The Possibilities of Dynamic Light Scattering Spectroscopy in the Detection of Malignant Processes

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Cancer is one of the main problems of modern medicine. The protein components analysis of serum can be very promising for tumor diagnosis at early malignancy. More than two proteins are found in human blood. They are presented mainly in the form of complexes and extracellular vesicles, the concentration and size of which vary in different physiological and pathological conditions. Spectroscopy method based on dynamic light scattering (DLS) is capable of analyzing multicomponent liquid medium with subsequent mathematical spectra processing and allows the range of measurable size of particles from 0.5 nm to 10 microns with a dynamic range of concentrations up to several orders of magnitude to be determined. Research of this method application for the diagnosis of cancer takes part for about 30 years. In the frames of this work the summarized results of many years study conducted in the Russian oncological centers are represented. The difference of the characteristic spectral indices of healthy people and patients with cancer is reliably determined. The spectra of blood serum of people with cancer pathology are well differentiated from non-cancer ones. It is shown that the DLS spectroscopy makes it possible to study the dynamics of cancer in the course of the treatment. Ovarian tumors (40 patients) are the example of good malignant and benign tumors differentiating. In so doing the sensitivity, specificity and diagnostic efficiency are at the level of 83–93%.

Studies show that DLS spectroscopy method can be recommended as an objective non-specific test for early diagnosis of cancer. This method allows screening diagnostics for the formation of groups of cancer risk, operational control of the effectiveness of the cancer treatment, as well as dispensary monitoring of treated patients and those professionally involved with dangerous and hazardous conditions.