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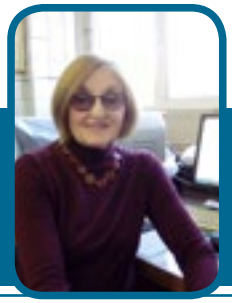

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Novel multifunctional porphyrazine pigments for bimodal tumor diagnostics, photodynamic therapy and real time monitoring of its progress by intracellular viscosity sensing

The various techniques available for cancer diagnosis and therapy are traditionally considered as separate approaches in medical care. But nowadays the development of the multifunctional agents which combine modalities for cancer diagnosis, treatment and real-time monitoring of treatment progress is a real imperative for specifically personalized medicine. If the imaging information is used to imaging-guided noninvasive therapy, the distribution and evolution of tumor/drug could be seen with time- and position-resolved modes, while the therapeutic efficiency and safety are also improved. Here we report on a series of novel red-emitting fluorescent cyano-aryl porphyrasine pigments which are found to be an excellent platform for preparation of bimodal tumor diagnostic agents in the form of Gd (III) cation-porphyrazine chelates. Monitoring of such the agent accumulation was successfully implemented in vivo. The selective accumulation of metal complexes in tumor had been demonstrated using fluorescence imaging and MRI (Figure) [1]. In addition, we had found the prepared series of cyano-aryl pigments to be the first red- emitting fluorescent 'molecular rotors', based on tetrapyrrole macrocyclic structure. The emission properties of molecular rotor-type dyes are strongly viscosity-dependent, i.e. the fluorescence lifetime and the quantum yield of these macrocycles strongly increase as a function of environment viscosity and can be used for local viscosity sensing [2]. On the other hand, cyano-aryl porphyrazins work as an efficient PDT sensitizer. We suggest that such the intracellular viscosity sensing could be used as a completely new type of diagnostic and dosimetry tool during a PDT treatment providing feedback information about individual therapy status.

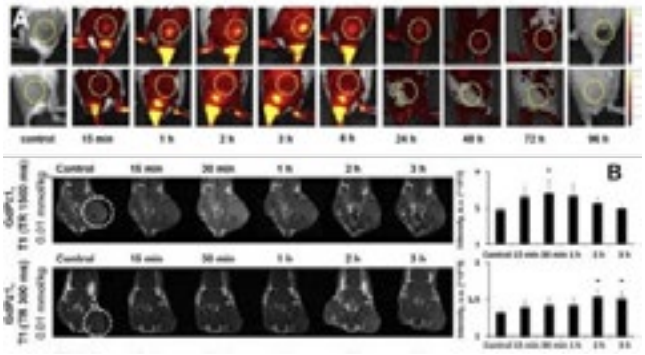

Figure. (A) *In vivo* monitoring of fluorescence signal distribution after i.v. injection of GdPz into Balb/c mice with CT26 tumors. Serial fluorescence images of the mouse injected with GdPz (excitation 605 nm, detection 660 nm). (B) MRI of CT26 tumors with GdPz (on the left). Quantification of the signal intensity in the tumor (on the right). Tumors are shown by the white circles.

Biography

Larisa Klapshina received her PhD from Razuvaev Institute of Organometallic Chemistry of Russian Academy of Sciences, IOMC RAS (Nizhny Novgorod, Russia. Currently she is a Senior Researcher at IOOMC RAS and at the Laboratory of Optical Theranostics in Nizhny Novgorod State University/ She and her group work in organic, organometallic synthesis and functional materials in bio-photonics and biomedicine. She is author of about 100 articless

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