**LEICESTER LIFESTYLE AND HEALTH RESEARCH GROUP**

**Plantarflexors (calf muscles): how much do they impact sarcopenia and aging?**

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**Section 2 – *Project Information***

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| **Project Title** | **Plantarflexors (calf muscles): how much do they impact sarcopenia and aging?** |
| **Project Summary**  |
| **Aim: Develop understanding about the relationship between Plantarflexor (calf muscle) strength, disease and lifestyle interventions, so that we can improve the functional abilities and quality of life of our patients living with long term health conditions and multi-morbidity.** **Background:** The calf muscles (plantarflexors) are crucial for walking and all functional activities producing forces (1) exceeding that of all other lower limb muscles except when sprinting.(2) Weakness of these muscles through aging and disease significantly impact a person’s ability to walk and complete activities of daily living.(3) Plantarflexor strength can accurately identify patients with sarcopenia (4) and those at risk of falls.(5,6) However there has been little largescale studies of this variable as the testing requires laboratory equipment, which limits largescale trial. Here at the University of Leicester we have pioneered a simple portable device with high levels of reliability and validity to test plantarflexor strength. Our current work has produced normative/reference values for elite sport and we are now ready to progress this research people living with long term health conditions including Sarcopenia. ***Methods:*** *Several linked studies across the translation pathway:* *Work package 1**A large scale cross-sectional study examining the interplay between plantarflexor muscle strength, walking (gait cycle) and health and disease (multiple long term conditions and Sarcopenia). This study will use the EXCEED database (*EXCEED is a longitudinal population-based cohort which facilitates the investigation of genetic, environmental and lifestyle-related determinants of a broad range of diseases and of multiple morbidity through data collected at baseline and via electronic healthcare record linkage and involves 11,000 participants*) to recruit participants with a large number of other measures already in place. Analysis of the measures already held on record and those we take will provide greater insight into the potential interlink between plantarflexor muscle strength and physical wellbeing.**This WP will utilise the new E3 university motion capture lab and analyse the relationships between plantarflexor strength (measured using the Fysiometer C-Station) and walking by using the Theia markerless motion capture system, the instrumented treadmill and collected strength data. Analysis will involve* *Work package 2 : Calf muscle (Soleus and Gastrocnemius) Biopsies* *WP2 will take a smaller cohort of participants from WP 1 and complete biopsies from both the gastrocnemius and Soleus muscles to identify fiber type, fiber size, anabolic resistance, following previously used methodology with Luke Baker the centre for Sarcopenia research at UoL.(7)* Work package 3 : The impact of lifestyle and therapeutic interventions on plantarflexor structure and function. The 3rd WP will assess the impact of lifestyle interventions (using ongoing studies at that time-point – working with our community and healthcare partnerships through the “Universities partnership scheme) and therapeutic interventions (Cardiac, Pulmonary and Renal exercise classes) on plantarflexor strength and function (gait/walking ability) by testing pre and post intervention. Work package 4 : A feasibility studyWill assess the feasibility of adding a plantarflexor focussed exercise regime to existing exercise and lifestyle interventions and take biopsies, strength and functional measurements pre and post intervention. *Expected outcomes and impact:** Improved knowledge of the involvement and importance of the plantarflexors in health and disease states (specifically Sarcopenia and LTHC and Multimorbidity) at a tissue (Micro) and whole person (macro) level.
* New knowledge about the impact of our existing lifestyle (including physical activity) and therapeutic interventions on the plantarflexors strength, structure and function.
* New exercise regimes tailored to the identified deficits in plantarflexor strength, structure and function suitable for large scale testing and adoption
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| **References** |
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