Monitoring Tissue Fluorescence in Bright Light

View U.S. Patent No. 10,045,696 in PDF format.

WARF: P130298US01

Inventors: Thomas (Rock) Mackie, Adam Uselmann, Andreas Velten, Surendra Prajapati, Kevin Eliceiri

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a fluorescence imaging system that can detect faint signals in brightly lit surgical suites.

Overview

Intrinsic and extrinsic fluorescent markers can help surgeons target and rapidly identify tumorous tissue. The signals given off by these markers are relatively faint and normally viewed with a fluorescent microscope or wide-field camera. Special imaging mechanisms isolate and boost the signals for detection.

While the markers simplify and improve tumor identification by “lighting up” otherwise invisible clusters of fluorescently labeled (e.g., cancerous) cells in both biopsies and surgery, the ambient room-lighting of the surgical suite must be turned off or greatly attenuated during surgery in order to detect the signals of many fluorescent markers, interrupting the workflow of the entire team.

Another application of intraoperative fluorescence imaging is locating embedded blood vessels or nervous tissue, which is useful in a variety of procedures. Depending on the emitted wavelength, the sensitivity of these techniques is limited by light contamination from the surroundings.

The Invention

UW–Madison researchers have developed a fluorescence imaging process that can be used in surgical suites and other brightly lit environments. Specifically, the imaging process coordinates with rapidly switched ambient room light, which turns off and on at a speed imperceptible to the human eye. Alternatively, research locations such as bioimaging facilities that are traditionally dark can be illuminated – improving productivity and safety. During the periods of darkness, fluorescence signals from microscopes can be detected and imaged without background light interference.

Applications

- Medical tissue fluorescence
- Intrinsic fluorescence contrast
- *In vivo* animal imaging
- Research tissue imaging

Key Benefits

- Faint signals can be detected and monitored in the operating room.
- Compatible with standard fluorescence systems

Stage of Development

Preliminary work has demonstrated a capture duty cycle of 90 percent combined with 500 Hz room illumination at a 5 percent duty cycle. The capture duty cycle may be extended further, to more than 99 percent. This would mean that detector sensitivity would only drop by 1 percent compared to a perfectly dark room while using full room illumination.

Additional Information

For More Information About the Inventors

- Andreas Velten
- Kevin Eliceiri

Related Technologies

- WARF reference number P07165US describes the use of endogenous fluorescence to identify cancerous cells.

Tech Fields

- Analytical Instrumentation, Methods & Materials : Microscopy
- Medical Imaging : Other diagnostic imaging

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867