

ИССЛЕДОВАНИЕ ГИСТОМОРФОЛОГИЧЕСКОГО СОСТОЯНИЯ СТЕНКИ ДЫХАТЕЛЬНЫХ ПУТЕЙ У ЭКСПЕРИМЕНТАЛЬНЫХ ЖИВОТНЫХ (КРОЛИКОВ) В НОРМЕ

М.Т.Юлдашева.

Ферганский медицинский институт общественного здоровья.

Для цитирования: © Юлдашева М.Т.

ИССЛЕДОВАНИЕ ГИСТОМОРФОЛОГИЧЕСКОГО СОСТОЯНИЯ СТЕНКИ ДЫХАТЕЛЬНЫХ ПУТЕЙ У ЭКСПЕРИМЕНТАЛЬНЫХ ЖИВОТНЫХ (КРОЛИКОВ) В НОРМЕ. ЖКМП.-2024.-Т.1.-№1.-С

Поступила: 19.01.2024

Одобрена: 07.02.2024

Принята к печати: 05.03.2024

Аннотация: В проведенной экспериментальной работе была исследована гистология дыхательных путей 14 кроликов-самцов породы шиншилла. Выявлены особенности структуры слизистой оболочки носовой полости, гортани, трахеи и бронхов. Обнаружены различные типы эпителиальных клеток, включая реснитчатые, бокаловидные, базальные, микроворсинчатые и эндокринные клетки. В гортани отмечено отсутствие клеток Клара и Лангерганса, а также отсутствие кашлевого рефлекса. Резюме подчеркивает гистологические особенности дыхательных путей кроликов, что может быть важным для понимания их физиологии и патологии.

Ключевые слова: дыхательные пути, слизистая оболочка, гортань, трахея, бронхи.

EKSPERIMENTAL HAYVONLAR (QUYONLAR)DA NORMAL HOLATDAGI NAFAS TIZIMI YO'LLARINING GISTOMORFOLOGIK HOLATINI O'RGANISH

М.Т.Юлдашева.

Фарғона жамоат саломатлиги тиббиёт институти.

Izoh: © Yuldasheva M.T.

EKSPERIMENTAL HAYVONLAR (QUYONLAR)DA NORMAL HOLATDAGI NAFAS TIZIMI YO'LLARINING GISTOMORFOLOGIK HOLATINI O'RGANISH. KPTJ.-2024-N.1.-№1-M

Qabul qilindi: 19.01.2024

Ko'rib chiqildi: 07.02.2024

Nashrga tayyorlandi: 05.03.2024

Аннотация: Tajribada shinshilla zotining 14 erkak quyonida nafas olish yo'llarini gistologik tadqiqot usulida o'rganildi. Tadqiqotda burun bo'shlig'i, halqum, traxeya va bronxlar shilliq qavatining tuzilishidagi o'ziga xos xususiyatlar aniqlandi. Epiteliya hujayralarining har xil turlari, shu jumladan kirpikli, qadahsimon, bazal, jiyakli va endokrin hujayralar aniqlandi. Halqumda Klara va Langergans hujayralarining yo'qligi, shuningdek yo'tal refleksining yo'qligi qayd etilgan. Xulosa quyonlarning nafas olish yo'llarining gistologik xususiyatlarini o'rganish, bu hayvonlar fiziologiyasi va patologiyasini tushunish uchun muhim bo'lishi mumkin.

Калит со'злар: nafas yo'llari, shilliq qavat, halqum, traxeya, bronxlar.

STUDY OF THE HISTOMORPHOLOGICAL CONDITION OF THE RESPIRATORY TRACT IN EXPERIMENTAL ANIMALS (RABBITS) UNDER NORMAL CONDITIONS

Yuldasheva M.T.

Fergana Medcial Institute of Public Health.

For situation: © Yuldasheva M.T.

STUDY OF THE HISTOMORPHOLOGICAL CONDITION OF THE RESPIRATORY TRACT IN EXPERIMENTAL ANIMALS (RABBITS) UNDER NORMAL CONDITIONS. JCPM.-2024.P.1.№1-A

Received: 19.01.2024

Revised: 07.02.2024

Accepted: 05.03.2024

Annotation: The conducted experimental work involved the histological study of the respiratory tract in 14 male rabbits of the chinchilla breed. The study revealed peculiarities in the structure of the mucous membrane of the nasal cavity, larynx, trachea, and bronchi. Various types of epithelial cells were identified, including ciliated, goblet, basal, microvillous, and endocrine cells. The larynx was noted for the absence of Clara and Langerhans cells, as well as the absence of the cough reflex. The summary emphasizes the histological features of rabbit respiratory pathways, which may be important for understanding their physiology and pathology.

Keywords: respiratory tract, mucous membrane, larynx, trachea, bronchi.

Introduction: Currently, due to the unfavorable environmental situation, there is an increasing concern about the irritating effects of odors from various chemical substances on the mucous membrane of the respiratory system organs, which consists of two main sections: the air-conducting pathways and the respiratory section [1]. The air-conducting pathways are divided into upper (the walls of the nasal cavity, nasopharynx, and oropharynx) and lower respiratory pathways (larynx, trachea, and bronchi). The mucous membrane of the respiratory pathways is covered with a multilayered ciliated epithelium [2]. The trachea is a tubular organ; at the bifurcation, it divides into two main bronchi, which enter the lungs through their gates. Inside the lung tissue, they repeatedly divide and form the bronchial tree. The smallest is the respiratory (respiratory) bronchioles, ending in small sacs - alveoli; together, they constitute the structural-functional unit of the lungs - the acinus, where gas exchange occurs between alveolar air and venous blood in capillaries covering the walls of the alveoli [3]. The acini look like small grape clusters. Their vesicular shape gives the lungs an amazing structure.

The respiratory organs perform vital functions for the organism; pathologies of this system can cause various severe disorders, up to respiratory failure, and can lead to a fatal outcome [4]. In particular, the respiratory system of rabbits differs from that of humans due to anatomical features of the chest cage, thoracic cavity and its components, as well as the diaphragm, which serves as a respiratory muscle. The diaphragm is a dome-shaped muscle, the contractions of which contribute to respiratory movements and changes in lung volume. Interest in the histological and morphological description of the respiratory tract in rabbits is justified by their value as models for research, as rabbits are considered hypersensitive to atmospheric pollutants, which induce various respiratory system pathologies [5].

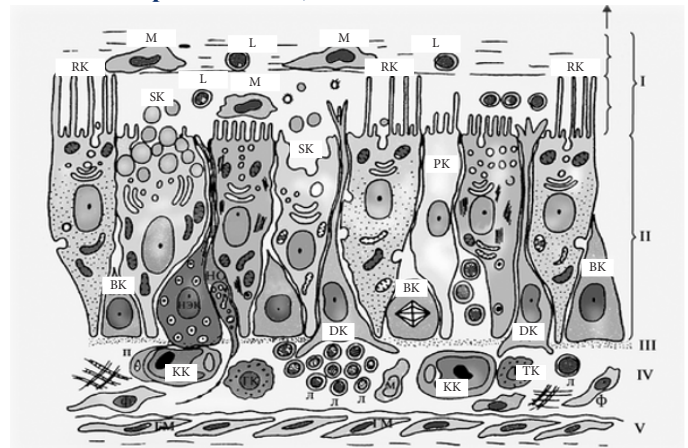
Material and Methods: The study utilized clinically healthy male rabbits of the chinchilla breed at various ages, with an average weight ranging from 2.3 to 2.8 kg. The rabbits were housed under identical conditions in the vivarium of the Fergana Medical Institute of Public Health. Fourteen male rabbits were selected for the investigation, and the euthanasia of animals was carried out under standard conditions. Tissue samples were obtained from the

walls of the nose, nasopharynx, larynx, trachea, and bronchi. The collected tissue specimens were fixed in neutral formalin. Microscopic slides were prepared and stained with hematoxylin-eosin using the Van Gieson method, and Schiff's reagent-Shik reaction was employed. Histomorphological structures of the mucous membrane of various sections of the respiratory pathways were examined under a light microscope to assess their condition.

Results: The research revealed that in rabbits, the cranial respiratory pathways comprise the nasal cavity, its walls, nasopharynx, and larynx, while the caudal respiratory pathways consist of the trachea, bronchi, and bronchioles with alveoli, each exhibiting distinctive histomorphological features. The mucous membrane of the nasal cavity and nasopharynx walls contains various types of cells, including ciliated, goblet, basal, microvillous, mucous, brush, and endocrine cells.

Fig. 1. Epithelial Cells of the Mucous Membrane in the Rabbit Air-Conducting Pathways.

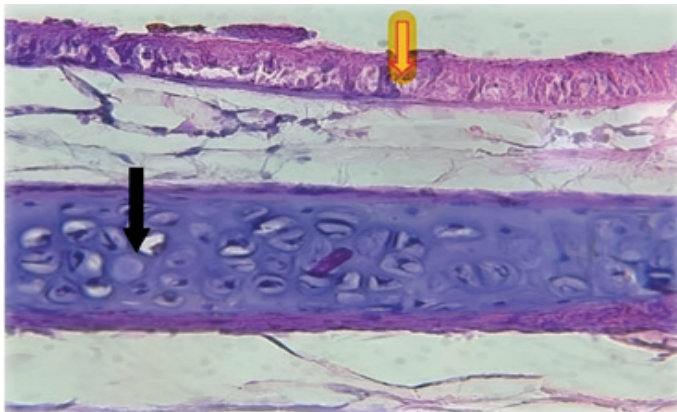
1 - ciliated multilayered epitheliocytes; 2 - endocrine cells; 3 - goblet exocrinocytes; 4 - non-ciliated cells; 5 - brush epithelial cells; 6 - basal membrane.



The larynx communicates with the oropharynx through its upper opening and transitions into the trachea at its lower part. The laryngeal wall consists of three layers, with the mucous membrane being the innermost layer, covered by a multilayered columnar epithelium. Between the epithelial cells, there are goblet, basal, microvillous, and brush cells. In the rabbit's larynx, Clara cells and Langerhans cells are absent, and there is no cough reflex. Beneath the epithelium lies the lamina propria, consisting of loose fibrous connective tissue with an elastic fiber network, mucous glands secreting mixed protein secretion, and clusters of lymphoid tissue resembling laryngeal tonsils.

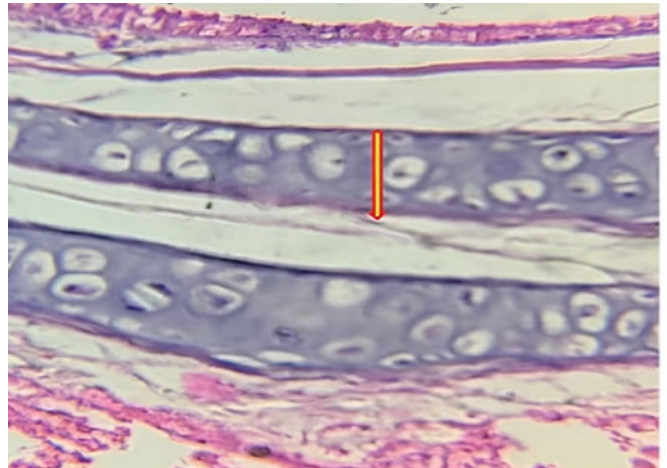
The fibrocartilaginous layer, with hyaline and elastic cartilaginous tissues, serves as the framework of the larynx. The adventitial layer is composed of loose fibrous connective tissue. Similarly, the tracheal wall of the rabbit consists of three layers (humans have four). The tracheal mucous membrane features ciliated epithelial cells, endocrine cells, goblet cells, and basal cells. Lymphoid follicles are present in the submucosal layer.

Fig. 2. Cross-section of the Rabbit Trachea. Histological Structures of the Mucous Membrane, Submucosa, and Cartilaginous Tissue.
(Hematoxylin Eosin. Magnification 10x, approximately 40x).



The trachea further divides into two main bronchi, branching asymmetrically to the right and left from the tracheal bifurcation. The right main bronchus (RMB) is shorter (0.8-1.2 cm) and wider (0.7-0.9 cm) than the left. Rabbit bronchi form a bronchial tree, with each main bronchus branching into 32 orders of bronchi (compared to 25 in humans). The RMB, from bifurcation to lung hilum, has 5-6 cartilaginous semirings, while the left main bronchus has 7-9. At the lung hilum, the RMB gives rise to cranial, middle, caudal, and accessory lobar bronchi, each corresponding to lung lobes. The left main bronchus, at the hilum, divides into cranial and caudal lobar bronchi, supplying the respective lung lobes. Bronchial walls consist of four layers: mucosa, submucosa, muscularis, and adventitia. Histomorphological studies reveal unique features in rabbit bronchi, including ciliated and columnar epithelial cells, goblet cells, brush cells, endocrine cells, Clara cells, and dendritic cells (Langerhans cells) on the mucous membrane. Dendritic cells are absent in other respiratory tract sections. Lymphoid follicles are present in the submucosa.

Fig. 3. Histological sections of the left intrapulmonary bronchus of the rabbit. The bronchial wall contains two layers of cartilage.
(Hematoxylin Eosin, magnification 40x).



Adult rabbit lungs (right and left) resemble irregular cones, covered by pleural sacs, and are located within the slightly compressed thoracic cage. The right lung is more voluminous than the left. Lung surfaces include diaphragmatic, costal, medial (mediastinal, vertebral part, with the left lung featuring a "cardiac" impression), and interlobar surfaces. The edges encompass a blunt dorsal edge, cardiac notch, and acute edge (ventral and basal). The left lung is divided into cranial (smaller) and caudal (larger) lobes by an oblique cranial fissure. A cardiac notch is present at the lower part of the anterior medial surface. The right lung, divided by cranial and caudal fissures, includes cranial, middle (wedge-shaped), caudal, and accessory (distinctive form) lobes. Interspersed between lung lobes are additional shallow fissures, contributing to individual lung variability. The number of lobes varies on each side, with the right lung comprising four lobes and the left lung containing two.

Conclusion: Clara and Langerhans cells, as well as mucous glands responsible for the cough reflex, are absent in the mucous membrane of the rabbit's trachea and bronchi. Dendritic cells are absent throughout the rabbit's respiratory tract, except in the bronchial mucosa. Each main bronchus in rabbits bifurcates into 32 orders of bronchi.

REFERENCES:

1. Ghofran Filihah Abd Al-Hussan¹, Wafaa Hadi AL-Hashemi², Waleed Jaleel abed AL-Kelaby³, Mohummed E. Mansur // Morphological and histological study of respiratory system of rabbits. Volume 7 / Issue 2 / 6, DOI. [10.21931/RB/2022.07.02.6](https://doi.org/10.21931/RB/2022.07.02.6)
2. Hamidova F.M., Ismoilov M.ZH. Sostoyanie slizistoj i podslizistoj obolochki traheobronhial'nogo derevo v norme. // "Science and education", 2023 V.4, Is5.
3. Harchenko V.V., Mantulina L.A., Nikishina E.I., Bahmet A.A., Klyuchkova S.V. Sostoyanie slizistoj obolochke traheobronhial'nogo dereva v norme u lyudej zrelogo vozrasta. // "Kurskij nauchno-prakticheskij vestnik" "Chelovek i ego zdorov'e", 2016 №3, S 89-99
4. Timofeevich L. M. Morfofunkcional'naya harakteristika resnitchatogo epiteliya vozduhonosnyh putej: novye nauchnye svedeniya k prezhnim predstavleniyam // Byulleten' fiziologii i patologii dyhaniya. 2015. № 57. C. 120–129.
5. Tkachenko L.V. Topograficheskaya anatomiya glavnyh bronhov, vorot i kornya legkih vzroslogo krolika v norme // Vestnik Altajskogo gosudarstvennogo agrarnogo universiteta № 12(86), 2011

Информация об авторах:

© ЮЛДАШЕВА М.Т. - Ферганский медицинский институт общественного здоровья. г. Фергана. Узбекистан.

Muallif haqida ma'lumot:

© YULDASHEVA M.T. - Farg'ona jamoat salomatligi tibbiyot instituti. Farg'ona sh. O'zbekiston.

Information about the authors:

© YULDASHEVA M.T. - Fergana Medical Institute of Public Health. Fergana. Uzbekistan.