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ENGLISH VERSION: RISK FACTORS AND PROBLEMS OF COLORECTAL CANCER SCREENING

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The study of domestic and foreign literature is dedicated to the study of the role of risk factors for the multifactorial disease - colorectal cancer. Modifiable factors (types of diets, hypodynamia, obesity, smoking and alcohol abuse), non-modifiable factors (age, inflammatory bowel diseases, bad family history, inherited syndromes, racial and ethnic factors) and factors with unproven or controversial degree of influence on pathological processes (night shift work) were considered. The analysis of the nature of genetic factors interaction with other colorectal cancer risk factors was carried out.

Key words: colorectal cancer, risk factors, screening.

Introduction.

Colorectal cancer (CRC) in many countries is the total malignant neoplasms incidence leader and is the second cause of death in the countries of the European Union. Every year in the world, there are recorded more than 1 million new cases of CRC and almost half of these patients die from disease progression [Nurhaziev, Hourani].

In Ukraine in recent years, the intense incidence of CRC is observed. Analysis of the malignant processes incidence in 2013 showed that the incidence of the colon and rectum cancer was 24.3% and 21.0% respectively [Schepotin].

The main part

The etiology of CRC is insufficiently studied, although in recent years, a lot of important data on this issue were gathered. Although there are known some of genetically determined syndromes with susceptibility to the disease progression, its primary importance in the pathogenesis belongs to environmental factors, etc. [Yevtushenko]. The exact causes of CRC are unknown to the date, but there is a number of risk factors that contribute to the progression of the disease [Phipps].

CRC is a multifactorial disease, in its pathogenesis many of important risk factors are important. Today we know that the risk of CRC in the European population is 4-5% [Baena]. Currently, the following main risk factors for CRC disease are the following: patient age, dietary habits, genetic syndromes, inflammatory diseases and benign colon tumors [Yevtushenko].

Despite the fact that most of the CRC cases belong to sporadic forms, the proportion of patients with complicated cancer history is 20-30% of all cases. Due to modern scientific researches in molecular genetics the key genes of many cancers, including CRC, were identified. However, the associations of different gene mutations with the risk of CRC in some populations are different. Taking into consideration that the CRC is referred to as a disease of multifactorial nature, the associativity of individual genotypes with the risk of falling ill is largely determined by ethnicity, type of diet, age, lifestyle, etc. [Zoratto].

Some authors consider that all risk factors for CRC can be divided into 3 groups: modifiable (which a person can affect) non-modifiable and factors of unproven or controversial degree of influence on pathological processes.

Nonmodifying risk factors for CRC include: age, inflammatory bowel disease (ulcerative colitis, Crohn's disease), bad family history (presence of colorectal cancer or adenomatous polyps in the lineage) inherited syndromes (Turco syndrome, Peutz-Jeghers syndrome, MUTYH gene associated polyposis), racial and ethnic factors, type II diabetes and others[…..]. Risk factors related to lifestyle (modifiable) are: certain types of diets, lack of exercise, obesity, smoking and alcohol abuse.

Conflicting factors include, for example, work in night shifts. As the results of one research showed, work in such mode at least 3 times a month for 15 years may increase the risk of CRC in women. Scientists attribute this to the change of melatonin level in the body [Aleksandrova].

Social factors:

Old age. Typically, patients suffer from CRC over the age of 50 years, and the likelihood of progression of the disease increases every year. However, the CRC also occurs in a younger age.

Gender. In most countries men have a higher risk of CRC than women.

Race and ethnicity. CRC is characterized by enormous geographical and ethnic occurrence fluctuations [Imyanitov]. Epidemiological studies showed, that immigrants from Asian and African countries with a low incidence of CRC after emigration in Europe and the United States suffer from this disease with a frequency,

characteristic of the new residence [Yevtushenko]. Also, jews, living in Eastern Europe (Ashkinazi), have the highest risk of developing CRC in the world.

Lifestyle factors:

Eating habits. A diet, rich in red meat (beef, lamb, liver), hot dogs and sausages, can contribute to the development of CRC. Conversely, a diet with predominating of vegetables, fruit and cereal products, regular consumption of vitamins A, B6, C, E, D and folic acid helps to reduce this risk. It is assumed that this may be due to endogenous insulin, which is a strong mitogen [Mahfouz]. In this aspect, it is assumed, that the most significant risk factor is the high contents in the faeces of bile acids, which are the powerful endogenous carcinogen. Contact of endogenous and exogenous carcinogens with epithelium causes damage of the large intestine mucosa, resulting in the secondary inflammatory reaction progression. Consequently, apoptosis inhibition processes with subsequent activation of proliferation, hypertrophy and stroma intestine sclerosis are activated. It is found that frequent consumption of fatty, fried and smoked foods contributes to the risk of CRC progression. Some authors attribute this to the formation of nitrosamines and acrolein, which are formed as a result of cooking meat products at high temperatures [Berjia].

Smoking. Tobacco smoke contains over 4,000 chemical compounds, most of which belong to the strongest carcinogens. It was established that smoking increases the risk of CRC. According to some authors, there is a connection between smoking cigarettes and mortality from CRC [Figueiredo].

Alcohol consumption. Many authors have concluded that there is a close and mostly little-known connection between high doses of alcohol and the risk of CRC. Canadian researchers showed that the development of CRC depends on the amount of beer to take. It is important, that ethanol by itself is not a carcinogen. Carcinogenic properties are possessed by its metabolite - acetaldehyde [Nishihara].

Physical inactivity and obesity. Mechanisms to reduce the risk of CRC in physical activity are not fully understood. However, it is believed that people with sedentary lifestyle are at increased risk of the disease progression.

Chronic inflammatory disease of the colon:

As for today, it is proved that the presence of Crohn's disease and ulcerative colitis in anamnesis increases the risk of CRC. It is known that these pathological processes have periods of exacerbation. Cycles of the inflammatory damage and healing lead to the increasing of the epithelial proliferation rate, followed by a more expressed susceptibility to the carcinogens activity [Wardle].

Genetic factors:

The most of the CRC cases are sporadic forms. According to the literature, genetic predisposition to cancer in patients with complicated history is about 30%. It is important, that genetic polymorphisms can alter the structure and functioning of proteins, and that significantly affects the majority of biochemical processes in the body. However, it was proved, that in different populations the specific CRC associations with polymorphism of certain genes were identified [Gao, Kornilov].

Carcinogenesis of CRC is the result of the influence of endogenous and exogenous factors on the human body. The vast majority of cancer antigens regulates physiological processes of cells development and functioning. Cancer oncogenes are divided into suppressor genes, protooncogenes [Sameer].

The CRC progresses for several years and is characterized by sequential accumulation of different gene mutations. However, most cases of CRC belong to sporadic forms and do not have the easily identified hereditary nature. Therefore, the study of these forms is of great scientific and practical interest.

Thus, CRC belongs to diseases for which, in our opinion, preventive measures can be carried out. Primary prevention should be aimed at identifying mutations that define high risk of CRC progression. Secondary prevention should be directed to the development of programs, which implementation can be achieved by screening of patient relatives, identifying families with hereditary cancer burdened history, medical and genetic counseling, active clinical examination. We believe that this is the only way for the organization and operating of genetic CRC prevention system.

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