Stereoscopic Augmented Microscope for Image-Guided Surgery

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Technology description

Background:
There are expected to be 23,130 newly diagnosed cases of primary malignant brain and central nervous system tumors in the United States in 2013 with a survival rate of 33.5%. Above that there are 98,000 to 170,000 new cases of metastatic brain tumors each year with a survival rate of 2.4%. With these tumors accounting for over 580,350 deaths and 30% of the total cancer mortality rate, there is a definite need for improvement in cancer diagnostics and therapeutics to increase patient' s outcomes.
Invention:
The invention proposed here produces a simultaneous view of the real anatomy (real object) and computer-processed near-infrared (NIR) fluorescence (synthetic object). This process is referred to as Augmented Microscopy. Using gold-liposome markers, the augmented microscope is capable of displaying NIR images in real time, superimposed with anatomical images of the operative view. This device can be directly implemented as a medical technology improving surgical efficiency by helping guide surgical procedures, delivering therapies, and improving resection of tumors.

Application area

Image guided laser ablation, Gold-Liposome-assisted laser ablation of brain tumors.
Image guided neurological medical procedures and imaging.
Monitoring blood flow using ICG IV injection (i.e. Visualization of Aneurism)
Optical Biopsy

Advantages

Combines Near-Infrared Spectrum superimposed with anatomical images (visible spectrum) shown through binocular images. Different from the industry standard where images are shown on a video screen.
Does not require a dark room.
This device is shown to be faster than what is currently on the market.

Current clinical practices requires physicians to switch between visible and NIR channels independently. The augmented microscope allows physicians to see both views in real time with real time adjustments of contrast/brightness, intensity, and color corrections.
Provides a multi-functional imaging system guiding surgical procedures in the treatment of brain tumors. Technology leads to clinically safe methods of Au-liposome assisted laser ablations of tumors.

Institution

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