A method for early diagnosis of cancer using a nuclear gamma-resonance spectroscopy, based on a comparison of shape and nuclei 57Fe spectrum parameters in the test the patient's blood with the spectra of the pre-compiled directory of the set of patients, taking into account their age, gender, type and stage of cancer.

EARLY DIAGNOSIS OF CANCER BY GAMMA-RESONANCE SPECTROSCOPY

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Introduction

Oncology remains one of the most important and challenging areas of medicine. Clinical symptoms of cancer is usually detected already in advanced stages of the disease. At the same time, according to scientists cancer is curable if it is detected in its early stages. Therefore, an essential condition for the effective treatment of any type of cancer is its early diagnosis, long before its clinical symptoms. For early diagnosis of cancer use a variety of immune and other methods, many of which are not effective and are not widely used because of technical implementation difficulties, non-high diagnostic, especially predictive value due to both false-positive and false-negative variability determined indicators, characterizes the practical importance of a diagnostic test. In our opinion, the most successful early detection of cancer should be based in research of the blood in which cancerous cells enter in the earliest stages of their birth and to a certain extent affect the physical and chemical state of the blood.

Aim

Show the possibility of the method of gamma-resonance spectroscopy to detect cancer of the blood in the early stages.

Material & Methods

For this purpose, we offer a method of nuclear gamma-resonance (Mössbauer) spectroscopy, which allows you to track the changes in physical and chemical states of the nuclear-stable iron isotope ^{57}Fe in blood components, human tissues and organs. Iron ion occupies the position of the geometric center of the hemoglobin molecule and hypersensitive energy structure of its nucleus responds to changes in blood status with the emergence of cancer markers. The new state of the blood affects the shape and parameters of the gamma resonance spectrum according to the known formulas:

$$\delta_I = E_{ye} - E_{yg} = \left\{\frac{2\pi}{3} Ze^2 \left[< r_e^2 > - < r_g^2 > \right] \left[\psi_a^2(0) - \psi_s^2(0) \right] \right\}$$

$$\Delta E = \pm \frac{1}{2} e^2 Q U_{zz}(0),$$

Results & Discussion

Figure 1 shows the gamma-resonance spectra of ^{57}Fe in the blood of three people (relatively healthy A and cancer patients B,C). As can be seen from the figure, these spectra differ in form, and on the basic parameters of the spectra. Figure 2 shows the maximum values of the parameters δ and ΔE, which show their marked difference not only for the healthy and the sick, but also for different patients. Figure 3 shows the temperature dependence δ(T) and ΔE (T),which show that in the temperature range 312 - 316 K (39-43 S) they have abnormal behavior associated with some phase transition - a dangerous change in the bio-chemical blood state for human health. The nature and magnitude of such anomalies may also be used for early detection and even to determine the biological nature of cancer. Interval values ΔE and δ shows that the valence of the iron ions in the blood of different patients and healthy varies Fe2+-Fe3+, depending on the physicochemical state and consist of blood.

Conclusion

The method of gamma-resonance spectroscopy to determine the difference between the parameters of the energy spectra of 57Fe nuclei in the blood of healthy people and patients with cancer that can diagnose the disease in its early stages - before the onset of clinical symptoms. Pre-compiled catalog of spectra of a plurality of patients, taking into account their age, gender, type and stage of cancer. A comparison study of blood spectra with those of the directory is determined the stage and type of cancer

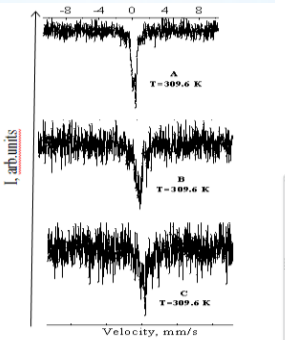

Fig.1.Gamma-resonance spectra of nuclei ^{57}Fe in the blood of healthy (A) and patients with blood cancer (B, C) people.

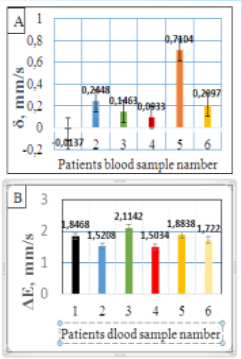

Fig.2. The maximum values of the isomeric shifts (A) and quadrupole splittings (B) spectra of the ^{57}Fe nucleus in the blood of healthy (1) and cancer patients (2-6) people.

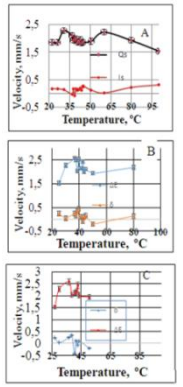

Fig. 3. Temperature dependence of the isomeric shifts δ and quadrupole splitting ΔE spectra of ^{57}Fe nuclei in the blood of healthy (A) and cancer patients (B, C).

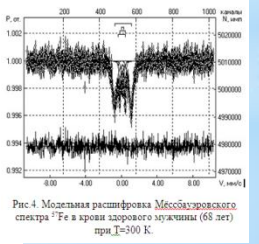

Рис.4. Модельная расшифровка Мёссбауровского спектра ^{57}Fe в крови здорового мужчины (68 лет) при T=300 K.