ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Histological Examination of Lungs of Gerbils Is Large When Infected with Micro-bacteria of Tuberculosis.

Yessimsiitova Zura[1]*, Kozhamzharova Assel [1], Tleubekkyzy Perizat[1], Ablaikhanova Nurzhanyat[1], Tussupbekova Gulmira[2], Bazarbayeva Zhannat[2], and Tagirova Rima[2].

Kazakh state national university of al-Farabi, Almaty, Kazakhstan,
S.D. Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan.
Medical University, Astana, Kazakhstan.

ABSTRACT

The tissue reaction at the site of localization of MBT initially has a nonspecific character. Such a reaction is observed in tissues regardless of the type of pathogen. There are violations of microcirculation, increased permeability of the vascular wall, local edema of the tissues, infiltration of the lesion zone by leukocytes, monocytes and other shaped elements of the blood. The first specific morphological signs of tuberculous inflammation appear later, two to three weeks after infection with the MBT. Specific inflammation. The development of tuberculosis specific inflammation is due to immunological changes that occur when the macroorganism interacts with the tuberculosis pathogen. In this regard, a specific inflammatory reaction in tuberculosis is characterized as a classic example of inflammation on the immune basis. The basic morphological element of tuberculous inflammation is a tubercle, which is more often called tuberculosis granuloma. Visualization of tuberculosis granuloma is possible with light microscopy. The most important distinctive feature of tuberculosis granuloma is the presence of a centrally located zone of curdled, or caseous, necrosis - dense amorphous tissue detritus, formed as a result of damage and death of phagocytes. Morphological changes in the lungs were studied with a large gerbil, infected with mycobacteria tuberculosis bovine and avian type. Infection was carried out subcutaneously in the groin area of the lower limb. The dose of infection is 1 mg per 1 ml. The duration of the experiment is three months. An animal slaughter was carried out every month. A number of features characterizing the morphological changes in tuberculosis have been revealed, which are manifested by a significant increase in the bulk density of the caseo-necrotic component, a decrease in the volume density of lymphoid infiltration in the lung tissue, and morphological signs of a decrease in T-cell immunity in the lymph nodes. As a result of all these changes, pathological processes develop, leading to the formation of tubercular tubercles of various sizes in the pulmonary parenchyma.

Keywords: morphology, tuberculosis, lungs, lymph nodes

Corresponding author Bissenbayeva Zh. Almaty, Chulanova 129, +77073851878, zhanat_2006@mail.ru

ISSN: 0975-8585

INTRODUCTION

Among the numerous physiologically important organ systems, one of the leading organs is the respiratory system. Lungs are a multifunctional organ. They not only perform gas exchange of the organism with the external environment, but also participate in thermoregulation, excretion of a number of substances, play an important role in fat and lipid metabolism, and also perform barrier, protective functions. The variety of lung functions determines the importance of their study.

Among the many environmental factors that specifically affect the lungs, the most dangerous is the effect of various strains of mycobacterium tuberculosis. The greatest epidemiological danger is represented by mycobacteria of bovine, avian and human species, which can be carried by various species of domestic and wild animals. To develop preventive and diagnostic measures to prevent the occurrence of tuberculosis of domestic animals and humans transmitted by wild animals, the study of structural and functional changes in the lungs in tuberculosis is of great importance. Lesions of pulmonary tuberculosis invariably cause changes in other organs. At the same time, there is a constant change in the liver. Along with functional changes, the development of a specific tuberculous inflammation is possible [1-8].

Tuberculosis of the lung is a disease of infectious etiology, which proceeds with the formation of specific inflammatory foci in the lungs. To date, pulmonary tuberculosis is not only a medical-biological, but also a serious socio-economic problem. Recently, many researchers have noted various morphofunctional rearrangements of the membrane system after exposure to certain factors. Of particular interest in this connection is the question of the peculiarities of the histological structure after infection with typical strains of tuberculosis of wild vertebrates [9-19]. Literary data on this issue are small and of a debatable nature. In connection with this, our task was to study the morphology of the lung system of gerbils large in norm and after infection with typical strains of tuberculosis after one or three months.

MATERIALS AND METHODS

The material for the study was a resectional lung tissue of large gerbil, infected with mycobacteria tuberculosis of bovine and avian type. Infection was carried out subcutaneously in the groin area of the lower limb. The dose of infection is 1 mg per 1 ml. The duration of the experiment is three months. An animal slaughter was carried out every month. For the study, the lungs were taken. The following were used as fixatives:

1) A solution of 10% neutral formalin;
2) Fixator of the FSU;

Subsequently, the material was processed according to a conventional method and poured into paraffin. From the paraffin blocks, sections of 5-6 microns thick were made. Histological sections were made on the MC-2 silt microtome, stained with hematoxylin-eosin. Further histological preparations were photographed on a microscope MBI-3.

RESULTS OF THE STUDY

The histological study of lungs of gerbils large in norm allowed to reveal the following features of their structure. The left lung is not subdivided into shares, the right has four lobes. Since the division of the lungs into lobes is associated with a more complete and perfect functioning of the breathing apparatus, in the gerbil, apparently, the main load in gas exchange is the right lung. Bronchial tree is short, intrapulmonary bronchi give branches from three to five orders of magnitude. Intrapulmonary bronchi have a three-layer anatomical type of structure. The bronchial mucosa is well developed. The single-layer epithelium of the mucosa is represented by multilayered low cylindrical cells located on the basal plate. The intrinsic layer of the bronchial mucosa is very thin, represented by fibrous elements, oriented mainly along the longitudinal axis of the bronchi. The muscular layer is poorly developed, and in the small bronchi almost completely disappears.

This indicates their low contractility. Bronchial glands in lungs of gerbil, as well as at all rodents, are poorly developed. According to modern concepts, bronchial glands take part in the process of thermoregulation. The alveolar department has a finely bubble structure. The shortening of intrapulmonary bronchi in small

ISSN: 0975-8585

mammals is indicative of their primitive function, and the small-bubble type of the alveolar region limits the volume and intensity of alveolar gas exchange (Fig. 1).

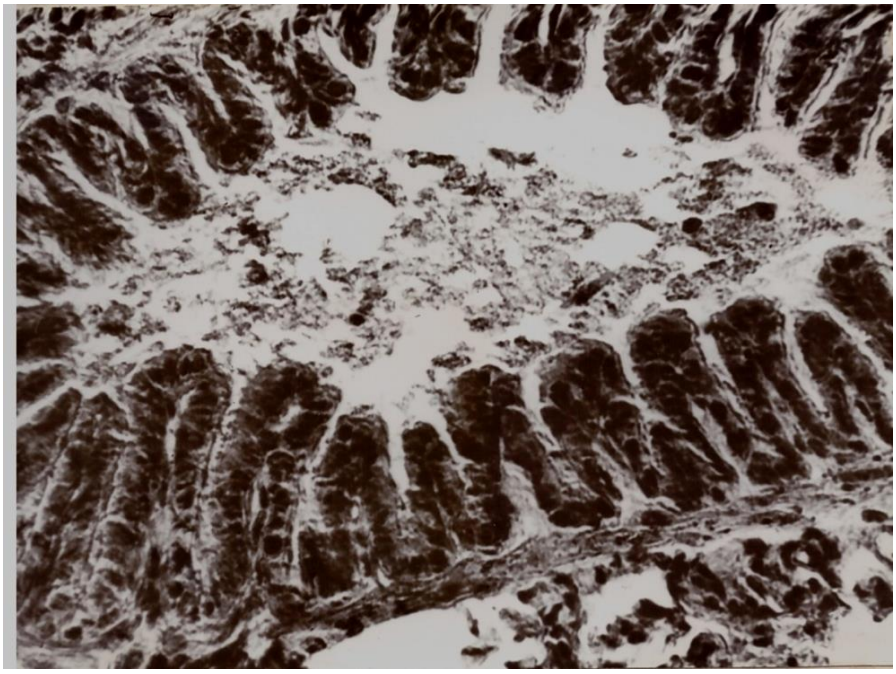

Figure 1. Microphotograph 10 x ok. okr. hematoxylin-eosin. Bronch is normal

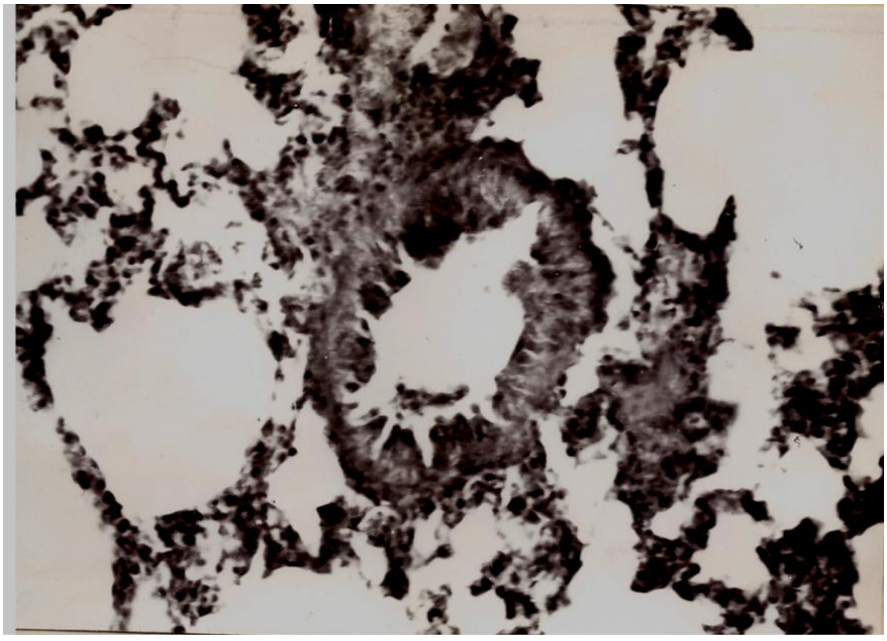

Figure 2. Microphotograph 10 x ok. okr. hematoxylin-eosin. Infected with avian type.

Morphological study of easy gerbils large with artificial infection of animals with mycobacteria tuberculosis avian typospecific inflammatory changes in the lungs occurs in the first month. In the field of the introduction of mycobacteria in the pulmonary parenchyma, tubercular tubercles begin to form. In the walls of the bronchi there is a partial sloughing of the epithelium into the cavity of the bronchi. The second month of the course of the tuberculosis process is characterized by the following changes, in the bronchi there is a pathological change, characterized by an increase in the folding of the mucous membrane, here and there the destruction of the walls of the bronchi takes place (Fig. 2).

Near some bronchi tubercular tubercles are formed, which are an example of productive tuberculous inflammation. In the alveolar department, the pathological process manifests itself in the form of thickening of the alveolar septa and in the accumulation of lymphoid cells in places. Near these clusters there are necrotic changes in the pulmonary parenchyma. Around the small bronchi and bronchioles there is a granulation tissue and tubercles that undergo necrosis. In the third month, with a favorable course, the tuberculous process subsides. At the same time, the inflammatory exudate resolves, the foci of tuberculosis are encapsulated and calcified due to the growth of the connective tissue.

Histological examination of light experimental animals infected with mycobacteria of bovine tuberculosis showed that in a month, specific changes appear in the pulmonary tissue. There is thickening of the alveolar septa, in some areas the integrity of the respiratory epithelium is destroyed. The phenomenon of hyperemia is clearly pronounced, infiltration of the connective tissue thrombus of the lungs with erythrocytes and leukocytes is observed. In the pulmonary parenchyma, tubercle tubercles of various sizes appear. Pathological changes are affected by bronchi, increased folding of the mucous membrane, in some bronchi partial destruction of the walls is observed, sometimes the lumen of the bronchi is filled with a secret. Two months later, the tuberculosis process progresses, which is manifested in the formation of large tubercles, covering a significant part of the lungs. The most severe structural changes are exposed to the lungs three months after infection with a bulbar type. The alveolar walls are strongly thickened (Fig. 3).

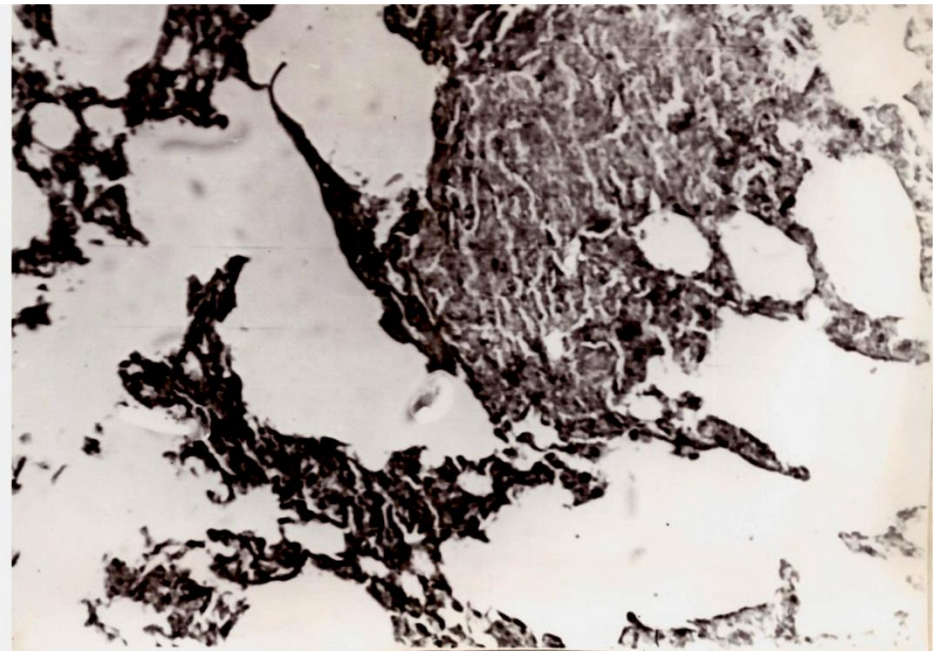

Figure 3. Microphotograph 10 x ok. okr. hematoxylin - eosin. Infected Mt.Bovis. 3 month

Severe lesions of the bronchi are noted. Hyperemia of the vessels is accompanied by extensive hemorrhages. Lungs in many areas are filled with pathological tissue. Foci of caseous necrosis are noted. In some areas there is a primary ingrowth deep into the caseous masses of the young connective tissue. In a specific granulation layer, epithelioid and lymphoid cells.

CONCLUSION

The lungs of non-infected animals clearly differentiate into the conductive and respiratory or alveolar parts. The walls of the bronchi are thin, indistinctly differentiated into separate layers. The most developed mucosa, the muscular layer is expressed insignificantly and is represented by single smooth-muscle beams. The alveolar region is generally fine-meshed and consists of short alveolar bronchioles opening through narrow alveolar courses into small alveolar sacs formed by interalveolar septa.

Experimental infection of gerbils with mycobacteria of a tuberculosis of the bird type in the lungs after a month there are small structural changes in the form of hyperemia, infiltration, partial mothballing of the

respiratory and bronchial epithelium. In the second month there is an increase in signs of a specific inflammation up to the formation of tuberculous tubercles in the center with necrosis. Bronchial diseases are subject to pathological changes, folding is increased, in places the destruction of the wall is observed. In the third month there is a stagnation of the tuberculosis process, accompanied by resorption of exudate and encapsulation of foci.

Histological examination of light animals infected with bovine type mycobacterium tuberculosis showed that already in the first month, pronounced specific changes appear in the pulmonary parenchyma: the tubercular tubercles reach considerable dimensions, the pulmonary septa are greatly thickened, and partial destruction of the walls is observed in individual bronchi. The most severe structural changes are exposed to the lungs three months after infection by the bovine type of pathogen. Severe lesions of the bronchi are noted. Pulmonary tissue in many areas is replaced by pathological. Foci of caseous necrosis are noted.

Thus, the histological methods of investigation made it possible to detect changes in microscopic structures accompanied by certain functional disorders of the alveolar cells at all stages of the development of inflammation.

CONCLUSIONS

- When a large gerbil is infected, typical strains of tuberculosis show specific changes at the tissue level.
- Pathological changes at the tissue level are expressed in the appearance of small granulomas in the first month and progression in the third month when administered. Bt. Bovis. With the introduction of the St. Avium strain, the granulomatous changes are not pronounced and have a small point character up to 3 months, then the attenuation of the tuberculous process.

REFERENCES

[1] Balasanyants G.S., Greymer M.S., Shpanskaya L.S. Indicators of endocrine status in patients with acute progressive pulmonary tuberculosis // Probl. Tub.-2000, - No. 6.- P.41-43;

[2] Balasanyants G.S. Acute progressive pulmonary tuberculosis: diagnosis, clinic, treatment: Abstract of the dissertation. Doct. honey. Sci., St. Petersburg, 2000.-35p .;

[3] Gavrilenko B.C. Clinical characteristics of adult patients with respiratory tuberculosis // Tuberculosis today: Proceedings of the VIIth Growth Congress of Phthisiatricians-Moscow, 2003, pp. 126;

[4] Gavrilenko B.C. Clinical characteristics of adult patients with respiratory tuberculosis // Tuberculosis today: Proceedings of the VIIth Growth Congress of Phthisiatricians-Moscow, 2003, pp. 126;

[5] Tereshin B.C. On the diagnosis of tuberculosis in the general health care network. // Probl. Tub .- 2003.- №5. p.23-26;

[6] Shilova M.V. Peculiarities of the prevalence of tuberculosis in different federal districts of Russia // Tuberculosis Today: Proceedings of the VII Russian Congress of Phthisiatricians Moscow, 2003 - P.31.

[7] Averin VV On the state of the function of external respiration in patients with infiltrative pulmonary tuberculosis // Clinical and experimental problems of modern phthisiology: Tr. VIII scientific. Conf. TsNIIT / Ed. AG Khomenko .- M., 1977. P. 29-30.

[8] Adamovich V.N. Infiltrative-pneumonic pulmonary tuberculosis: Abstract. diss. . Doct. honey. Sciences.- Moscow, 1970.-23 p.

[9] Alexandrova A.V. X-ray diagnosis of respiratory tuberculosis. Moscow: Medicine, 1983.-192 p.

[10] Alexandrova TM, Aksenova K. Yu., Kuznetsova VI, Novikova TI, Shishkina SI The current course of tuberculosis in the Stavropol Territory // Sb. summary reports of the III Congress of phthisiatricians. - Ekaterinburg, 1997.- p. 8.

[11] Gavrilenko V.C. Clinical characteristics of adult patients with respiratory tuberculosis // Tuberculosis today: Materials VII. Congress of phthisiatricians-Moscow, 2003 p. 126

[12] Gamperis Yu., Gaydamamene D., Dimbelene M. The immediate and long-term results of 6-month chemotherapy for newly diagnosed patients with pulmonary tuberculosis // Probl. Ty6.-1993.-N4.-p.58.

[13] Gilmyarov RF, Aminev Kh.K., Glebova V.B. et al. State and prospects of antituberculous care for the population of the Republic of Bashkortost // Sb. summary reports of the III Congress of phthisiatricians: -Ekaterinburg, 1997.- p. Eleven.

[14] Gorokhova, TV, "Dynamics and structure of drug resistance of mycobacterium tuberculosis in patients with pulmonary tuberculosis," Probl. Tub. - 1997.- P.33-35.

[15] Gudz EA, Prilutsky AS Immunological reactivity of patients with different tuberculosis activity // Probl. tube. 1987.-No.3. - P.44-47

[16] Nurtazin ST, Esimitsiytova ZB, Mankibaeva SA, Bazarbaeva Zh.M. Morphological study of the lungs of large gerbil, infected with mycobacterium tuberculosis M.t.bovis. Khabarshi ecology series, №3 (42), Almaty «Kazakh University» 2014. 405-408 p.

[17] Z. Yessimsiitova, J. Bazarbaeva, S. Nurtazin, N. Ablaikhanova. The hıstologocal study of the effect of radiotrophy of the speccıal products on the stomach of Wıstar rats exposed to gamma-ırradıatıon. Jornal of Boitechnology Volume 185, Suplement, Pages S1-S126 (September 2014) European Biotechnology Congress 2014, IF-3,34 page S48.

[18] Mankibaeva SA, Nurtazin ST, Esimitsiytova ZB, Bazarbaeva Zh.M., Saparov KA, Abdullaeva BA Bulletin of KazNU, biological series No. 1 (63). 2015 P.310-315.

[19] Espembetov B.A., Bazarbaeva Zh.M., Nisanova R.K., Yesimitsiytova Z.B., Syrym NS, Zinina N.N. Vector vaccine against brucellosis. Bulletin of Treasury. The series is ecological. №1 / 2 (40), Almaty «Kazakh University» 2014. P. 77-80.