

DermaInspect[®]: In vivo high resolution multiphoton tomography of human skin

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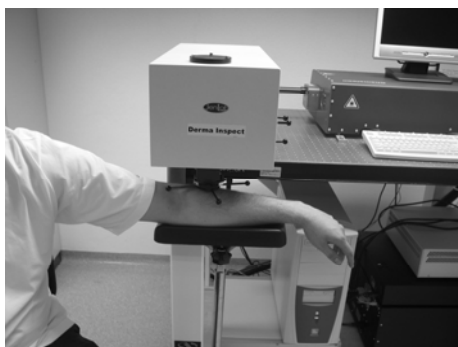
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ABSTRACT

The DermaInspect[®] is a novel femtosecond laser scanning system which provides non-invasive in vivo optical biopsies of skin with ultrahigh subcellular resolution [1]. The system is based on two-photon excited autofluorescence. The nonlinear induced autofluorescence originates from naturally endogenous fluorophores and protein structures such as NAD(P)H, flavins, elastin, porphyrins, and melanin. Second harmonic generation (SHG) can be used to detect collagen structures. Including Fluorescence lifetime imaging (FLIM) the DermaInspect provides 4-D-imaging (x,y,z, τ) with subcellular spatial and < 250 ps temporal resolution for laboratory as well as clinical (in vivo) use. The system gives detailed information about cell and tissue structure into the depth of up to 200 μm in human skin. Major application of DermaInspect[®] is skin cancer diagnosis. Further applications include tissue engineering and in situ drug monitoring.



The system consists of a compact, turn-key tunable femtosecond near infrared (NIR) laser, a beam-scan module with galvoscaners and piezo-driven optics, a fast PMT detector module as well as a control unit including JenLab Image software for 3D and 4D image processing.

Figure 1: DermaInspect[®]

[1] K. König, I. Riemann, "High-resolution multiphoton tomography of human skin with subcellular spatial resolution and picosecond time resolution", J. Biomed. Opt. **8**(3), 432-439 (2003).