

SENSORY INNERVATION OF THE UPPER LIP IN THE DOMESTIC PIG (*Sus scrofa f. domestica*)

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Abstract: The corpuscular sensory structures in the corium of pigs' lip are mostly represented by simple lamellar corpuscles, which occur in 3 basic variants: with the axon straight or bended, with the axon divided into branches and with division of the distal part of the corpuscle. The last two types occur only in 9.4% of cases and are also called Golgi-Mazzoni corpuscles. Glomerular sensory corpuscles occur only sporadically. Both these kinds of sensory corpuscles serve the mechanoperception and adapt rapidly.

Keywords: Domestic pig, *Sus scrofa*, Suidae, Neuroanatomy, Sensory corpuscles.

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1. Introduction

Simple lamellar corpuscles were described in different regions of the pig skin - see Malinovsky *et al.* (1982), also for review, Ortonne *et al.* (1987), Rettig and Halata (1990) and Corona *et al.* (1991). Malinovsky *et al.* (*op. cit.*) described in the pig lip skin also glomerular corpuscles.

Only little attention was paid to variability of sensory corpuscles, to comparison with other kinds of animals and to character of glomerular sensory corpuscles. These problems became therefore the aim of our work. In accordance with Malinovsky (1990) we refuse the term "nerve ending" as each sensory structure represents a structural system formed by several subsystems. The same concerns the term "receptor" which is used in modern biology for binding capacities on the cells' level. Therefore

the above author proposed the new term "sensory nerve formation - SNF".

2. Material and Methods

The sensory innervation of the upper lip of the domestic pig was studied in 5 adult individuals. Nervous structures were demonstrated using silver impregnation according to Bielschowski - Gross - Lawrentyev for light microscope; for electron microscopic examination the material was firstly fixed in glutaraldehyde and then processed in the usual way.

3. Results

In the epidermis simple SNF were found. In the corium occur subepidermal arborizations of nerve fibres, numerous lamellar sensory corpuscles and sporadic simple glomerular corpuscles (Fig. 1).

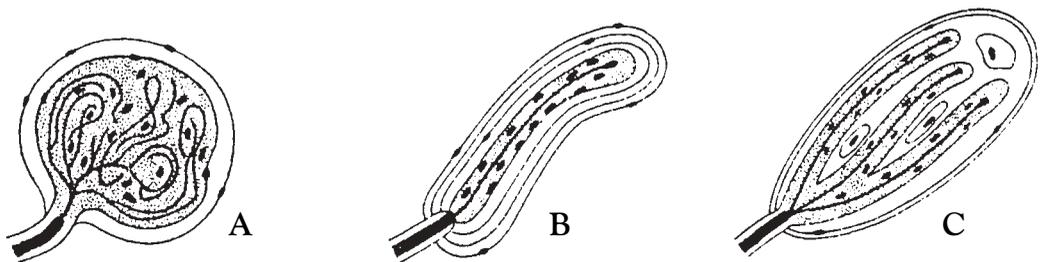


Figure 1 - Glomerular (A), simple lamellar (B) and Golgi-Mazzoni (C) sensory corpuscles.

Lamellar sensory corpuscles occur in 3 basic variants: a) with the axon straight or bended (90.5% of cases); b) with axon divided into 2 or several branches (9.0%) and c) with division of the distal part of the corpuscle (0.4% of cases). The axon or its branches are always situated within the inner core, formed by several lamellae of modified Schwann cells. The surface of the corpuscle is covered by a relatively thin capsule. The ultrastructural examination confirmed the usual structure of simple lamellar corpuscles only with a greater amount of thick collagenous microfibrils in the interlamellar spaces.

Glomerular sensory corpuscles were found only sporadically. One or two axons enter the corpuscle and form inside it a ball - like (glomerular) formation. The capsule is very thin. The electron microscope proved that these corpuscles are formed by accumulation of dendritic zones and irregularly arranged modified Schwann cells. The capsule is formed only by several perineural lamellae.

4. Discussion

The results demonstrate morphological variability of lamellar sensory corpuscles (Krause cylindric end - bulbs) and Golgi-Mazzoni corpuscles as a variety of the first group. In comparison with the goat's lip skin (Malinovsky & Matonoha, 1968) and with cat's lip skin (Malinovsky, 1966b) there occurs a smaller amount of Golgi-Mazzoni corpuscles in the pig's skin (Fig. 2). This difference could be connected with different function of the upper lip in the pig in comparison with that in the goat and in the cat in which the upper lip is more used as a touch organ. Ramification of the axon, of the inner core and of the whole corpuscle is probably joined with an enhanced touch perception. In cat's foot-pads a still greater amount of Golgi-Mazzoni corpuscles was found (Malinovsky, 1966a).

Ortonne *et al.* (*op cit.*) think that lamellae of the inner core are of the same origin as those of perineural cells forming the capsule and correspond to the epithelial cells. This view is in a strong contradiction with all other works concerning the origin of both kinds of these cells.

The glomerular sensory corpuscles are less frequent in non-primate mammals (Malinovsky *et al.*, 1993); the simple lamellar and Golgi-Mazzoni corpuscles are less frequent in Primates, in which the glomerular corpuscles of different varieties prevail.

Both these kinds of sensory corpuscles are the-

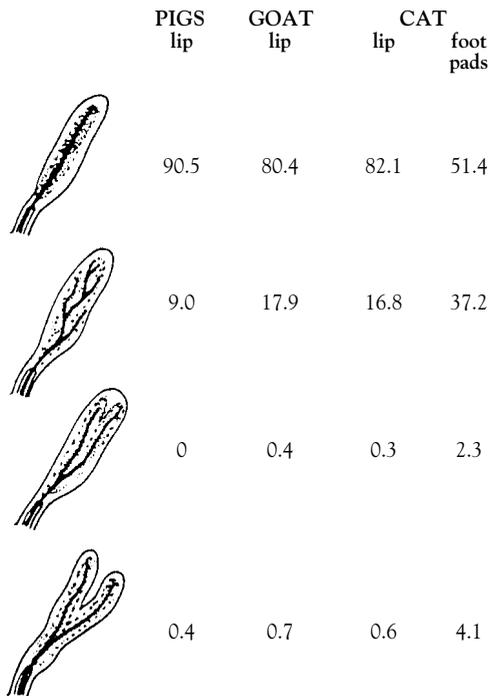


Figure 2 - Comparison of variability of lamellar corpuscles in the upper lips of the pig, the goat and the cat and in foot pads of the cat. The numbers indicate the occurrence percentage. The rest to 100% is represented by other types of corpuscles.

refore commonly considered as equivalent structures serving the mechanoperception. While for simple sensory corpuscles and Golgi-Mazzoni corpuscles a rapid adaptation was proved, the adaptation velocity of the glomerular corpuscles was not stated till now. Notwithstanding with regard to their structure a rapid adaptation of these corpuscles can be anticipated, too.

In the pig lip skin no Meissner corpuscles were found. The only described finding by Dubreuil (1937) probably was a glomerular sensory corpuscle described by us.

Ortonne *et al.* (*op. cit.*) described in deep layers of epidermal ridges of pig snout skin numerous Merkel cells. Rettig and Halata (*op. cit.*) found in the epithelial pegs of the anal canal Merkel complexes associated into groups (more than 200 complexes). The hair follicles are innervated by simple SNF, Ruffini SNF, Merkel complexes and hair bulbs.

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