

## Medical > In Vivo > Other material

# 116

### In Vivo Confocal Scanning Laser Microscopy of Human Skin II: Advances in Instrumentation and Comparison to Histology

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#### **ABSTRACT**

In 1995, we reported the construction of a video-rate scanning laser confocal microscope for imaging human skin in vivo. Since then, we have improved the resolution, contrast, depth of imaging, and field of view. Confocal images of human skin are shown with experimentally measured lateral resolution 0.5-1.0 micron and axial resolution (section thickness) 3-5 micron at near-infrared wavelengths of 830 nm and 1064 nm; this resolution compares well to that of histology which is based on typically 5 micron thin sections. Imaging is possible to maximum depth of 350 micron over field of view of 160-800 micron. A mechanical skin-contact device was developed to laterally stabilize the imaging site to within +/- 25 micron in the presence of subject motion. Based on these results, we built a small, portable, and robust confocal microscope that is capable of imaging normal and abnormal skin morphology and dynamic processes in vivo, in both laboratory and clinical settings. We report advances in confocal microscope instrumentation and methods, an optimum range of parameters, improved images of normal human skin, and comparison of confocal images with histology.