

Neuromotor and Functional Performance of Older Men With and Without Pre-Sarcopenia

Horan SA¹, Arnold BJW¹, Weeks BK¹ and Kavanagh JJ¹ (s.horan@griffith.edu.au)



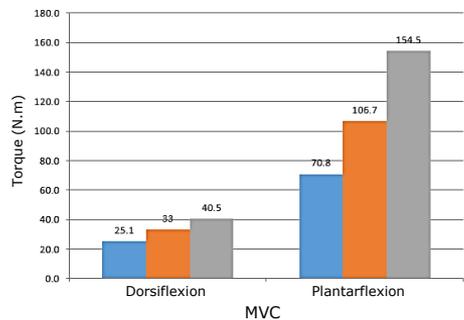
¹ School of Allied Health Sciences and Menzies Health Institute Queensland, Griffith University, Gold Coast, Australia

Background: Skeletal muscle mass increases over the first three decades of life, declines steadily through middle age, and more rapidly in older age. Sarcopenia describes a condition of significant loss of muscle mass in conjunction with reduced strength and function. While the changes in mass, strength and function across the lifespan are well-documented, little is currently known of the underlying mechanisms.

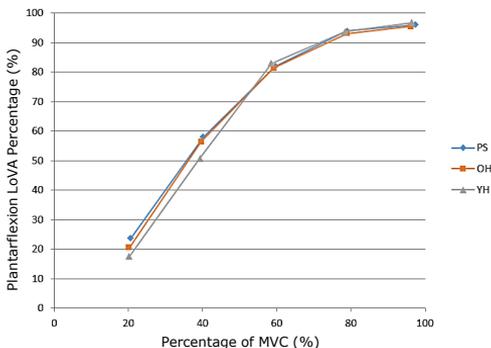
Methods: Twenty-one older men (74.8 ± 4.9yrs; height: 174.4 ± 6.5cm; 84.3 ± 11.4kg) and 10 younger men (26.4 ± 4.2yrs; height: 178.8 ± 7.8cm; 75.9 ± 11.1kg) were recruited. Muscle and fat mass were determined by DXA (Norland XR-800, USA). Functional performance was examined with isometric knee extension, timed-up-and-go (TUG), 5-times sit-to-stand (5TSTS), and self-selected gait speed.

Neuromotor measures included Level of Voluntary Activation (LoVA; 20%, 40%, 60% 80%, MVC) during a plantar flexion task, using tibial nerve stimulation. Plantar and dorsi flexor force were measured using a custom foot plate and torque transducer. Muscle activity of the tibialis anterior, soleus, medial gastrocnemius, and vastus lateralis muscles were recorded using surface EMG.

Results: Three older men were classified with pre-



PS: pre-sarcopenic | OH: old healthy | YH: young healthy



Results (cont'd): ...sarcopenia based on DXA-derived measures of appendicular lean mass (<6.8kg/m²). No differences in LoVA were observed between young healthy men, older healthy men, and older men with pre-sarcopenia (YH: 20%=17.6, 40%=50.7, 60%=82.9, 80%=93.8, 100%=96.7; OH: 20%=20.5, 40%=56.3, 60%=81.3, 80%=93.1, 100%=95.5; PS: 20%=23.7, 40%=58.0, 60%=81.9, 80%=93.9, 100%=96.1). Although not significant, men with pre-sarcopenia achieved the lowest dorsi flexion (YH=40.5N.m; OH=33.0N.m; PS=25.1N.m), plantar flexion (YH=154.5N.m; OH=106.7N.m; PS=70.8N.m), and knee extension forces (YH=841.7N; OH=509.2N; PS=361.0N). No differences in functional performance measures including TUG performance, 5TSTS performance, and self selected gait speed were observed for the three groups.

Discussion: These preliminary findings suggest that older men with pre-sarcopenia maintain functional abilities and demonstrate similar levels of voluntary muscle activation compared to healthy men, despite apparent deficits in strength. This is an important finding as it suggests that older men with pre-sarcopenia still have the neurophysiological capacity to fully activate these muscles (the calf muscle in this project), with strength deficits likely a result of local muscle deficits (i.e. limitations in the ability of the contractile elements to generate force). Recruitment is ongoing and further work will examine neuromotor characteristics in response to fatigue and muscle inhibition.

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