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Recent advances in improving colorectal screening

Summary. *The steady growth of colorectal cancer in the world motivates many scientists in the constant search for new methods of diagnosis of early stages of cancer of the colon and rectum. The article describes the methods of research of scientists around the world about cancer markers used for the diagnosis of colorectal cancer to reduce the steadily growing cancers of the colon and rectum.*

Keywords: *Colorectal cancer, screening, cancer markers, carcinoembryonic antigen.*

Over the past 10 years the world has witnessed a steady rise in the incidence of colorectal cancer (CRC). According to the database GLOBOCAN, the number of cases of malignant tumors of the colon in 2012 amounted to 1,360,602 (746,298 men and 614,304 women), the number of deaths - 693,933 (373,639 men and 320,294 women). Global average incidence was 17.2% of the company (20.6%ooo men and 14.3%oooamong women) - 4th place in the structure of oncological diseases of the entire population, 3-rd place among men and 2-nd place among women mortality of 8.4% of the company (10.0%ooo among men and 6.9%ooo among women), 5th place in the structure of the total population oncology death, 4th place amongmen, 3rd place among women. It is expected that in the next 20 years, incidence rates increase not only by increasing the number of the world population, but also due to its aging [1].

In connection with the above, scientists around the world are constantly looking for methods of research that can detect colorectal cancer in its early stages. One area of research - the study of non-enzymatic tumor markers, so-called tumor markers. Tumor markers - a substance produced by the tumor cells or normal cells in response to the tumor [2]. Markers can be useful as screening tests, differential diagnosis, in predicting and dynamic observation of the disease. They can differentiate malignant tumors from benign in the case of an undifferentiated histology [3]. Markers can be taken from blood, urine and other body fluids [2]. In the diagnosis and monitoring of colorectal cancer is most often used carcinoembryonic antigen (CEA), cancer antigen (CA) 19-9, tumor antigen of colorectal cancer (tumor associated glycoprotein, TAG-72), tissue polypeptide antigen (TPS) and TAG-72. Increasing the value of tumor markers in the diagnosis helps metastases or recurrence [4]. Unfortunately, the tumor markers currently in use are not able to establish the diagnosis of colorectal cancer in the early stages due to insufficient sensitivity and specificity [5].

The best-known marker of cancer of the gastrointestinal truck, especially colon cancer is carcinoembryonic antigen (CEA), which opened in 1965. scientists Gold and Freedman [2].

CEA is a glycoprotein, located in the peripheral layers of the cell membrane of the colon. Elevated CEA levels in the serum can be associated with the presence in the body of carcinogenesis. In 50% of patients is indicative of tumor recurrence after resection. Unfortunately, the increase in the concentration of CEA is rarely found in the early stages of the disease; typically observed in advanced cases of tumor [2, 4]. Note that CEA is not detected in 40% of patients with colorectal cancer, and has poor specificity because increasing its level is detected not only for colorectal cancer but also at other sites of malignant neoplasms and nonmalignant diseases. The high level of the marker is often detected metastases in the liver, at least at the local cancer, increase of this indicator can also occur in the presence of inflammatory diseases, including hepatitis, inflammatory bowel disease, pancreatitis, obstructive pulmonary disease. Thus, the CEA cannot be considered oncology marker primary diagnosis of colorectal cancer. Recent studies have shown that 15% of tumors of the colon are not accompanied by increased levels of CEA and this figure increases slightly [4].

After the radical treatment, the level of CEA in the blood of the patient is usually reduced relative to the source or to standards. High CEA levels after surgery is a poor prognostic sign and evidence of non-radical of the treatment, which is accompanied by an increase in the likelihood of recurrence and reduced survival. The systematic definition of CEA in patients after radical treatment reveals a relapse. Increased CEA levels in the plasma of a patient more than 2 times compared to baseline (post-operative) or indicator - 10 ng / ml can be regarded as an alarm and requires in-depth examination of the patient in order to detect recurrence. Despite the fact that CEA is very specific for colorectal cancer, the sensitivity is not sufficient for the early detection of cancer [6, 7].

Scientists of Pakistan Khyber Pakhtunkhwa conducted a comparative study of CEA levels in patients with gastric cancer and colorectal cancer.

This study involved 66 patients. CEA levels were determined in the blood of patients using the technique of ELISA.

Of the 66 patients, there was an increase in the level of CEA in 59.1% of cases, 60.7% - in patients with colon cancer, and 57.9% - in patients with gastric cancer. In addition, the researchers noted that the incidence of colorectal cancer and gastric cancer is higher in men than in women. CEA levels were relatively higher in patients (51.5%) with histology moderately differentiated carcinoma than patients with highly differentiated and poorly differentiated carcinoma. The conclusion drawn by scientists from Pakistan: CEA has higher sensitivity for colon cancer than for gastric cancer [8].

Australian scientists have conducted research using the analyzer Proseek® Multiplex Oncology I, which holds the expression of 92 human proteins that are identical units of plasma were investigated by immunoassay analyzer Bio-Plex Pro ™ human cytokine 27-plex. The scientists were challenged to identify tumor markers that could establish the diagnosis of colorectal cancer in the early stages, when

surgical treatment is much more effective. Current diagnostic methods for colorectal cancer do not possess the necessary sensitivity and specificity required for the early detection of the disease population. Plasma samples were obtained from 75 patients who were divided into two groups according to the classification by Duke colorectal cancer (early stage, late stage) and one group - control, 92 were examined for the expression of human proteins by immunoassay analyzer Proseek® Multiplex Oncology I . An identical set of plasma samples were analyzed for immunological analyzer Bio-Plex Pro ™ 27-Plex. The study found that the expression level of CEA, IL-8 and prolactin correlates with stage of colorectal cancer. CEA levels, IL-8 and prolactin matched control group of benign tumors and malignant diseases. Consequently, according to these scientists, these tumor markers should be used for the diagnosis of benign colon and rectum, and the early stages of malignant tumors of the colon [9].

Scientists from the Chinese study was conducted, the purpose of which was to evaluate the prognostic value of tumor markers CA 19-9, CEA and CA125 in the serum before surgery correlated with 5-year disease-free survival of patients with colorectal cancer.

Tumor markers CA19-9, CEA and CA125 were studied in 103 patients with colorectal cancer and was conducted correlation with 5-year survival.

Patients with positive tests for tumor markers CA19-9, CEA and CA125 recurrence within 5 years was almost 2 times higher than in patients with negative results of the analysis of these markers (75.0% vs. 41.0%, 65, 6% versus 39.4% and 87.5% vs. 44.2%, respectively, all p <(O) 0.05), as well as the life expectancy without relapse declined in patients with a positive tumor markers in comparison with the control group (14 versus 35 months, 20 months to 36 and 4 to 35 months, respectively, all P <(a) 0.05). In addition, the scientists compared the number of positive tumor markers duration of life expectancy of patients without relapse: patients with a negative index of all 3 markers indicator of life without recurrence was 59 months, with a positive result of 1-2 marker indicator life without recurrence was 14 months, 3 tumor markers positive result indicator of life without relapse was 4 months. Patients with positive results both CA19-9, CA125 and CEA had the highest percentage of recurrence (100%) and the lowest level of the index of life without recurrence (4 months). Thus, preoperative serum tumor markers CA19-9 + CEA + CA125 can be used as an independent predictor of 5-year disease-free survival [10].

Another group of Chinese scientists hoping to find sensitive and specific tumor marker for colorectal cancer conducted a study whose purpose was to investigate the presence of serum CEA, alpha-fetoprotein (AFP) and CA19-9 in patients with disorders of the colon. The scientists examined 46 patients with confirmed colorectal cancer and 36 cases with benign colon. The result of the study was a significant increase in serum CEA, CA19-9 and AFP in patients with colorectal cancer compared with patients with benign tumors (all P <0.05). The sensitivity of tumor markers for colorectal cancer CEA, AFP, and CA19-9 totaled 80.43%, 73.91% and 69.57%, respectively; specificity of tumor markers for colorectal cancer CEA, AFP, and CA19-9 totaled 75.00% 69.44%, 61.11% respectively. As with previous research, these study researchers also suggest that the study of the level of serum CEA can be used in a joint study with other biomarkers, in this case with AFP and CA19-9, as the diagnosis of colorectal cancer [11].

Another study of CEA and CA 19-9 conducted by scientists of Bosnia and Herzegovina confirmed the above studies, which describe the data are tumor markers confirm late carcinogenesis, especially in the presence of metastases. There were examined 91 patients with a confirmed diagnosis of adenocarcinoma of the colon in 98% of cases. All patients underwent a colonoscopy, biopsy and measurement of CEA and CA 19-9 in the blood serum. The study involved 58 men and 33 women, mean age 66.6 years. The greatest number of patients aged 56-75 years. Metastases were observed in 37 patients with a predominance in the liver. Scientists note that the CEA and CA 19-9 in patients with liver metastases had a relatively high value [12].

Thus, considering the above study it can be concluded that CEA as a single tumor marker for early diagnosis of colorectal cancer can not be used due to the lack of sensitivity and specificity for colorectal cancer. However, in combination with AFP, CA 19-9, CA 125 can be applied as dynamic factor surveillance in the early and late postoperative period on the CRC, as well as a 5-year life expectancy without recurrence.

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Тұжырым

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Колоректальды ісік скринингті жақсарту туралы соңғы жетістіктер

Әлемде тоқ ішек ісігінің санының өсуіне байланысты көптеген ғалымдар тоқ ішек пен және тік ішектіңісігін ерте сатысында табатын жаңа диагностика әдістерін ізденуде. Мақалада колоректалды ісіктің төмендету мақсатында онкологиялық маркерлерді зерттейтін әлемнің түрлі елдерінің ғалымдардың зерттеу жұмыстары сипатталған.

Түйінді сөздер: Колоректальды рак, скрининг, ісік маркерлер, раковоэмбриональный антиген.

Аннотация

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Современные достижения в усовершенствовании скрининга колоректального рака

Неуклонный рост колоректального рака во всем мире мотивирует многих ученых на постоянный поиск новых методов диагностики ранних стадий рака толстого кишечника и прямой кишки. В статье описаны исследования ученых разных стран,использующих онкологические маркеры для проведения диагностики колоректального рака с целью снижения неуклонно растущего рака толстой и прямой кишки.

Ключевые слова: Колоректальный рак, скрининг, онкологические маркеры, раковоэмбриональный антиген.