

Editorial

Optical measurement in living tissue is widely used in clinical practice. Especially, measurements using near infrared (NIR) light, such as pulse oximetry to measure hemoglobin saturation in the fingertip, is one of the fields showing great success. NIR light penetrating deep into the tissue can provide vital information regarding living tissue non-invasively.

Recently, indocyanine green (ICG) fluorescence imaging techniques using NIR light have been gaining considerable interest in the field of surgical oncology. ICG, a commonly used diagnostic reagent, is a convenient fluorophore in living tissue. When injected into the tissue, it is taken up into the lymphatic vessels. By obtaining images of lymphatic drainage from the tumor site, the sentinel node embedded in the connective tissue can be visualized before dissection. There are increasing numbers of papers reporting the usefulness of the ICG fluorescent method in sentinel node biopsy for various kinds of cancer. In plastic surgery, the usefulness of ICG fluorescence imaging has also been proven. Several novel findings have been reported, which had not been recognized by other conventional imaging techniques. Cancer imaging and diagnosis would be the next area of interest.

In this special issue, featuring fluorescence imaging using ICG, twelve papers were collected. The first two articles are presenting aspects of biophysics and bioengineering. Dr. Marshall summed up the present status of fluorescence imaging and suggested future possibilities in molecular imaging. Dr. Miwa described the principles of PDE, one of the most common devices in clinical use. The following ten articles demonstrated clinical application in various fields; one in hepatobiliary cancer, two in plastic surgery, one in skin cancer, two in gastric cancer, and four in breast cancer. The spatial and temporal analysis of lymphatic flow, which had not previously been recognized, may promote the development of novel concepts of certain pathological conditions, for example, the lymphatic network in a patient of lymph-edema or personalized lymph node mapping. Among many techniques using ICG as a non-specific contrast agent for lymphatic mapping and vascular patency, it should be noted that Dr. Ishizawa is exploring the field of cancer imaging, which has been one of the greatest successes in the optical imaging. In the near future, quantification would be one of the tissues to be solved. Efforts to increase the sensitivity to overcome the attenuation of fluorescence signals in the tissue are also necessary. Optical imaging, including ICG fluorescence, may be “the promised land” for surgical oncology. We hope that this special issue will be another step in the further exploration of clinical applications.

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