Age-Related Loss of Skeletal Muscle Strength and Size

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Key Points:

- **As we get older muscle strength, both force and power, is lost quicker than total muscle mass.**
- **This rapid age-related loss in strength can be explained, in large part, by the selective decrease in size of the fast muscle fibers.**

Aging is accompanied by a decline in strength, both force and power, which negatively impacts the ability of older adults to perform daily activities, such as going up a flight of stairs[2,3,4,5]. Some studies suggest that the age-related loss in total muscle mass, known as sarcopenia, is the main factor for the loss in strength in older adults; however, the loss in strength occurs sooner and more rapidly than sarcopenia suggesting other factors must be involved[2,3,4]. Although the cause for the age-related decline in strength remains unknown, several explanations exist ranging from a reduced ability of the brain to tell the muscle to activate to a loss in the quality of the remaining muscle itself [2,3,4,5].

One of the most likely explanations is that the muscle of older adults experience a selective loss of the fast muscle (Figure 1A)[1,3,4,5]. Human muscles are made up of a mixture of muscle cells, commonly known as fibers, that can be broadly categorized into slow and fast[3,5]. Compared to fast muscle fibers, slow muscle fibers are much weaker relative to their size but do not tire (fatigue) as easily[3]. It is well known that as we get older, the fast muscle fibers tend to get smaller whereas the slow muscle fiber size is less affected[5]. Because of the large difference in the strength of the slow and fast muscle fibers, it is possible that the selective loss in size of the fast muscle fibers can explain the rapid loss in strength as we get older[1,3,5]. In support of this idea, a recent study observed a close association between the size of the fast muscle and the loss in both force and power in a group of older compared with younger men (Figure 1B)[3].

As for now, this is a theory as there are several other factors that change as we get older and may be contributing to the age-related loss in strength[1,2,3,4,5]. More studies are needed to test whether and how much these factors contribute to the loss in strength so that we can come up with treatments to improve strength and overall function in the aging population.

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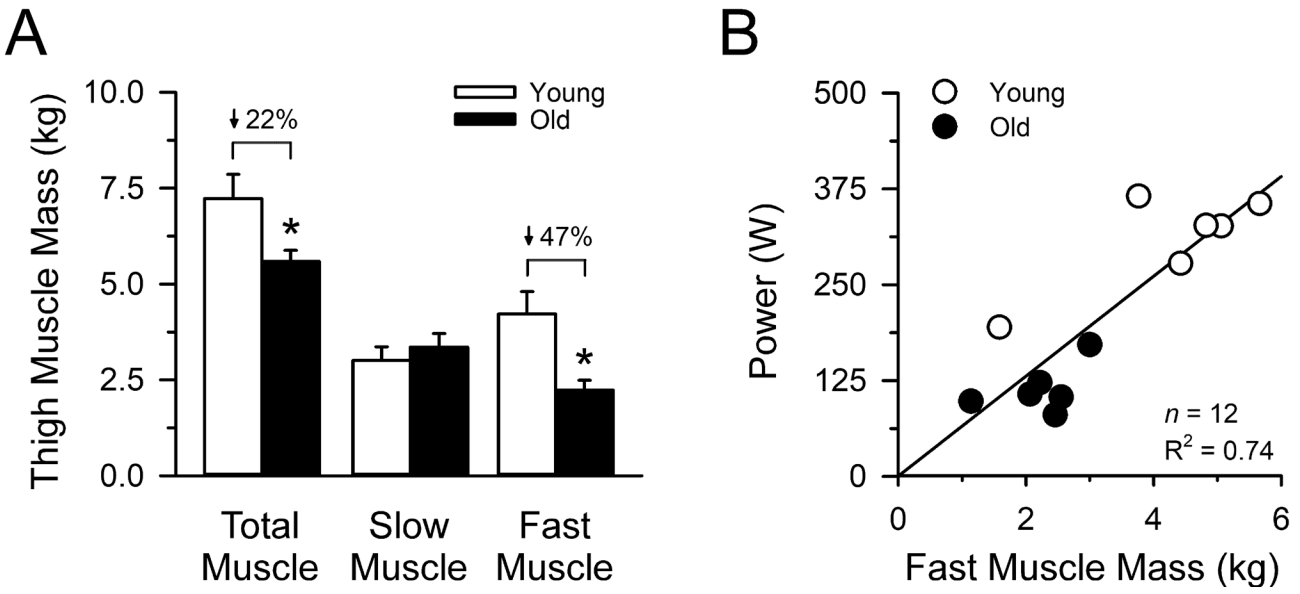

Figure 1: The total muscle mass of the thigh was 22% lower in a group of old (82 yrs) compared with young men (23 yrs), which was explained entirely by the loss in fast muscle with no age differences in the amount of slow muscle (A). The age differences in the amount of fast muscle were closely associated with the lower power outputs produced by the thigh muscles in the older compared with young men (B)[3].

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