Age-Related Reduction in High-Velocity Power and Myofiber Morphology and Composition

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Power is diminished more dramatically at higher contraction velocities in older adults. It has been suggested that this may reflect age-related changes in single myofiber morphology or composition. **PURPOSE:** To examine power, muscle activation, and single myofiber morphology and composition between young (YM) and older (OM) males. **METHODS:** Power, or torque × velocity, was recorded during isokinetic knee extensions at $60°\cdot s^{-1}$ and $180°\cdot s^{-1}$ in healthy, untrained YM (n=15; 20.7±2.2 yrs) and OM (n=15; 71.6±3.9 yrs). The relative increase in power from $60°\cdot s^{-1}$ to $180°\cdot s^{-1}$ was recorded for each participant. Electromyography amplitude of the vastus lateralis (VL) was normalized to its peak from a maximal isometric contraction to calculate muscle activation. VL tissue samples were obtained from a sub-sample (YM=13; OM=11) via microbiopsy and immunofluorescence was used to identify type I and IIa myofibers for subsequent analysis of cross-sectional area (CSA). Independent samples t-tests were used to compare groups and select correlations were assessed. **RESULTS:** Relative increase in power was greater in YM (159% vs. 115%; p=0.005). Muscle activation was similar between groups (p>0.05). Individual fiber type compositions and CSA were similar between groups (p>0.05), but type IIa:type I myofiber size ratio was lower in OM (-31.15%; p=0.002). Myofiber size nor composition data correlated with the relative power increase (p>0.05). **CONCLUSION:** OM had smaller type IIa myofibers relative to type I myofiber size, which may reflect age-related motor unit remodeling. Nevertheless, and albeit a smaller sample size, myofiber size nor composition were associated with the age-related diminishment in relative power increase.

Key words:

Intrinsic muscle properties, aging, sarcopenia, microbiopsy