Almost any type of differentiated cells may lose the ability to control dividing and transform into tumor cells. Tumor transformation is associated with activation of protooncogenes and/or inactivation of suppressor genes or abnormal cell differentiation. More and more data indicate that one of the factors responsible for the induction of tumor transformation are *Reactive Oxygen Species (ROS)*. At the same time, ROS production is a natural part of oxygen metabolism. ROS present in physiological concentrations play an important role in cellular metabolism. The imbalance between the production of ROS and the efficiency of antioxidant systems leads to oxidative stress and subsequent damage to important macromolecules such as: DNA, proteins and lipids. Oxidative stress in cancer cells also includes inflammation and cytokine effects, intense metabolism, dysfunctions in the respiratory chain. High levels of ROS in cancer cells can also lead to resistance to certain groups of drugs used in cancer therapy. Tumor transformation, including ROS, can involve multiple changes in cytoskeleton and cell membranes, as well as in the composition and number of membrane channels, receptors, and enzymes. Cancer cells are characterized by a lack of antiproliferative signals. The distribution and activity of microfiltration and microtubule affect tumor interactions, their adhesion and mobility, which makes it possible to change the appearance and formation of metastasis. At the molecular level most of proliferation signals are sent to the cells by the pRb, p107 and p130 proteins. Hypophosphorylation of the pRb protein inhibits proliferation, leading to changes in the function of the relevant transcription factors. **The main goal of the project is to analyze the biochemical and mechanical properties of human cells and tissues of stomach and colon, including samples with oxidative stress generation, using Raman imaging, determining cell stiffness parameters based on atomic force microscopy (AFM), understanding cells and tissues morphology for resolution below the diffraction limit (SNOM). The analysis will also include the identification of energy relaxation channels in normal and malignant structures using femtosecond laser spectroscopy and the effect of selected natural antioxidants and statins on the mechanical and optical properties of normal and cancerous cells and tissues.**