

EXERCISE AND SPORT SCIENCES REVIEWS



ESSR Journal Club

Covered Article: “Skeletal Muscle Power: A Critical Determinant of Physical Functioning in Older Adults” by Kieran F. Reid and Roger A. Fielding

Exercise and Sport Sciences Reviews. 40(1):4-12, January 2012.

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1. Many studies concerning muscle performance use the evaluation of muscle strength, in particular 1RM. When investigating muscle performance in older adults, why might the evaluation of muscle power be of more benefit?
2. Describe the relationship between muscle strength, maximal contraction velocity and muscle power. Why is peak muscle power typically observed at approximately 70% of 1RM, while maximal contraction velocity is approximately 40% of 1RM?
3. The article discusses various methods of muscle power assessment. Discuss various common methods of lower-extremity muscular power assessment (*e.g.*, isokinetic dynamometer, standing long jump, vertical jump, Margaria step test, etc.) and considerations that must be taken when using these tests with older adults.
4. The authors suggest that, “preservation of muscle strength with aging has a greater dependence on the maintenance of muscle mass whereas the impairments in muscle power among elders with mobility limitations may develop independently of muscle atrophy with advancing age.” How are these conclusions likely to affect exercise prescription recommendations for aging populations?
5. What are the potential mechanisms that may contribute to decreases in muscle quality, distinct from muscle atrophy, over the lifespan?
6. How does the capacity to generate power output compare between type II and type I muscle fibers?
7. Neuromuscular activation is defined in this review article as “the process by which the nervous system produces muscular force through recruitment and rate coding of motor units.” What are some possible sources of age-associated impairments in the recruitment and rate coding of motor units during muscle contraction? Do you think impaired neuromuscular activation is primarily at the central or peripheral level?

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8. Limited mobility is a growing problem in the aged population. Do you think limited mobility in the elderly is a cause or consequence of impaired neuromuscular activity?
9. The article describes how in the elderly or mobility-limited elders, surviving muscle fiber contractile properties partially compensate for the major age-related losses. However, is there any change in the surviving muscle fibers elasticity that is related to aging?
10. Discuss changes in single fiber contractile properties that can be linked to changes in molecular signaling in the muscle cell.
11. Explain why high velocity power training may be a more effective training modality for age-related declines in physiological function compared to conventional strength training. What are the limitations of high velocity power training in an elderly population?