Immediate Label-Free Ex Vivo Evaluation of Human Brain Tumor Biopsies With Confocal Reflectance Microscopy.

Eschbacher JM, Georges JF, Belykh E, Yazdanabadi MI, Martirosyan NL, Szeto E, Seiler CY, Mooney MA, Daniels JK, Goehring KY, Van Keuren-Jensen KR, Preul MC, Coons SW, Mehta S, Nakaji P.


ABSTRACT
Confocal microscopy utilizing fluorescent dyes is widely gaining use in the clinical setting as a diagnostic tool. Reflectance confocal microscopy is a method of visualizing tissue specimens without fluorescent dyes while relying on the natural refractile properties of cellular and subcellular structures. We prospectively evaluated 76 CNS lesions with confocal reflectance microscopy (CRM) to determine cellularity, architecture, and morphological characteristics. A neuropathologist found that all cases showed similar histopathological features when compared to matched hematoxylin and eosin-stained sections. RNA isolated from 7 tissues following CRM imaging retained high RNA integrity, suggesting that CRM does not alter tissue properties for molecular studies. A neuropathologist and surgical pathologist masked to the imaging results independently evaluated a subset of CRM images. In these evaluations, 100% of images reviewed by the neuropathologist and 95.7% of images reviewed by the surgical pathologist were correctly diagnosed as lesional or nonlesional. Furthermore, 97.9% and 91.5% of cases were correctly diagnosed as tumor or not tumor by the neuropathologist and surgical pathologist, respectively, while 95.8% and 85.1% were identified with the correct diagnosis. Our data indicate that CRM is a useful tool for rapidly screening patient biopsies for diagnostic adequacy, molecular studies, and biobanking. 

KEYWORDS: Brain biopsy; Confocal reflectance microscopy; Intraoperative tissue analysis; Neoplasms
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