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CHARACTERISTICS OF THE INDIVIDUAL COMPONENTS OF THE GUINEA PIGS' HUMORAL IMMUNE BLOOD IN THE DYNAMICS OF THE EXPERIMENTAL BRONCHIAL ASTHMA FORMATION

ХАРАКТЕРИСТИКА ОКРЕМИХ КОМПОНЕНТІВ ГУМОРАЛЬНОГО ІМУНІТЕТУ КРОВІ МОРСЬКИХ СВИНОК В ДИНАМІЦІ ФОРМУВАННЯ ЕКСПЕРИМЕНТАЛЬНОЇ БРОНХІАЛЬНОЇ АСТМИ

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Abstract

It was found rapid growth of immunoglobulin A in early period of the disease in comparison with control values, indicating apparently his particular activation and stimulation of humoral immunity in general. In the late period (26^{th} and 33^{rd} day) formation asthma revealed the increasing of this index, but top down direction respectively 100,0% and 45,5% opposite the first group of guinea pigs ($p \leq 0,05$).

As for the content of other types of antibodies, the highest level of content immunoglobulins M and G in the blood was in the fourth group of guinea pigs with asthma (26^{th} day), indicating a direct dependence of antigenic impact on the economic performance and the body's ability to respond adequately protective response to the damaging effect factor. However,

in the latest period of experimental models of disease are seeing a slight decline all parameters of humoral immunity.

Evaluating the results of the research it can be concluded that stimulation of humoral immunity and the inclusion of protective mechanisms in the process, which aims are the destruction of antigens and removing them from the body of animals with experimental asthma.

Key words: bronchial asthma, immune system, immunoglobulins A, M, G.

Реферат

У роботі встановлено стрімке зростання рівня імуноглобуліну А в ранньому періоді експериментальної моделі хвороби у порівнянні з показниками контрольних величин, що свідчить очевидно про його активацію зокрема, та стимуляцію гуморального імунітету в цілому. У більш пізні етапи (на 26 і 33-і доби) формування бронхіальної астми виявлено також підвищення цього показника, але нисхідного напрямку відповідно на 100,0% та 45,5% напроти І групи морських свинок ($p \leq 0,05$).

Щодо вмісту інших видів імуноглобулінів, то найвищий ступінь вмісту імуноглобулінів М та G у крові був у четвертої групи морських свинок з БА (на 26-у добу), що говорить про пряму залежність часу антигенного впливу на рівень цих показників та здатність організму адекватно відповідати захисною реакцією на дію пошкоджуючого фактора. Проте, у найпізніший період експериментальної моделі хвороби спостерігаємо незначний спад усіх досліджуваних показників гуморальної ланки імунітету.

Оцінюючи результати дослідження, можна зробити висновок про стимуляцію гуморальної ланки імунітету та про включення захисних механізмів у процес, який спрямований на руйнування антигенів та видалення їх з організму тварин з експериментальною бронхіальної астмою.

Ключові слова: бронхіальна астма, імунна система, імуноглобуліни А, М, G.

Реферат

В работе установлен стремительный рост уровня иммуноглобулина А в раннем периоде экспериментальной модели болезни в сравнении с показателями контрольных величин, что свидетельствует очевидно о его активации в частности, и стимуляцию гуморального иммунитета в целом. В более поздние этапы (на 26 и 33-ые сутки) формирование бронхиальной астмы обнаружено также повышение этого показателя, но обратного направления соответственно на 100,0% и 45,5% напротив I группы морских свинок ($p \leq 0,05$).

Относительно содержимого других видов иммуноглобулинов, то наивысшая степень содержимого иммуноглобулинов М и G в крови была у четвертой группы морских свинок из БА (на 26-ые сутки), что говорит о прямой зависимости времени антигенного влияния на уровень этих показателей и способность организма адекватно отвечать защитной реакцией на действие патогенного фактора. Однако, в самый поздний период экспериментальной модели болезни наблюдаем незначительный спад всех исследуемых показателей гуморального звена иммунитета.

Оценивая результаты исследования, можно сделать вывод о стимуляции гуморального звена иммунитета и о включении защитных механизмов в процесс, который направлен на разрушение антигенов и удаление их из организма животных с экспериментальной бронхиальной астмой.

Ключевые слова: бронхиальная астма, иммунная система, иммуноглобулины A, M, G.

Introduction. Allergic diseases occupy a large part in the clinic of internal medicine and tend to permanent growth. Bronchial asthma (BA) - a chronic relapsing disease based on the increased reactivity of the bronchial tree of immunological and non- immunological genesis. First of all this disease is caused by the rapid growth of the chemical industry, pollution products of incomplete combustion, industrial emissions, excessive use of various drugs, etc. [1,2]. It was found that susceptibility to various inflammatory and allergic lung lesions and to their clinical course features is associated with the immune system, which is actively involved in host mechanisms' defense [3]. In normal lymphoid apparatus bronchoalveolar tree is represented with both specific and nonspecific immune units. Humoral factors of local defense include immunoglobulins (Ig) A, M, G. They indicate the status of the local immune system in serum indirectly. One of the most important physiological function of immunoglobulin is the neutralizing antigens, including autogens to form circulating immune complexes and their subsequent elimination from the body, which aims to support immunobiological homeostasis [4,5].

Today the issues which are connected with the pathogenesis, diagnosis and treatment are not completely researched. In particular, there are not useful publications about the level of antibodies in case of experimental BA.

That's why the aim of our research was to investigate the level of immunoglobulins A, M, G in guinea pigs' blood in case of the experimental bronchial asthma formation.

Materials and methods. Researches were carried out on 60 guinea-pigs (males). The weight of each one was 180-220g. They were divided into 5 groups for 12 animals in each of

them. Among the first group (control) were intact guinea-pigs. Among the second group were animals with an experimental BA (5^{th} day). Among the third group were guinea-pigs on the 19^{th} day of the experiment. The fourth group consisted of animals with an experimental BA (26^{th} day) and the last fifth group included guinea-pigs with an experimental BA (33^{rd} day). For the purpose of detailed analysis and interpretation of humoral immunity in different days of the experiment were separated two periods of experimental asthma: early and late. The early period included a group of animals with BA on the 5th and 19th days of the experiment. Late period included guinea pigs at 26th and 33rd day of asthma.

Experimental model of bronchial asthma was restored on guinea-pigs by the V.I. Babych method (1979). All experimental animals were kept in standard vivarium conditions in the Danylo Halytskiy Lviv National Medical University. Euthanasia of animals was carried out by the way of decapitation followed the European Convention for the protection of vertebrate animals used for experimental and other scientific purposes (1985). The content of immunoglobulins A, M and G was determined in all groups of guinea pigs [6]. Numerical results were adapted with static method using Stjudent's criteria.

Results and discussion. As a result of research it was found that in guinea pigs with experimental BA observed changes immunoglobulins us all defined classes in different periods of its formation.

The results showed that the level of immunoglobulin A was rapidly growing in animals of the second and third groups in this experimental model of disease according to 54,5% ($p \leq 0,05$) and 127,3% ($p \leq 0,05$) compared to those of control values, indicating that the activation of the synthesis of immunoglobulin A in particular, and the stimulation of humoral immunity in general. In the later period (26^{th} and 33^{rd} day) bronchial asthma formation revealed the increasing of this index, but top down direction respectively 100,0% and 45,5% in comparison with the first group of guinea pigs ($p \leq 0,05$).

Defining an indicator of humoral immunity - immunoglobulin M in depending on the duration of its antigen showed an increasing of 30,8% ($p \leq 0,05$) and 69,2% ($p \leq 0,05$) early in the development of experimental BA (5^{th} and 19^{th} day) compared with the control group of animals. Subsequently, after 26 days the experimental model of disease observed further increase in Ig M in the blood of 100,0% ($p \leq 0,05$) opposite intact guinea pigs, and the 33^{rd} day growth rate reached only 61,5% ($p \leq 0,05$) compared with the first group. Dynamics of antibodies in the blood of guinea pigs in experimental asthma are presented in Table 1.

An important addition for deeper and more comprehensive characteristics of the humoral immunity is to determine the blood of animals in asthma not only immunoglobulins A, M, but also an indicator - immunoglobulin G. The results showed a similar nature and single direction.

Thus, in the second and third groups of animals in this experiment increased levels of Ig G in blood respectively 38,6% ($p \leq 0,05$) and 50,9% ($p \leq 0,05$) compared with control group. In the later period of the experimental model of immunoglobulin G levels gradually increased to 71,9% ($p \leq 0,05$) 26^{th} day, and only 24,6% ($p \leq 0,05$) on the 33rd day of experimental asthma compared with control group.

As seen from the data, the highest level of content immunoglobulins M and G in the blood was in the fourth group of guinea pigs with bronchial asthma (26^{th} day), indicating a direct dependence of antigenic impact on the economic performance and the body's ability to respond adequately protective reaction the effect of damaging factors. However, in the latest period of experimental models of disease are seeing a slight declining all parameters of humoral immunity.

Table 1. **The level of Ig A, M and G in guinea pigs in the experimental bronchial asthma. (M ± m, n=60).**

Form of experience	Duration of disease (days)	Number of animals	A	M	G
Intact animals. Control		12	1,1±0,1	1,3±0,2	5,7±0,5
Guinea pigs with an experimental BA	5	12	1,7±0,2	1,7±0,2	7,9±0,5
	19	12	2,5±0,3	2,2±0,3	8,6±0,7
	26	12	2,2±0,2	2,6±0,3	9,8±0,6
	33	12	1,6±0,2	2,1±0,2	7,1±0,5

Conclusions. Evaluating the results of the research it can be concluded that stimulation of humoral immunity and the inclusion of protective mechanisms in the process, which aims are the destruction of antigens and removing them from the body of animals with experimental bronchial asthma.

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