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SOMMA, MECHANISTIC STUDIES OF MUSCLE AGING IN HUMANS

MUSCLE SIZE ACROSS THE LIFESPAN: D3CR MUSCLE MASS AND MRI THIGH MUSCLE VOLUME

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D3-creatine (D3Cr) dilution provides an accurate estimate of total body skeletal muscle mass, yet few studies have examined its relationship with function and performance across the lifespan, particularly before age 70. We modelled the association of age with D3Cr muscle mass across adulthood and compared it with the association of age with muscle function and performance. Adults aged 30-69 yrs (n=69; 33 men) and 70+ (n=826; 344 men) from the Study of Muscle, Mobility and Aging had D3Cr muscle mass, MRI thigh muscle volume, 1 RM leg strength and leg extension power, 4m walking speed, and cardiorespiratory fitness (VO2 peak) assessed. Regression models were used to estimate age-related annualized percent differences in D3Cr muscle mass and other outcomes across age groups. In men, progressively lower D_3Cr muscle mass with advancing age (-0.5%/year in young adults to -1.4%/year in the oldest-old) paralleled the pattern observed for leg strength and walking speed ($p>0.05$ for difference in slope between D3Cr muscle mass, leg strength and walking speed). Compared to age-related annualized percent different in D3Cr muscle mass, larger age-associated differences were observed for leg power and VO_2 peak, and smaller for MRI thigh muscle volume. In women, lower D_3Cr muscle mass was already apparent in young adults (-0.6%/year) and remained relatively stable thereafter, a pattern also observed for MRI thigh muscle volume. In contrast, age-related differences in strength, power, and VO_2 peak in women generally exceeded those in D_3Cr muscle mass, while walking speed tracked more closely. Overall, age-associated differences in muscle mass tracked closely with strength (men) and functional capacity. These results indicate the role of low muscle mass in functional decline has been underestimated, emphasizing the importance of strategies to preserve or enhance muscle mass throughout adulthood.