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Opinion

Common Risk Factors and Comorbidity of Cardiovascular Diseases and Cancer

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In the first decades of the XXI century, chronic non-communicable diseases (CNDs) retain leadership as the primary cause of disability and complication among people of working age in developed countries of the world.[1] Their total share in adult mortality is about 77%.[2]

Malignant oncological diseases, along with cardiovascular diseases (CVDs) associated with atherosclerosis, are among the top three causes of mortality in the working-age population. In the United States, among adults, ischemic heart disease is the cause of death in 20.1% of cases, cerebral stroke in 6.3% of cases, and cancer of various localizations in 26.6% of cases. In China, in the structure of mortality rates, cerebral stroke occupies 21.3%, coronary artery disease 18.4%, and cancer of various localizations 31%. In Russia, the contribution of ischemic heart disease to mortality is 34.2%, cerebral stroke 19.9%, and cancer of various localizations 14.6%.[1]

According to the forecast of WHO experts, in 2030, CVD will occupy 26.5% of the mortality structure, while oncological diseases of various localization will occupy 8.5%.[3]

Meanwhile, the comorbidity of somatic diseases among cancer patients is an urgent problem.[4,5] Comorbidity of somatic diseases possesses not only prognostic value for people with cancer, but also negatively affects patients' quality of life. According to the literature, at the time of diagnosis, at least two or three chronic diseases are registered in patients with oncological diseases.[4] According to Canadian researchers, in a prospective study with an analysis of more than 600 thousand patients with various localization cancers, more than 5 additional somatic diseases were detected in 23%.[6]

Various somatic diseases can develop both before the establishment of oncological diseases and after verification of the diagnosis and treatment. Among people with brain cancer before and after the diagnosis of the disease, the greatest number of somatic diseases were revealed compared to prostate cancer, which may be due to age, social, and marital status as well as the presence of obesity and exposure to chemotherapy.[7]

According to Al-Kindi *et al*., from 15% (breast cancer) to 43% (lung cancer), somatic diseases occur in groups of individuals with malignant tumors of 6 CVD localities. The average frequency of CVD in this cohort was 30%, which coincides with the data obtained in this study.[8] Buddeke *et al*. in a prospective 10-year study involving 2,397,773 patients with various CVDs demonstrated that oncological diseases were the most common causes of non-cardiovascular comorbidity. In people with heart failure, oncological diseases were detected in 54% of cases; in people with peripheral atherosclerosis, 46%; in people with coronary heart disease, 40%; and in patients with cerebrovascular diseases, 32%. During the observation period, incidents of new cases of cancer in men and women increased by 5% and 4%, respectively.[9] According to Koene *et al*., the pathogenetic relationship between oncological diseases and CVDs may be due to a chronic inflammatory process that plays an important role in the pathogenesis and progression of both diseases.[10]

It is known that risk factors (RFs) play an important role in the development of CND. More than 200 RF are known to science, and as the results of new research accumulate, their number increases. RF is distributed according to several principles with the most widely used definition being modifiable and unmodified RF. It has been proven that unmodified RF, such as age, gender, and hereditary burden, play an important role in the development of both CVDs and oncological diseases.[11]

However, modifiable biological and behavioral RF make a significant contribution to the development of CND. According to prospective studies, 7 out of 8 RF known as cardiovascular RF (smoking, harmful alcohol consumption, poor nutrition, lack of physical activity, obesity, increased blood pressure, elevated blood glucose, and elevated cholesterol levels) play an important role in the development of oncological diseases of various localization. Consequently, some modifiable RF have universal properties. According to experts, some RF, along with hereditary predisposition, play the role of a catalyst in the development of several CNDs.[12]

According to the data of the US National Registry, patients (n = 1,582) with breast, prostate, uterine and colorectal cancers were found to have multiple RF, such as smoking, overweight, sedentary lifestyle, hypercholesterolemia, arterial hypertension, and diabetes mellitus.[4] In comparison to the population of the same age without

Abbreviations: CNDs, chronic non-communicable diseases; CVDs, cardiovascular diseases; RF, risk factor.

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oncological diseases, CVD RF are more common in people with oncological diseases:

- 62.0% - overweight or obese;
- 55.0% - hypertension;
- 20.7% - diabetes mellitus;
- 18.1% - sedentary lifestyle;
  5.1% - smoke.

Such factors as age, obesity, and a sedentary lifestyle may contribute to an increased risk of cancer in patients with diabetes. Possible mechanisms linking diabetes and cancer include hyperglycemia, hyperinsulinemia, and increased bioactivity of insulin-like growth factor 1. The severity of chronic obstructive pulmonary disease, including airway obstruction and pulmonary emphysema, is considered a prognostic factor of lung cancer.[13] Of course, the fight against tobacco smoking is one of the important measures to prevent complications of chronic obstructive pulmonary disease and lung cancer. The role of chronic inflammation in the development of cancer and chronic non-communicable diseases, including cardiovascular diseases, is undeniable.

In the literature, the quality of life of patients with oncological diseases is widely discussed.[14,15] Both simultaneous and prospective studies are devoted to this problem, and it has been established that there is a close relationship between the quality and prognosis of life of patients with oncological and somatic diseases.

At least 10 years ago, a German multicenter cohort study assessed the quality of life of 2,704 patients diagnosed with breast, prostate, and colorectal cancer. For comparison, 1,765 people were included in the control group.[14] The quality of life was assessed using the Core 30 questionnaire (EORTC QLQ-C30). In general, among individuals with a 10-year survival rate, the quality of life was comparable with the control group, but patients indicated the presence of clinical symptoms of various types and the presence of a number of limitations. Symptoms such as shortness of breath, constipation, and diarrhea were more often described in people with colorectal cancer. In another study, the quality of life (EORTC QLQ-C30 scale) was assessed after 5 and 10 years among 1,000 survivors with different localization of a malignant tumor. In some patients, along with cancer, 5 concomitant diseases were registered, and in 23%, 7 or more concomitant diseases were detected. Compared with the control group, patients with malignant diseases were more likely to complain of fatigue, insomnia, and pain. The parameters of quality of life and subjective complaints depended on localization, treatment, and individual parameters. In general, patients with 5- and 10-year survival after cancer detection, compared with the control group, indicated a lower quality of life, particularly in daily activities, social life, psychological well-being, and financial issues.[15]

Early intervention in the form of primary prevention plays an important role in reducing both morbidity and prevention of complications of CVDs and oncological diseases. A good example of this is represented by the results of the Finnish prospective study, the North Karelia Project. A 37-year preventive program at the population level implying the correction of behavioral risk factors and lifestyle (limiting the consumption of animal fats, dietary salt, tobacco control, and other multifactorial prevention measures) of people of various ages contributed to a reduction in mortality from cancer in general by 65%, from lung cancer by 80%, from coronary heart disease by 85%, and from all CVDs by 79%.[2]

Identification of a high-risk group and active preventive intervention is also important in preventing the development of complications in people with cardiovascular and oncological diseases. Screening (medical examination) among certain groups of people, primarily those with a hereditary burden, improper lifestyle, and the presence of certain RF is one of the justified preventive measures.

Finally, secondary prevention in people with verified diseases can improve both the quality of life and the prognosis of life in patients with comorbidity.

The concept of management of chronic diseases implies three approaches: a population strategy for correcting FR and lifestyle, identification and correction of a group of people at high risk of developing both individual diseases and their comorbidity, and, finally, secondary prevention of complications of these diseases.

Thus, in order to improve the quality and life expectancy of patients with oncological diseases, therapeutic and preventive interventions should cover concomitant diseases, primarily CVDs and their risk factors.

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Concept development and article design (MNM), collection of literature sources and translation of articles (KKB), processing of literary materials and analytical work (AKK). All authors have made a significant contribution to this study and have approved the final manuscript.

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