PADUA DAYS ON MUSCLE AND MOBILITY MEDICINE 2026

International Conference

March 3rd to 6th Euganean Thermae and Padua, Italy

PHYSICAL EXERCISE AND AGING PREVENTION: SCIENTIFIC EVIDENCE AND UNDERLYING MECHANISMS

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Aging constitutes a multifactorial biological process marked by a progressive decline in physiological function and heightened susceptibility to chronic pathologies. As the global population ages, developing interventions that prioritize healthspan and mitigate the rising burden of chronic disability have become a public health priority. While sedentary behavior is increasingly identified as a primary driver of accelerated biological aging, physical activity stands as an effective non-pharmacological intervention to counteract functional decline and preserve health. This presentation will critically examine the current scientific evidence regarding the role of physical exercise in delaying the onset of age-related comorbidities, elucidating the molecular and systemic mechanisms underlying its protective effects. The discussion will highlight how exercise acts as a systemic intervention, modulating key hallmarks of aging including mitochondrial dysfunction, oxidative stress, "inflammaging" and sarcopenia. It will also address the neuroprotective dimensions of exercise, detailing mechanisms that foster neuroplasticity, cognitive reserve and psychological well-being, thereby attenuating age-related functional decline. (1-7) The utimate aim is to show that the prescription of exercise is not merely a lifestyle modification but a fundamental therapeutic intervention for morbidity reduction and the promotion of healthy longevity.

Keywords: *healthy aging, physical exercise, neuroplasticity, sarcopenia, inflammaging.*