

# MODERN ENTEROSORPTION FOR PREVENTING EXACERBATIONS OF CHRONIC PATHOLOGY OF THE UPPER RESPIRATORY TRACT IN CHILDREN LIVING IN REGIONS WITH ECOLOGICAL TROUBLE

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*It does not admit of doubt that treatment and remediation and prevention of respiratory diseases in children living in ecologically unfavorable conditions has a high social importance. An open, prospective, randomized, controlled study of the efficacy and safety of the method, including the stimulation of lymphatic drainage and modern enterosorption using Enterogel preparation (polymethylsiloxane polyhydrate) was performed. The study included 45 adolescents aged 12.0±1.5 years; all adolescents lived in the area adjacent to the Astrakhan gas complex and all were registered in the pediatric polyclinic for frequent respiratory infections. The duration of treatment course was 2 weeks, then children received probiotics in accordance with the instructions for 20 days. Blood levels of middle-sized molecules (MMM) were estimated. Reduction of number of absence for school due to upper respiratory infections per year compared with the previous year was considered as efficacy endpoint. As a result of treatment, the MSM levels returned to normal values, and the number of absence for school decreased by 3 times. Wellness programs using the stimulation of lymphatic drainage and modern enterosorption for school children showed high efficacy for the prevention of bronchopulmonary diseases.*

*Key words: bronchopulmonary pathology, endogenous intoxication, environmental maladjustment, endoecological rehabilitation, enterosorption, Enterogel, probiotics*

## The urgency of the problem

About half of all diseases of children and adolescents are respiratory tract diseases, often associated with a high level of endogenous intoxication (EI). They determine the level of children's morbidity and mortality, which means the high social importance of prevention, treatment and rehabilitation measures among this population [1-4]. Clinic, pathogenesis and treatment of EI devoted in the last years a lot of publications, including literature reviews [5, 6]. According to established ideas, under EI understand the poisoning of the body by intermediate and final products of metabolism caused by their accumulation above the physiological levels in connection with the activation of catabolic processes while reducing endogenous detoxification. So for diseases associated with the technogenic chemical factors it was shown adequate use of elimination methods, among which the most widespread is modern enterosorption [7, 8]. Moreover, a number of works demonstrated modern enterosorption effectiveness in prevention of the development of bronchial asthma in children living in an environmental heavy metals and formaldehyde pollution [9, 10].

Our research has shown that among children residing in the district near of the Astrakhan gas complex (AGK), were observed negative health changes, characterized by increasing in the functional disorders number, and more chronic diseases with age, progressive increase in morbidity, disharmonic physical development. One of the factors, facilitating children's health deterioration, is the living in districts with sub-threshold concentrations of industrial sulfur-containing pollutants in air.

Clinical structure of pathology for children living in constant presence sulfur-containing pollutants in air characterized by the predominance diseases of respiratory tract, circulatory and nervous system.

Imbalance of components of the immune protection is an important pathogenetic factor in the development of the ecological disadaptation in children living in areas of activities gas-industry companies [11-13].

**The purpose of the study** was to assess the efficacy and safety of endoecological correction method using modern enterosorption, herbal remedies and probiotic for prevention respiratory diseases in children living in conditions of anthropogenic overload due activation of protective adaptation mechanisms.

## Material and methods

Studied health group teenagers, pupils, age of 12.0±1.5 years, living on the areas adjacent to the AGK location. 45 children with frequent respiratory infections were chosen who were under pediatrician supervision.

As enterosorbent children receive Enterogel (polymethylsiloxane polyhydrate) at a dose of 15 g (tablespoon) 3 times daily 1-2 hours after meals for 2 weeks.

As a mean for enhancing the movement of tissue fluid and lymphatic drainage we were used

herbal remedies Levinasan (*Silybum marianum* fruits, *Ribes nigrum* leaves) registered as food supplement also within 2 weeks [14]. For the disbiosis prophylaxis we used probiotic containing live microorganisms (*Bifidobacterium*, *B. longum* and *B. bifidum*), – a preparation Bifidum-BUG [15]. Upon completion of the course of enterosorption and lymphatic drainage stimulation the children were given the probiotic in the dose of 6 ml 2 times daily on an empty stomach for 20 days.

Rehabilitation was carried out in the beginning of the school year (september). Medications and food supplements were given according to instructions to the drugs.

The study methods included medium weight peptide level in the blood (medium molecular weight peptide – MMWP) and the account of missed classes number due the upper respiratory tract diseases.

Almost any disease and stress leads to activation of the processes of free radical oxidation in the body, which leads to the accumulation toxic substances, including endotoxins. Peroxide damage of proteins leads to their degradation and formation of toxic fragments, including MMWP.

Significant feature of MMWP is high biological activity. Accumulation MMWP is not only a endointoxication marker: they exacerbate the pathological process, playing a secondary toxins role, affecting the function of all systems and organs [16-19].

The study of the MMWP showed level increase in 48.9% of cases (22 patients). The average MMWP level in this category of patients was  $0,295 \pm 0,005$  U. The rest part of the adolescents (23; 51,1%) MMWP levels were within normal limits. Average MMWP level in the whole group before treatment was  $0,250 \pm 0,008$  U (normal limit –  $0,215 \pm 0,003$  U).

The average number of missing classes (days) due to diseases of the respiratory tract, previous to the studied academic year was in this group  $26.4 \pm 2.5$  days.

### **Results and discussion**

Under the action of xenobiotics on human body in polluted areas endogenous toxicity of the body increased, which is reflected enhancement the serum MMWP level in the in the examined adolescents. This, in turn led to significant increasing of the missed classes (days) number due to upper respiratory tract diseases and the parameter changed relatively stable across the group surveyed. MMWP level 2 weeks after the completion of the treatment showed normalization of this intoxication parameter (Fig. 1). Its value after the treatment was  $0,210 \pm 0,001$  U ( $p < 0.05$ ).

The average number of missing classes due disease decreased in the studied academic year  $7,5 \pm 1,8$  day ( $p < 0.05$ ; Fig. 2). Moreover, 16 adolescents did not miss school due to the disease. The basis of the therapy was on biomedical (endoecological) law of the pathogenic therapy for any pathology, described by professor Y. M. Levin, according to microorgan's and parts of humoral transport system dysfunctions are an immutable elements of local pathological process independent of its etiology and localization in the body, and to eliminate these dysfunction is mandatory principle of any pathogenetic therapy.

The postulates underlying endoecological law:

Cells of a multicellular organism make the surrounding tissue inextricably morphofunctional unit termed "microorgan".

Cells metabolism provides functionally inseparable parts of humoral transport.

The clotting system is the leading mechanism controlling the flow of the humor in parts of humoral transport.

Disorders of microorgan functions, the factors of humoral transport and clotting system – constant elements of pathological process pathogenesis regardless of etiology and localization in the body.

The technology impact of endo-ecological rehabilitation and treatment according Y. M. Levin (EERL) is to enhance the flow of liquids, surrounding cell of the body, and subsequent lymphatic drainage stimulation.

The main EERL mechanism is elimination of toxins from intercellular space and optimization of the protective functions of the organism.

Numerous studies proved that the inclusion of EERL in the treatment of various diseases

promotes positive dynamics of clinical symptoms, normalization of parameters, characterizing the exacerbation activity, and factors involved in the pathogenesis of the disease, modulation most of the parameters of homeostasis for, reducing the level of EI, as well as reducing the volume of medicament therapy [20-23].

A separate EERL link is enteral detoxification (enterosorption) promoting disturbed metabolism products elimination from the tissues using modern sorbents. As preparation for enterosorption we used organosilicone preparation Enterogel, which is not only helps to eliminate toxins from the body, including technogenic products, but covers the wall of the digestive tract, protecting them from damage [7-9].

A number of studies have proven effectiveness and safety of Enterogel in the standard scheme of treatment of acute and chronic respiratory diseases such as pneumonia [24-26], and bronchial asthma [28-30].

One of the most probable mechanisms that determine the efficiency of modern enterosorption is the restoration of the enterohepatic barrier, which is disrupted in children under the effects of environmental pollution, as well as by the allergic reactions. Endotoxin blood level increase leads to the development of intoxication and pulmonary symptoms. In addition to the direct endotoxin blood level test, one of the recognized markers of endotoxemia is the serum MMWP level test.

Enterohepatic barrier recovery leads to a decrease in endotoxin penetration in the blood, normalise enterohepatic circulation and elimination of toxins from the body. Clinically it is manifested the prevention of the development or the relief of the manifestations of pulmonary and intoxication syndromes.

The use of probiotics, containing live *Bifidobacteria*, not only to restores the possible loss of them during the treatment course, but also complements the immunomodulation process, potentiated by other components we used in the scheme.

### **Conclusion**

The results of the study evidenced high efficiency the course of healing with using the stimulation of lymphatic drainage and modern enterosorption (Enterogel). This scheme can be recommended for widely used in prevention in children of school age with risk factors for prophylaxis and prevention of respiratory tract diseases progression.

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Pic.1. The average MMWP value before and after treatment, U.

Pic. 2. Average missing classes number per year before and after treatment, days.