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THE PATHOGENETIC BASIS OF CORRELATION SECRETION THYROIDS HORMONS WITH PROGRESS AND PROGNOSIS CHRONIC OBSRUCTIVE PULMONARY DISEASE (COPD)

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Abstract

We has been studied influence of thyroxine on functional thymalinum-dependence activity of T-cell-bound immunity. It was established that preincubation of T-lympocytes with physiological concentration of thyroxine led to pronounced thymalinum-dependence abolition of receptor field of T-lympocytes modification.

The syndrome of low triiodthyronine in patients with COPD is a kind of "factor of complication" of the course of the disease. It is due to the formation of a deeper disruption of reparative regeneration of the bronchial epithelium (including procoagulant and fibrinolytic activity of epithelial cells) and aggravation of immune disbalance.

Key words: thyroxine, triiodthyronin, thymalinum, chronic obstructive pulmonary disease (COPD)

Rational: COPD is a prevalent disease according to the results of the symposium resolution (COPD - Global Strategy, Symposium No. 92). It is prone to prophylaxis and treatment. COPD characterizes by persistent respiratory tract constraints (usually progressive) and associates with an increased chronic inflammatory response in the respiratory tract and lung to the action harmful particles or gases. There are presence of frequent exacerbations and

concomitant diseases. It has a significant impact on the severity of the disease and the prognosis [3, 6, 8, 10, 21].

COPD remains one of the most common human diseases, due to environmental pollution, smoking, repeated respiratory infections. COPD have a leading place in medical statistics in patients who seeks for medical help [2, 3, 7, 15].

Only 25% of COPD cases diagnose in a time according to the European Respiratory Society. Moreover, there is a worldwide trend towards an increase in the mobility: for the last decade its has increased by 25% in men and 69% in women [3, 15, 22]. Mortality in COPD is 3.2 times more than in pneumonia and it is 1.1% and 1.18% [13, 18, 20].

In the "European white book of the lungs" Ukraine presents as one of the countries with the highest mortality from COPD [3].

COPD is accompanied by a progressive and practically irreversible decrease in the function of external respiration (HPV). It leads to hypoxemia and hypoxia of many organs and systems, incl. cardiovascular, digestive, endocrine.

We used the following functional criteria in the Global Initiative program (GOLD, 20116) in analyzing the characteristics of the age-specific population of the affected COPD: in persons 18 to 71 years, the FEV1 / FVC ratio is less than 0.7, 9.8%, and in the population 60-74 year-olds in 23% of cases. So we can do the conclusion that COPDs are more widely spread in older age groups [15].

Analysis of literary sources has shown increase not only in bronchopulmonary pathology in the elderly groups, but also dysfunction of the thyroid gland (thyroid gland) in the direction of decline [4, 5, 8, 11]. The disease takes on the character of the comorbid pathology with the phenomena of multiple organ failure. We have chosen to study the pathogenetic relationship of thyroid hormones secretion to the development and prognosis of COPD due into account the small study of thyroid effects in the course of COPD.

Objective: We explore on the basis of the analysis of literature sources the existence of the relationship of secretion of thyroid hormones with the development and prognosis of COPD.

Materials and methods: The function of the secretory apparatus (hypersecretion of the mucus, bronchial secretion) develops in response to invasive pathogenic factors in the bronchial glands. The infection joins. The cascade of reactions develops too. This leads to damage to the bronchi, bronchioles, adjacent alveoli. The enzymes and antiproteases imbalance, defects of antioxidant defense increase lung damage [7].

The main pathophysiological disorder in patients with COPD is the expiratory airflow restriction. It bases on reversible and irreversible components. The irreversible includes: fibrosis and narrowing of the respiratory tract; loss of elastic traction of the lungs due to alveolar destruction; decrease of alveolar support of the gap of the small airways. Reversible reasons include: the accumulation of inflammatory cells, mucus and exudate of the plasma in the bronchi; reduction of muscles of the bronchi; dynamic hyperventilation (i.e., increased airiness of the lungs) with physical exertion. The presence of frequent exacerbations and concomitant illnesses has a significant effect on the severity and prognosis of COPD [1, 9].

We observed a number of inflammatory mediators in patients with COPD. It attracts inflammatory cells from circulation (chemotactic effects), enhances the inflammatory process (pro-inflammatory cytokines) and induces structural changes (growth factors) [11].

COPD characterizes by a specific nature of inflammation. It presences of neutrophils and macrophages, an increase in the number of CD8 (cytotoxic) T-suppressor-1-lymphocyte link. These cells, together with neutrophils and macrophages release inflammatory mediators and enzymes, interacting with structural cells of the airways, pulmonary parenchyma and pulmonary vessels [19].

The depression of the proliferative response of T-lymphocytes to nonspecific mitogens in patients with COPD combines with an increase in the sensitization of lymphocytes to tissue and bacterial antigens. The sensibility of leukocyte and its morphological reflection to bronchial tissues is infiltration by eosinophils, lymphocytes and neutrophils of all layers of the bronchial wall. Its occur in different quantitative ratios in both COPD and bronchial asthma (BA) [10].

The persistence of COPD and especially the development of exacerbations of the disease accompany by the progression of structural changes in the bronchi. So, productive inflammation in bronchioles with a diameter of less than 2 mm accompany by thickening of the walls of bronchioles. Also it does the formation of bronchioloectasises and polyposis bronchiolitis with the of obstructive ventilation. The inflammation, exudation and fibrosis in the distal airways correlate a decrease in the volume of forced expiration in the first second (FEV1) and the ratio of FEV1 to forced vital capacity (FVC). Peripheral obstruction leads to a restriction of airflow velocity and a progressive increase in "air traps" during exhalation. As a result it is increased airiness of the lungs - hyperinflation. Hyperinflation develops in the early stages of COPD and it leads mechanism in the development of expiratory dyspnea. The dynamic (at physical loads) hyperinflation is a result of increase dyspnea and decrease exercise tolerance [2, 4].

COPD considers not only as a bronchopulmonary pathology, but also as a systemic disease according to the current trends in the development of science (Program GOLD 2016), [14, 15].

Many authors widely discuss the influence of COPD on digestive organs, cardiovascular, bone-muscular, nerves, endocrine, immune, etc. systems in the literature [16, 17, 21]. A combined pathology of the thyroid gland and COPD as a less studied deserves special attention. It has a common autoimmune-endocrine origin [18].

As one of the topical problems of modern pulmonology is the development of effective methods of diagnosis, treatment and prevention of COPD. Its occur in more than 25% of patients. It is necessary to study some pathogenetic aspects of the progression of bronchoobstructive syndrome and to define the role of adaptive regulatory changes in the endocrine system in this disease [5].

There is correlation between the level of secretion of the hormones of the thyroid line, the development and chronicization of the chronic nonspecific inflammatory process of different localization. Functional disorders of the thyroid gland cause inflammatory action in various organs and tissues. So, in last years it has been proved that the deficiency of thyroid hormones contributes to both development and maintenance of chronic inflammation in the bronchi [4, 5, 14, 19].

The effect of the hormones of the thyroid line on the course of the inflammatory process is connected to their immunoactive effect. A stimulating dose-dependent effect of T3 and T4 on humoral immunity was found in experiments on animals. This effect realizes on the antigen-independent post-timin stage of T-cell differentiation [12, 15]. So, T3 and T4 have an inhibitory effect on the functional activity of T-suppressors. It stimulate the differentiation of B-lymphocytes. Low doses of T3 and T4 stimulate protein synthesis and growth processes in tissues and cells. In big doses it has a inhibitory effect [22]. In cultured experimental models triiodothyronine activates the cytotoxic functions of lymphocytes and the phagocytic activity of monocytes. Thyroxine increases the activity of EK cells in laboratory animals [6].

The development of thyrotoxicosis promotes the development of immunopathological reactions of hypersensitivity. It is, above all, disturbance of the metabolism of corticosteroids, prostaglandins and histamine. On the contrary, thyroidectomy leads to a slowdown in the growth of all lymphoid organs. It is a reason of a decrease in the humoral immune response with a decrease in cellular responses [5].

So the study of the mechanism of thyroiditis in patients with COPD is practically absent in the Ukrainian literature. And only such an analysis can objectivize the value of

thyroid dysfunction, as a factor in the progression of broncho-obstructive syndrome in COPD, and the formation of its complications [1, 17].

Conclusion

1. Patients with COPD have a pronounced disbalance in the functional activity of the bronchial epithelium. In this case, the severity of depression of reparative regeneration of bronchial epithelium determine by the nosological form of chronic bronchopulmonary disease.

2. The progression of secondary chronic bronchitis in patients with COPD characterizes by the formation of endocrine disbalance (synthesis of hormones of the thyroid line).

3. It was established that the syndrome of low triiodothyronine in patients with COPD is a kind of "factor of complication" of the course of the disease due to the formation of a deeper disturbance in the reparative regeneration of bronchial epithelium (including procoagulant and fibrinolytic activity of epithelial cells) and aggravation of immune imbalance.

4. In patients with COPD was established the dependence of the morphogenetic activity of lymphocytes on the endocrine potential of the blood (the level of thyroid hormones).

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