

чного АТ з ознаками гіпертрофії міокарда лівого шлуночка та ожиріння I або II стадії. Таким чином, аби «спуститись» хоча б на одну сходинку (з «дуже високого» рівня сумарного ССР на просто «високий»), для кожного з цих хворих потрібно розробити індивідуальну програму, направлену на подолання конкретної критичної ситуації, включаючи оптимізацію харчування, підвищення активності, а також призначення адекватної антигіпертензивної та/або гіполіпідемічної терапії.

Отримані результати в цілому показали, що оцінка сумарного ССР має ключове значення для вибору профілактичної стратегії та конкретних дій у хворих на ХОЗЛ, які мають поєднання декількох ФР. Модифікація ФР особливо буде необхідною для пацієнтів з високим або дуже високим висхідним рівнем сумарного ССР.

### Висновки

1. Хворі на ХОЗЛ тяжкого перебігу в цілому по групі відносяться до осіб з досить високим ризиком розвитку несприятливих серцево-судинних подій;

2. У загальній структурі хворих на ХОЗЛ тяжкого перебігу дуже високий сумарний ССР сягає майже 70%, високий – 30%; можна припустити, що помірний та низький сумарний ССР у цієї категорії хворих зустрічається надзвичайно рідко;

3. Ведення хворих на ХОЗЛ тяжкого перебігу потребує дій, направлених на корекцію ФР, які ще можна модифікувати: зниження ваги, відмову від тютюнопаління, підвищення фізичної активності, контроль АТ та показників ліпідограма.

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## ENGLISH VERSION: CARDIOVASCULAR RISK IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE\*

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*Chronic obstructive pulmonary disease (COPD) has many risk factors (RF) and pathogenetic mechanisms that are common with cardiovascular diseases (CVD), especially coronary heart disease (CHD). Among the most widespread shared risk factors are smoking, age and physical inactivity caused by respiratory failure, poor nutrition, and environmental deterioration. The aim of our study was to assess the degree of total cardiovascular risk (CVR) in patients with COPD of severe course for prediction of their cardiovascular events and justify the ways of total CVR correction for each of patients. We observed 29 men with the severe course of COPD in stable phase of the pathological process. In order to identify the extent of total CVR, we determined the demographic parameters for each patient (age, gender), attitude to smoking (smoker / non-smoker), systolic blood pressure and total cholesterol (TC) levels (mmol/l). The results generally showed that the estimate of total CVR in patients with COPD is crucial when choosing the prevention strategy aimed at overcoming a particular emergency, including the optimization of nutrition, increased activity, as well as the prescription of adequate antihypertensive and lipid-lowering therapy.*

Key words: Chronic obstructive pulmonary disease, cardiovascular diseases, risk factors

Chronic obstructive pulmonary disease (COPD) is currently one of five diseases that are characterized by

the highest death rate. Cardiovascular events constitute an important reason thereof [6].

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COPD has many risk factors (RF) and pathogenetic mechanisms, common with cardiovascular diseases (CVD). Firstly, COPD is characterized by chronic inflammation of the airways, which is caused mainly by smoking; besides, smoking is a RF in the development of CVD as well [2, 10, 11]. In addition, many patients with COPD have other RF of CVD development (especially coronary heart disease (CHD)): age, physical inactivity that is caused by respiratory failure, poor nutrition, and environmental deterioration. Secondly, the relationship between COPD and CVD is realized through a number of pathogenic mechanisms, among which the systemic inflammation is the most important [1, 4, 9].

The prognosis for patients with COPD largely depends on the presence of concomitant cardiac pathology, and the degree of severity of functional and / or morphological disorders [3, 11].

Development and implementation of preventive measures to reduce the risk of CVD in patients with COPD is one of the priorities for modern medicine [6]. The solution to this problem is impossible without determination of total cardiovascular risk (CVR), to which the patient is attributed.

To assess the total risk of fatal cardiovascular disease, the European scale SCORE (Systemic Coronary Risk Evaluation) has been developed over the past 10 years. This model is easy to use because, firstly, the definition of RF, which can be modified (they are taken into account by the scale), does not require significant economic costs, and, secondly, by means of this scale one can predict the possible risk of deaths and diseases associated with atherosclerosis [8].

The aim of our study was to assess the total CVR in patients with COPD of severe course for predicting the development of cardiovascular accidents, as well as the ways to justify the correction of total CVR for each patient.

**Materials and methods**

We examined 29 men with severe course of COPD in stable phase of pathological process (average age - 65.4 ± 2.6 years). In relation to smoking, patients were distributed as follows: 28 (96.6%) of them were "active smokers" in the past or at present, duration of smoking was 36.4 ± 3.9 years, the index "pack / year" - 38.8 ± 2.5; one (3.4%) patient had never smoked.

General clinical methods of physical examination were conducted with mandatory measurement of blood pressure (BP).

To determine the severity of ventilation disorders and verification of COPD diagnosis, spirometry was conducted with the calculation of forced expiratory volume in the first second (FEV1), vital capacity (VC) and the ratio of FEV1 / FVC before and after pharmacological tests with short-term bronchodilator (salbutamol 400 mcg through spacer). The diagnosis of COPD was made according to the order of Ministry of Public Health of Ukraine No. 555 as of 27.06.2013. All patients received adequate medical therapy (inhaled corticosteroids and bronchodilators).

The criteria for inclusion of patients in the study were: verified COPD (FEV1<80% of the appropriate volume, FEV1 / FVC <0.7) and patient's consent to participate in the study. Exclusion criteria were: chronic heart failure III or IV functional class, presence of cancer in the case history or at present, terminal renal or hepatic insufficiency, concomitant asthma, and pulmonary tuberculosis.

To determine the degree of total CVR, demographic indicators (age, gender), attitude to smoking (smoker / non-smoker), systolic blood pressure and total cholesterol in the blood serum (mmol / l) were determined for each patient. We used the following proposed gradation levels of CVR [8]:

1) very high CVR: proven atherosclerosis of any location; diabetes type I or II with target organ damage (microalbuminuria); chronic kidney disease (glomerular filtration rate - less than 60 ml/min/1.73m2); SCORE risk, determined by the calculator - higher than 10% (the figure reflects the probability of fatal CVD events over the next 10 years, expressed as a percentage);

2) high CVR: diagnosis of any cardiovascular disease, diabetes type II or I, significantly increased levels of certain RF (hypertension of high degree (BP higher than 180/110 Hg.mm), familial dyslipidemia, etc.), total cholesterol level in the blood higher than 8.0 mmol / l; SCORE risk - higher than 5, but lower than 10%;

3) moderate CVR: SCORE risk - higher than 1, but lower than 5%;

4) low CVR: SCORE risk - 1% or less.

It is necessary to take into account that the level of total CVR may still rise with signs of subclinical atherosclerosis (e.g., ultrasound of the carotid arteries), obesity, left ventricular hypertrophy (electrocardiogram or echocardiography), early development of CVD in immediate relatives, lowered LDL cholesterol, increased levels of triglycerides or markers of systemic inflammation (C-reactive protein, fibrinogen), impaired glucose tolerance and sedentary lifestyle.

Statistical analysis of our data was performed using «STATISTICA 6.1».

**Results and discussion**

All examined patient had rather severe bronchial obstruction, FEV1 level in post-test was 45.9 ± 2.19% of appropriate volume, ratio of FEV1 / FVC - 0.47 ± 0.12.

Depending individually on the cumulative value of CVR calculated by SCORE, the examined patients were attributed to one of the categories (Table 1).

The analysis showed that none of the patients have been classified or categorized as moderate CVR, let alone in the category of low CVR.

*Table 1  
Distribution of patients with COPD by CVR degree*

No.	CVR degree	Number of patients, abs. (%)
1.	Very high	20 (69.0)
2.	High	9 (31.0)
3.	Moderate	-
4.	Low	-

The category of high CVR included examined patients with COPD of severe course, in which SCORE risk had individual variations from 5.53 to 10.0%. Moreover, by individual analysis, they were people aged from 57 to 64 (average age of patients was 58.6 ± 1.19). All patients were smokers in the past or at present; two of them (22.2%) had hypertension (however, they received adequate medical treatment, and therefore had normal blood pressure), other patients (77.8%) had increased systolic blood pressure; the level of total cholesterol in the blood serum of patients ranged from 2.80 to 7.76 mmol / l (in five patients it was lower than 5.17 mmol / l, i.e., had normal reference values, and in four patients - it was

higher than 5.17 mmol / l, i.e., moderately high or high). Thus, for such a cohort of patients with COPD, there are only two ways to reduce CVR degree - either normalization of systolic blood pressure (if there is a problem) or lowering the total blood cholesterol (it would be preferable to influence both options), because neither age, nor the existing long-term factor of smoking can be influenced.

Regarding the category of very high CVR, the situation was even more complicated. Three patients (15.0%) have had the history of myocardial infarction with proven coronary artery atherosclerosis, one (5.0%) patient had type II diabetes with evidence of microalbuminuria, one (5.0%) patient had atherosclerosis of carotid arteries against the background of total cholesterol serum level of 8.1 mmol / l. Consequently, all patients mentioned above were classified as the severest category in relation to the total CVR, and additional SCORE calculation was not needed. The remaining 15 (75.0%) patients that were included in the cohort of very high CVR, firstly, were aged from 65 to 78 (the age over 65 as such is "problematic", thus SCORE calculator to the patients of this age was not applied); secondly, all of them were classified as having a high pack / year index; thirdly, 12 of them (80.0%) had high levels of total blood cholesterol (although the figures were lower than 8.0 mmol / l, but higher than 5.5 mmol / l), and 13 (86.7%) - even higher parameters of systolic blood pressure with evidence of left ventricular hypertrophy and obesity stage I or II. Thus, in order to "go down" at least one step (from "very high" level of total CVR to the "high" one) for each of these patients it is needed to develop a customized program aimed at overcoming the specific critical situations, including optimizing the nutrition, increased activity and prescription of adequate anti-hypertensive and / or lipid-lowering therapy.

In general, the obtained results showed that the calculation of total CVR is the key to choosing preventive strategies and specific actions in COPD patients who have the combination of several RF. Modification of the RF will be especially necessary for patients with high or very high levels of total CVR.

#### **Conclusions:**

1) COPD patients with severe course in general are attributed to people with relatively high risk of adverse cardiovascular events;

2) in patients with COPD with severe course, the very high overall CVR is nearly 70%, high - 30%; which suggests that moderate and low overall CVR in these patients is extremely rare;

3) management of patients with COPD of severe course requires actions aimed at correcting the RF, which can still be modified, weight loss, smoking cessation, increased physical activity, blood pressure control and lipidogram indicators.

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