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### Dynamics Of Surface-Active Fraction Indices Of Lung Surfactant System, External Respiration Function And Myocardium Functional Reserves In Patients With Chronic Obstructive Pulmonary Disease (COPD) Associated With Ischemic Heart Disease (IHD).

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The indices of external respiration function, level of surface-active fraction of lung surfactant system (LSS), the left ventricular ejection fraction were studied in a group of 60 patients with COPD associated with IHD. Patients were divided into 2 subgroups depending on the administered therapy: subgroup 1 – 30 patients that received standard therapy; subgroup 2 – 30 patients that in addition to standard therapy received tincture of Echinacea and Chlorophyllipt. The obtained results confirmed reduction of the level of surface-active fraction of lung surfactant system (LSS) in patients of both subgroups that improved under the influence of the administered therapy, though more significant dynamics of mentioned index was observed in patients of subgroup 2 concomitantly with improvement of indices of external respiration function and functional reserves of the myocardium.

Addition of Echinacea and Chlorophyllipt preparations to complex therapy will enable prevention of complications development and will improve disease prognosis in such category of patients.

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*Keyword:* COPD, IHD, Surface Active Fraction of Lung Surfactant, Echinacea, Chlorophyllipt.

#### 1. Introduction

Chronic obstructive pulmonary disease (COPD) is a complex syndrome that includes inflammation of respiratory tracts, reduction of airspeed, edema, mucociliary dysfunction and hypoxic vasoconstriction of lung arterioles that leads to decrease of perfusion as well as to further structural changes of respiratory tracts in addition to significant systems effects that cause accompanying pathologic conditions [1].

Synchronous course of chronic heart failure and COPD is always accompanied by the syndrome of “mutual burden” and main pathogenetical mechanisms are: chronic visceral hypoxia, alteration of bronchial patency, changes in pulmonary circulation, alteration of cardiac rhythm and progressive aggravation of systolic and diastolic functions of the left ventricle, increase of blood thrombogenicity, disorder of microcirculation [2].

Combination of these nosological forms is a part of “cardiorespiratory pathology” concept. Out of all cases of IHD, frequency of development of cardiorespiratory pathology increases with age from 12,6 to 84%. Emergence of several pathological processes in patient (for example, IHD associated with COPD) leads to formation of syndrome of “mutual burden” with corresponding clinical characteristics of the disease which creates a need for new approaches in diagnostics, and, particularly, in treatment strategy [3].

**1.1 The aim** of this research was determination of the level dynamics of surface-active fraction of LSS, indices of external respiration function and myocardium functional reserves in patients with COPD and accompanying IHD in the process of treatment with Echinacea and Chlorophyllipt tinctures.

## 2. Materials And Methods

To solve the set forth task, there was examined a group of 60 patients with COPD and accompanying IHD that in the process of treatment was divided into 2 subgroups: subgroup 1 – 30 patients that were undergoing standard therapy and subgroup 2 – 30 patients that were taking 30 drops of Echinacea tincture in the morning and during the daytime on the background of standard therapy and 5 ml of 1% alcoholic solution of Chlorophyllipt diluted in 30 ml of water 3 times per day 40 minutes before food intake. Patients were examined before therapy and on the 21<sup>st</sup> -24<sup>th</sup> day of treatment.

There was analyzed the condition of bronchoalveolar lavage for determination of surface-active fraction level of lung surfactant system (LSS) using equipment similar to Wilhelmi – Lugmer torsion balance (model of stalagmometer). Functional research of external respiratory function included spirometry that was done using equipment “Spirosift-3000” (Japan). Also were analyzed the indices of vital lung capacity (VLC), forced expiratory volume per 1 minute (FEV 1), bronchial patency of big, medium and small caliber (PEFR25, PEFR50, PEFR75 respectively), and Tiffno index

(FEV1/VLC). Study of functional reserves of the myocardium was done by the method of echocardiography using echocardiograph Kranzbühler-30 (Germany). All the results were statistically processed.

## 3. Research Results

The obtained results indicate reduction of level of surface-active fraction of LSS in patients of both subgroups.

Thus, if subgroup 1 patients with COPD on the background of IHD had the level of surface-active fraction of LSS of  $6.94 \pm 0.37$  mcmol/l, in subgroup 2 patients this index was defined on the level of  $7.00 \pm 1.11$  mcmol/l. The respective changes took place under the influence of treatment that was carried out while the most significant increase of index was observed in subgroup 2 patients ( $10.17 \pm 1.01$  mcmol/l and  $8.02 \pm 0.18$  mcmol/l correspondingly). The described dynamics of surface-active fraction of LSS was observed concomitantly with improvement of external respiration function indices that were more significant in subgroup 2 patients, and echocardiography indices. The realized research has established that in patients with COPD associated with IHD was observed a real level reduction of surface-active fraction of LSS. This is related to the fact that under conditions of continuous course of COPD, which is characteristic of patients with associated pathology, takes place quantitative and qualitative exhaustion of lung surfactant, namely its cellular component – the system of pulmonary alveolar macrophages [4]. Sustained overload of phagocytizing cells with antigenic stimuli and products of inflammation process slows down utilization processes of waste surfactant that in turn cannot provide to pneumocytes of type II the substrate for renewal of its active form [5].

## 4. Conclusions:

1. Course of COPD on the background of IHD is accompanied by reduction of level of surface-active fraction of lung surfactant system. These changes are observed concomitantly with decrease of indices of external respiration function

- and functional reserves of the myocardium.
- Application of Echinacea and Chlorophyllipt preparations in complex therapy enables improvement of indices of external respiration and hemodynamics that will improve disease prognosis in this category of patients.
  - It is appropriate to focus further research on investigation of possibility of correction of pathogenic chains and prevention of development of complications originating from associated pathology of IHD and COPD.

**Table 1:** Dynamics of indices in patients with COPD associated with IHD before and after treatment, (M±m)

Index, unit of measure	Patients with COPD associated with IHD that received standard therapy (p=30)		Patients with COPD associated with IHD that received tincture of Echinacea and Chlorophyllipt (p=30)		P1	P2
	Before treatment	After treatment	Before treatment	After treatment		
VLC, %	70,31±1,28	73,88±1,04	72,65±1,32	78,52±1,64	≤ 0,05	≤ 0,05
FEV 1, %	45,21±1,44	49,18±1,22	47,76±1,24	52,95±1,32	≤ 0,05	≤ 0,05
Tiffno index, %	64,31±1,12	66,57±1,07	65,74±1,68	68,43±1,87	> 0,05	> 0,05
Content of surface-active fraction of LSS (mcmol/l)	6,94±0,37	8,02±0,18	7,00±1,11	10,17±1,01	≤ 0,05	≤ 0,05
EF, %	55,23±1,25	59,43±0,65	58,91±2,02	67,69±2,13	≤ 0,05	≤ 0,05

**Note:**

P1 – *p-value* for patients that received standard therapy, before and after treatment N.

P2 – *p-value* for patients that received Echinacea before and after treatment.

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