APPLYING TATTOO DYE AS THIRD-HARMONIC-GENERATION CONTRAST AGENT FOR IN VIVO OPTICAL BIOPSY OF HUMAN SKIN

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In vivo epi-harmonic-generation microscopy (HGM) has been reported to provide an extraordinary performance on human skin and oral mucosa [1-3]. In human skin, third-harmonic-generation (THG) microscopy can provide intrinsic contrasts in elastic fibers, cytoplasmic membrane, nucleus, lipid bodies, hemoglobin, and melanin. For advanced molecular imaging, it is sometime required to develop exogenous contrast agents to trace the function of a specific molecule [4]. In this paper, we demonstrate that regularly adopted tattoo dye can serve as a THG contrast agent for in vivo molecular imaging in skin. Spectroscopy and microscopy experiments were performed on dye cells, in vivo mouse skin, and eventually in human skin in vivo. Strong resonance-enhanced THG was generated from the different tattoo-dyes, similar to the principles of previous reports by using hematoxylin [4]. Taking advantage of the weak multiphoton fluorescence of a specific tattoo dye, in vivo molecular THG microscopy of human skin by using tattoo dyes is confirmed. In comparison with hematoxylin or nanoparticles [5] as exogenous THG contrast agents, tattoo dyes are with a bio-compatible characteristic for future clinical applications. Our result indicates that tattoo dye provides a high potential to serve as a THG exogenous contrast agent for in vivo optical biopsy of human skin.