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Confocal microscopy with strip mosaicing for rapid imaging over large areas of excised tissue.

Abeytunge S, Li Y, Larson B, Peterson G, Seltzer E, Toledo-Crow R, Rajadhyaksha M.: *J Biomed Opt.* 2013 Feb 06;18(6):61227. doi: 10.1117/1.JBO.18.6.061227.

ABSTRACT

Confocal mosaicing microscopy is a developing technology platform for imaging tumor margins directly in freshly excised tissue, without the processing required for conventional pathology. Previously, mosaicing on 12- \times -12 mm^2 of excised skin tissue from Mohs surgery and detection of basal cell carcinoma margins was demonstrated in 9 min. Last year, we reported the feasibility of a faster approach called "strip mosaicing," which was demonstrated on a 10- \times -10 mm^2 of tissue in 3 min. Here we describe further advances in instrumentation, software, and speed. A mechanism was also developed to flatten tissue in order to enable consistent and repeatable acquisition of images over large areas. We demonstrate mosaicing on 10- \times -10 mm^2 of skin tissue with 1- μm lateral resolution in 90 s. A 2.5- \times -3.5 cm^2 piece of breast tissue was scanned with 0.8- μm lateral resolution in 13 min. Rapid mosaicing of confocal images on large areas of fresh tissue potentially offers a means to perform pathology at the bedside. Imaging of tumor margins with strip mosaicing confocal microscopy may serve as an adjunct to conventional (frozen or fixed) pathology for guiding surgery.