

SIGNIFICANCE OF FUNCTIONAL CHARACTERISTIC OF BLOOD SERUM ALBUMIN IN LABORATORY DIAGNOSTICS OF OVARIAN CARCINOMA AND PREDICTING POST-SURGICAL COMPLICATIONS

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Comparative research of functional characteristics of blood serum albumin among patients with ovarian carcinoma and healthy women has revealed a significant disturbance in conformational and detoxication characteristics of albumin in case of ovarian carcinoma. It has been shown that parameter of albumin conformation can be used in early diagnostics of actively-developing ovary tumors, and defining index of detoxication efficiency of albumin can serve as perspective factor of predicting post-surgical complications in case of surgical treatment for patients with ovarian carcinoma.

Keywords: albumin, ovarian carcinoma, post-surgical complications

Ovarian carcinoma (OC) is one of the most aggressive types of oncologic pathology, and this disease is diagnosed in 65–70% of cases at later stages of its development, when a prediction can be unfavourable. 5-year survival potential for patients with stage I of this pathology equals 75,2%, stage II – 41,1%, stage III – 35%, stage IV – 17% [5]. Therefore, searching simple and reliable methods of early diagnostics for malignant ovary formations remains one of urgent problems in modern onco-gynaecology.

Nowadays studying disturbance in molecular structures and conformational characteristics of different mediators, formed in an organism under the influence of malignant tumor plays a great part, as well as active search for new, more informative indexes in evaluation of an organism's. The available objects of research are conformational characteristics and other physical-chemical characteristics of basic proteins of human organism, particularly blood serum albumin.

Transportation and conformation characteristics of albumin depend on location of three-dimensional structures that connect sites in its molecule and can be disturbed in case of different pathologic conditions: endotoxemia, hepatic failure, gestosis of the pregnant, schizophrenia, oncologic pathologies [2, 4, 6, 8, 9].

In this regard a great attention should be devoted to researching functional characteristics of blood serum albumin among patients with OC, discovered for the first time, that can be defined by a rapid and aggressive growth of tumor, it allows us to define degree of blockage in centers of albumin connection as well as evaluating detoxication function of liver.

Objective of the research is to evaluate possibilities of using conformational index of blood serum albumin as an additional test in laboratory diagnostics of OC and also evaluate the

significance of serum albumin detoxication activity in predicting post-surgical complications.

Materials and methods of research

109 women in age from 19 to 80 years were observed in Russian Oncological Center of N.N. Blokhin, among them – 59 patients with OC of stages I-III (age median 52 years) and 50 healthy women (age median 48 years). Functional characteristics of albumin were studied at the moment of patients' acceptance in the clinic before treatment.

Studying conformational and detoxication characteristics of serum albumin (ATA-test) was carried out via method of back probe spectroscopy with implementation of digital paramagnet resonance (DPR-spectroscopy) [10].

Statistic analysis of research results was carried out with programme "Statistica" (the data was presented by median and lower and higher quartiles), non-parametric method, and implementation of U-criterion of Mann-Whitney in independent groups.

Results of research and their discussion

It was established that conformation of serum albumin is significantly altered in blood serum of patients with OC.

When molecules of physiologically-active substances of endogenous and exogenous origins enter blood they associate with molecules of blood plasma proteins. Such association decreases toxicity of substances that enter blood flow significantly. However, in case of neoplastic processes increase in concentration of incomplete metabolism products in blood of patients as well as accumulation of various tumor metabolites in blood leads to blockage or allosteric changes in centers of connection at molecule of albumin thus causing disturbance in complex-forming and transportation function [7].

Parameters of functional activity of serum albumin in patients with ovarian cancer and healthy women

Groups/indicators	DR	DTE %
Healthy women (n = 50)	1,579 (1,281–1,994)	113,70 (97,20–130,60)
Patients with ovarian cancer (n = 59)	0,812 (0,605–1,133) p < 0,001	64,50 (39,80–80,40) p < 0,001

Thus, among patients with OC index of specific albumin conformation DR was lower than among the practically healthy women by 49%. It proves an expressed change in albumin conformation in blood serum of patients with OC and allows us to recommend DR index in early diagnostics of actively-developing malignant tumors.

Low values of DR among patients with OC in relation to the index of healthy women is explained by local alterations in structural-functional condition of albumin, as well as decrease in its conformational mobility and lability due to blockage of connection centers of albumin by various tumor metabolites and toxic ligands.

While studying detoxication ability of blood serum albumin we discovered that index of DTE is practically two times lower among patients with OC than in control group (64,5% and 113,7% correspondingly, table).

The earlier research [3] showed us the efficiency of DTE parameter in early revelation (day 1) of developing purulent-septic complications among oncological patients, exposed to surgery of gastrointestinal tract cancer.

In order to evaluate efficiency of using DTE values, patients with OC were divided into two groups: group 1 – with DTE level of higher than 40% (low risk of post-surgical complications) – 42 patients, group 2 – with DTE level below 40% (high level of developing purulent-septic complications after the surgery, including patients who suffered decomposition of ovary tumor) – 17 patients. Analysis of the data demonstrated that in group 1 frequency of post-surgical complications equaled 9,5%, and in group 2 – 23,5%.

Thus, among patients with OC with initially lower detoxication efficiency of blood serum albumin frequency of post-surgical complications was 2,5 times higher than among patients with high level of DTE.

The received data confirm the results of our earlier work on evaluating clinical-economic efficiency of implementing ATA-test

in predicting purulent-septic complications and effectiveness of their therapy after surgical intervention for oncologic patients where prognostic significance of defining DTE levels before the surgery was proved as well as economic effect of revealing groups of patients with high risk of early post-surgical complications [1].

The results of evaluating efficiency of albumin detoxication activity can be used in attending patients with OC while undertaking surgical treatment and opportune revelation of purulent-septic complications that can disturb flow of post-surgical period, prolong the period of patients' presence in the hospital and increase treatment costs.

Conclusion

Comparative research of functional characteristics of blood serum albumin has revealed significant disturbance in conformational and detoxication characteristics of albumin among patients with ovary cancer in relation to healthy women. It has been demonstrated that parameter of albumin conformation DR can be used in early diagnostics of actively-developing ovary tumors, and defining index of albumin detoxication activity DTE can serve as a perspective factor of predicting post-surgical complications in case of treating patients with OC through surgery.

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