

# LOW-COHERENCE INTERFERENCE MICROSCOPY FOR HIGH-RESOLUTION 3D IMAGING IN BIOLOGY

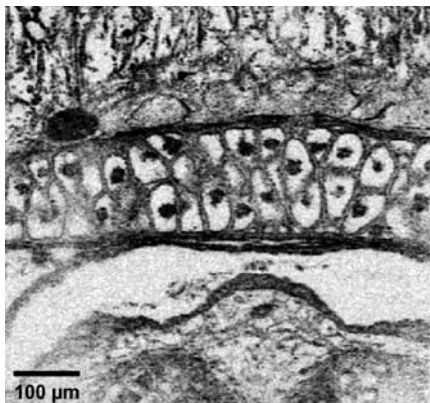
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Optical coherence tomography (OCT) is a technique of choice for noninvasive three-dimensional imaging of biological tissues with micrometer-scale resolution. The image contrast is based on the backscattering properties of the tissues resulting from refractive index inhomogeneities. In conventional OCT, images are obtained by scanning a broad bandwidth laser beam through the sample placed in one arm of a Michelson-type interferometer.

In recent years, we have been exploring another approach to OCT, using whole-field illumination and a CCD camera. Various low-coherence light sources (halogen lamp, cw or flash arc lamp) are used as illumination sources in a Linnik-type interference microscope. *En-face* tomographic images are obtained in real-time without scanning. The acquisition time per image can be as short as 10  $\mu$ s. Isotropic spatial resolution of 1  $\mu$ m is achieved with a detection sensitivity of  $\sim$  90 dB, allowing “non invasive” histopathology of various biological tissues.

We present the different experimental setups we have developed. The performances of our techniques are compared with those of conventional OCT scanners. Images of various biological tissues are presented, especially in the domains of embryology and ophthalmology.



Tomographic image (XZ) inside the head of the African frog tadpole *Xenopus Laevis*. Cells are revealed with their membrane and nucleus morphology.

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