Merkel cells and Meissner's corpuscles in human digital skin display Piezo2 immunoreactivity

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The transformation of mechanical energy into electrical signals is the first step in mechanotransduction in the peripheral sensory nervous system and relies on the presence of mechanically gated ion channels within specialized sensory organs called mechanoreceptors. Piezo2 is a vertebrate stretch-gated ion channel necessary for mechanosensitive channels in mammalian cells. Functionally, it is related to light touch, which has been detected in murine cutaneous Merkel cell?neurite complexes, Meissner-like corpuscles and lanceolate nerve endings. To the best of our knowledge, the occurrence of Piezo2 in human cutaneous mechanoreceptors has never been investigated. Here, we used simple and double immunohistochemistry to investigate the occurrence of Piezo2 in human digital glabrous skin. Piezo2 immunoreactivity was detected in approximately 80% of morphologically and immunohistochemically characterized (cytokeratin 20+, chromogranin A+ and synaptophisin+) Merkel cells. Most of them were in close contact with Piezo2? nerve fibre profiles. Moreover, the axon, but not the lamellar cells, of Meissner's corpuscles was also Piezo2+, but other mechanoreceptors, i.e. Pacinian or Ruffini's corpuscles, were devoid of immunoreactivity. Piezo2 was also observed in non-nervous tissue, especially the basal keratinocytes, endothelial cells and sweat glands. The present results demonstrate the occurrence of Piezo2 in cutaneous sensory nerve formations that functionally work as slowly adapting (Merkel

cells) and rapidly adapting (Meissner's corpuscles) low-threshold mechanoreceptors and are related to fine and discriminative touch but not to vibration or hard touch. These data offer additional insight into the molecular basis of mechanosensing in humans. © 2017 Anatomical Society

cutaneous mechanoreceptors

mechanotransduction

Meissner's corpuscles

Merkel cells

Piezo2 ion channel

chromogranin A

cytokeratin 20

membrane protein

Piezo2 protein

unclassified drug

ion channel

PIEZO2 protein, human

adult

Article

axon

controlled study

female

human

human cell

human tissue

immunohistochemistry

immunoreactivity

keratinocyte

lamellar body

male

mechanotransduction

Merkel cell

morphotype

priority journal

protein expression

protein localization

quantitative study

skin nerve

skin receptor

submucous plexus

biosynthesis

finger

innervation

mechanoreceptor

Merkel cell

metabolism

middle aged

physiology

skin

young adult

Adult

Female

Fingers

Humans

Ion Channels

Male

Mechanoreceptors

Mechanotransduction, Cellular

Merkel Cells

Middle Aged

Skin

Young Adult