Localization of Postganglionic Neurons to the Male Genital Organ in the Major Pelvic Ganglion of the Rat

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SHIMIZU, T., EGAN-KONOPKA, L.M., OHTA, Y. and DUN, N.J. Localization of Postganglionic Neurons to the Male Genital Organ in the Major Pelvic Ganglion of the Rat. Tohoku J. exp. Med., 1982, 136 (3), 351-352 —– The localization of postganglionic neurons to the penis within the major pelvic ganglion of the male rat was investigated by means of the retrograde HRP method. The results demonstrated that labeled neurons are localized in the caudal pole of the ganglion and also in the main branch to the penis and that some labeled fibers pass through the ganglion into the pelvic nerve. HRP method; postganglionic neurons; penis (clitoris); major pelvic ganglion

Anatomical localization of neurons in the rat superior cervical ganglion that projected into different postganglionic trunks has been studied by Bowers and Zigmond (1979). The major pelvic ganglion of the rat is a good material for this kind of investigation, because it has well defined postganglionic processes (Langworthy 1965; Purinton et al. 1973). Among them, the main nerve to the penis (clitoris) is the largest branch projecting from the ganglion. The study was undertaken to obtain detailed information on the topographical distribution of neurons which innervate the penis in the major pelvic ganglion.

In six anesthetized male rats, either the right or the left main branch was cut 2-3 mm apart from the ganglion and solid HRP was applied to the proximal cut-end for 1 hr. 48 hr after HRP application, the ganglion was removed and immersed in a common fixative. In a cryostadt the ganglion was cut in parallel to its flat lateral surface. Sections were incubated into H2O2 and Hanks-Pates reagent and counter-stained with neutral red.

Under the light microscope, the neurons containing brown reaction products were identified as those labeled retrograde with HRP. In sections of superficial (lateral) part of the ganglion, where several small branches projected from the ganglion, a few labeled cell bodies were found in the caudal pole of the ganglion. Many labeled neurons were observed in sections through the deep (medial) aspect of the ganglion (Fig. 1) in which the pelvic and hypogastric nerves were seen. They were situated not only in the caudal pole of the ganglion but in the main branch to the penis. At the bases of the pelvic and hypogastric nerves no labeled neurons were observed. The present results coincide with physiological evidence that the postganglionic neurons are situated close to the effector organs.

It seems possible that the labeled neurons include short adrenergic neurons insisted by Dail and Evan (1974) and sensory neurons to the penis found by Purinton et al. (1971). There are several unlabeled neurons at the base of the main branch and in the caudal...
pole of the ganglion. Our investigation by intracellular recordings has revealed that some ganglionic neurons in these regions receive presynaptic inputs from the penis (unpublished). According to Purinton et al. (1971), sensory neurons in the ganglion are synaptically connected with ganglionic neurons and formed a peripheral reflex to the penis. The unlabeled neurons are probably postganglionic neurons of this reflex system.

The labeled nerve bundles at the base of the pelvic nerve may be afferent fibers originating from the penis and reaching the dorsal root ganglion through the pelvic nerve.

![Diagram of HRP-labeled neurons in the pelvic ganglion](image_url)

**Fig. 1.** The distribution of HRP-labeled neurons in a section of medial part of the right pelvic ganglion. A: Both labeled (solid) and unlabeled (open) neurons are shown. 1, main branch to the penis (clitoris); 2, pelvic nerve; 3, hypogastric nerve; 4, 5, other large branches from the ganglion. B: The labeled neurons (dots) for simplifying the diagram A.

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**References**