

# Development of A Fluorescent Surgical Gauze Dyed with Indocyanine Green

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**Background:** Surgical gauze is one of the must-have items during surgery and is also used to stop bleeding, protect organs, and guide the direction of surgery. However, surgical gauze is occasionally retained in the body, which causes a serious problem. We developed a novel fluorescent surgical gauze using indocyanine green (ICG) to prevent gauze remnants and to use for navigation surgery.

**Method:** We examined the optimal treating conditions for ICG. After immersing a piece of cotton gauze, which is frequently used in surgery, in an ICG aqueous solution ( $5.0 \times 10^{-4}$  mol/l) with a liquor ratio of 50:1 at room temperature, it was heated up to 80 °C and kept for 60, 120, and 240 min, followed by washing with distilled water and autoclaving at 132 °C for 8 min. Fluorescent intensity was examined with SPY PHI (Stryker) system before and after autoclaving.

**Results:** Bright fluorescence from ICG was observed in the near-IR region for all dyed gauzes. The gauze with the shortest dyeing time (60 min) with autoclaving showed the strongest fluorescence intensity, and its fluorescence was clearly observed by transmitting through tissues such as mesentery and stomach with a thickness of about 10 mm.

**Conclusion:** ICG-dyed gauze emits bright fluorescence by transmitting through tissues. We will pursue the optimal treating conditions of ICG and develop more versatile fluorescent gauzes for navigation surgery and preventing gauze remnants.