

DESCRIPTION FOR THE GENERAL PUBLIC

The project entitled "Spectral histopathology, FTIR and immunoSERS, for the recognition of biochemical status of pre-metastatic niche and micrometastasis in murine model of breast cancer" aims to "take fingerprint" of cancer metastasis before it fully develops. As is generally known, cancer is the most deadly disease in the world and despite the continuous development of new diagnostic and therapeutic strategies, the number of new cases and deaths continues to rise. It is predicted that 50% of new cases among women and men will be affected by breast/prostate, lung, bronchial and colorectum cancers, of which 20% is attributed to breast cancer. But the primary tumor is not the main cause of death, only its metastasis. This process occurs through intravasation of cancer cells into blood and lymphatic vessels, their transport *via* systemic circulation to distant organs and then the formation of micrometastases proliferating to macrometastasis. It is also known that the metastatic site is not accidental but an organ "receives" the chemical signal from the primary tumor to "prepare" its tissue matrix to accept the unwelcome guest and to create so-called the pre-metastatic niche. And this project is dedicated to the recognition the pre-metastatic niche and micrometastases by advanced imaging techniques of vibrational motion of all the components present in a biological system, i.e. by infrared absorption spectroscopy and Raman spectroscopy using specially designed nanosensors (surface-enhanced Raman spectroscopy, SERS). Vibrations of molecules are specific for each of them and provides a unique "fingerprint" which is described in terms of chemical composition. If we combine such as detection with spatial measurement we get an image of chemical information strictly specific for a sample. Based on such research technology, we will image tissues and cells from lungs to that metastasis occurs in breast cancer. Designed research requires collection of biological material at well-defined stages of metastasis and therefore we will carry out our studies on animal models of cancers.