

## INTRAOPERATIVE DETECTION OF INSUFFICIENT SURGICAL MARGINS IN HEAD AND NECK CANCER RESECTION USING DUAL APERTURE FLUORESCENCE RATIO IMAGING

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**Key Words:** Fluorescence guided surgery, Head and neck cancer, epidermal growth factor receptor, cetuximab.

Surgical excision is often the primary treatment for solid tumors in oral squamous cell carcinomas, where wide local excision (achieving a healthy tissue margin of >5 mm around the excised tumor) is the goal as it is linked with reduced local recurrence rates and improved overall survival. However, current clinical methods of assessing surgical margins cannot provide assessment of the whole margins, intraoperatively (while the patient is still on the operating table) and while recent intraoperative fluorescence-guided surgery approaches have shown promise for detected “positive” inadequate margins (<1 mm), they have had limited success in the detection of “close” inadequate margins (1-5 mm). Here, a dual aperture fluorescence ratio (dAFR) imaging approach was evaluated as a means of improving detection of close margins by more directly mapping depth of fluorescence in solid tumor resections from patients who were administered with the fluorescent imaging agent, 800CW-cetuximab, prior to surgery. The dAFR approach was compared directly against a single aperture view fluorescence (sAF) and pathology measurements of margin thickness in specimens from five patients and a total of 14 margin locations (1 positive, 7 close, and 6 clear margins). The area under the curve of the receiver operating characteristic, representing the ability to detect close compared to clear margins was found to be  $1.0 \pm 0.2$  and  $0.6 \pm 0.2$  using dAFR and sAF, respectively, with the improvements in dAFR being statistically significant ( $p < 0.01$ ).