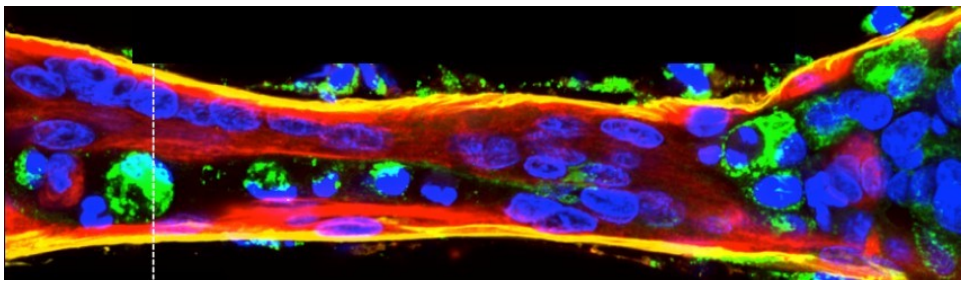
The dysfunction of human skeletal muscle stem cells with ageing during in vivo regeneration and in vitro myogenesis



This project seeks to uncover mechanisms behind the poorer activation of muscle stem cells in elderly individuals when compared to younger counterparts. This has implications for repair of muscle after injury, restoration of lost muscle mass after periods of forced inactivity such as hospitalization, and in combatting the age-related decline in muscle mass and function. We have collected muscle samples from young and older individuals before and after they were subjected to a controlled muscle injury protocol. This model leads to necrosis of entire muscle fibres, which are then completely reformed by the resident stem cells of skeletal muscle, the activity of which is tightly orchestrated by other cells types also found in skeletal muscle. These include immune cells, fibroblasts and vessel-associated cells and their interaction is complex.

Your task would be to perform confocal microscopy imaging of immunofluorescently stained single muscle fibres (image above) and tissue sections in order to gain insight into differences in cell profiles between young and old. Depending on what you find, you would then go on to test the nature of that cell interaction using cell culture of primary human muscle stem cells isolated from fresh tissue. Molecular modifications can be carried out to delve even further into mechanisms at play in the dysfunction of muscle stem cells with ageing. It is likely that this work will amount to a publication, either as part of a larger paper from our group or an independent paper. You would be supervised by Abigail Mackey, Associate Professor at the Department of Biomedical Sciences (BMI), and lab work would be carried out at the Core Facility for Integrated Microscopy (BMI, Panum Institute) and at Institute of Sports Medicine, Bispebjerg Hospital, where we obtain tissue samples and do the cell culture work.

See these two publications for further background information on the topic and methods:

Bechshøft CJL…Mackey AL. Age and prior exercise in vivo determine the subsequent in vitro molecular profile of myoblasts and non-myogenic cells derived from human skeletal muscle. Am J Physiol Cell Physiol. 2019, 316(6): C898-C912.

Mackey AL, Kjaer M. The breaking and making of healthy adult human skeletal muscle in vivo. Skeletal Muscle, 2017, 7(1): 24.

Contact me for further details on this or other potential projects:

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