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TUMOR MICROENVIRONMENT AND BREAST CANCER FORECAST

Abstract

Goal: to study the effect of the tumor microenvironment on the course and outcome of breast cancer.

Material and methods. To improve the diagnosis and treatment of breast cancer by studying the tumor microenvironment, its impact on the course and prognosis, we analyzed a group of 457 breast cancer patients.

Results. High LVI was detected in the group of patients with an unfavorable outcome (76.8%), in the group with a favorable outcome, lymphovascular invasion was diagnosed in 33.8% of cases. Tumor infiltration by lymphocytes was diagnosed in 229 patients (50.1%), of which in the group of patients with a favorable outcome of the disease, this sign was detected in 61.6%, with an unfavorable outcome in 38.4% of cases ($\chi^2=7.49$, $p < 0.001$).

Conclusion. Thus, in breast cancer, the presence, severity, and cellular components of lymphocytic infiltration in combination with IHC status and molecular genetic markers play an important role in determining the prognosis of the tumor process. Also, this factor is an indicator of the likely positive effect of immunotherapy.

Keywords: breast cancer, tumor microenvironment, prognosis.

Introduction

Recently, many studies have been devoted to the study of the tumor microenvironment and its interaction with it. Stromal cells (fibroblasts, immunocompetent, endothelial cells, etc.) extracellular matrix, soluble factors not only have a complex effect on the behavior of the tumor (proliferation of tumor cells, the ability to invade and metastasize), but also play an important role in the response of tumor cells to antitumor agents.

Tumor infiltrating lymphocytes are also of great prognostic and predictive value in breast cancer. In hormone-negative, HER2-neu-positive tumors, a high content of tumor-infiltrating lymphocytes increases

the effect of chemotherapy and patient survival. Increased content of CD8 lymphocytes in the tumor, and anthracycline chemotherapy has a synergistic positive effect, increasing the level of pathologically complete response to neoadjuvant chemotherapy.

Goal: to study the effect of the tumor microenvironment on the course and outcome of breast cancer.

Materials and methods

To improve the diagnosis and treatment of breast cancer by studying the tumor microenvironment, its impact on the course and prognosis, we analyzed a group of 457 breast cancer patients.

Patients were divided into two groups: the main group, patients with a favorable outcome of the dis-

ease were selected, and the control group consisted of patients with progression of the pathological process during the follow-up period (7 years).

1491 histological preparations belonging to 457 breast cancer patients were examined.

Results

At lafter an imfovascular invasion, tumor cells enter the blood or lymphatic vessels, which indicates a high tumor activity and the probability of its metastasis. Lymphovascular invasion (LVI) is basically the

initial stage of metastasis. High LVI was detected in the group of patients with an unfavorable outcome (76.8%), in the group with a favorable outcome, lymphovascular invasion was diagnosed in 33.8% of cases. This sign is a highly reliable prognostic sign, since in patients without lymphovascular invasion, local control for seven years was observed in 83.6% of cases and only 16.4% of cases in patients without LVI, the progression of the tumor process was detected ($\chi^2=4.67$, $p < 0.001$).

Table 1. – Distribution of patients by prognostic groups depending on the differentiation of tumors in breast cancer

Presence of the attribute	Main group		Control group	
	abs	%	Abs	%
Lymphovascular invasion				
There are n=225	99	33.8	126	76.8
No n=232	194	66.2	38	23.2
Extensive intra-current component				
There are n=202	71	24.2	131	79.9
No n=255	222	75.8	33	20.1
Ratio of stroma to tumor parenchyma				
Scanty stroma n=266	230	78.5	36	21.9
Pronounced stroma n=191	63	21.5	128	78.1
Infiltration of the tumor by lymphocytes				
There are n=229	141	48.1	88	53.7
No n=228	152	51.9	76	46.3
Total	293		164	

Extensive intraductal component, as well as LVI, indicate an aggressive growth of breast cancer. In 64.8% of patients with the presence of extensive intraductal component in histological preparations, the outcome was not favorable. In the absence of this feature, 87.1% of patients lived up to seven years and are currently under close monitoring ($\chi^2 = 6.94$ $p < 0.001$).

Phenotypic features of any tumor are formed as a result of the interaction of tumor cells and its stroma. The tumor stroma consists of It consists of cellular elements of connective tissue, blood vessels, nerves and extracellular matrix.

Out of 293 patients, the tumor with scanty stroma was detected in 78% of patients, with severe stroma in 21.9% of patients. Rich stroma was more often di-

agnosed in the group of patients with an unfavorable outcome of the disease, which was 78.1% of the total number of patients ($\chi^2 = 4.58$, $p < 0.001$). When analyzing the effect of stroma on life expectancy, the following data were revealed – patients with a scanty tumor stroma had a greater chance of recovery than patients with a rich tumor stroma.

Thus, the stroma provides vital communications necessary for tumor growth and for the spread of tumor cells. In our study, in patients with scanty tumor stroma, the seven-year survival rate was 86.5%, and in patients with severe advanced tumor stroma, more than 67% continued to progress despite comprehensive treatment measures, after some remission ($\chi^2 = 5.98$, $p < 0.001$).

During lymphocytic infiltration of the tumor, the latter is populated by immunocompetent cells, such as T-lymphocytes with specific antitumor activity, natural killers (NK) or TIL cells that are capable of lysing tumor cells. According to literature data, infiltration of tumor tissue by lymphocytes is a favorable prognostic sign.

Tumor infiltration by lymphocytes was diagnosed in 229 patients (50.1%), of which in the group of patients with a favorable outcome of the disease,

this sign was detected in 61.6%, with an unfavorable outcome in 38.4% of cases ($\chi^2 = 7.49$, $p < 0.001$).

Conclusion

Thus, in breast cancer, the presence, severity, and cellular components of lymphocytic infiltration in combination with IHC status and molecular genetic markers play an important role in determining the prognosis of the tumor process. Also, this factor is an indicator of the likely positive effect of immunotherapy.

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