RESEARCH 4 YOU (R4U)

The University of Nottingham
Centre of Metabolism, Ageing & Physiology
(COMAP)
Research Community

R4U Research bulletin
Edition 5
July 2025

Foreword

Welcome to the R4U Research Community for the Centre of Metabolism, Ageing and Physiology (COMAP).

COMAP is a University of Nottingham research group based at the Royal Derby Hospital, with a volunteer research community known as R4U (Research For You).

As the name suggests, COMAP is interested in better understanding what happens to the human body with ageing and age-associated disease, and how some of these changes may be delayed or modified with interventions.

If you are reading this newsletter you have signed up to join R4U.
R4U is crucial to the work that COMAP do, and as an R4U member we will keep you updated on that work that we are doing and ask for help with research design and promotion – this is known as Patient and Public Involvement, or PPI for short.

We will also use this newsletter to let you know of any opportunities to take part in research as a volunteer, and of any public events we are aware of that we think you might be interested in.

Please continue to let us know if you have any comments or suggestions on how this could be improved.

Finally, if you no longer wish be part of this group, please send an email titled 'unsubscribe me' to MS-COMAP-Research@exmail.nottingham.ac.uk

Journey of a COMAP muscle sample

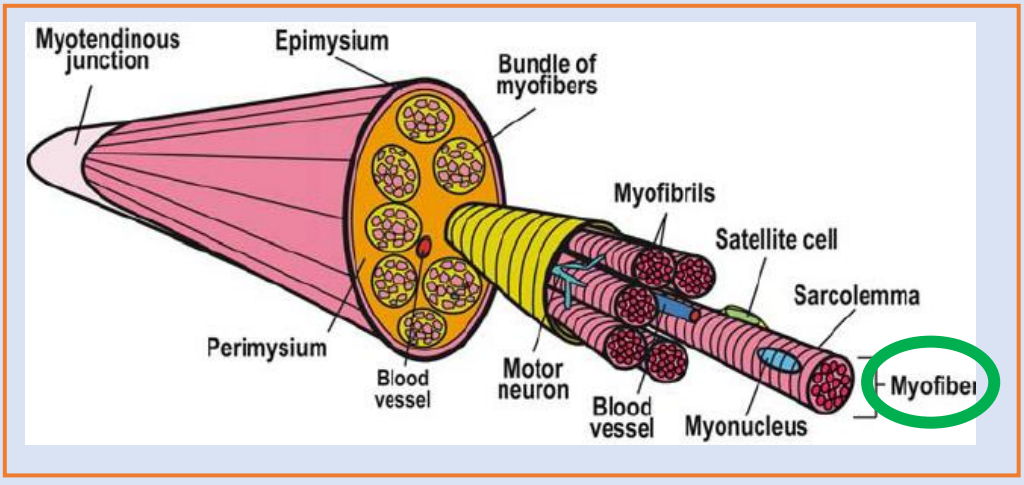
Many of our research studies involve collecting one or more samples of muscle tissue, normally from the vastus lateralis muscle which makes up one of your quadricep muscles at the front of the thigh. These are performed by a qualified medical doctor under local anaesthetic, and they resemble precious little ruby gemstones (to me at least ☺). We look for a total sample weight of around 100-150mg which is often akin to the size of an orange pip.

What happens to it after we collect this sample?

This depends on the type of analysis we're doing but typically, we'll wash it in a cold saline solution to remove any excess blood, gently dab the tissue on some gauze to dry it a little, and then place it into labelled tubes that are snap frozen in liquid nitrogen at -196°C. After that the tissue will be weighed and logged following Human Tissue Authority guidelines. After logging, it will be stored in one of our many -80°C freezers, which are continually monitored for temperature until we are ready to run our analyses.

How do we use the samples to find out how fast your muscles are being made?

First of all, we separate the muscle into different fractions using different solutions and centrifugation. We are primarily interested in the myofibres, these are responsible for the contraction of the muscle, so we isolate this fraction, and break the protein back down into individual amino acids. We are then ready to measure how much of the labelled amino acid we have given you has gone into the myofibres.



Picture of the organisation of human muscles

What's next…? Mass spectrometry - read on….

Journey of a COMAP muscle sample… continued

Many of you will have been given 'tracers' or labelled amino acids to consume e.g. heavy water or deuterium during the course of your research involvement with us.

What are these tracers and how do we label the amino acids?

We either give you an amino acid which has a naturally occurring heavy isotope in it, or we can give you heavy water (deuterium replaces hydrogen in water), which transfers into amino acids during normal metabolism, and this amino acid is then made into protein. We use 'stable isotopes', which are heavier than the parent atom (e.g. ^{13}C vs. ^{12}C or ^{2}H (deuterium, D) v. ^{1}H (hydrogen)), these are stable atoms and are not radioactive. We have used these safely for over 40 years.

How do we measure these stable isotopes?

Because these atoms have a different mass (weight), we can use mass spectrometers to identify and quantify these atoms in the amino acids. We joke that these instruments are "very expensive weighing machines", costing from £60,000 to over £1,000,000. These instruments are very sensitive and precise and can measure very low levels of labelling – this allows us to measure how fast your muscles are being made!

Pictures of two of our mass spectrometers

Mass Spectrometry

Our COMAP research group is highly regarded for its work in the field of Mass Spectrometry…but what is mass spectrometry and how do we use it in our research?

Step 1. We take the amino acids from the fraction of muscle protein, and we separate them by chromatography, and the labelled amino acid is then burned at high temperature producing CO_2, Hydrogen and Nitrogen gases. So, for ^{13}C we measure CO_2 gas, and for ^{2}H (deuterium), we measure H2 (hydrogen) gas.

Step 2. The gas is passed into the mass spectrometer where it is ionised: a beam of electrons is fired at the gas, knocking off an electron, the charged gas is then directed towards the detectors, through a magnetic field which deflects the ions, based on weight, so the 'lighter' molecules are deflected further, and hit a different detector – so we can tell how much of the light and heavy molecules there are! The isotope ratio – "Simples"!

Step 3. From measuring this isotope ratio, we can work out how much of the labelled amino acid has gone into the muscle protein over time and if we take a few biopsies and perform an intervention i.e., feed someone or exercise the leg muscles, we can measure the effect of this intervention.

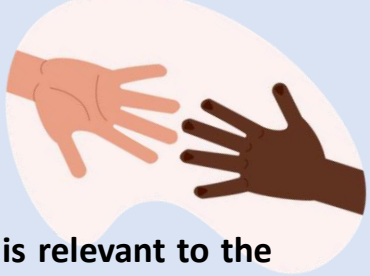
For example, feeding someone protein can double the rate at which they make muscle protein, but this only lasts for up to two hours, at which point the rate returns to baseline. This is why we can't get bigger muscles just by eating protein, we need also to exercise to increase the size of our muscles.

As we get older, our muscles do not respond as well to protein feeding and exercise, so we begin to lose muscle, the same thing happens in some long terms diseases where we lose muscle – our aim is to find ways to overcome this and to maintain muscle 'health' (mass and function) including in older age or when suffering from disease.

Without using stable isotopes and mass spectrometers we would not be able to fully understand the processes regulating muscle growth and loss.

Centre Of Metabolism, Ageing & Physiology

Call for Help



All research relies on a public voice to make sure our research is relevant to the needs of the people we are hoping to help.

We are keen to ensure that the information we provide is understandable for a non-specialist audience, and that we are spreading the message of our research to the right people in the right way.

In each edition of this newsletter, we will let you know what activities we need help with, including any studies that are looking for research volunteers.

We are looking for individuals with Parkinson's Disease to help with a research study.

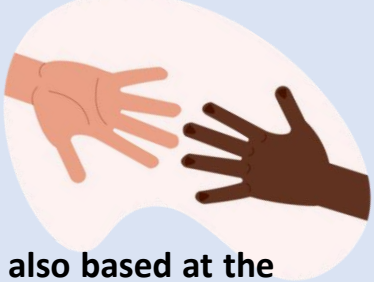
Do you know anyone that might be interested?

Please feel free to share this newsletter and/or contact Mehmet Yildirim:

alymy12@exmail.nottingham.ac.uk for more information.

Please feel free to share this request if you have any family or friends with Parkinson's disease.

Call for Help



The COMAP team collaborate frequently with other academics also based at the University of Nottingham Medical School at Derby, and these other research groups also need participants to help with their research.

Tim England, Professor of Stroke Medicine & Honorary Consultant Physician at Royal Derby Hospital and Philip Bath, Professor of Stroke Medicine and Head of Academic Stroke for the University would also like to know if you could help them with a study they are running.

Tim says: "We have an opportunity for a couple of our volunteers to support our research in a different way. We are submitting a grant proposal to support a clinical trial in people over the age 65 years old, using two medications already licensed for use in other conditions (ISMN and Cilostazol). The aim of this study is to reduce the burden of a condition called cerebral small vessel disease. The ultimate goal is to prove that the medication reduces the risk of developing vascular dementia.

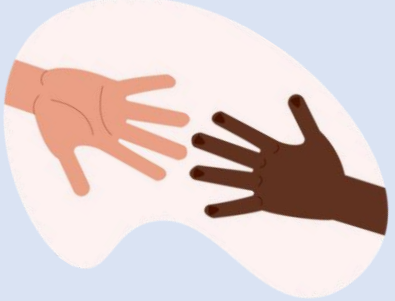
We are looking for a couple of volunteers aged over 65 to help with conducting the above trial. One will sit on the trial steering committee (TSC), which will meet every 6-months over the course of 42 months. You will act as a patient representative to help guide some of the decisions made. The other role is much more frequent, meeting monthly to guide the trial management group. Most of the meetings are conducted online but we can arrange things that are most convenient for anyone who volunteers to help

Ideally, you would be over 65 with lived experience of caring for anyone with dementia this will help but this it is not essential".

Both Prof England and Prof Bath are more than happy to hear from you directly. If you would like to help with this request or if you have any questions, please click the email links below.

Philip Bath (staff) mszpb@exmail.nottingham.ac.uk
Tim England (staff) mdztje@exmail.nottingham.ac.uk

Call for Help



The COMAP team also work closely with researchers at Queens Medical Centre, Nottingham. For those of you based near Nottingham, please get in touch with Jo if you think you might be able to help with the project outlined below.

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We Are Recruiting

Want to help research into ageing?

Interested to know when protein feeding is best for muscle building?

Researchers from The University of Nottingham at QMC are looking for **Healthy Male Volunteers 65-75 yrs old**

Investigating the effect of the timing of protein feeding on muscle protein synthesis.

A 4-week study consuming protein with meals or between meals involving resistance exercise and collection of biological samples.

If you are interested in helping us with our studies, please email joanne.mallinson@nottingham.ac.uk, Tel 0115 8230248

Congratulations!

Congratulations to Hui-Tien Lui on passing his PhD viva!

You may not have met Hui-Tien as his PhD work has been conducted in our wet-laboratories using human samples and cell-culture models.

We're celebrating that Hui-Tien has successfully defended his PhD thesis related to the mTOR signalling pathway in ageing muscle and other tissues.

Hui-Tien will now be returning home to Taiwan.

Well done Hui-Tien!!

Finally, some other University news...

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We thought from time to time you might also like to hear about other ways our University is making a difference.

Nottingham to test out public restaurant model to offer social and healthy eating

A ‘public restaurant’ will be piloted in Nottingham as part of a new research project that will evaluate if this approach can help improve public health and wellbeing by providing everyone with access to high-quality food.

Public restaurants are a type of public infrastructure, like public libraries or leisure centres– supported by government to keep costs accessible so that everyone benefits.
There are two pilot restaurants due to open in Nottingham and Dundee in spring 2026 that will be co-designed with local residents and partners to ensure they reflect the tastes, needs and priorities of their communities. The restaurant aims to give people access to affordable healthy eating out options with locally produced food that supports sustainable and ethical farming practice.

To read the full article, please visit the following page: https://www.nottingham.ac.uk/news/nottingham-to-test-out-public-restaurant-model-to-offer-social-and-healthy-eating