The PhD Scholarship ***"Impact of physical activity on the trajectory of neuromuscular ageing in humans"*** is fully funded by the University of Padova, Italy to support a full-time PhD student who is commencing research in the field of Biomedical Sciences.

This project will investigate the impact of physical activity on the trajectory of neuromuscular ageing in humans.
While ageing is known to be characterised by a progressive loss of muscle mass and function, known as sarcopenia, recent evidence, particularly from animal models, suggests that regular exercise has a neuroprotective effect, helping to preserve neuromuscular junction integrity, muscle fibre innervation, motor unit number and motor function. The focus of this project shall be the investigation of the molecular and cellular mechanisms controlling NMJ and motoneuron stability, their impact on NMJ transmission and eventually, on motor function in older people with different history of physical activity. The main goal is to understand the cellular and molecular mechanisms by which different levels of habitual physical activity can modulate the age-related loss of muscle mass and motor function in old age.

The laboratory work involved in this doctoral project will consist of molecular assays of NMJ structural components assessed by Elisa electrophoresis, biomarkers of denervation/reinnervation by immuno-histochemistry and protein quantification (by Western blotting), biomarkers of mitochondrial dysfunction assessed on blood and muscle biopsy samples.

Parallel research activities supporting this project, but not necessarily requested from the PhD student, will investigate the neurophysiological aspects of sarcopenia and will involve, motor unit action potential characteristics by intramuscular and surface EMG, in vivo muscle function assessment and functional performance during daily tasks, such as gait performance and dynamic balance.

Our laboratory is highly specialised and has a long-term track record in the study of neuromuscular plasticity in ageing, disuse and exercise, is well funded both from national and international grants and has an excellent publication record. Recent examples of relevant papers of our laboratory in this field of research are:

1: Monti E, Tagliaferri S, Zampieri S, Sarto F, Sirago G, Franchi MV, Ticinesi A, Longobucco Y, Adorni E, Lauretani F, Von Haehling S, Marzetti E, Calvani R, Bernabei R, Cesari M, Maggio M, Narici MV. Effects of a 2-year exercise training on neuromuscular system health in older individuals with low muscle function. J Cachexia Sarcopenia Muscle. 2023

2: Pratt J, Whitton L, Ryan A, Juliusdottir T, Dolan J, Conroy J, Narici M, De Vito G, Boreham C. Genes encoding agrin (AGRN) and neurotrypsin (PRSS12) are associated with muscle mass, strength and plasma C-terminal agrin fragment concentration. Geroscience. 2023 Jan 7

3: Sarto F, Stashuk DW, Franchi MV, Monti E, Zampieri S, Valli G, Sirago G, Candia J, Hartnell LM, Paganini M, McPhee JS, De Vito G, Ferrucci L, Reggiani C, Narici MV. Effects of short-term unloading and active recovery on human motor unit properties, neuromuscular junction transmission and transcriptomic profile. J Physiol. 2022 Nov;600(21):4731-4751.

4: Pratt J, De Vito G, Narici M, Segurado R, Pessanha L, Dolan J, Conroy J, Boreham C. Plasma C-Terminal Agrin Fragment as an Early Biomarker for Sarcopenia: Results From the GenoFit Study. J Gerontol A Biol Sci Med Sci. 2021 Nov 15;76(12):2090-2096.

5: Monti E, Reggiani C, Franchi MV, Toniolo L, Sandri M, Armani A, Zampieri S, Giacomello E, Sarto F, Sirago G, Murgia M, Nogara L, Marcucci L, Ciciliot S, Šimunic B, Pišot R, Narici MV. Neuromuscular junction instability and altered intracellular calcium handling as early determinants of force loss during unloading in humans. J Physiol. 2021 Jun;599(12):3037-3061.

6: Pratt J, De Vito G, Segurado R, Pessanha L, Dolan J, Narici M, Boreham C. Plasma neurofilament light levels associate with muscle mass and strength in middle-aged and older adults: findings from GenoFit. J Cachexia Sarcopenia Muscle. 2022 Jun;13(3):1811-1820

7: Franchi MV, Badiali F, Sarto F, Müller P, Müller NG, Rehfeld K, Monti E, Rankin D, Longo S, Lund J, Hökelmann A, Narici M. Neuromuscular Aging: A Case for the Neuroprotective Effects of Dancing. Gerontology. 2023;69(1):73-81.

8: Sirago G, Pellegrino MA, Bottinelli R, Franchi MV, Narici MV. Loss of neuromuscular junction integrity and muscle atrophy in skeletal muscle disuse. Ageing Res Rev. 2023 Jan;83:101810.

9: Murgia M, Brocca L, Monti E, Franchi MV, Zwiebel M, Steigerwald S, Giacomello E, Sartori R, Zampieri S, Capovilla G, Gasparini M, Biolo G, Sandri M, Mann M, Narici MV. Plasma proteome profiling of healthy subjects undergoing bed rest reveals unloading-dependent changes linked to muscle atrophy. J Cachexia Sarcopenia Muscle. 2023 Feb;14(1):439-451. doi: 10.1002/jcsm.13146.

The **three-year PhD** bursary will consist of a total of **75,000 €** (60,111 € personal bursary, 4873 € research allowance, plus 10,000 € for periods in foreign laboratories).

In order to be eligible for the Studentship, applicants must satisfy the usual eligibility criteria, including adequate academic qualifications.

Applicants must have, or expect to have obtained, at least an upper second degree from a European or overseas equivalent in a relevant area of biomedical sciences, neuroscience, cellular and molecular biology, physiology or a degree in exercise and sport science provided it involved molecular biology laboratory experience. A Masters is desirable but not essential.

Applicants must be fluent in English language, both spoken and written.

Application:

To apply for this post please follow the following online instructions at this web address: https://www.unipd.it/en/phd-courses-2023-2024

Enquiries about this PhD position may be made to Professor Marco Narici, Department of Biomedical Sciences, University of Padova, Italy: **marco.narici@unipd.it**