

Visualization of in vivo dermal collagen fiber distribution by non-linear optical effect

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Second-harmonic-generation (SHG) microscopy has been applied to observe collagen fiber structure in porcine dermis. Collagen fiber structure in the samples is clearly visualized as high contrast SHG images using a sample-scanning SHG microscope based on a transmission configuration equipped with a mode-locked Ti:sapphire laser. From comparison of the SHG images between the transmission detection mode and reflection one, we have confirmed that the reflection-mode SHG imaging is also applicable to observation of the collagen fiber structure in the porcine dermis. In order to apply the SHG measurement to human skin, we have used a mode-locked Cr:forsterite laser with a long wavelength and compared its imaging characteristics with that of the Ti: sapphire laser-based microscope for the measurement of dermal collagen fiber. The results indicate that the applicability of the Cr:forsterite laser-based SHG microscope for in vivo imaging of human skin.