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## THE CHARACTERISTICS OF INTERLEUKIN-4 AT CHILDREN WITH ALLERGIC RHINITIS

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The research was carried out among children, receiving the medical treatment from the allergic rhinitis. Total 56 children were examined in, there were 62% boys. For determination of interleukin 4 reagent kits «Interleukin-4-IFA-BEST» were used to determine the immune-ferment concentration of interleukin 4 in human biological fluids and culture media. In the blood and in the other body fluids the certain tendency remained, it is the increase of the interleukin 4 level at children of the older age group.

It is determined the interleukin-4 level content in children biological fluids with the allergic rhinitis according to the age and the pathological process severity. In screening (indirectly) monitoring children with the allergic rhinitis, it is possible to use to research biological fluids, as the least traumatic diagnostic method.

*Key words:* allergic rhinitis, interleukin-4, biological fluids

Allergic rhinitis is a widespread worldwide disease. The number of patients in different countries varies within 10-25% of the population. In Kazakhstan, allergic rhinitis is differently spread: in the South-East of the Republic the sickness rate reaches 25% of the population, in the North of the country – 5-10%. In Almaty about 100,000 patients suffer from allergosis [3]. It is established that over the past 20 years the number of the allergic rhinitis cases has increased almost in 3 times. The high-level of the sickness rate determines that the problem of the allergic rhinitis remains unsolved. This is probably due to the combined effect of genetic factors and environmental factors on the child's body. In 12% of cases the allergic rhinitis begins at children after ARVI. Probably unfavorable conditions can conduce to the rise of the allergic rhinitis – the contact with poultry and animals and fodder for them, down, feather pillows, mushroom spores, and house dust. The frequency of children allergic rhinitis is higher in families where parents smoke [3, 5]. The influence of exogenic allergens at risk children determines the allergy rise as a hyper IgE of B-lymphocytes, which is a consequence of the proliferation and the activation of Th2-clone allergen-specific T-lymphocytes and due to the increased production of interleukin-4 and interleukin-13. The basophils proliferation of the both types intensifies under the influence of interleukin-4, interleukin-3 and the number of receptors to Fc-fragment IgE increases on their surface. At this immune response stage the fundamental basis is established, distinguishing the immediate type of allergic reactions from the other hypersensitive reactions: there is «an operating time» of specific IgE (homocytotropic antibodies or reagins) and their fixing on tissue baso-

phils and peripheral blood basophils. The complexity and the multi-level mechanism of reactions determine specifics of children treatment with different pathologic processes. At the same time the study of these process components may stipulate both diagnostic characteristics and the complex of treatment and rehabilitation measures [1, 2, 4].

In this connection, the purpose of our research was the study of the characteristics of interleukin-4 level at children with the allergic rhinitis.

### MATERIALS AND METHODS

The research was carried out among children, receiving the medical treatment from the allergic rhinitis. Total 56 children were examined in, there were 62% boys. In the course of diagnosing the allergic rhinitis, the working classification was used, proposed by WHO experts in 2003, based on the determination of the symptom duration and on a subjective appraisal of the allergic rhinitis influence on the patients' quality of life, presented in the methodological recommendations for the allergic rhinitis in the Republic of Kazakhstan (2009). Patient examinations were carried out in accordance with protocols approved by the Republic of Kazakhstan for this pathology. For determination of interleukin-4 reagent kits «Interleukin-4-IFA-BEST» were used to determine the immune-ferment concentration of interleukin-4 in human biological fluids and culture media. The research was carried out on the basis of the KSMU immunologic laboratory. The statistical methods of processing were used to carry out the data analysis, applying in the medical data analysis. The calculation is made on the basis use of computer applications Microsoft Excel 7.0 and SPSS 12.0.

### RESULTS AND DISCUSSION

The research was based on the reacting level position of interleukin-4 in allergic processes. To improve its understanding, the content analysis was carried out at children with the allergic rhinitis, depending on their age. The data analysis showed that there were values at children of younger age group (7-11 years), determining a lower content of interleukin-4 in biological fluids: at children aged 7-11 years in the blood  $0,9326 \pm 0,02$ , in the urine  $0,646 \pm 0,003$ , in the saliva  $0,762 \pm 0,25$ , at children aged 11-14 years in the blood  $1,634 \pm 0,026$ , in the urine  $0,874 \pm 0,042$ , in the saliva  $1,934 \pm 0,041$ . At the same time there were significant differences by the interleukin-4 content in the blood and in the saliva, depending on the age, but in the urine, although there was a tendency to the increase of this index in the older age group, significant differences were not found. In the blood and in the other body fluids the certain tendency remained, it is the increase of the interleukin-4 level at children of the older age group. Basing on the pathogenic basis of the current process, the analysis of interleukin-4 index level was carried out, depending on the disease severity. The analysis showed that there were significant differences in the interleukin-4 content at the examined children, depending on the process severity, by the blood content at children with mild case in 2,9 times, in the saliva in 2,5 times, the interleukin-4 level was less than at children with the moderate allergic rhinitis progression (accordingly in the blood  $0,632 \pm 0,12$  and  $0,843 \pm 0,17$ , in the saliva  $0,726 \pm 0,17^*$  and  $1,27 \pm 0,15^*$ ), there was no significant differences of the interleukin-4 content in the urine, although the general tendency remained. The interleukin-4 index level at the examined children, depending on the age and the pathological process severity of the allergic rhinitis showed, that the change of indexes was in process with the same tendency. At the same time at children of the older age group there were more evident differences (without significant differences) of the interleukin-4 index level, particularly in the blood, as compared with the interleukin-4 indexes at children of the younger age group. Thus, the analysis of the interleukin-4 level data in biological fluids of children with the allergic rhinitis showed that there were significant differences at the examined children depending on the age (the increase of the index level at children in the older age group), and we think, it is probably related both to the state of the immune system formation during ontogenesis in the younger group, and with a longer course of the

disease process at children of the older age group. At that, these tendencies were determined at normal values of the interleukin-4 content in the blood. By comparison interleukin-4 indexes, depending on the level in biological fluids, it was revealed, that the most significant differences of the interleukin-4 index content were found in the saliva, which is possible related to the character of the disease process, and the uniformity of index level tendencies in the blood, in the urine and in the saliva may determine the content in the blood indirectly. This aspect offers the possibility of, in accordance with the content in the saliva, the correction both rehabilitation and preventive activities, and the viewing the interleukin-4 level content in the blood indirectly during the course of the allergic rhinitis at children.

The child's body in pathological conditions is viewed now, as a well-developed multi-component system, functioning with the help of the teamwork of its separate elements. At the same time, the exogenous allergen influence, particularly at-risk children, determines the allergy rise, as a hyper-IgE of B lymphocytes, which is a consequence of the proliferation and the activation of Th2-clone allergen-specific T-lymphocytes and due to the increased production of interleukin-4. At this immune response stage the fundamental basis is established, distinguishing the immediate type of allergic reactions from the other hypersensitive reactions: there is «an operating time» of specific IgE (homocytotropic antibodies or reagins) and their fixing on tissue basophils and peripheral blood basophils. It is known that the child development is largely determined by various factors and the allergic rhinitis, in particular. All this creates the need for their detailed study. In connection with it there is an opportunity to find more factors and the knowledge of the level content characteristics in the body can contribute both to the development of additional diagnostic criteria, and the inclusion of additional activities into the general complex of preventive and curative measures. In the fight for children's health today, of course, not only all the basic but and applied research results must be used in the natural sciences area, which anyway concern the child.

It is determined the interleukin-4 level content in children biological fluids with the allergic rhinitis according to the age and the pathological process severity. In screening (indirectly) monitoring children with the allergic rhinitis, it is possible to use to research biological fluids, as the least traumatic diagnostic method.

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*АЛЛЕРГИЯЛЫҚ РИНИТПЕН НАУҚАС БАЛАЛАРДАҒЫ ИНТЕРЛЕЙКИН-4 ДЕҢГЕЙІ СИПАТТАМАСЫ*

Аллергиялық ринитте балалардағы интерлейкин 4 деңгейінің ерекшеліктерін зерттеу, аллергиялық риниттен емделіп жатқан балалармен жүргізілген. Зерттелгендер саны 56 бала, оның ішінен 62% ұл баланы құрайды. Интерлейкин 4 деңгейі ҚММУ иммунологиялық зертханасында интерлейкин 4 адамның биологиялық сұйықтығы мен егу ортасында «Интерлейкин 4 – ИФА-БЕСТ» реагентінің көмегімен анықталды. Интерлейкин 4 деңгейінің жоғарылауының басты тенденциясы ауырлық және жасына сай келеді, ол биологиялық сұйықтықта жақсы анықталған.

Аллергиялық ринит кезінде биологиялық сұйықтықтан интерлейкин 4 зерттеуі ең жарақаты аз зерттеу болып табылады.

*Кілт сөздер:* аллергиялық ринит, интерлейкин 4, деңгейі, биологиялық сұйықтық

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*ХАРАКТЕРИСТИКА УРОВНЯ ИНТЕРЛЕЙКИНА-4 У ДЕТЕЙ С АЛЛЕРГИЧЕСКИМ РИНИТОМ*

Изучение особенностей уровня интерлейкина-4 проведено при анализе показателей у детей, находившихся на лечении с аллергическим ринитом. Всего обследовано 56 детей, из них 62% составили мальчики. Уровень интерлейкина-4 определялся на базе иммунологической лаборатории Карагандинского государственного медицинского университета при помощи иммуноферментного анализа концентрации интерлейкина-4 в биологических жидкостях человека и культуральных средах, при помощи набора реагента «Интерлейкин-4 – ИФА-БЕСТ».

Выявлено, что основной тенденцией уровня интерлейкина-4 являлось его увеличение в зависимости от тяжести процесса и возраста ребенка. Исследование уровня интерлейкина-4 в биологических жидкостях при аллергическом рините у детей является наименее травматичным способом.

*Ключевые слова:* аллергический ринит, интерлейкин-4, биологические жидкости