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42 Confocal mosaicing microscopy in skin excisions: a demonstration of rapid surgical pathology

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ABSTRACT

Precise micro-surgical removal of tumour with minimal damage to the surrounding normal tissue requires a series of excisions, each guided by an examination of frozen histology of the previous. An example is Mohs surgery for the removal of basal cell carcinomas (BCCs) in skin. The preparation of frozen histology is labour-intensive and slow. Confocal microscopy may enable rapid detection of tumours directly in surgical excisions with minimal need for frozen histology. Mosaicing of images enables observation of nuclear and cellular morphology in large areas of surgically excised tissue. In skin, the use of 10-1% acetic acid as a reflectance contrast agent brightens nuclei in 0.5-5 min and enhances nuclear-to-dermis contrast and detectability of BCCs. A tissue fixture was engineered for precisely mounting surgical excisions to enable mosaicing of 36 x 36 images to create a field of view of 12 x 12 mm. This large field of view displays the excision at 2x magnification, similar to that routinely used by Mohs surgeons when examining frozen

histology. Comparison of mosaics to histology demonstrates detectability of BCCs. Confocal mosaicing presently requires 9 min, instead of 20-45 min per excision for preparing frozen histology, and thus may provide a means for rapid pathology-at-the-bedside to expedite and guide surgery.