Cancer is the second cause of death after cardiovascular disease in the modern population of highly developed countries. Their treatment, especially in advanced forms, entails very high economic and social costs. Currently, at the end of the COVID-19 pandemic, modern medicine will have to focus on the treatment of neoplastic diseases at the level of cases usually detected in the population and additional cases - so far undiagnosed due to pandemic exacerbations and other conditions related to the pandemic. The treatment of neoplastic diseases is burdened with side effects that are very severe for the patient, and in many cases, it causes significant damage to health; what is more, it still turns out to be ineffective in many cases. One of the common features of cells developing in a cancerous tumour is that they grow under conditions of constant oxygen deficiency (called hypoxia), mainly because rapidly dividing cells cannot produce blood vessels quickly enough. This fact causes several problems related to cancer therapy. Many drugs currently used in cancer treatment are based on generating the so-called reactive oxygen species (ROS), leading to oxidative stress and cancer cell death. An example of such therapy is the photodynamic therapy in which biologically inactive compounds, the photosensitizers, are activated by light and create reactive oxygen species. Therefore, research on photodynamic therapy requires both: controlling the oxygen level and obtaining information about the presence of reactive oxygen species in the experimental system. The latter parameter is particularly difficult to measure, and the only method that allows its observation and imaging is electron paramagnetic resonance (EPR). This method allows the detection of paramagnetic systems, i.e. with the unpaired electrons. The electron paramagnetic resonance-based imager (EPRI) developed with our team's participation for a previous project and is continuously improved. This method will be used to monitor the oxygen level in model neoplastic tumours obtained in a chicken embryo chorioallantoic membrane model. Photodynamic therapy allows for the selective elimination of neoplastic cells that have absorbed the photosensitizer by irradiation with visible light, usually limited to the neoplastic lesion, usually in the near-infrared range. In photodynamic therapy, the factors that determine its effectiveness are the ability of light to penetrate the tissue and the availability of oxygen. These two obstacles will be overcome using a novel photosensitizer, which contains elements capable of releasing oxygen and a chemical system that generates light directly in the cancer cell. This will allow the elimination of neoplasms located very deep in the patient's body, in tissues where both the access of light and photosensitizer is a limiting factor. The selective delivery to cancer cells of both: the photosensitizer and the light-generating factor will be ensured nanocapsules carrying these agents. They will be targeted directly to the cell overexpressing typical for cancer cells receptors like, e.g. Her2 overexpressed by breast or ovarian cancer cells; however, targeting other kinds of receptors will also be tested.