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name of the unit: LABORATORY OF LASER MOLECULAR SPECTROSCOPY Institute of Applied Radiation Chemistry, Lodz University of Technology		symbol: I-34 http://www.mitr.p.lodz.pl/raman
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scope of activities: <p>The pandemics has witnessed an explosion in research examining the interplay between the immune response and the intracellular metabolic pathways that mediate it. Research in the field of immunometabolism has revealed that similar mechanisms regulate the host response to infection, autoimmunity, and cancer. The new tools by Raman imaging we present in this paper raise exciting possibilities for new ways to understand pathways of our immune responses, recognize metabolites that regulates these pathways and suggest how we might use them to optimize vaccinations to stimulate the conditions of adaptive immune system.</p> <p>Research conducted at LLMS also confirms the possibility of implementing pioneering and innovative methods of oncological diagnostics based on Raman biomarkers in clinical practice. The biochemical information contained in Raman spectra allows not only to make a diagnosis and assess the degree of tumor aggressiveness, but also to understand the mechanisms of metabolic reprogramming in cancer cells and to track epigenetic changes that occur during the development of cancer disease. Research conducted at LLMS plays a key role in developing of effective oncological therapies. LLMS research on cancer diagnostic tools has a wide social and economic impact on the medical sector through the possibility of translating the developed analytical methods into clinical oncology practice, contributing to the improvement of spatial and spectral resolution of diagnostic techniques (especially important in infiltrating cancers), high sensitivity and specificity of diagnostics molecular imaging techniques offer hope for shortening the diagnosis time, implementing objective diagnostic protocols, independence of the diagnosis interpretation.</p>		graphic material



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<p>present activities:</p> <p>Development of diagnostic protocols for cancer changes in the human brain, breast and gastrointestinal tract based on the Raman biomarkers of cancer changes. Analysis of changes in the cell respiration cycle in normal and cancer cells based on Raman imaging with particular emphasis on changes in Cytochrome C. At the moment, based on the research carried out at the LLSM, it was found that:</p> <ol style="list-style-type: none">1) Raman spectroscopy and imaging (RS) and (RI) allow fast and unambiguous distinction between normal and cancer tissues based on specific proteins and lipids (Raman biomarkers),2) The sensitivity and specificity of the developed diagnostic protocols based on Raman biomarkers were estimated, using chemometric methods, at the level of over 85%,3) Raman biomarker values correlate with the grade of cancer disease development - it is possible to create calibration curves linking the grade of cancer malignancy with the value of the biomarker,4) RS and RI allow not only to make a diagnosis, but also to understand the mechanisms of cancer thanks to biochemical information contained in vibration spectra5) Based on the designated Raman biomarkers it is possible;<ul style="list-style-type: none">• in-vivo and ex-vivo diagnostics of cancer changes• performing in-vivo Raman-guided surgery• performing an optical biopsy• performing virtual histopathology.	
<p>Future activities:</p> <p>Translation of laboratory research into clinical practice.</p> <p>Information on the publication and other forms of disseminating research results is available on the LLMS website: www.mitr.p.lodz.pl/raman</p>	
<p>Keywords:</p> <p>cancer, oncological diagnostics, Raman imaging, Raman biomarkers</p>	
<p>List of internship proposal in this research team:</p>	
<p>List of attachments:</p>	