Poster Session

Quantitative Raman Mapping of Nucleic Acids in Cells and Tissues

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In histopathology and tumor diagnostics, hematoxylin staining is the gold standard used to identify the nuclei morphology in cells and tissues. Although being a well-established technique, hematoxylin staining is an invasive method and it cannot be used for in vivo diagnostics and to quantify the density of nucleic acids. To circumvent these limitations, a label-free quantitative imaging technique exploiting the intrinsic biomolecular vibrations of nucleic acids is highly desirable. The aim of our work is to identify unambiguous nucleic acids markers in typical cells found in different layers of skin, such as adipocytes and keratinocytes, based on their intrinsic vibrational Raman contrast by confocal Raman microspectroscopy. Furthermore, we demonstrate the applicability of these markers for the label-free mapping of a human melanoma skin section showing an excellent correspondence of cell morphology between Raman and H&E contrast.
As a demonstration of nucleic acids quantification, we monitor the variations of the ploidy in G1, S and G2 cell cycle phases of HeLa.
The proposed method offers the potential for a fast, label-free and quantitative mapping of nuclei in large tissue sections by means of coherent Raman scattering techniques and its application in tumor diagnostics.