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Diet quantity not quality, age and BMI are the most prolific predictors of skeletal muscle structural and functional characteristics in middle-age and older persons

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Statement of the Problem: The impact, within a single cohort, of independent modulators of skeletal muscle quality, including age, adiposity/obesity, nutrition and physical activity, is unclear.

Methodology & Theoretical Orientation: Using a cross-sectional design, we examined the association between ageing, adiposity, nutrition and physical activity against intrinsic muscle-tendon unit (MTU) structural and functional characteristics. We hypothesized that: (1) Muscle-building nutrients intake would positively impact on muscle quality; (2) the previously reported negative impact of high adiposity on older skeletal muscle quality, would increase the deleterious impact of ageing on skeletal muscle size and function; (3) high physical activity with low sedentary behavior would positively impact MTU quality. Fifty untrained males (M=15) and females (F=35) aged 43-80 years old were categorized by adiposity (M=normal adipose <28%: high adipose \geq 28%; F=normal adipose <40%: high adipose \geq 40%) and body mass index (BMI) (Normal 18–24.9, Overweight (BMI 25–29.9) and Obese (BMI>30)). Optimal diet quality, to achieve skeletal muscle synthesis and/or sparing in vivo, was theorized as a combination of: >1.2g/day protein, >1.6g/day omega 3 fatty acids, >10g/day omega 6 fatty acids, >10µg/day vitamin D and >3mg/day vitamin E.

Findings: Diet quality did not differ between subpopulations. Interestingly, optimal diet quality predicted 3/10, work-based physical activity and adiposity each predicted 4/10, age predicted 5/10, total calories predicted 7/10, whilst BMI predicted 8/10 skeletal muscle structural and functional characteristics. Only one maker of muscle function differed between low vs. high adipose persons (p=0.015). BMI however differentiated normal weight and obese individuals in 6/10 MTU characteristics (p<0.043).

Conclusion & Significance: MTU 'optimization focused lifestyle interventions' should target education regarding adequate food quantity intake, whilst aiming also to increase habitual moderate-to-vigorous physical activity, particularly in high BMI middle-age to older individuals.

Biography

Onambele-Pearson G L is a reader in human muscle and tendon physiology of Department of Exercise and Sport Science at the Manchester Metropolitan University. Her research is concerned with the response of the muscle-tendon unit to ageing, lifestyle (nutrition, supplementation, exercise, sedentarism) and hormonal (therapeutic prescription, intrinsic variability) stimuli. She holds a BSc in Pharmacology and Toxicology (University of East London-UK), an MSc in Neurophysiology (University College London-UK), a Post-Graduation in Academic Practice (Manchester Metropolitan University), and a PhD in Human Physiology (University College London-UK). Her research links with institutions around the globe are maintained through her roles as grant reviewers for 10 awarding bodies worldwide, peer-reviewed for 20 journals, three journal editorial board memberships. She is the Head of 'Health, Exercise and Active Living' (HEAL) Research Centre at MMU. She is also the Governor at Mid Cheshire Hospitals Foundation Trust, Leighton.

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