System for fluorescence-guided surgery (P-1254)

Key Facts

- Novel and innovative method / system for instrument navigation within a patient's body

Abstract

One of the main challenges associated with laparoscopy is the exact placement of the instrument within the body of a patient. To address this issue, DKFZ researchers have developed a system for computer assisted surgery that combines low invasivity with robust and reliable behavior.

Development Stage

The method is ready to use and reduced to practice. Current experiments use a novel fluorescent-labeled PSMA tracer developed at DKFZ for prostate cancer-specific laparoscopy.

The Technology

The presented system uses 3D medical image information from a patient's body that additionally includes data regarding the spatial position of a purpose-made fluorescent marker. That data is processed and used in combination with an augmented reality visualization tool and a fluorescent detection device. The resulting information concerning the spatial relationship between the visualization tool and the marked structures of the body enables the surgeon to place and navigate the instrument, e.g. the laparoscope, within an organ in an extremely precise, safe, and reliable manner (see Figure).

Applications and Commercial Opportunity

The technology is particularly well suited for use in combination with fluorescent markers and tracers such as the new PSMA-HBED-fluorescent compounds (P-1124).

Inventors

The inventors are Lena Maier-Hein, Esther Wild, and Dogu Teber.

Intellectual Property

A European patent application (application number EP15193169.8) was filed on November 5, 2015.

Further Information

No other public information is currently available, but further information (speaking with the inventor) is available under a signed Confidential Disclosure Agreement (CDA).

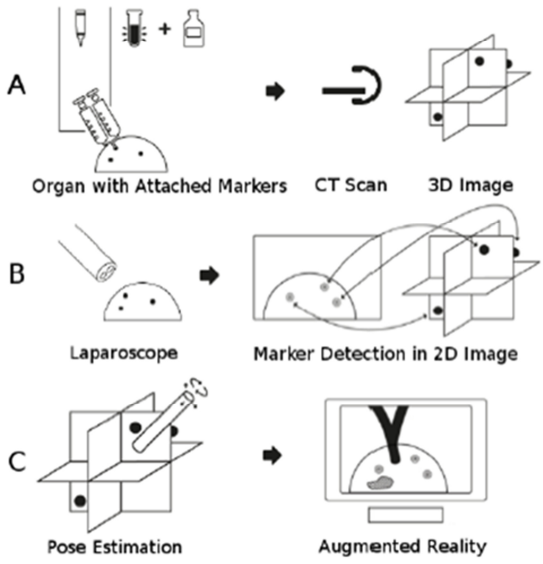

Figure: Schematic overview of the general approach to intra-operative registration using fluorescent markers. A: Mixture consisting of an adhesive (e.g. cyanoacrylate), a fluorophore (e.g. ICG) and a contrast agent is placed on the surface of an organ. A 3D image (e.g. CT scan) revealing the 3D marker positions is recorded. B: Fluorescence video of the organ is recorded using a laparoscope. 2D marker positions are detected in the video frames and matched to the corresponding 3D positions. C: Using 2D/3D registration, the laparoscope pose relative to the 3D image is estimated. This can be used to visualize subsurface information, such as tumors or vessels, using Augmented Reality.

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