

# Team devises use of food dye, near infrared light to aid in breast resection

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Roughly 1 in 4 women having breast conserving surgery (BCS) return to the surgical suite for further resection because of cancerous tissue left behind due to unclear margins. Investigators at the Optics in Medicine Lab at Dartmouth's Thayer School of Engineering and Norris Cotton Cancer Center, led by Brian W. Pogue, PhD and Keith Paulsen PhD, with first author and PhD candidate David M. McClatchy III, devised a novel approach to perform near infrared (NIR) optical measurements of resected breast tissue after the margins have had their traditional marking by the surgeon to preserve information about their orientation for potential follow-up surgeries. Their findings are presented in a Letter in the *Journal of Biomedical Optics* titled, "Molecular dyes used for surgical specimen margin orientation allow for intraoperative optical assessment during breast conserving surgery."

"This work is a significant step towards making NIR optical methods for intraoperative [breast tumor](#) margin assessment clinically feasible by not compromising the current surgical practice of inking resected specimens for margin orientation," explained McClatchy.

Breast conserving surgery, where only a small volume of tissue around a [breast](#) cancer tumor is surgically removed, is becoming a more common choice for women with localized [breast cancer](#) who previously would have selected mastectomy for their surgical therapy. In BCS, it is often difficult for the surgeon to locate and resect the [cancerous tissue](#) all around the core of the tumor. This leads to a high frequency of returns to surgery for further resection.

Dartmouth's Optics in Medicine Lab, and the entire [biomedical optics](#) community, has focused on developing a system to use intraoperatively to determine whether the margins of resected breast specimens are free of cancer during surgery. The goal of intraoperative imaging is to avoid follow up resections.

This study focused on coming up with a practical solution that both preserves the surgical practice of inking the margins of the tumor, and allows quality imaging post-inking. The group found FD&C food dyes could be substituted for previously used inks that attenuated the NIR signal as to render the images useless. The food dyes do not attenuate the NIR optical signal and allow crisp intraoperative imaging. After imaging, the traditional surgical inks are applied, as they are needed for histopathological processing.

"This is the first breast tumor margin assessment system that is able to interrogate the breast tissue by seeing through dyes or inks used for marking specimen orientation," said McClatchy. "It facilitates a key step toward clinical translation of NIR techniques for breast tumor margin assessment, both here at Dartmouth, and in the biomedical community at large."

Looking forward, the group is co-registering their imaging technique to gross histopathology of freshly excised breast tissue specimens, and creating a database to correlate their imaging technique to [breast tissue](#) pathological diagnoses. This will allow the investigators to determine the status of breast tumor margins in real-time during surgical procedures.

**More information:** [spie.org/x866.xml](http://spie.org/x866.xml)

Provided by The Geisel School of Medicine at Dartmouth

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