

주최·주관 대한심장혈관흉부외과학회

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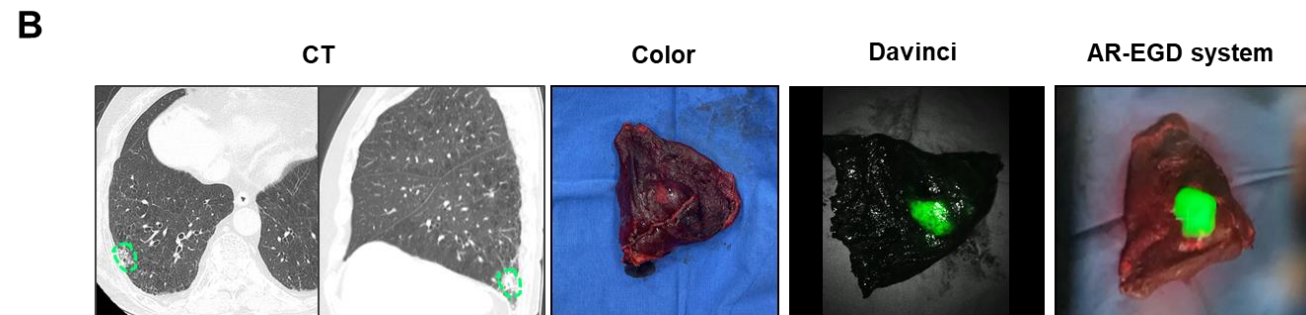
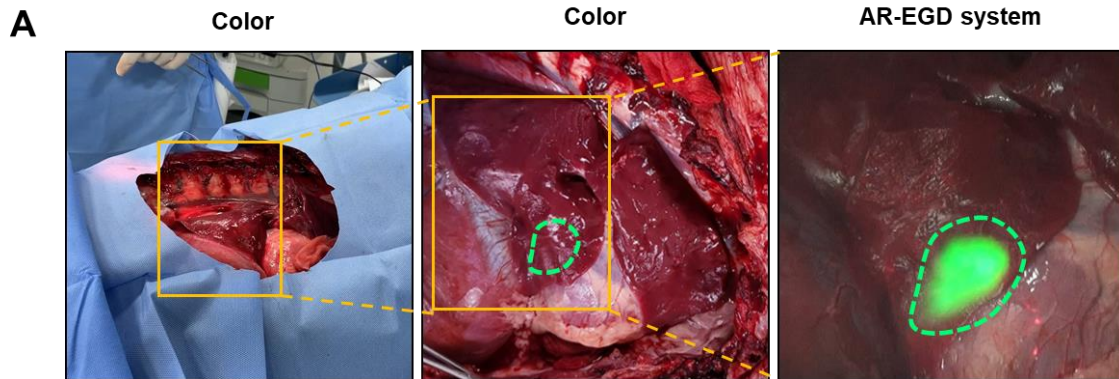
A Novel Fluorescent Imaging-Guided Surgery by Augmented Reality Eyewear Display-Experimental Studies

- **Near-infrared (NIR) imaging systems** in surgery, typically reliant on monitors, may distract surgeons and increase the risk of errors.
- We developed a novel **augmented reality eyewear display (AR-EWD) system** that can not only allow surgeons to visualize clear images of the target areas in real time but also enable them to perform highly immersive surgery without dizziness.
- **The clinical feasibility of AR-EWD is evaluated through extensive preclinical and clinical studies.**

- AR-EWD generates stereoscopic images by combining NIR fluorescence and visible light from the target site.
- These images, processed by an algorithm developed on the Visual Studio 2017 C++ platform, are relayed directly to the surgeon through AR optics.
- The system's efficiency was tested using indocyanine green (ICG)-based NIR images in various animal models.
- Additionally, specimens from 10 lung tumor patients labeled with ICG preoperatively were examined and compared to images from standard NIR fluorescence imaging systems.



- AR-EWD system featured a 60° field of view, full high definition resolution, a video refresh rate of 30 fps, and a high modulation transfer function of 30 cyc/mm.
- AR-EWD accurately imaged sentinel lymph nodes, intersegmental planes, and lung tumor in rabbit models, with image fidelity consistent with real observations.
- It also successfully detected lung pseudotumor and intersegmental planes in canine models, aiding in segmentectomies.
- In the clinical study, the AR-EWD detected lung tumor in all 10 patients, aligning closely with standard NIR fluorescence imaging systems.



- The AR-EWD proved effective in providing clear, real-time images of the target area, thereby enabling highly immersive surgical procedures.
- Therefore, AR-EWD can be fully integrated into oncological surgery, enhancing the surgeon's capabilities.

