Skeletal muscle atrophy and hypertrophy after spinal cord injury

Ashraf S Gorgey
Virginia Commonwealth University, USA

Skeletal muscle atrophy is one of the most prominent changes to occur post spinal cord injury (SCI), with thigh muscle cross-sectional area being up to 30–50% smaller than that of able-bodied controls few weeks after injury. Skeletal muscle atrophy has dramatic effects, especially after motor complete SCI (i.e. no voluntary movement below the level of injury) on several health parameters. These parameters may include bone, metabolic and cardiovascular health and may lead to secondary health complications similar to obesity, type II diabetes and cardiovascular disease. Therefore, an effective rehabilitation approach is essential to attenuate the process of skeletal muscle atrophy and the rapid decline in lean mass after SCI. Neuromuscular electrical stimulation (NMES)-resistance training (RT) has been shown to be an effective rehabilitation strategy for producing muscle hypertrophy and decreasing fat in individuals with SCI. The training process involves progressively loading the strained muscle in a gradual fashion to carry on weights for 12-16 weeks. We have demonstrated that person with motor complete SCI can lift ~26 lbs. without any noticeable adverse events. Enhancing the development of metabolically active lean muscle mass has the potential to enhance, basal metabolic rate, glucose homeostasis and improve lipid profile following SCI. We will demonstrate recent evidence that highlights the significance of restoring and maintaining lean mass on mitochondrial health, visceral fat as well as metabolic health after SCI. We believe that a multi-disciplinary approach of combining NMES-RT and dietary interventions can optimize cardiometabolic outcomes after SCI.

Biography

Ashraf S Gorgey is currently the Director of Spinal Cord Injury Research at Hunter Holmes McGuire at VA Medical Center and Associate Professor at Department of Physical Medicine and Rehabilitation, Virginia Commonwealth University. He has a Bachelor and Master degrees in Physical Therapy. He acquired his PhD in Exercise Physiology in 2005 with special emphasis on electrical stimulation, muscle activation and fatigue from the University of Georgia. He completed a postdoctoral fellowship at the University of Michigan with special focus on studying the adaptations in body composition and metabolic profile after SCI. His research background is in Rehabilitation and Exercise Physiology with special interest in individuals with SCI. His research work has focused on investigating rehabilitation strategies that could improve the quality of life in individuals with SCI and minimize the SCI health related secondary complications. He is primarily interested in applications of electrical stimulation and the capability of utilizing exercise intervention to evoke skeletal muscle hypertrophy, favorable body composition and metabolic profiles in persons with chronic SCI. He is also interested in understanding the cellular and molecular adaptations to unloading and hypertrophy.

agorgey@gmail.com

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