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# THYMOMEGALY WITH OBSTRUCTIVE BRONCHITIS IN EARLY CHILDREN TREC

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**Аннотация:** Тимомегалия с обструктивным бронхитом у детей раннего возраста Т-лимфопоэз намного мало в вилочковой железе, то как Т-рецепторы эксцизионных колец. Т рецепторы эксцизионных колец представляют собой кольцевидные молекулы как ДНК, которые определяются только в Т-клетках, некоторых литературах указывают что эмигрировавших из вилочковой железы и могут служит мерой интенсивности созревания Т-лимфоцитов и их эмиграции из этой железы, т.е. для функциональной активности тимуса. Для комплексного лечения и добавлением иммуномодулирующего препарата при БОС способствует восстановлению нарушенного Т-лимфопоэза, причем содержание ТРЭК практически достигает уровня у здоровых детей без тимомегалии.

**Ключевые слова:** Тимомегалия ; обструктивный бронхит;дети, Т-рецепторные эксцизионные кольца;

**Anotation:**Thymomegaly with obstructive bronchitis in young children T-lymphopoiesis is much less in the thymus, like T-receptors of excision rings. T excision ring receptors are ring-shaped molecules like DNA that are detected only in T cells, some literature indicates that they emigrate from the thymus gland and can serve as a measure of the intensity of maturation of T lymphocytes and their emigration from this gland, i.e. for the functional activity of the thymus. For complex treatment, the addition of an immunomodulatory drug during biofeedback helps restore impaired T-lymphopoiesis, and the content of TREC almost reaches the level in healthy children without thymomegaly.

**Key words:** Thymomegaly; obstructive bronchitis; children, T-receptor excision rings;

In young children, hyperplasia of lymphoid tissue is often observed, including tissue of the thymus gland - thymomegaly. Many studies have shown that such children, already in the first year of life, are more likely to suffer from acute respiratory infections, anemia, rickets, various nutritional disorders, and they are more likely to develop allergic reactions. Under the age of 3 years, more than half of children with an enlarged thymus gland belong to the group of frequently ill children with a more severe and prolonged course of ARVI. Such clinical manifestations are the result of impaired functioning of the immune system in thymomegaly. It was found that with thymic

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hyperplasia in children, despite an increase in the number of thymocytes in it, T-lymphopenia is observed with a predominant decrease in CD4+ cells. In previous works, we conducted a study of the functional state of the thymus gland in thymomegaly in children, namely, the study of the processes of T-lymphopoiesis through indicators characterizing the emigration of T-cells from it; it has been shown that the functional activity of the thymus gland in children with thymomegaly is reduced compared to the age norm. It was previously shown that the immunomodulatory drug tactivin has a positive effect aimed at preventing frequent intercurrent infections in thymomegaly in children. When treating the immunomodulator for children with thymomegaly during an acute respiratory process, positive dynamics are noted: faster disappearance of cough, less pronounced catarrhal symptoms, absence of a protracted and complicated course of the disease; immunologically, tactivin helps to increase the number of T-lymphocytes and their subpopulations (CD4, CD8) .

In this work, we conducted a study of the effect of an immunomodulator on T-lymphopoiesis in thymomegaly in young children with obstructive bronchitis. T-lymphopoiesis was assessed by the level of TREC (T-receptor excision rings). TRECs are circular DNA molecules that are formed during the rearrangement of T-cell receptor genes during the differentiation of T-lymphocytes in the thymus gland. This structure is determined only in T cells that have recently emigrated from it and serves as a measure of the intensity of maturation of T lymphocytes and their emigration from the thymus gland, i.e. functional activity of this organ.

**Material and methods:** TREC levels were determined in 25 children with thymomegaly aged from 2 months to 1.5 years. All children were diagnosed with BOS at its height. The patients were undergoing inpatient treatment. From the moment of admission, the children received an intranasal immunomodulator at a dose of 1 mcg/kg daily for 5 days Severity of the condition: fever with a body temperature of more than 39ºC, lethargy, cough, retraction of the intercostal spaces, the appearance of cyanosis, rapid noisy breathing with wheezing exhalation, scattered dry wheezing, and sometimes moist medium-bubble wheezing in the lungs, refusal to drink, “inflammatory” changes in the analysis of peripheral blood and other signs of intoxication - was the basis for prescribing antibacterial therapy to all children. Treatment of broncho-obstructive syndrome included measures to improve the drainage function of the bronchi, anti-inflammatory and bronchodilator therapy. Apart from hormonal therapy, children in this group were not used in the treatment. Blood sampling was carried out twice: before the start of treatment and 1 day after the end of therapy. The comparison group included 5 children with BOS and thymomegaly, who were hospitalized and receiving similar therapy, but without the introduction of an immunomodulator, examined upon admission and again after 6 days. Mononuclear

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cells were isolated from the peripheral blood of the examined children by centrifugation in a one-step density gradient of Ficoll-Verografin (Sigma). DNA was isolated from 1×106 mononuclear cells. The calculation of the TREC copy number was carried out using a standard curve constructed from dilutions of a plasmid with a known concentration of TREC DNA. The plasmid was obtained by cloning the TREC DNA of human thymocytes. The effect of immunomodulator therapy on the number of TRECs (copies per 1 thousand lymphocytes) in peripheral blood lymphocytes of young children with thymomegaly Group Upon admission After 6 days Children receiving immunomodulator therapy 17.62 (11.81—35.72) 58.10* (27.43—80.40) Comparison group 17.36 (8.29—29.33) 10.02 (9.87—21.33)As can be seen, treatment with the addition of immunomodulators (intranasally for 5 days) in the complex treatment of biofeedback leads to a statistically significant increase in the content of TREC: up to 58.10 (27.43-80.40) copies per 1 thousand peripheral blood lymphocytes, and the level TREC reaches 80% of the TREC content in healthy children without thymomegaly - 73.34 (53.99-83.84) copies per 1 thousand lymphocytes (p = 0.4) [10]. In the comparison group, the level of TREC-containing cells did not change (p>0.05). Thus, our study showed a statistically significant increase in the content of TREC in peripheral blood lymphocytes after the use of an immunomodulator without hormonal therapy and complex biofeedback therapy (p = 0.01 for the Wilcoxon test). Moreover, the level of TREC practically reached the content of TREC in children without thymomegaly. Therefore, it can be assumed that adding an immunomodulator to the complex treatment of biofeedback can help restore T-lymphopoiesis in thymomegaly.

Until now, it was believed that the basis of the pharmacological action of the immunomodulator is the stimulation of the T-cell immune response when it decreases: increased production of Th1 cytokines (including IL-2 and IFNγ) and the activity of cytotoxic T cells, normalization of the number of T-lymphocytes, ratio T and B cells, as well as subpopulations of T cells; in addition, it has a beneficial effect on the function of hematopoietic stem cells. Let us assume that peptide hormones of the thymus cause some “maturation” of T-lymphocytes in the peripheral part of the immune system, but there was no exact experimental data confirming this phenomenon. This work shows that another effect of drugs based on thymus peptides may be their effect on T-cell differentiation. However, to state that the pharmacological effect of immunomodulators is associated with its effect on the emigration of T cells from the thymus, it is necessary to increase the sample size and continue research in this direction.

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