

Ageing of the somatosensory system at the periphery: age-related changes in cutaneous mechanoreceptors

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Decline of tactile sensation associated with ageing depends on modifications in skin and both central and peripheral nervous systems. At present, age-related changes in the periphery of the somatosensory system, particularly concerning the effects on mechanoreceptors, remain unknown. Here we used immunohistochemistry to analyse the age-dependent changes in Meissner's and Pacinian corpuscles as well as in Merkel cell-neurite complexes. Moreover, variations in the neurotrophic TrkB-BDNF system and the mechanoprotein Piezo2 (involved in maintenance of cutaneous mechanoreceptors and light touch, respectively) were evaluated. The number of Meissner's corpuscles and Merkel cells decreased progressively with ageing. Meissner's corpuscles were smaller, rounded in morphology and located deeper in the dermis, and signs of corpuscular denervation were found in the oldest subjects. Pacinian corpuscles generally showed no relevant age-related alterations. Reduced expression of Piezo2 in the axon of Meissner's corpuscles and in Merkel cells was observed in old subjects, as well as a decline in the BDNF-TrkB neurotrophic system. This study demonstrates that cutaneous Meissner's corpuscles and Merkel cell-neurite complexes (and less evidently Pacinian corpuscles) undergo morphological and size changes during the ageing process, as well as a reduction in terms of density. Furthermore, the mechanoprotein

Piezo2 and the neurotrophic TrkB-BDNF system are reduced in aged corpuscles. Taken together, these alterations might explain part of the impairment of the somatosensory system associated with ageing. © 2019 Anatomical Society

ageing

BDNF-TrkB system

glabrous skin innervation

human

Piezo2

sensory corpuscles

brain derived neurotrophic factor

brain derived neurotrophic factor receptor

ion channel

Piezo2 protein

unclassified drug

adult

aged

aging

Article

axon

cell density

cell size

cell structure

controlled study

denervation

female

human

human cell

human tissue

male

mechanoreceptor

Meissner corpuscle

Merkel cell

Pacini corpuscle

pathogenesis

priority journal

protein expression

skin receptor

somatosensory disorder

somatosensory system

touch

very elderly