determined by the water displacement technique. Femur length and skinfold thickness at the midventral surface of the thigh were also determined. Assuming the thigh to be a cylinder, fat free thigh volume was then approximated from this data using the equation below, and all subsequent measurements of torque work and power were made relative to this value (Table 1).

$$D_{FF} = [2\sqrt{V/\pi \cdot L}] - S$$
$$V_{FF} = [D_{FF}/2]^2 \cdot \pi \cdot L$$

D_{FF} = fat free diameter (cm)
V = measured volume (cm^3)
L = measured length (cm)
S = thigh skinfold thickness (cm)
V_{FF} = fat free thigh volume (cm^3)

Testing Protocol. Torque production by the right quadriceps muscle group was determined during leg extension on an isokinetic dynamometer (Cybex II). This instrument operates by restricting the angular velocity to a predetermined value in the range $0–300° \cdot s^{-1}$ while the resistance accomodates torque applied at all points in the range of motion. To reduce energy oscillations in the recordings, the electrical signal was damped (setting of 3).

Following standard calibration of the dynamometer, each subject was seated and extraneous movement restricted by straps across the chest, lower abdomen, upper thigh and just above the right patella. The central axis of the lever arm was then aligned with the anatomical axis of rotation of the knee. The length of the lever arm was set at 30 cm for all subjects and attached to the lower leg. After