



UK Research
and Innovation

Muscle resilience across the life course: from cells to society

Value proposition

November 2023

MyAge is a member of the UK Ageing Networks

About My Age

MyAge is a UK interdisciplinary network researching *muscle resilience across the life course: from cells to society*. Funded by the Biotechnology and Biological Sciences Research Council and the Medical Research Council, we aim to improve understanding of the mechanisms leading to reduced muscle function and set the direction of future research and effective interventions. We work with industry, policy makers, funders, healthcare professionals, inequality experts and the public, to tackle the biggest questions in muscle ageing.

Muscle ageing: problem and opportunity

The challenge of population ageing is increasing dramatically. In 2021 there were over 12 million people aged 65 years and older in the UK¹⁻³. This number is expected to increase by more than 40% within 20 years. Although an increasing number of people are living longer, they are not healthier; adults in the UK often spend the last decade of life in poor health. This places a substantial burden on health and social care services.

Key numbers



470,000

approximate number of British people of working age suffering from musculoskeletal symptoms⁴

£2.5 billion

estimated annual UK excess healthcare costs associated with muscle weakness⁶

12.5 million

approximate number of people over 65 in the UK¹⁻³

Twice as many years without disability for those living in the wealthiest parts of England compared to the poorest areas, beyond the age of 65.⁵



Less than
5%

of the NHS budget is spent on prevention of ill health⁷

1200%

global increase in annual investment into longevity between 2013 and 2021⁸

One of the highest impact changes during ageing is the loss of muscle mass, quality and function, termed sarcopenia.



Approximately **50%** of muscle is lost by the eighth decade of life⁹.

As muscle is critical for normal physical and metabolic function, loss results in multiple adverse outcomes, directly linked with impairment of multiple systems. This results in increased risk of several long-term conditions including cognitive decline, cardiovascular disease, and neurological disorders, as well as falls, fractures, frailty and physical disability; all of which are associated with reduced muscle resilience. It is the main driver of loss of independence in old age and is associated with substantial societal and economic costs through the life course. In addition, the effects of muscle loss are not experienced evenly across society, because sex, ethnicity and both physical and social environments strongly drive health inequalities in ageing. As a leading cause of sickness absence from work, reduced muscle resilience impacts health and economic productivity at a relatively young age.

Investing in muscle resilience and preventing muscle loss from a younger age will support individuals to maintain good muscle health and reduce economic inequalities throughout life. We already know that investment in medical research provides long term returns to the economy:



Every £1 spent on musculoskeletal diseases delivers a return of about **25p** p.a., forever¹⁰.

On the other hand, excess healthcare costs associated with muscle weakness in later life are estimated to be £2.5B per annum in the UK⁶. Contributing to the UK economy, by addressing these challenges is a major focus of the network, which will be achieved through collaboration, formation of new commercial ventures and industrial collaboration.



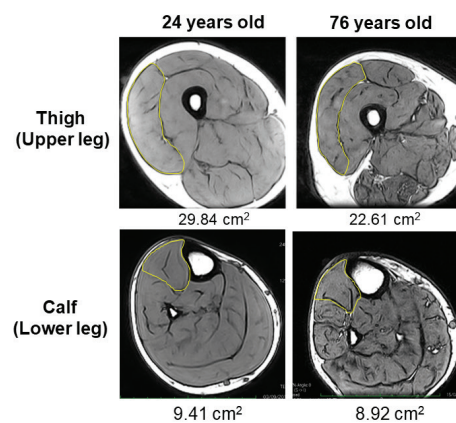
Dr James Gavin (r) and Olivia Richards (c), working with Catherine Knighton of Hampshire County Council (l) on the implementation of cobot (collaborative robot) technology for health and social care.

MyAge capabilities

MyAge has brought together over **80 key academic groups** in muscle resilience and ageing across the UK (including MRC-Arthritis Research UK Centre for Integrated research into Musculoskeletal Ageing (CIMA), the Centre for Musculoskeletal Ageing Research (CMAR) and the MRC Lifecourse Epidemiology Centre), with international links. The groups collectively have established expertise in areas including (but not limited to):

- Novel screening platforms for pharmaceutical and nutraceutical intervention
- Single cell and subcellular analysis
- Electrophysiology
- Nanotechnology
- AI and data science
- Molecular phenotyping/multi-omics
- Regenerative biology
- Immunology
- Endocrinology
- Exercise physiology
- Cellular and clinical imaging (e.g. fMRI)
- Tissue banks and datasets
- Design and conduct of nutritional and physical activity interventional studies across age ranges and geographies; patient cohorts
- Interaction between environmental factors, genetic and epigenetic processes with respect to their influence on health and risk of disease across the life course
- LifeLab state-of-the-art adolescent education and intervention initiative for health across the life course

The value of MyAge is in its innovative approach to break down the silos associated with reductionist research. This approach brings together non-overlapping expertise of researchers, industrialists and stakeholders from muscle research, metabolism, regenerative medicine, genomics, epigenetics, maths, data and social sciences, health inequity, biotech and pharma to understand the mechanistic pathways of muscle development, differentiation and decline. The expertise and resources within the network and its international connections will be utilised for commercialisation and formation of new ventures, for collaboration with industry and for creating the substantial societal impact urgently needed for the ageing population of the UK and beyond.



Magnetic resonance images of thigh and calf muscles: comparison of muscle cross-sectional area between young and older individuals. Image courtesy of Dr Mathew Piasecki, University of Nottingham.

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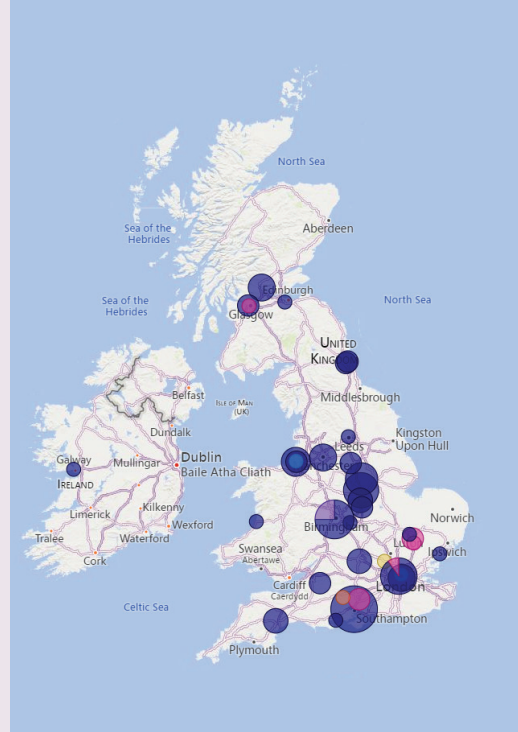
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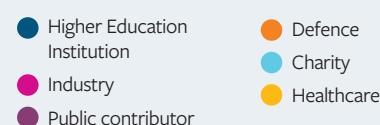
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MyAge membership distribution



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