My major interest is developing imaging methodology approach for studying tumor microenvironment. Electron Paramagnetic Resonance (EPR) oximetry, together with other tumor microenvironment parameters, such as oxidative stress, redox status, pH allow broader approach to noninvasive studies of the tumor microenvironment. Tissue pO2 and hypoxia our main focus. For example, we have shown that both hypoxia and vasculature play a role in tumor response to photodynamic therapy (Krzykawska et al., 2014), the role of vasculature changes in tumor tissue perfusion (Drzal et al., MRI 2022), or changes in the structure and function of the vasculature of tumors growing in the eye (Leszczynski et al., 2018). We also develop image analysis methods, such as co-registration of images acquired using different modalities (Gonet et al., 2019, Dziurman et al., 2025). Today in our lab we use EPR for pO2 determination, ultrasound for tissue structure, color Doppler ultrasound for blood flow, DCE-US and DCE-MRI for tissue perfusion, luminesce in vivo for metastasis development, and CT for tissue structure and metastasis. Recently we have obtained optoacoustics imager, allowing the blood saturation measurements, as well as spatial distribution of collagen, melanin and other molecules. These noninvasive modalities are combined with molecular biology, confocal microscopy, and histology. Such a methodological approach allows us to study complex interactions within the tumor microenvironment and its role in tumor resistance to therapies. Our goal is to find out how the physical parameters of the tumor microenvironment, such as intratumoral pressure, perfusion, and pO2, interact with the biological factors and whether it is possible to modify these factors to achieve more effective antitumor therapies.