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


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-×-12??mm² 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-×-10??mm² 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-×-10??mm² of skin tissue with 1-?m lateral resolution in 90 s. A 2.5-×-3.5??cm² piece of breast tissue was scanned with 0.8-?m 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.