



Histology of Meissner's Corpuscles

Vikrant Singh*

Department of Pharmacy, GD Goenka University, India

*Corresponding author: Vikrant S, Pharmaceutical Division, Department of Pharmacy and Specialty Medicine, GD Goenka University, India, Vikrant9671@outlook.com

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Professor Georg Meissner and Professor Rudolf Wagner originally characterised Meissner corpuscles in 1852. They are also known as Wagner-Meissner corpuscles or tactile corpuscles. These unique encapsulated nerve terminals are found in the dermal papillae of glabrous skin and convey delicate touch and low-frequency vibration sensations to the central nervous system (CNS). Meissner corpuscles are important for somatosensory acuity, particularly in the digital extremities and palmar skin, and have clinical implications for peripheral and diabetic neuropathy, as well as age-related degradation of dermatological tactile sensibility.

At a depth of around 150 micrometres, Meissner corpuscles are ellipsoid mechanoreceptors situated superficially inside the dermal papillae. The corpuscles have a diameter of 20 to 40 micrometres and a length of 80 to 150 micrometres, with their long axis parallel to the skin surface. With less than three corpuscles per papilla, one corpuscle can be discovered in every two to four dermal papillae. The size and density of receptors are determined by the genesis location.

Elongated Schwann cells, a connective tissue capsule, and a central axon are the three basic components of each corpuscle. The flattened Schwann cells are stacked against a background of an interlamellar matrix primarily comprised of collagen and microfilaments. Meissner corpuscles have a capsule made of endoneurial-perineural fibroblastic connective tissue. Two to four layers of fibroblasts and fibrillary matrix border the deepest part of the corpuscle. The capsule's apex is unfinished. Collagen fibrils from the interlamellar matrix extend into the dermis in this area, anchoring the receptor to the epidermis' basal surface.

A nerve terminal produced from an intermediate-large amyloid-beta myelinated afferent fibre supplies each corpuscle. Additional unmyelinated C fibres have also been observed to innervate the epidermis; however these fibres may simply pass through the corpuscle. Normally, a single axon supplies corpuscles; however corpuscles with two to seven auxiliary branches from the main

Axon has been reported. As it enters the corpuscle, the nerve fibre keeps its myelin coating, but after a short distance, it becomes amyelinic. As it wanders tortuously through the lamellae, the nerve fibre forks several times, creating bulbous expansions.

Meissner corpuscles are cutaneous nerve endings that convey delicate, discriminative touch and vibration sensations to the brain. Meissner corpuscles respond to skin indentations of less than 10 micrometres and are particularly sensitive to low-frequency vibrations between 10 and 50 Hertz. These corpuscles may also sense the sensation of slip between an item and the skin, providing grip control. Because certain axons may express substance P and other nociceptive peptides, Meissner corpuscles have been proposed to have a role in pain sensation transmission. The role of these corpuscles in human nociception has to be investigated further.

Collagen fibres linked to the lamellae transmit the external force applied to a Meissner corpuscle. The resultant physical distortion causes the nerve axon terminals to bend, causing an action potential to be generated. When the stimulus is removed, the form of the corpuscle returns to normal, resulting in a second series of action potentials. Meissner corpuscles are low-threshold phasic receptors, meaning they adjust to stimuli fast. The reactivity of Meissner corpuscles diminishes significantly after prolonged stimulation before stopping. Such sensors are unable to communicate information about the stimulus' duration.

Cutaneous Meissner corpuscles are present in glabrous skin, especially the fingers, palms, and soles, and they increase sensitivity to light touch in these tissues. On the lips, palate, tongue, and genitalia, there are more Meissner corpuscles. The density of Meissner corpuscles varies greatly between investigations, and there is no consensus on how many there are. In one research, corpuscular densities in digit five and the thenar eminence were found to be 12 and 5.1 corpuscles per millimetre, respectively.