

# Lifestyle

Skeletal muscle

Exercise

Nutrition/Supplementation

Endocrinology

## Optimisation of Exercise and Diet in People over 60 years old: Skeletal Muscle and Quality of Life Responses

Dr GL Onambélé-Pearson, Professor CE Stewart & Mr L Breen

IRM, Manchester Metropolitan University

### The Investigation

#### Background & Objectives

Physical activity in old age<sup>1</sup> may delay the progression of sarcopenia and is thus of paramount importance for maintaining the functional abilities needed to carry out daily tasks. Poor diet influences both metabolic and protein synthetic pathways<sup>2</sup> culminating in lethargy and sarcopenia<sup>3</sup>.

#### Objectives

To obtain a better understanding of the physiological and hormonal impact of exercise and or nutrition on functional ability.

#### Hypotheses

That to improve quality of life in older people, targeted physical activity and a healthy diet (+/- protein supplementation) is essential. This intervention is the best way to counteract declining anabolic profiles, sarcopenia and increased frailty.

#### Plan

**Participants:** aged 60-90 years ( $n=48$ ) will be randomly assigned to one of four groups: a) Nutritional advice, b) Nutritional advice + supplements, c) Nutritional advice + exercise and d) Nutritional advice + exercise + supplements.

**Nutritional advice & Supplementation:** Leaflets and data from the WHO, the Ministry of Health and the Healthy People 2010 report will be collated to produce a "Healthy Eating Pack" to disseminate to each participant. In the post-exercise phase a restorative rebound in the naturally occurring anabolic hormones occurs (e.g. GH, insulin, IGF). This phase is frequently referred to as biochemical or metabolic supercompensation. Ingestion of carbohydrates, proteins or amino acids during this phase, will facilitate a protein synthetic response in the muscle following a bout of exercise.

**Resistance training:** Progressive over 12 weeks, at the rate of three weekly training sessions, of which two will be supervised.

#### Assessments

**Endocrinology:** Fasting blood samples (~6ml) will be obtained from a superficial forearm vein for analyses of: glucose, IGF-I, IGFBPs 1+3, cortisol, and leptin using ELISAs. An overnight urinary sample will be collected to estimate GH abundance.

**Muscle structural and functional determinations:** 1) muscle strength & power, and tendon structural & mechanical properties will be assessed using dynamometry, electromyography and B-mode ultrasound (US) imaging, 2) muscle volume & architecture and tendon dimensions will be monitored using US and magnetic resonance imaging (MRI), 3) neural activation capacity will be determined using peripheral magnetic stimulations, 4) ability to carry out activities of daily-living using standard tests of functional abilities.

**Psychometric tests:** Using previously validated questionnaires.

### Potential Benefits

#### For older people & society

Nutritional advice should improve the hormonal profiles of the participants (e.g. more energy and better mood as a consequence of improved diet) and hence improve their quality of life. These responses should be enhanced with exercise.

All findings will be widely publicised to help increase the awareness of the benefits of exercise, diet and supplementation. This is particularly relevant to many older people who lose interest in food, and thereby inadvertently accelerate declines in their quality of life (increased lethargy, increased sedentary life style, decreased anabolic hormones, increased catabolic hormones and increased muscle wasting).



### Resources

The project received funds of £28,245 from SPARC. Lucozade was kindly donated by GlaxoSmithKline.

### Mentors, Collaborators and Partners

Prof CN Maganaris (Manchester Metropolitan University), Dr KD Tipton (University of Birmingham), Ms KE Burgess (University of Salford) and GlaxoSmithKline

### Key References

1. Pearson, G., et al., Ageing, postural and dynamic balance performances: Effects of specific stability, inertial and isotonic training. *J Aging and Phys Act*, 2004. 12(3): p. 414-415.
2. Lockwood, T.D., The transfer of reductive energy and pace of proteome turnover: a theory of integrated catabolic control. *Antioxid Redox Signal*, 2005. 7(7-8): p. 982-98.
3. Vanitallie, T.B., Frailty in the elderly: contributions of sarcopenia and visceral protein depletion. *Metabolism*, 2003. 52(10 Suppl 2): p. 22-13.
4. Verger, P., et al., Influence of the composition of a meal taken after physical exercise on mood, vigilance, performance. *Physiol Behav*, 1998. 64(3): p. 317-22.



#### Contact Details

Principal Investigator

Dr Gladys Onambélé-Pearson

[g.pearson@mmu.ac.uk](mailto:g.pearson@mmu.ac.uk)

IRM, Manchester Metropolitan University

Hassall Road, Alsager, ST7 2HL

Co-Investigator

Professor Claire Stewart

[c.stewart@mmu.ac.uk](mailto:c.stewart@mmu.ac.uk)

Research student

Leigh Breen

[l.breen@mmu.ac.uk](mailto:l.breen@mmu.ac.uk)

+44 (0) 161 247 5313

