

SUPPLEMENTARY MATERIAL

Title: Intraoperative Margin Assessment in Oral and Oropharyngeal Cancer using Label-Free Fluorescence Lifetime Imaging and Machine Learning

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S1. Comparison of Healthy Tongue and Tonsil FLIm Parameter Medians (*ex vivo*)

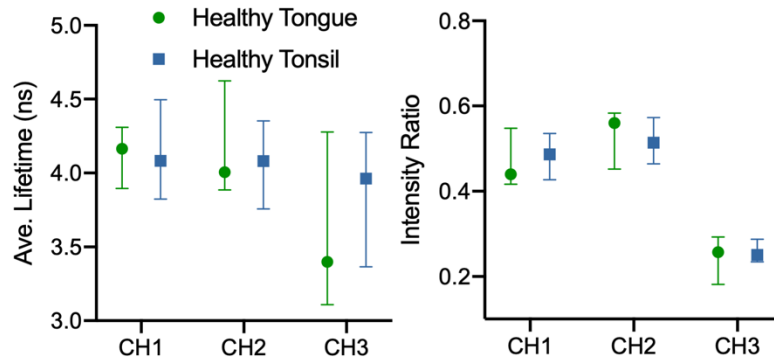


Figure S1. Average fluorescence lifetime and spectral intensity ratio medians (with 95% confidence interval) for healthy tongue and tonsil specimens (*ex vivo*). Higher variability is observed relative to *in vivo* imaging, particularly for average lifetime, likely due to effects of tumor excision (cauterization, loss of blood flow).

S2. Classifier Generalization to One-Off Anatomies and Conditions (*ex vivo*)

TISSUE CLASSIFICATION PERFORMANCE FOR ONE-OFF ANATOMIES AND CONDITIONS (*EX VIVO*) USING RANDOM FOREST (% \pm 95% CI)

Anatomy/ Condition	ROC-AUC
Excessive bleeding	0.56
Ulceration	0.61
Pharynx	0.60
Floor of Mouth	Specificity: 0.60
Posterior Maxilla	0.63
Gingiva	0.70
Lip	Specificity: 0.69
Palate	0.79
Filiform Papillae	0.43
glossotonsillar sulcus	0.61
Unknown Primary A	0.60
Unknown Primary B	Specificity: 0.67
Unknown Primary C	Specificity: 0.81