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MODERN LABORATORY DIAGNOSIS OF PANCREATIC CANCER

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Abstract
Pancreatic cancer is a tumor lesion originating from the pancreatic ducts or pancreatic parenchyma. Symptoms of pancreatic cancer include nausea, loss of appetite, upper abdominal pain, impaired bowel function, decreased body weight, jaundiced coloration of the sclerae and visible mucous membranes.

Keywords: Pancreatic cancer, oncomarkers, pancreatic parenchyma, radiation therapy, serologic diagnostics.

Introduction

Laboratory (determination of biochemical parameters and blood oncomarkers) and instrumental diagnostics are used to detect pancreatic cancer. Radical treatment involves resection of the pancreas in various volumes; radiation and chemotherapeutic treatment may be used [1,2,3].

Serologic diagnostics of pancreatic cancer is used in clinical practice. Its positive aspects are non-invasiveness and relatively low cost. There are 5 types of serologic markers: mucin derivatives of glycoprotein structures (CA 19-9), oncofetal glycoproteins (REA), epithelial membrane antigens, enzymes (elastase 1), and hormones [2,8,9].

In modern clinic, the most widely used method is the study of CA 19-9 level in blood plasma, the sensitivity of which is 83%, specificity - 82%. Elevated CA 19-9 level in pancreatic juice is detected in almost 80% of cases, which is comparable to the results of blood plasma study [9,10,11].

These tumor markers are used to monitor and predict the course of the disease. An increase in marker levels indicates disease recurrence. The average life expectancy of patients in whom the level of markers (CA 19-9) normalizes after surgical intervention is about 1.5 years, compared to 7 months in cases in which the level does not normalize [8].

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The use of another oncomarker - carcinoembryonic antigen (CEA) to determine the presence of a malignant tumor is shown to a lesser extent, as its sensitivity does not exceed 33% with a specificity of 95%. A high level of REA in combination with an elevated CA19-9 level is a very unfavorable prognostic factor. There are also more distant prospects for the use of oncomarkers: more differentiated selection of chemotherapeutic treatment, as well as the development of various variants of gene therapy [4,5,6].

Thus, the combination of clinical-instrumental and molecular-genetic methods of tumor process diagnostics is of practical importance in early detection of pancreatic cancer, in more accurate determination of individual prognosis of the course of the oncological process, which is undoubtedly important in the choice of an adequate method of patient's treatment, and in monitoring of the disease for early detection of its recurrence. The use in clinical practice of analysis for specific components of tumor tissue - oncomarkers is currently one of the most promising directions in the differential diagnosis of various neoplasms [1,2,3].

Biochemical analysis, having high sensitivity and specificity, allows not only to determine the presence of tumor cells in the examined material, but also very often to predict its development. Currently, a large number of tests for oncomarkers specific for different types of tumors are known. Undoubtedly, the ideal marker must be a component of the cell without which tumor growth is impossible, while at the same time it must be absent in a normal pancreatic cell, for which the number of divisions is limited. All this together gives the assurance that the test for this oncomarker will be as effective as possible with respect to the correct diagnosis of malignancy. One of the most modern promising oncomarkers that meet the above requirements is telomerase [16].

High telomerase activity is not characteristic of the tissue of benign pancreatic neoplasms, but its indices increase during the transition from the group of papillary mucinous tumors to the group of malignant tumors, which allows us to consider telomerase as a highly specific marker, indicating pancreatic cancer in 100% of observations [3, 7].

In case of reasonable suspicion of pancreatic cancer and normal values of oncomarkers (CA 19-9, REA), in parallel with morphological examination of tissue material obtained from puncture histobiopsy, it is advisable to analyze telomerase activity in the tissue sample [6]. The incidence of pancreatic cancer is 10 cases per 100,000 people per year and is progressively increasing worldwide [5]. By the time of diagnosis, in more than 85% of patients, pancreatic cancer has spread beyond the organ, so radical surgery is impossible. The diagnosis of pancreatic cancer on the background of chronic pancreatitis is especially difficult [12,13,14,15].

The oncomarker of choice in this case is CA 19-9, the sensitivity of which, regardless of the degree of tumor differentiation, is 86% and specificity - 91%. More than 60% of patients with operable pancreatic tumors have an elevated level of CA 19-9, and it doubles over a period of 1-4 months. But elevation of the marker is detected in less than 55% of patients with tumor size less than 3 cm, i.e. normal CA 19-9 level does not exclude the presence of pancreatic cancer. On this basis, Klapdor recommends that in a patient over 45 years of age with epigastric symptoms, along with imaging studies (ultrasound, CT, MRI, endo-ultrasound), CA 19-9 determination is recommended 3 weeks after the painful attack, especially if the cause of the painful attack remains unclear and bothersome clinical symptoms persist. CA 19-9 levels in pancreatic cancer greater than 1000 U/mL usually indicate lymph node involvement, and greater than 10000 U/mL indicates hematogenous

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dissemination. In addition to CA 19-9, CA 242 and REA are used in pancreatic cancer, and the significance of CA 72-4 has been discussed. The advantage of these markers is that their level is independent of the manifestations of cholestasis.

However, the sensitivity of CA 242 for the diagnosis of cancer process in the pancreas varies from 41 to 75% with a specificity of 85-95%. With equal specificity (90%), the sensitivity of CA 242 for differential diagnosis of pancreatic cancer and chronic pancreatitis is higher than CA 19-9. These oncomarkers are significant independent prognostic factors: median survival is 8 and 20 months for patients with CA 19-9 concentrations above and below the median [4, 7].

After surgery, median survival increases when CA 19-9 levels normalize. The prognosis for patients with preoperative CA 242 levels less than 25 U/mL is significantly more favorable than for those with higher CA 242 concentrations, regardless of the stage of the cancer process [7,8,9,10,11,12].

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