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The effect of thiotriazoline on impaired immune system in experimental pneumonia and contact dermatitis

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Abstract

Literary sources indicate that various pathological processes are accompanied by the development of a violation of the immune system.

The aim of the study was to determine the pathogenetic justification for the use of thiotriazoline on the basis of immune system disorders in experimental pneumonia (EP) and contact dermatitis (CD).

The researches were carried out on 55 guinea-pigs. The study material was collected on the 4th, 8th, 10th and 18th days of EP and ECD under ether anesthesia. EP was called by the method of VN Shlyapnikov, TL Solodov. ECD was simulated by method of VA Volkovoj. The content of T and B lymphocytes in the blood was determined by the method of Chernushenko KF, Kogosova LS, and the level of the circulating immune complexes (CIC) by the method of V. Haskova, J. Kaslik. We have established a gradual increase in the level of B-lymphocytes and CIC against the background of a decrease in T-lymphocytes in the blood on the 4th, 8th, 10th and 18th days of the development of EP and CD, with a predominance on the 18th day of the experiment before treatment. The use of thiotriazoline caused an immunocorrective effect in CD and EP.

Key words: contact dermatitis; pneumonia; immune system; thiotriazoline.

Влияние тиотриазолина на нарушенные показатели иммунной системы при экспериментальной пневмонии и контактном дерматите

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Литературные источники свидетельствуют о том, что разные патологические процессы сопровождаются развитием нарушением иммунной системы. Цель исследования: определить патогенетическое обоснования применения тиотриазолина на основании нарушений иммунной системы при экспериментальной пневмонии (ЭП) и контактном дерматите (КД). Проводили исследования на 55 морских свинках. Декапитацию животных проводили на 4-е, 8-е, 10-е и 18-е сутки ЭП и КД под эфирным наркозом. ЭП воспроизводили по методу В.Н. Шляпникова и соавт., КД – по методу В.А. Волковой. Содержание Т и В лимфоцитов определяли по методу Э. Ф. Чернушенко, Л.С. Когосова. ЦИК по методу V. Naskova, J. Kaslik.

Нами установлено постепенное возрастания уровня В-лимфоцитов и ЦИК на фоне снижения Т-лимфоцитов в крови на 4-е, 8-е, 10-е и 18-е сутки развития ЭП и КД с преобладанием на 18-е сутки эксперимента до лечения. Применения тиотриазолина вызывало иммунокорректирующий эффект при КД и ЭП.

Ключевые слова: контактный дерматит; пневмония; иммунная система; тиотриазолин.

One of the most common respiratory pathologies is pneumonia, which increases significantly and in most cases it causes a number of various complications, periods of incapacity for work and even death [3, 7]. Contact dermatitis (CD) in the structure of skin diseases takes from 20-80% of cases.

Currently, an important problem of medicine is the study of comorbid pathology in the clinic and combined pathology in the experiment, which mutually enhance the formation and aggravate the underlying disease, as well as affect immunological reactivity, cause complications, reduce treatment of such diseases [1]. Pneumonia and contact dermatitis also belong to these diseases.

At present, the issues concerning changes in immune homeostasis in combined pathology - pneumonia and contact dermatitis before and after treatment with thiotriazoline have not been fully studied.

The aim of the study was to determine the pathogenetic justification of the use of thiotriazoline based on disorders of cellular and humoral immunity in the dynamics of experimental pneumonia (EP) and contact dermatitis.

Materials and methods. The researches were carried out on 55 guinea-pigs (males), the weight of each one was 180-220g. They were divided into 6 groups. I group (control) were intact guinea-pigs (10 animals), II, III, IV and V groups – were animals with an experimental pneumonia and experimental contact dermatitis (ECD) in accordance on the 4th, 8th, 10th and 18th days of experiment (for 9 animals each of them) before treatment. The last VI group included animals with EP and ECD on the 18th day of their development that were treated by thiotriazoline. Thiotriazoline was administered intramuscularly at a dose of 100 mg per 1 kg of weight daily from the 8th to the 18th days of the experiment during 10 days. We have selected fixed days (4th, 8th, 10th and 18th) for studies that correspond to the classical stages of the inflammatory process. For the purpose of detailed analysis and interpretation of immune system indicators in different days of the experiment, two periods of development of ECD and EP were distinguished: early (4th and 8th days of experiment) and late (10th and 18th days).

EP was called by the method of VN Shlyapnikov, TL Solodov [4]. ECD was simulated by method of VA Volkovoj [2]. The content of T and B lymphocytes in the blood was determined by the method of Chernushenko KF, Kogosova LS [5], and the level of the circulating immune complexes (CIC) by the method of V. Haskova, J. Kaslik [6]. Numerical results were adapted with static method using Student's criteria.

Results and discussion. Immunological studies revealed a decrease in the level of T-lymphocytes in the blood on the 4th and 8th days of development of EP and CD, respectively, by 37.2% ($p < 0.05$) and 50.2% ($p < 0.05$) against the first group of animals. Then on the 10th and 18th days of inflammatory processes in the lungs and skin there was an even greater decrease in this indicator, in accordance, by 81.0% ($p < 0.05$) and 82.0% ($p < 0.05$) relative to control, indicating the suppression of cellular immunity, especially on the 10th and 18th days of the experiment.

The study of the content of B-lymphocytes in the blood both in the early (4th and 8th days) and in the late (10th and 18th days) periods of EP and CD development established their gradual increase by 29.3% ($p < 0.05$), 83.3% ($p < 0.05$), 89.3% ($p < 0.05$) and 98.0% ($p < 0.001$)

against control, indicating stimulation of the humoral immune system, which predominated on the 10th and 18th days of these disease models.

CIC research is important for the characteristic of humoral immunity state, which can play both a protective and damaging role in the development of a disease. The early period (4th and 8th days) EP and CD was manifested by an increase in the level of CIC in the blood by 29.9% ($p < 0.05$) and 58.5% ($p < 0.05$) against intact animals, respectively. On the 10th and 18th days of ECD and EP development there was a further growth in the level of CIC in the blood by 66.7% ($p < 0.05$) and 92.1% ($p < 0.05$) relative to control, which showed about one of the immunocomplex mechanisms of inflammatory processes formation in lungs and skin.

Thus, our research results indicate a disturbed immune status in CD and EP. This became the basis for the pathogenetic justification of the use of the drug thiotriazoline for immunocorrective purposes.

The use of thiotriazoline for 10 days caused an increase in the level of T-lymphocytes by 94.3% ($p < 0.05$) and a decrease in the content of B-lymphocytes and CIC in the blood by 31.6% ($p < 0.05$) and 29.7% ($p < 0.05$) in the VI group on the 18th day against a group of animals with these models of diseases, which were not administered this drug. The results of our research indicate its immunocorrective effect on impaired indicators of the immune processes.

Thus, our determination of immune system markers on the 4th, 8th, 10th and 18th days of CD and EP makes it possible to state the violation of the immune system and its participation in the pathogenesis of their development.

Conclusions. Based on the results of our research, we can conclude that in the development of EP and CD there are significant changes in the immune system. This was manifested by cellular depression and activation of humoral immune systems and their active participation in the pathogenesis of the development of these disease models before therapy. The use of the drug thiotriazoline caused an immunocorrective effect on impaired markers of immune processes in EP and CD. Therefore, these results indicate that it is possible to use thiotriazoline the complex therapy of contact dermatitis and pneumonia and its pathogenetic justification.

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