CHANGES IN COMPOSITION OF PARAMAGNETIC CENTERS OF EPITHELIAL TISSUE DURING COLORECTAL CARCINOMA

P.V. Zelenikhin, A.V. Makeeva, A.A. Rodionov, E.A. Sokolova, I.G. Gataullin, O.N. Ilinskaya

Abstract

EPR spectroscopy possesses high potential for efficient diagnostics and monitoring of malignant tumor development. The analysis of qualitative and quantitative changes in the composition of paramagnetic centers is applied for characterization of tumor biopsy material as well as for definition of the specific markers of neoplasia in blood serum. A number of tumors (melanoma in particular) are known to contain stable specific paramagnetic radicals. The presence of these radicals allows diagnosing accurately certain types of malignant tumors using EPR spectroscopy, including in vivo. Colorectal carcinoma was shown to occupy one of the leading places according to the frequency of occurrence among oncological diseases in the developed countries. Therefore, searching for the specific paramagnetic markers of various types of cancer tumors, including colorectal carcinoma, is a promising approach to control these pathologies.

For the first time, specific distinctions in the qualitative composition of the paramagnetic centers of malignant and normal rectal epithelium have been recorded using EPR spectroscopy. The spectral characteristics indicated the presence of nitroxyl radicals in tumor tissue. Specific distinctions between normal and malignant tissues were observed only in the samples frozen in liquid nitrogen immediately after preparation. Lyophilization of biopsy material led to the disappearance of signals typical for tumor tissue.

Keywords: colorectal carcinoma, EPR, free radicals.

References


Received
October 2, 2013

**Zelenikhin Pavel Valerevich** – PhD in Biology, Associated Professor, Department of Microbiology, Kazan Federal University, Kazan, Russia.
E-mail: pasha_mic@mail.ru

**Makeeva Anna Vladimirovna** – PhD Student, Department of Microbiology, Kazan Federal University, Kazan, Russia.
E-mail: annam.ksu@gmail.com

**Rodionov Aleksandr Aleksandrovich** – Junior Research Fellow, Department of Quantum Electronics and Radiospectroscopy, Kazan Federal University, Kazan, Russia.
E-mail: rodionovshurik@yandex.ru

**Sokolova Evgeniya Aleksandrovna** – PhD in Biology, Associated Professor, Department of Quality Management, Kazan Federal University, Kazan, Russia.
E-mail: zhenya_mic@mail.ru

**Gataullin Ilgiz Gabdullovich** – Doctor of Medicine, Professor, Department of Oncology and Surgery, Kazan State Medical Academy, Kazan, Russia.
E-mail: ilgizg@list.ru

**Ilinskaya Olga Nikolaevna** – Doctor of Biology, Professor, Head of the Department of Microbiology, Kazan Federal University, Kazan, Russia.
E-mail: Olga.Ilinskaya@kpfu.ru