

CAN HOLOGRAPHIC TOMOGRAPHY REPLACE OPTICAL MICROSCOPY IN BIOLOGICAL AND MEDICAL PRACTICE?

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Holographic tomography (HT) is a noninvasive, non-specific imaging technique which allows to obtain information about 3D refractive index distribution of analyzed unstained biological specimens. In recent years, HT carried out in a configuration with a stationary sample and limited angular range of projections gained significant popularity due to extremely easy and fast sample preparation stage [1-3]. Combined with dedicated tomographic reconstruction procedures, HT gives access to high resolution results with quasi-isotropic resolution.

In our opinion, currently HT has reached maturity level that is high enough to ask a question, whether this technique can potentially support (or even replace) classical microscopic imaging techniques in medical and biological practice. We believe that truly quantitative nature and full repeatability of obtained results supports the question stated in the title. To prove our point, we present results of selected applications of HT carried out with 2 commercial systems developed by TomoCube and Nanolive companies and 1 laboratory system developed by Warsaw University of Technology. We show the strongest advantage of HT, namely the fact that results obtained with devices that carry out HT in different ways are quantitatively equal in terms of obtained refractive index values. The presented applications include analysis of living and fixed cells (fibroblasts, keratinocytes, red blood cells), tissue slices but also identification of dermal fillers.

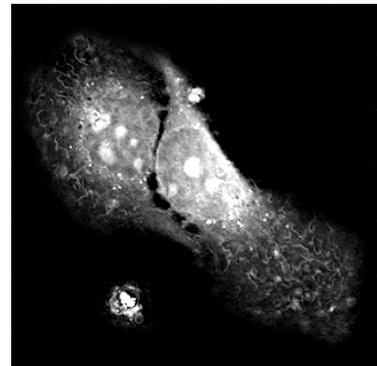


Figure 1: 2D cross-section through 3D holographic tomography reconstruction of two keratinocytes.

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