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17 | Feasibility of confocal fluorescence microscopy for real-time evaluation of neoplasia in fresh human breast tissue.

ABSTRACT

Breast cancer management could be improved by developing real-time imaging tools to assess tissue architecture without extensive processing. We sought to determine whether confocal fluorescence microscopy (CFM) provides sufficient information to identify neoplasia in breast tissue. Breast tissue specimens were imaged following proflavine application. Regions of interest (ROIs) were selected in histologic slides and in the corresponding region on confocal images, and then divided into sets for training and validation. Readers reviewed images in the training set and evaluated images in the validation set for the presence of neoplasia. Accuracy was assessed using histologic diagnosis as the gold standard. Seventy tissue specimens from 31 patients were imaged; 235 ROIs were identified and diagnosed as neoplastic or non-neoplastic. A training set was assembled using 23 matched ROIs; 49 matched ROIs were assembled into a validation set. Neoplasia was identified in histologic images: 93% sensitivity, 97% specificity [area under the curve (AUC=0.987)] and in confocal images: 93% sensitivity 93% specificity (AUC=0.957). CFM produced images of architectural features in breast tissue comparable with conventional histology, while requiring little processing. Potential applications include assessment of excised tissue margins and evaluation of tissue adequacy for bio-banking and genomic studies.