

Effect of the dose of administered upconversion nanoparticles on the refractive index of tissues in the development of model liver cancer

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Upconversion particles play an important role in the application of photodynamic therapy, which helps to treat malignant tumors with high efficiency [1, 2]. Since the development of pathology changes the structure and composition of biological tissues, and, consequently, their optical properties undergo significant changes, several research groups have proposed using the refractive index, as one of the main optical parameters, as a marker for differentiating normal and pathological biological tissue, including experimental diabetes in animals [3]. Also, the refractive index is an important optical characteristic that is necessary for a complete description of the optical properties of biological tissues.

The work shows dispersion dependences for various tissues taken in the area of tumor development after the introduction of NaYF₄+BSA and NaYF₄+BSA+FA nanoparticles in single, double and triple doses. According to the data obtained, for all tissues there is an increase in the refractive index with an increase in the administered dose of nanoparticles. The refractive index at a wavelength of 589 nm for tumor tissue was 1.3457 for a single dose, 1.3531 for a double dose, and 1.4371 for a triple dose of NaYF₄ + BSA. Also, a higher refractive index at 589 nm - 1.4018 is characteristic of tumor tissue with a three-fold dose of NaYF₄ + BSA + FA, compared to a single dose - 1.3459 and a double dose - 1.3623. An increased refractive index value may indicate the accumulation of nanoparticles in tumor tissue and other tissues located in the area of tumor development.

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