

Sialic acids expression in human skeletal muscle tissue during aging

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Sarcopenia is the physiological age related decline in muscle mass and strength. It has been associated with disability and morbidity in the elderly population. The aetiology of sarcopenia involves still unclear multiple factors, but the adverse effects are well documented. Among the numerous involved factors, sialic acids could be included. Some studies performed on animal models demonstrated an important role of sialic acids in skeletal muscle during embryonic and post-natal development and aging. In human only investigations regarding the role of sialic acid in a particular pathology, hereditary inclusion body myopathy, leading muscular weakness and atrophy, have been carried out. The aim of this study was to widely characterize monomeric and polymeric sialic acids and evaluate their expression and role in human skeletal muscle tissue in different ages of adult life. Specimens of inferior limb muscles from men aged 18-25 years (group 1) and from men aged 72-93 (group 2) were obtained at autopsy. Some sample sections were stained with haematoxylin-eosin for morphological analysis. The study of sialic acids expression was carried out using lectin histochemistry (MAA, SNA and PNA) in addition to the use of enzymatic and chemical treatments to characterize the different glycosidic linkages of the monomeric sialic acids to saccharidic chain and to obtain information on structure of the monomeric and polymeric sialic acids. Immunohistochemistry was also performed to evaluate the expression of polysialic acid (anti-PolySia). The morphological remarks showed decrease in thickness and in number of the muscular fibres in group 2 compared to group 1. Lectin histochemistry and immunohistochemistry evidenced that in both the study groups various types of sialic acid were present in the sarcolemma and the surrounding connective of the muscular fibres, but in different amount. Monomeric sialic acids, linked α -2,3 (MAA) and α -2,6 (SNA) to galactose and/or galactosamine, decreased in group 2 with respect to group 1, whereas polysialic acid showed an increase (PNA with treatments and anti-PolySia). Sialic acid acetylation was present in group 1, whereas was lacking in group 2 (PNA with treatments). These findings demonstrated changes in expression of sialic acids in skeletal muscle fibres correlated to morphological modifications in different ages. This can contribute to highlight the role of these carbohydrates in normal structure and functionality of this tissue and in its age-related changes.

Key words

Sialic acids, skeletal muscle tissue, aging, lectins histochemistry, immunohistochemistry.