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Abstract Title: Advancements in Confocal Laser Endomicroscopy for the Rapid Fluorescent Staining and Diagnosis of Brain Tumors

Category 1: Tumor
Category 2: Young Neurosurgeons Research Forum

Abstract:

Introduction:
Current systems for intraoperative brain tumor confocal laser endomicroscopy (CLE) have limited resolution that makes image interpretation by neurosurgeons and pathologists challenging. We report significant advancements in imaging performance with a high resolution CLE system.

Methods:
Fresh human brain tumor biopsy specimens (gliomas, meningiomas, pituitary tumors and others) stained with a variety of fluorophores (n=46 examinations total) and experimental murine gliomas injected with fluorescein (FNa) intravenously (n=10) or 5-ALA (n=10) intraperitonealy were assessed and compared using a prototype clinical-grade CLE system with 405nm laser excitation. Collected high resolution 1920x1080 pixels images were assessed and compared using FIJI.

Results:
Individual autofluorescent cells and fibers with S/B ratio about 1.7 and various patterns were detected in all tumor specimens. Acridine orange was the brightest rapid nucleic acid stain (signal intensity (SI) nuclei(N)222&plusmn;36; cytoplasm(C)79&plusmn;6; extracellular matrix(ECM) 23&plusmn;1; RBC16&plusmn;6 AU, p&lt;01). Acriflavine stained cytoplasm and nuclei less bright than acridine orange (N153&plusmn;13; C112&plusmn;14; ECM48&plusmn;11; RBC34&plusmn;9 AI, p&lt;05). Sulforhodamine 101 showed images of increased brightness and selectively stained astrocytes in some images. Topical FNa application highlighted general structure of tumor ECM, followed by slow dye incorporation by the cells. Intravenous FNa resulted in better cell/ECM contrast, cell size and shape delineation. Cresyl violet highlighted stained tissue but was not structurally specific.

Conclusion:
Compared to previous systems, the advancements in CLE reveal significant digital image detail, resolution, and display for rapid tissue diagnosis and evaluation to support and quicken decision making. FNa was best for in vivo imaging, while acridine orange provided best contrast for ex vivo imaging...

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Presentation Preference: Either Oral OR Poster
Study Design: Other
Manuscript: NO

Awards:

Has the work presented in this abstract or substantially similar work been presented or published previously?

No NA

Has the work in this abstract or substantially similar work being submitted for presentation at another meeting?:

NA
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Are you a Medical Student or Resident and would like your abstract considered for oral presentation in the Young Neurosurgeons Research Forum?

Yes