

TEXTURE ANALYSIS OF POLARIMETRIC NONLINEAR MICROSCOPY IMAGES FOR COLON CANCER DIAGNOSTICS

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Early cancer detection calls for novel diagnostic methods. Second-harmonic generation (SHG) microscopy, in particular, is interesting for imaging non-centrosymmetric structures such as collagen fibers, which are known to undergo structural changes in cancerous tissue [1]. Acquired images can be investigated using texture analysis methods. Implementation of texture analysis requires calculation of gray-level co-occurrence matrix (GLCM), which is used to extract textural features, including contrast, correlation, and entropy. Textural parameters have been investigated for use in cancer diagnostics [2].

In this work, SHG polarimetric microscopy is used to investigate collagen structure in normal and cancerous human colon histological samples. From obtained images, maps of polarimetric parameters are calculated and the resulting images are analyzed using GLCM. Resulting textural data is used to compare healthy and cancerous colon samples.

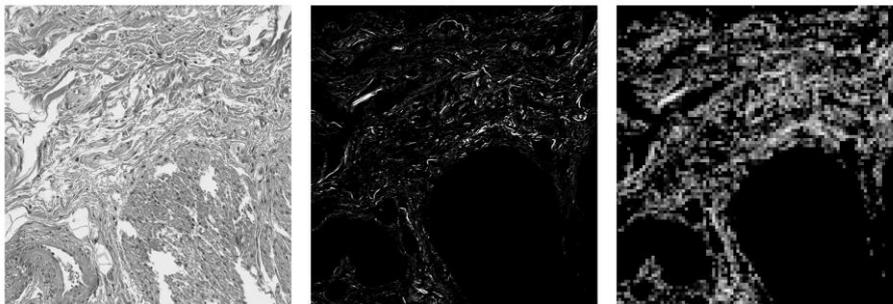


Figure 1: Polarimetric SHG microscopy and texture analysis of normal colon tissue. H&E stained histological slide (left), SHG intensity image of the same area (middle) and an entropy texture parameter map of SHG intensity image (right). Size of images: 600 × 600 μm.

[1] Xu, S. et al., “The role of collagen in cancer: from bench to bedside,” *J Transl Med*, **17**, 309 (2019).

[2] Golaraei, A. et al., “Polarimetric second-harmonic generation microscopy of the hierarchical structure of collagen in stage I-III non-small cell lung carcinoma,” *Biomed. Opt. Express*, **11**, 1851-1863 (2020).