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Comparison of polarization sensitive second harmonic generation microscopy techniques for the study of biological tissues

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Abstract

Recently, polarization sensitive second harmonic generation (pSHG) microscopy has become a powerful tool for the study of the noncentrosymmetric biological structures. This is due to the fact that pSHG has some intrinsically benefits such as high resolution and contrast; it can also penetrate deeply into the sample in a noninvasive manner. However, one drawback of the pSHG technique is that the imaging procedure is not fast enough to study the in vivo samples or to monitor the dynamics of different tissues. This issue imposes some limitations on using the pSHG technique to study the in vivo samples. Fortunately, recently, single scan polarization sensitive second harmonic generation (SS-pSHG) technique has been introduced as a fast alternative to the conventional pSHG technique. In this article, the results obtained from ex vivo biological samples of starch, human cornea and animal tendon have been compared in a pixel-to-pixel manner using pSHG and SS-pSHG techniques in the forward direction. Even though the samples used here are ex vivo, the results of this study reveal that the polarization sensitive SHG microscopy techniques have a great potential to study biological tissues in a noninvasive procedure. This issue is more important, especially in the cases samples are in vivo.

Keywords: medical and biological imaging, nonlinear microscopy, polarization, second harmonic generation, tissue

For full article, refer to the Persian section

