Multi-methodological Insight into the Tissue: Raman and AFM Imaging Combined with Immunohistochemical Staining

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Multi-methodological approach based on subsequent application of Raman and AFM imaging, complemented in some cases by immunohistochemical staining (IHC) to analysis of the same tissue area, was applied to study tissue condition in pathology. Raman imaging provides information about biochemical composition of the tissue, AFM is a complementary method of surface analysis i.e. topography or mechanical properties of the sample, such as stiffness or adhesion, while IHC is a golden standard. The applied methodology allowed for obtaining multifactorial information about the studied samples and, as such, is an effective approach to investigate biochemical alterations related to pathological changes in tissues and cells. Examples of Raman imaging combined with AFM and immunohistochemical staining to visualize the tissue condition *ex vivo* are presented in this work (Fig. 1).
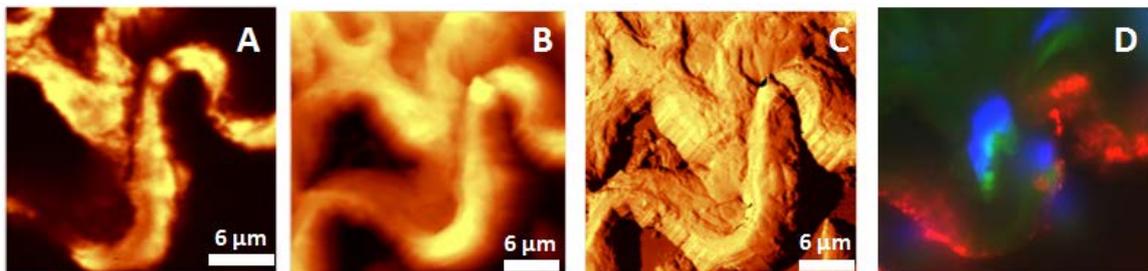
Fig. 1. The images of the vessel wall cross section: Raman distribution image of organic specimens (A), AFM AC topography (B), AFM AC phase (C) and the same fragment of tissue after immunohistochemical staining (D: red – endothelium, blue – nuclei, green – autofluorescence of elastin fibres).