

HISTOLOGICAL STRUCTURE OF THE REPRODUCTIVE ORGANS IN LABORATORY ANIMALS

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Abstract. This article, using neurohistological methods, investigates the histological structure and development of nerve fibers in the seminal vesicles of rats during the postnatal period. The seminal vesicles are richly supplied with nerve elements, consisting of myelinated and unmyelinated nerve plexuses and fibers. During the period of sexual maturation, the nerve fibers of the seminal vesicles reach their highest degree of development.

Keywords: rat, postnatal period, seminal vesicles, development, innervation, neurohistological methods.

ГИСТОЛОГИЧЕСКОЕ СТРОЕНИЕ ПОЛОВЫХ ОРГАНОВ У ЛАБОРАТОРНЫХ ЖИВОТНЫХ

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Аннотация. В данной статье с использованием нейрогистологических методов изучена гистологическая структура развития нервных волокон семенных пузырьков у крыс в постнатальном периоде. Семенные пузырьки богато снабжены нервными элементами, состоящими из миелиновых и безмиелиновых нервных сплетений и волокон. В период полового созревания нервные волокна семенных пузырьков достигают наивысшей степени развития.

Ключевые слова: крыса, постнатальный период, семенные пузырьки, развитие, иннервация, нейрогистологические методы.

Introduction. One of the complex and insufficiently studied problems in modern neurobiology is the question of the origin, development, and age-related changes of the nervous system [1,2]. A comprehensive understanding of the relationship between structure and function requires their study from an ontogenetic perspective. A review of the literature available to us has shown that the development of the seminal vesicles in rats, unlike that of other organs, has attracted little attention from researchers [3,4,5]. The issue of innervation of the seminal vesicles has received scant attention with regard to the material substrate of innervation. In the works of these authors, histological and cytological data on the development of cellular and tissue (especially nervous) structures of the rat seminal vesicles in different age periods are either completely absent or presented insufficiently [6,7,8]. Aiming to fill this gap to some extent, we investigated the morphology of the vesicles and their nervous elements throughout postnatal development.

Aim of the Study. To investigate the neurohistological development of the nerves of the seminal vesicles in rats during the postnatal period.

Materials and Methods. The material for the study consisted of seminal vesicles from 69 rats, covering ages from the suckling period to the period of pronounced senile changes. To address the objectives, general histological, neurohistological, and histochemical methods were employed. The general structure of the seminal vesicles was revealed by hematoxylin-eosin staining; collagen fibers of connective tissue were detected using the Van Gieson method, and elastic fibers using the Weigert method. Nervous elements of the seminal vesicles were visualized by silver impregnation according to the methods of Bielschowsky-Gros, Campos, and Rasskazova, while cell nuclei were counterstained with alum carmine.

Results of the Study. The results of the study showed that the seminal vesicles are richly supplied with nervous elements: nerve trunks, myelinated and unmyelinated

fibers, plexuses, ganglia, and sensory nerve endings. Numerous small nerve trunks divide into bundles of varying thickness, consisting mainly of unmyelinated fibers. These bundles branch repeatedly and intertwine, forming nerve plexuses. In some areas, nerve trunks consisting predominantly of unmyelinated fibers are encountered. Sensory nerve endings are represented by thin terminals formed from myelinated fibers that have lost their myelin sheath. These receptor structures are encountered infrequently and mostly have the appearance of small bushes. Quite often, in the wall of the seminal vesicles, small ganglia consisting of nerve cells can be detected. The latter often vary in shape and size. Nerve trunks and bundles anastomose with each other through the exchange of individual nerve fibers and bundles. In the adventitial layer, individual nerve bundles and fibers intertwine to form a nerve plexus, from which nerve fibers extend into the muscular layer. In the muscular layer of the seminal vesicles, nerve trunks follow a tortuous course and form a large number of nerve plexuses. Some nerve trunks cross blood vessels along their path. At the sites of crossing, the nerve trunks and individual fibers become strongly argyrophilic and dilated, which is likely an adaptive, functional phenomenon. Thick nerve trunks divide into thinner ones, which give rise to preterminal fibers that often end in bush-like terminals. Some myelinated nerve fibers, having lost their myelin sheath, terminate in arborized or dichotomous terminal branches of a receptor nature. Nerve fibers accompanying blood vessels form perivascular nerve plexuses on them or terminate as terminals both in the vessel wall and in the surrounding tissue of the seminal vesicle. Analysis of our material showed that in rats during the suckling period (days 1–21), the intramural nervous apparatus is not yet fully formed; thus, out of 8–20 differentiating nerve cells, only 2–3 are mature. At the age of 22–120 days (immature period), further complexity of the nervous elements occurs; the number of mature nerve cells reaches 5–8. During this period, the number of fibers in the nerve trunks significantly increases, as does the density of the nerve plexuses.

Conclusion. In the sexually mature reproductive period, the nervous elements of the seminal vesicles in rats reach their maximum development. The nerve trunks contain the greatest number of nerve fibers, the nerve plexuses achieve the highest density, and the majority of nerve cells are differentiated multipolar neurons. During this period (5–23 months), the seminal vesicles reach their greatest development and possess the most highly developed nervous apparatus. In the period of pronounced senile changes (19–40 months), marked reactive structural changes in the nervous elements are observed.

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