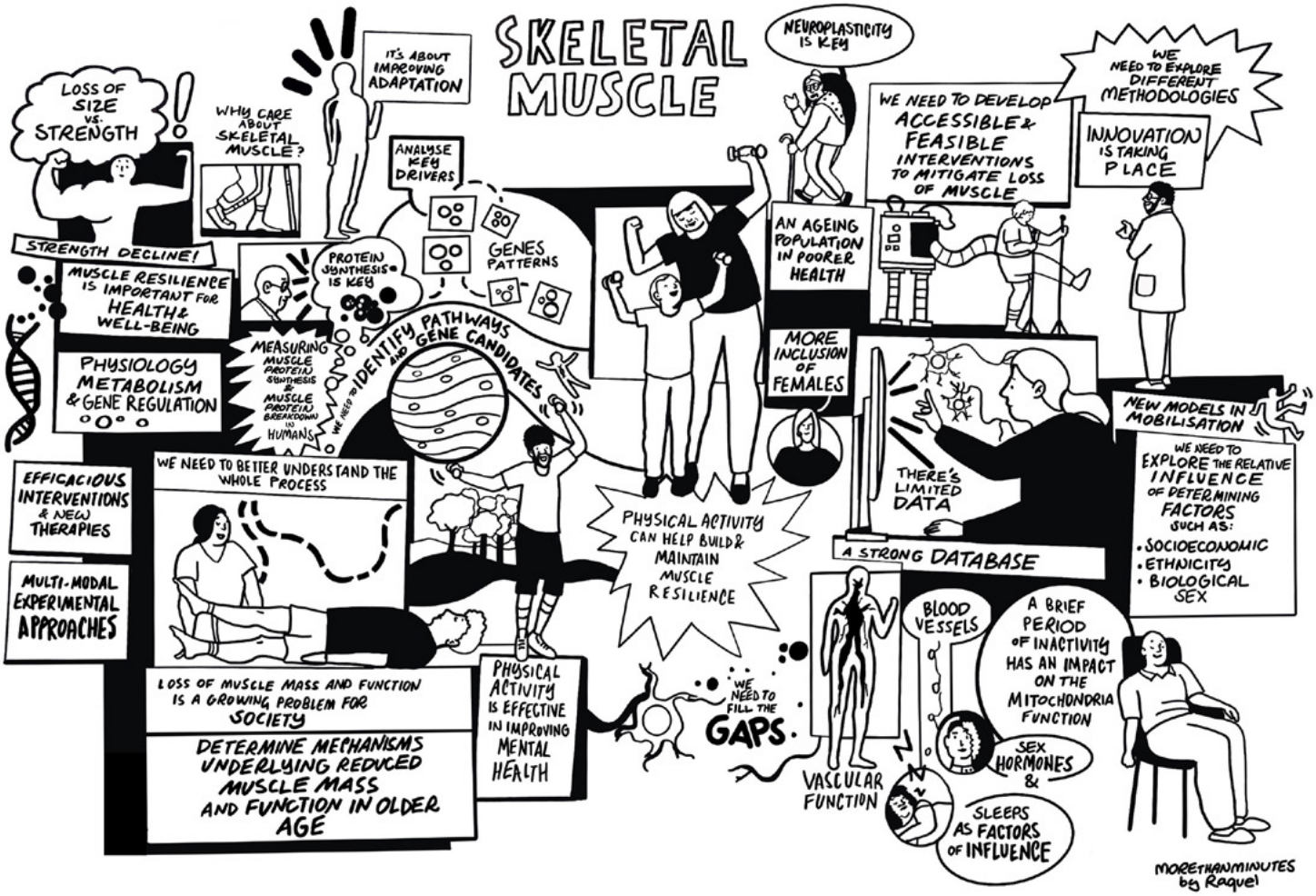
# MyAge: Muscle resilience across the life course

## November 2023




**Cover art by Raquel Durán, More than Minutes,** capturing discussions at The Physiological Society annual conference, 10 July 2023.

# Welcome to MyAge!

MyAge is a collaborative group of researchers from across the UK with an interest in the effects of muscle ageing and how to help people live more healthily throughout the life course.

Our network has expertise in areas such as muscle cell biology, regenerative medicine, genetics, physiology, nutrition, engineering, artificial intelligence, mathematics and social sciences.

Together, the group is working to better understand how our muscles become weaker over time, and in response to challenges like inactivity or illness. We want to set the direction of future research, which will result in effective interventions to improve muscle function and strength as we grow older.

MyAge is building an interdisciplinary community of researchers who want to improve muscle resilience. Supporting our next generation of experts, our early career researchers, has been a priority.

MyAge works with policymakers, funders, healthcare professionals, inequality experts and the public, to tackle the biggest challenges in muscle ageing.

## What is muscle resilience and how does it affect me?

More people are living longer, but they are not necessarily living healthier lives.

Resilience is how well our bodies can cope with change and stress over time, whether that's due to ageing or sometimes through illness, injury, poor nutrition or periods of inactivity.

As we age, we lose muscle resilience, which can lead to falls, fractures and disability as well as conditions such as cardiovascular disease and type 2 diabetes.

There are over 12 million people aged 65 and older in the UK. This is expected to increase by more than 40% within 20 years.

Up to 50% of muscle mass can be lost by the time we are 70.

Poor musculoskeletal health is a leading cause of adults leaving the workforce early.

By the end of 2021, only 36% of UK children were meeting national guidelines on physical activity.

**"The UK has a strong basic science understanding of the muscle ageing processes, internationally well-established fields of research, and a deep understanding of the key role of healthy muscle ageing for living well, for longer. We are well placed to transform muscle resilience research across the life course."**

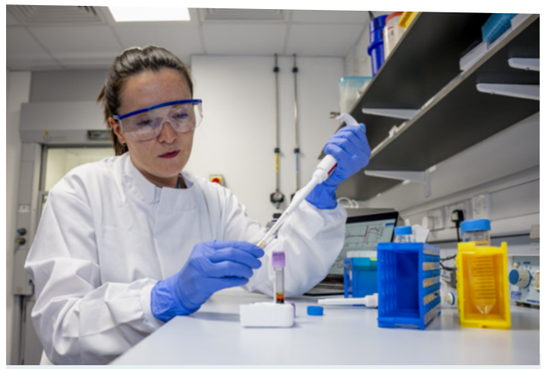
*Professor Carolyn Greig, School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham*

## What did MyAge set out to do?

The MyAge network has come together to ask the most important research questions about ageing, muscle resilience and how muscle loss can be prevented and treated, so we can help people live well for longer. Over the past two years, the group has assessed and discussed how to move the research agenda forward to help people build muscle resilience at all stages of life, as well as how to develop new treatments for muscle loss.

The group has created a roadmap to guide that research agenda, which:

- asks which research questions should be a priority.
- suggests how we should be conducting research studies to ensure we look at muscle resilience at different stages of life, and for different groups in society, as well as the mechanics of muscle resilience.
- provides recommendations for policy makers so our evidence can be used to help people improve muscle resilience at key stages throughout their life, and to accelerate the development of treatments and interventions.



MyAge funded early career researcher, Dr Colleen Deane, to work with systems biologist, Dr Owen Rackham, on a project to help uncover how we lose the ability to regenerate muscle as we age.

# Key questions

The following questions are what the MyAge network believe, should be helping shape the research activity into muscle resilience.

- What are the undiscovered causes and influences of age-related muscle loss
- How do illnesses and diseases affect muscle loss
- How do our muscles react to injury
- How does inactivity influence muscle loss with increasing age
- What are the differences between men and women, and why
- What influence does ethnicity have on muscle resilience
- How can we unlock new preventive and therapeutic approaches to lessen muscle ageing
- Which rehabilitation strategies are most effective at improving mobility in a diverse, multicultural society
- What is 'natural' ageing, i.e., what are the relative contributions of the passage of time and environment/lifestyle to muscle ageing

**...across the population?**

## How do we improve muscle resilience across the life course?

Loss of muscle mass, quality and function is a growing problem across our society, but the effects are not experienced evenly. Women live longer, but experience more frailty than men. Sex, ethnicity, physical and social environments all strongly drive health inequalities in ageing. We need a holistic approach to improving muscle resilience which includes basic scientific research, environmental factors, studying all stages of life, prevention and intervention. If we do this successfully, there is an opportunity to improve the health and economic outcomes for all, including the most deprived in our society.

Developing the following approaches could prevent loss of muscle strength and resilience, according to the MyAge team.

**Pre-clinical research** – develop muscle tissues in the lab to mimic different ageing stages so we can better understand how and why muscles change across the life course.

**Biomarker discovery** – find measurable indicators of muscle condition to help us keep track of muscle tissue loss.

**Wearable tech** – develop devices, apps and monitoring platforms to provide data that will help manage chronic long-term conditions that influence muscle resilience.

**Personal interventions** – develop lifestyle-based approaches for maintaining and treating muscle resilience loss for different groups of people.

**Study methods** - Combine appropriately designed studies including standardised procedures and robust outcome measures to tell whether an intervention has worked or not. A strong evidence base is essential when turning research into practice.

**"We could reduce frailty in later life by promoting muscle strength and development in childhood and adolescence, thereby also improving health and wellbeing across the life course."**

*Professor Keith Godfrey, MRC Lifecourse Epidemiology Centre, University of Southampton & NIHR Southampton Biomedical Research Centre*

Dr Mark Burton and other early career researchers from universities at Stirling, Edinburgh Napier, Liverpool John Moores and Southampton were supported by MyAge to map the differences between healthy individuals and those with muscle loss, at the level of individual cells.

Understanding these differences may give an opportunity to slow down or counteract muscle loss with lifestyle interventions or drug therapies.

MyAge has been meeting with policy makers to tell them what the research community needs to make positive steps forward. We told them we need to:

- Engage with more decision makers so they understand the seriousness of the issue and why research is important in finding good solutions
- Speak with members of the public of all ages to ensure they have the opportunity to be involved in research activity
- Keep investing in research, especially in lab-based research, to understand the causes of ageing
- Build an international and interdisciplinary research community that works together to address this societal issue
- Promote closer collaborations between life and social sciences
- Support the research community to share resources like research samples and data, to foster better collaboration
- Ensure clinical trials and research studies represent the diversity of people from across society so we can understand the differences in ageing between groups and to reduce health disparities
- Encourage and develop partnerships with industry.

**Understanding the hidden causes of muscle ageing and developing interventions to prevent declining muscle resilience across the life course is central to helping people be more independent in later life, ease the economic pressure on our healthcare system and reduce health inequality. In a nutshell it's important to make sure old age is enjoyed and not endured!"**

*Professor Janet Lord, FMedSci, CBE, MRC Versus Arthritis Centre for Musculoskeletal Ageing Research, University of Birmingham.*

## How can I increase my muscle resilience?

Physical activity can help build and maintain muscle resilience. In many instances physical activity is as effective as healthcare and pharmacological intervention. The UK's Chief Medical Officer suggests **per week:**

**150** mins moderate activity

**or**

**75** mins vigorous activity

**2** sessions building strength

**Minimise** sedentary time. **Break up** periods of inactivity.

**2** sessions improving balance

**NHS exercise guidelines for all ages:** www.nhs.uk/live-well/exercise/exercise-guidelines/

## How to get involved in research

If you're interested in taking part in muscle resilience research, please visit the National Institute for Health and Care Research (NIHR) website at **www.nihr.ac.uk/patients-carers-and-the-public/** or scan the QR code for more information, or contact your local NIHR Biomedical Research Centre to see what opportunities are available.

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