

**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ**



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**107-ї підсумкової науково-практичної конференції
з міжнародною участю
професорсько-викладацького колективу
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DEVELOPMENT, EVOLUTION, AND FUNCTIONAL SIGNIFICANCE OF THE
VOMERONASAL ORGAN

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Introduction. The sensory organs transmit physical (vision, hearing, and touch) or chemical (smell and taste) signals. In particular, the chemoreceptors of the respiratory epithelium are anatomically connected with the structures of the limbic system and therefore contribute to the formation of emotions, memories, and behavior. The cortical end of the olfactory analyzer is located in the hippocampal gyrus (Ammon's horn). Parallel to the olfactory system, there exists the vomeronasal system, or the vomeronasal organ (VNO).

The aim of the study. To investigate the development, evolution, and functional significance of the vomeronasal organ in humans and certain animals, and to outline prospects for further research.

Materials and methods. The work presents a scientific analysis of data from original research publications concerning the morphology, evolution, and physiology of the vomeronasal organ.

Results of the study. The ontogenetic development of the VNO in humans begins with the formation of an epithelial thickening on the medial wall of the nasal cavity approximately on the 33rd day of embryonic development. As a result of invagination, a canal is formed that transforms into a tubular structure, increasing in length and volume. The VNO appears as a pair of epithelial tubes opening into the nasal cavity and located in the submucosal layer of the anterior third of the nasal septum. Histological studies confirm the presence of Jacobson's organ. In fetuses, the VNO appears as paired tubes surrounded by small blood vessels with autonomous innervation. By the 28th week of gestation, intraepithelial blood vessels and mitotic figures are no longer observed, which may indicate degeneration of the vomeronasal organ.

Histological examination of the nasal septum has revealed vomeronasal cavities in approximately 70 % of adults. Unlike in other mammals, the human VNO is not supported by a rigid bony or cartilaginous tube. There is no erectile tissue around the cavities to facilitate active intake of stimuli; therefore, stimuli likely enter the lumen of the organ only by passive diffusion against the flow of mucus secreted by glands. The epithelium of the human VNO differs markedly from the VNO epithelium of other species as well as from both olfactory and respiratory epithelia in humans.

Currently, histological examination remains the only reliable method for identifying the VNO. Numerous staining methods (hematoxylin, eosin, Weigert's resorcin-fuchsin, trichrome staining, etc.) are used for light microscopy, as well as immunohistochemical techniques that enable detection of molecular markers characteristic of nerve cells, vomeronasal, and olfactory neurons within the VNO cells. The VNO is histologically present in almost all examined samples of adult humans, but macroscopically only the vomeronasal pit on the nasal septum is visible-usually yellowish in color due to the accumulation of lipofuscin. The size and shape of the pit demonstrate considerable variability.

The microbiome (of the skin, gastrointestinal, and genitourinary tracts) determines the volatile compounds secreted by the body. A well-known example of the decisive role of the microbiome in body odor formation is the production of axillary secretions that arise from the biotransformation of naturally secreted odorless precursor molecules by skin bacteria. The recent loss of smell as a marker of COVID-19 infection has made the importance of olfaction more evident to humans in general, clearly influencing individual well-being.

Conclusion. From the above, it follows that there is no consensus regarding the anatomical structure, development, functional role, or sex- and age-related changes of the human vomeronasal organ, which structurally represents a blind canal within the mucosa of the nasal septum. Its morphological parameters and age-related functional changes in the postnatal period have not been established. Its role in the perception of aromatic compounds and anatomical connection with the

central nervous system remain unproven. The human VNO is most likely not a vital organ for human existence but rather a functional evolutionary remnant.

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STRUCTURE AND TOPOGRAPHICAL-ANATOMIC RELATIONSHIPS WITH ADJACENT FORMATIONS OF THE NASAL SEPTUM IN ADULT PEOPLE

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Introduction. Recently, doctors around the world have been facing the problem of diseases of the upper respiratory tract, in particular, pathologies of the nasal cavity and sinuses. Over the past 10 years, there has been an increase in the number of these diseases worldwide. In terms of its anatomical structure, the nasal cavity is quite complex in the human body. A large number of works published by scientists around the world indicate excessive interest in this problem. However, at the same time, this indicates the lack of a common consensus on the anatomical structure, in the process of establishment, development, functioning, gender-age changes of the nasal septum, etiology and pathogenesis of its most common diseases and the choice of the optimal type of correction.

The aim of the study. To study the structure, topographic-anatomical features and syntopy of the nasal septum in people of mature age

Materials and methods. Using classical morphological research methods (microscopic, histological, macroscopic, radiological), the features of the structure and syntopy of the structures of the nasal septum were studied on 40 preparations and computer tomograms of people of mature age.

Results of the study. The medial wall of the nasal cavity is formed by the nasal septum, represented by cartilaginous and bone parts. The cartilaginous part is formed by the cartilage of the nasal septum, which has the shape of an irregular quadrangular plate. The anteroposterior dimension of the cartilage is 29.0 ± 0.42 mm, the vertical dimension is 26.0 ± 0.56 mm, and the thickness is 3.2 ± 0.02 mm. Its posterior-inferior edge, in the form of a small process, is wedged between the anterior edge of the perpendicular plate of the ethmoid bone and the anterior edge of the cochlea.

The bony part of the nasal septum is formed by the perpendicular plate of the ethmoid bone and the cochlea. The anteroposterior dimension of the perpendicular plate is 36.0 ± 1.6 mm. The vertical dimension near the anterior end of the plate is 24.0 ± 0.63 mm, and near the posterior end is 18.0 ± 0.14 mm. The thickness of its bone wall is 3.0 ± 0.07 mm. The median branch of the ethmoid artery horizontally goes to the nasal septum (while intersecting the trunks of the olfactory nerves at right angles), and then has a descending direction.

In the nasal septum, the vessels are divided into 5-8 branches of the third order, which diverge in a fan-shaped manner. The latter are divided into branches of the following orders. Their numerous trunks are found in the mucous membrane of the nasal septum. The sphenopalatine artery enters the posterior nasal cavity through the sphenopalatine foramen. At a distance of 12.0-16.0 mm anterior to the sphenopalatine foramen, the latter gives off 2-4 main branches to the lateral wall of the nose and one, larger, to the nasal septum - the posterior septal artery.

The posterior septal artery on all preparations has a horizontal direction, in the posterior part of the nasal septum it is dichotomously divided into second-order branches: upper and lower. The upper one goes forward, divides into tertiary branches, which anastomose with the posterior ethmoid arteries. The lower one is closer to the lower edge of the nasal septum. On its way, it gives off third-order branches, which anastomose with each other and form loops of various shapes and sizes. In addition, the above branches give numerous thin branches to the epithelial lining. In the latter, they form a dense vascular network.

Conclusions. The greatest concentration of the arterial network on the studied preparations is found in the anterior lower part of the nasal septum. Topographically, the most superficially located small network of blood vessels, then - medium-caliber vessels and, finally, large vascular trunks have the deepest position. The mucous membrane of the posterior parts of the nasal septum is