

## Magnetic Resonance of Ferritin Crystalline Particles in Tumor Tissue

Yurtaeva S., Efimov V., Silkin N., Rodionov A., Burmistrov M., Panov A., Moroshek A.  
*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

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### Abstract

Lyophilized samples of human tumor tissue exposed and not exposed to radiation therapy were investigated by magnetic resonance spectroscopy. The measurements were taken in the temperature range of 4-280 K on an X-band electron paramagnetic resonance spectrometer. Two types of ferromagnetic resonance signals were detected. The first type signals ( $g_{\text{eff}} \approx 2.1 \div 2.4$ ) were detected in the spectra of 25% of the samples. The orientational dependence of these signals has been found. The temperature dependences of the first type signals were measured. Specific features were observed near the temperature of 125 K. They are evidently typical for the Verwey phase transition in magnetite. We suppose that the first type signals may belong to arrays or chains of ferritin particles with the crystal core in the form of magnetite. The temperature dependences of magnetic resonance characteristics of ferritin in tumors are differ from those of the same characteristics of ferritin in healthy tissue investigated before. In spectra of irradiated tumors, the second type signals at low fields were detected which may be due to aggregates of different iron particles in cell lysosomes. © 2012 Springer-Verlag.

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