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Characteristic of individual indicators of phagocytic activity of leukocytes under conditions of formation of experimental contact dermatitis and experimental pneumonia and the effect of the drug thiotriazoline

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Abstract

The work demonstrated, that polymorho-nuclear leucocytes take an active part in formation of experimental contact dermatitis and experimental pneumonia before and after administration of the antioxidant thiotriazoline and also testify to metabolic processes stimulation in leucocytes.

The immune-modulating thiotriazoline preparation application, beginning from 8 th day of the experiment, and during 10 days, showed the renewal of indexes of phagocytar leucocytes' activity, the test of nitroblue tetrasolium, what testifies to its corregating action – on nonspecific resistance condition.

Key words: contact dermatitis; pneumonia; polymorho-nuclear leucocytes; nonspecific resistance; thiotriazoline.

Характеристика окремих показників фагоцитарної активності лейкоцитів за умов формування експериментального контактного дерматиту і експериментальної пневмонії та вплив препарату тіотриазоліну

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У роботі встановлено, що поліморфно-ядерні лейкоцити приймають активну участь у формуванні експериментального контактного дерматиту та експериментальної пневмонії, а також свідчать про стимуляцію метаболічних процесів у лейкоцитах.

Застосування імуномодулюючого препарату тиотріазоліну, починаючи з 8-ї доби експерименту впродовж 10 днів, показало відновлення показників фагоцитарної активності лейкоцитів, тесту нітросинього тетразолію в порівнянні з групою тварин, які не піддавалися впливу цього препарату, що свідчить про його імунокоригуючу дію на стан неспецифічної резистентності.

Ключові слова: контактний дерматит; пневмонія; поліморфно-ядерні лейкоцити; неспецифічна резистентність; тіотриазолін.

Характеристика отдельных показателей фагоцитарной активности лейкоцитов в условиях формирования экспериментального контактного дерматита и экспериментальной пневмонии и влияние препарата тиотриазолина

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В работе установлено, что полиморфно-ядерные лейкоциты принимают активное участие в формировании экспериментального контактного дерматита и експериментальной пневмонии, а также свидетельствуют об стимуляции метаболических процессов в лейкоцитах.

Применение иммуномодулирующего препарата тиотриазолина, начиная с 8 суток эксперимента на протяжение 10 дней, показало восстановление показателей фагоцитарной активности лейкоцитов, теста нитросинего тэтразолия в сравнение с

группой животных, которые не подвергались действию этого препарата, что свидетельствует об его корригирующем действие на состояние неспецифической резистентности.

Ключевые слова: контактный дерматит; пневмония; полиморфно-ядерные лейкоциты; неспецифическая резистентность; тиотриазолин.

Introduction. Pneumonia remains an important medical and social problem in the 21st century. This is due, first of all, to its high prevalence, relatively high rates of disability and mortality, as well as significant economic costs as a result of this disease [6]. The incidence of pneumonia in European countries ranges from 2 to 15 cases per 1000 people per year, in Ukraine this rate is about 400 cases per 100 000 adults. The risk of development pneumonia increases with age [6]. Combined pathology, which accounts for the majority of chronic diseases, not only adversely affects patients' treatment but also significantly impairs their quality of life. To date, issues related to the diagnosis and treatment of combined conditions are extremely relevant. Contact dermatitis is one of the most common diseases today that develops in response to contact with various factors [5]. It is established that the violation of the immune mechanisms of protection in patients is one of the essential reasons for the formation of a chronic course of a disease [5].

Non-specific reactivity factors play an important role in the body's anti-infectious protection. Polymorphonuclear leukocytes (PMNL) are one of the leading links in this system. Together with macrophages, they are involved in the uptake and disintegration of antigens that produce a number of antiviral and bactericidal agents, mediators of inflammation. Performing an important function in inflammatory reactions, PMNL integrate them with immune responses [3]. Given the above, we first studied the functional state of PMNL in experimental contact dermatitis (ECD) and experimental pneumonia (EP) at 4,8,10 and 18 days of the experiment before and after treatment.

We evaluated nonspecific resistance of the organism by studying phagocytic number (PhN), phagocytic index (PhI) and nitrosin tetrazolium test (NST test) in peripheral blood of guinea pigs at certain stages of experimental combined model, and the effect of the drug thiotriazoline, which has antioxidant, immuno-correcting, membrane-stabilizing and detoxifying properties.

Thus, the purpose of our research was to study the individual indicators of phagocytic leukocyte activity (PhLA) in the blood of guinea pigs in the dynamics of ECD and EP and to correct their disorders by thiotriazoline.

Materials and methods. The researches were carried out on 60 guinea-pigs (category: Cavia porcellus, males). The weight of each one was 180-220g. They were divided into 6 groups for 9 animals each of them, except the first (15 animals). Among the first group (control) were intact guinea-pigs. Among the second group were animals with an ECD and EP (4^{th} day). Among the third group were guinea-pigs on the 8^{th} day of the experiment. The fourth group consisted of animals with an experimental CD and EP (10^{th} day) and the fifth group included guinea-pigs with an combined pathology (18^{th} day, before thiotriazolin using). The last sixth group included animals that were treated by thiotriazolin. For the purpose of detailed analysis and interpretation of PhLA indicators in different days of the experiment, two periods of development of ECD and EP were distinguished: early and late. The chosen days of ECD and EP were due to the classical stages of the inflammatory process. Early period included groups of animals on the 4^{th} and 8^{th} days of experiment. The late one – guinea pigs on the 10^{th} and 18^{th} days of ECD and EP.

Experimental contact dermatitis was simulated by method of VA Volkovoj (2010). EP was called by the method of VN Shlyapnikov, TL Solodov (1998). Thiotriazoline was administered intramuscularly at a dose of 100 mg per 1 kg of weight daily from the 8^{th} to the 18^{th} days of the experiment. The study material was collected under ether anesthesia. All groups of guinea pigs were determined by PhI [2], PhN [2], NST test [3] in the blood. Numerical results were adapted with static method using Student's criteria.

Results and discussion. Studying PhI in the peripheral blood of guinea pigs with ECD and EP we observe the following picture: phagocytic index, as well as PhN on the 4^{th} day was at the level of control values ($p \geq 0.05$), and already on 8,10 and 18 days PhI decreases respectively by 53.6%, 55.7% and 57.5% when compared with intact guinea pigs ($p \leq 0.05$). Similar, only less pronounced changes occur with the phagocytic number: a decreasing of 26.5%, 22.4%, and 42.8%, respectively, at 8, 10, and 18 days of the experiment against group I animals ($p \leq 0.05$).

Therefore, while summarizing the change in PMNL in guinea pigs in experimental CD and EP, we see its suppression depending on the duration of antigenic factors, which indicates a depression of leukocyte activity under these conditions.

We also studied the NST test, which is recognized as one of the most objective criteria for evaluating the functional status of peripheral blood PMNL. The results of the study showed on the 4^{th} day of ECD and EP without stimulation at the level of control values ($p \geq 0.05$). In the future (at 8, 10 and 18 days) regression of the studied indicator by 22.9%,

32.7% and 37.7% when compared with the control group of animals ($p \leq 0.05$) is noted, indicating possible suppression by the non-specific level of immunity.

The obtained results give an opportunity to express the opinion that PMNL are actively involved in the formation of ECD and EP, and also indicate stimulation of metabolic processes in leukocytes. The above tests (PhAL and NST) are of high diagnostic value and allow to characterize the degree of activity of the inflammatory process and to determine the participation of individual units of mechanisms of protection of the organism.

For the correction of nonspecific resistance in the sixth group of animals was introduced immuno-correcting drug thiotriazoline. The use of thiotriazoline showed an increase of PhI in 58.0%, of PhN by 39.2%, NST test without stimulation by 34.2% compared with the group of animals that were not exposed to this drug ($p_1 \leq 0.05$).

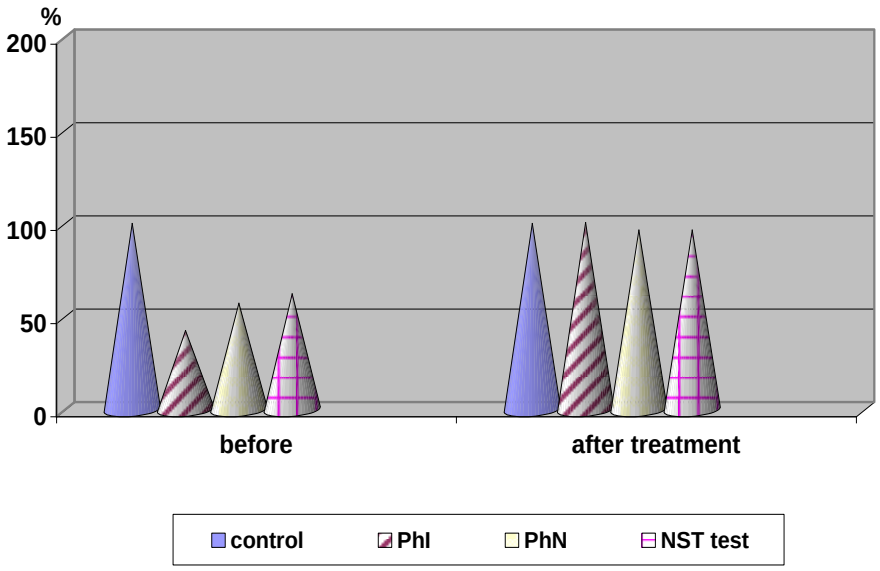

Fig. 1. The influence of thiotriazolin on the level of PhAL indexes in guinea pigs' blood in the ECD and EP formation dynamics

Conclusions. The obtained results make it possible to consider the violation of nonspecific resistance in this combined experimental model. Immunomodulatory therapy, which included the use of thiotriazoline for 10 days, resulted in the correction of PhAL and NST test. Thus, based on the conducted studies, it can be argued that thiotriazoline has a corrective effect on these metabolic processes in neutrophils under conditions of the development of ECD and EP and needs further experimental and clinical studies.

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