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Effects of a high-intensity interval training combined with citrulline supplementation on muscle function in obese older adults: Importance of initial protein intake**Mylene Aubertin Leheudre^{1,2}, Marcangeli V^{1,2}, Carvalho L P^{1,2}, Dulac M D^{1, 2}, El Hajj-Boutros G^{1,2}, Gouspillou G^{1,2}, Gaudreau P^{3,4}, Morais J A^{5,6} and Noirez P¹**¹Université du Québec à Montréal, Canada²Centre de Recherche de l'Institut Universitaire de Gériatrie de Montréal, Canada³Centre de Recherche du Centre Hospitalier Universitaire de Montréal, Canada⁴Université de Montréal, Canada⁵The Research Institute of the McGill University Health Centre, Canada⁶McGill University, Canada

Aging is associated with losses of muscle mass, strength and quality which are strong risk factors of functional incapacities. Physical activity and nutrition are two of the most promising non-pharmacological avenues to counteract functional incapacities. More precisely, High Intensity Interval Training (HIIT), short but intense physical activity training, is recognized to improve metabolic function, aerobic capacity and body composition in older adults. Another potential avenue is L-citrulline (CIT), a non-proteogenic-amino acid which seems to prevent the loss of muscle mass and strength in older adults. Preliminary results showed a beneficial additive effect of CIT and HIIT on muscle function in obese older adults. However, it has been shown that the amount of protein intake could influence physical adaptations following exercise intervention and affect also the efficacy of CIT to improve body composition in malnourished people. We aimed to evaluate if the initial amount of protein intake could influence the combined effect of CIT to HIIT on body composition, muscle strength and functional capacities in older adults. Thirty-eight (38) sedentary obese (criteria: % fat mass (FM)) subjects (67±5 years) who ingested CIT (10 g/d; blind-condition) and completed a 12-week elliptical HIIT program (cycle: 30 sec>85% and 90 sec at 65% of maximal predicted heart rate; 3x30 min/week) were divided a-posteriori into 2 groups according to the initial amount of protein intake (PROT-: <1 g.kg-1.d-1 (n=18) vs. PROT+: >1 g.kg-1.d-1 (n=20)). Functional capacities (4 m-walking test, chair and step tests), physical endurance (6 MWT), muscle strengths (Knee Extensor Strength (KES), Handgrip (HS)), Muscle Power (Leg power rig; MP), body composition (DXA) were measured pre- and post-intervention. No difference at baseline between groups except by design for protein intake (PROT-: 0.78 g.kg-1.d-1 vs. PROT+: 1.33 g.kg-1.d-1). Following the intervention (CIT+HIIT), all subjects improved significantly (p<0.05) on waist circumference (103.2 vs. 100.4 cm), total FM (37 vs. 35.9%) and Fat-Free-Mass (FFM: 46.5 vs. 47 kg), KES (315 vs. 367 N), HS (32.5 vs. 34.3 kg), MP (151 vs. 180 W), 4-m walking test (0.74 vs. 0.68 sec), step test (30 vs. 34 rep), chair test (19.0 vs.15.8 sec) and 6 MWT (549 vs. 618 m). Regarding the initial protein intake effect, PROT- decreased significantly more gynoid (PROT-: T0: 41.4-T12: 39.1% vs. PROT+: T0: 38.7-T12: 39.1%) and leg (PROT-: T0: 37.3-T12: 35.2% vs. PROT+: T0: 34.9-T12: 34.7%) FMs and improved significantly more leg FFM (PROT-: T0: 16.3-T12: 16.8 kg vs. PROT+: T0: 16.8-T12: 16.7 kg) and HS (PROT-: T0: 32.7-T12: 35.9 kg vs. PROT+: T0: 32.4-T12: 32.8 kg) than PROT+. Our results show that CIT+HIIT combination is more beneficial in obese older adults eating initially less than 1 g.kg-1.d-1 of proteins since they had greater improvements on body composition and muscle strengths. Further randomized controlled trials are needed to confirm these promising results since protein intake was studied a-posteriori.

Biography

Aubertin-Leheudre received a master degree in adapted physical activity (Aging/Exercise) from University of Toulouse and Sherbrooke in 2002 and a Ph.D. degree in Gerontology (Physiology/Nutrition) from University of Sherbrooke in 2006. She then completed her post-doctoral studies in aging, nutrition and endocrinology at Folkhasan Research Center, division of nutrition and cancer and endocrinology (University of Helsinki, Finland). Aubertin-Leheudre is currently Professor of kinesiology at UQAM and researcher at the research center of the University Institute of Geriatrics of Montreal. She is currently Junior 2, FRSQ (investigator salary award). The major line of her research investigates the effects of physical training and nutritional interventions on muscle function in frail and non-frail older adults.

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