ALTERATIONS OF COLLAGEN ULTRASTRUCTURE IN LENTIGINOUS MELANOMA STUDIED BY POLARIMETRIC SECOND HARMONIC-GENERATION MICROSCOPY

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1. INTRODUCTION

Collagen found in extracellular matrix (ECM) is known to produce significant SHG signals, which are strongly dependent on the angle between the incoming light polarization and the orientation of collagen fibers [1]. Since cancer causes substantial changes in collagen structure, polarimetric SHG microscopy is a suitable tool for their characterization.

2. SAMPLES AND METHODS

The double Stokes-Mueller polarimetry (DSMP) and its reduced polarimetry counterpart ®PIPO (polarization-in, polarization-out), which is based on linear polarization states, are powerful tools for characterizing the differences between normal and cancerous tissues [1].

In this work, PIPO polarimetry was used to investigate pT1b stage lentiginous melanoma histological sections and to characterize the difference between normal and cancerous tissues. The intensity, achiral susceptibility ratio R and orientation angle distributions were analyzed.

3. RESULTS

Polarimetric analysis of normal and cancerous tissues showed differences in collagen fiber orientations, decrease in SHG intensity and increase in R ratio in cancerous tissues, demonstrating altered collagen structure. The changes in the SHG polarimetric parameters can be potentially applied for melanoma diagnostics and prognostics.
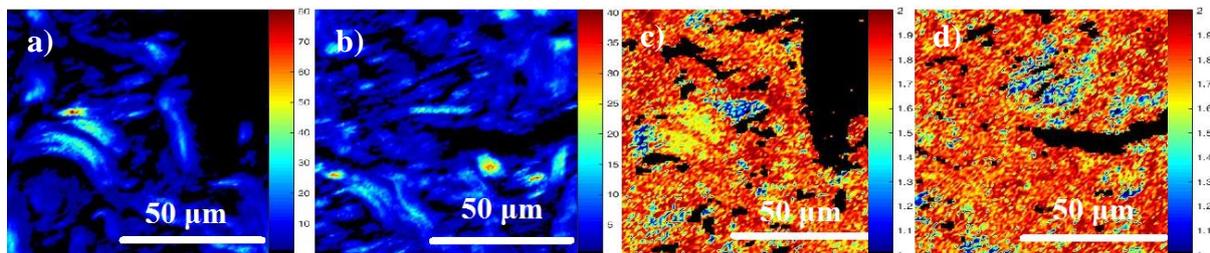

Figure 1: SHG intensity and R ratio distribution in cancerous (a,c) and normal (b,d) tissues.

[1] M. Samim, S. Krouglov, and V. Barzda, "Double Stokes Mueller polarimetry of second-harmonic generation in ordered molecular structures," J. Opt. Soc. Am. B 32, 451-461 (2015)