

Fluorescence endoscopy for colon cancer detection with a fabricated optical lens module

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Abstract – Early detection of colon cancer is important to prevent progression of cancer. Conventional white light colonoscopy cannot provide sufficient information. The colonoscopy missing rate of colon cancer is 27% [1]. Fluorescence endoscopic imaging system can detect location of colon cancer by observing molecular changes [2]. We developed fluorescence endoscopic imaging system with a fabricated optical lens module. The developed imaging system consists of endoscopic imaging probe, light source and imaging device. The endoscopic imaging probe was fabricated with optical lens modules, fiber-optic image bundles, and light guide bundles. The optical lens module has field of view of 90 degrees, focal length of 10 mm, F-number of 5, respectively. The lens module outer diameter was less than 2.8 mm. The light source device includes a white light-emitting diode (LED) and optical band pass filter. The filtered light has a center wavelength of 455 nm and bandwidth of 50 nm. The filtered light is transmitted to endoscopic imaging probe. The imaging device obtains fluorescence signals delivered to the endoscopic imaging probe. We evaluated the *in vivo* imaging capability of our developed fluorescence endoscopic imaging system in the porcine colon after generation of tumors by injection of fluorescein isothiocyanate (FITC). We obtained fast real-time images of *in vivo* porcine colon tissue from high optical sensitivity and low exposure time of camera (50 ms). We confirmed that high fluorescence intensities were detected in the tumor by injected fluorophore. In this work, developed fluorescence endoscopic imaging system with the biocompatible fluorophore demonstrated the potential to improve the screening of tumors within the colon. We expect the developed imaging system to be used in human clinical studies.

REFERENCE

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