Bone, muscle and rheumatology

IDENTIFICATION AND QUANTIFICATION OF SATELLITE CELLS IN SKELETAL MUSCLE FROM COMMUNITY DWELLING OLDER MEN: FINDINGS FROM THE HERTFORDSHIRE SARCOPENIA STUDY (HSS)

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Introduction: Sarcopenia, defined by the European Working Group on Sarcopenia in Older People (EWGSOP) is the loss of muscle mass and function with age. Sarcopenia has a multifactorial aetiology, which includes reduced number and/or function of satellite cells (SC). These cells are central to the growth and repair of skeletal muscle. Previously, SC have been identified by electron microscopy and immunofluorescence techniques. Few studies have demonstrated the ability to identify SC by immunohistochemical techniques in fixed human tissue. The objective of this study was to develop a methodology and determine the feasibility of identifying and quantifying SC.

Methods: 99 men born between 1931 and 1939 (mean age 72) consented for detailed characterisation of muscle mass and strength as well as a muscle biopsy of the vastus lateralis. Tissue was processed for immunohistochemical studies. Sections of muscle were stained with paired box protein transcription factor 7 (PAX-7) antibody. Photomicroscopy and image analysis were used to calculate muscle tissue area, satellite cell number and fibre number per section after which values for SC per mm² muscle (SC density), SC per fibre and fibres per mm² muscle were derived.

Results: Due to incomplete tissue fixation, muscle sections were available for 75 participants. The median SC count was 2, interquartile range (IQR 1.5-3.2). The median satellite cell density was 4 cells per mm² muscle (IQR 2.1-6.0). There were 0.04 SC per fibre (IQR 0.02-0.07). The median fibre count was 198 (IQR 120-321), median fibre density was 99 fibres/mm² (IQR 65.2-119.3).

Conclusion: Identifying and quantifying SC by immunohistochemistry in human tissue is feasible. The next steps are to apply the EWGSOP algorithm to the HSS sample to determine the relationship between SC and sarcopenia. The methodological findings of this study can now be applied to future studies that also include women.