Skeletal muscle nitrate metabolism as a modulator of cardiovascular health in ageing

Supervisory team:
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Project description:

Inorganic nitrate is a natural part of our diet and is particularly abundant in many vegetables. Nitrate itself is biologically inactive but there are pathways by which it can be converted into nitric oxide (NO), an important molecule that regulates many aspects of metabolic and cardiovascular health. Sufficient dietary nitrate intake may be particularly important in older age, when the body's enzymatic production of NO decreases. Recent research indicates that skeletal muscle may play an important role as a site for nitrate storage, and nitrate and NO metabolism, in humans (Figure 1). The aim of this PhD studentship, therefore, is to explore the relationships between indices of cardiovascular health and nitrate-reduction capacity and NO metabolism of skeletal muscle. The research will assess whether human skeletal muscle makes a significant contribution to nitrate reduction, explore the mechanisms of nitrate transport between the circulation and skeletal muscle, and determine the influence of dietary interventions on muscle nitrate content and functional outcomes in younger and older adults.

The successful candidate will become a part of an interdisciplinary research team spanning the Colleges of Life and Environmental Sciences and Medicine and Health at the University of Exeter, and collaborators at the National Institutes of Health (NIH, USA) and the University of Copenhagen (Denmark). The student will benefit from a range of unique training opportunities in state-of-the-art techniques in NO biochemistry, as well as in vivo human experiments with dietary interventions, collection of biological samples, and assessment of cardiovascular fitness. The outcomes of this PhD programme will make a significant novel contribution to current knowledge on the therapeutic potential and mechanistic bases of dietary nitrate to advance healthy ageing.

Figure 1: Nitrate-Nitrite-NO Pathway: from Mouth to Muscle