

〈教育セミナー〉

第48回教育セミナー (2023)・「皮膚を見る・観る・診る～最新の可視化技術レビュー～」

生体蛍光イメージングの基礎と応用

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Basics and Applications of Intravital Fluorescence Imaging

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Abstract

Intravital fluorescence imaging is a promising technique and has been applied for *in vivo* experiments in various research fields including cancer research. Recently, there has been a growing interest in applying this intravital fluorescent imaging technique to study different disease process and complex biology *in vivo*. Particularly, intravital fluorescence imaging using various functional fluorescent proteins and dyes, in conjunction with appropriate fluorescence microscopy, allows us visualization of cell behavior as well as cell function *in vivo*. For instance, we tried to apply the intravital fluorescence imaging technology to monitor cancer cell behavior and function such as cell cycle progression and signal transduction *in vivo*. We have developed Fucci (Fluorescent ubiquitination-based cell cycle indicator) to visualize cell cycle progression *in vitro* and *in vivo*¹⁾. We also developed two-photon excitation microscopy-based experimental platforms that enable the prospective analysis of cancer stem cell dynamics with sufficient spatiotemporal resolution and revealed that cell-matrix interface regulates dormancy in human colon cancer stem cells²⁾. In addition, we tried to show the interaction between cancer cells and tumor microenvironment such as blood vessels and lymphatic vessels by intravital fluorescence imaging technique *in vivo*. Moreover, we developed various fluorescence imaging equipment including two-photon microscope and light-sheet microscope. Intravital fluorescence imaging will be useful to investigate biology and test the effectiveness of therapeutic agents.

Key words: intravital fluorescence imaging, green fluorescent protein (GFP), multi-photon excitation microscope, super-resolution microscopy, light sheet microscopy.