

A three-photon excitation fluorescence microscope for in vivo deep tissue imaging.

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Abstract

Deep tissue imaging technologies are especially important for intravital microscopy of animals. In particular, three-photon fluorescence excitation microscopy (3P microscopy) has been shown to provide rather deep optical access into various types of biological tissues. For example, achievable maximal imaging depths using 3P microscopy is at least two-fold larger compared to two-photon fluorescence excitation microscopy (2P microscopy). Most 3P microscopes have been developed or optimized in specialized laboratories with partially complex components like custom laser solutions and adaptive optics. In addition, access for a larger number of interested scientists to these laboratories is usually difficult. Here, we show that a 3P microscope can be established, optimized, maintained, and used in a multi user core facility. We report that similar imaging depths with comparable laser power then previously published can be reached and imaging of even sensitive specimen can be accomplished.