ABSTRACT

J Biophotonics. 2022 Dec 12:e202200291. doi: 10.1002/jbio.202200291. Online ahead of print.

Intraoperative detection of IDH-mutant glioma using fluorescence lifetime imaging.

Noble Anbunesan S(1), Alfonso-Garcia A(1), Zhou X(1), Bec J(1), Lee HS(2), Jin LW(2), Bloch O(3), Marcu L(1)(3).

Author information:
(1)Dept. Biomedical Engineering, University of California Davis, Davis, USA.
(2)Dept. Pathology and Laboratory Medicine, University of California Davis, Sacramento, USA.
(3)Dept. Neurosurgery, University of California Davis, Sacramento, USA.

Identifying isocitrate dehydrogenase (IDH)-mutation and glioma subtype during surgery instead of days later can aid in modifying tumor resection strategies for better survival outcomes. We report intraoperative identification of IDH-mutant glioma (N=12 patients) with a clinically compatible fluorescence lifetime imaging (FLIm) device (excitation: 355 nm; emission spectral bands: 390/40 nm, 470/28 nm, 542/50 nm). The fluorescence-derived parameters were analyzed to study the optical contrast between IDH-mutant tumors and surrounding brain tissue. IDH-mutant oligodendrogliomas exhibited shorter lifetimes (3.3 ± 0.1 ns) than IDH-mutant astrocytomas (4.1 ± 0.1 ns). Both IDH-mutant glioma subtypes had shorter lifetimes than white matter (4.6 ± 0.4 ns) but had comparable lifetimes to cortex. Lifetimes also increased with malignancy grade within IDH-mutant oligodendrogliomas (grade 2: 2.96 ± 0.08 ns, grade 3: 3.4 ± 0.3 ns) but not within IDH-mutant astrocytomas. The current results support the feasibility of FLIm as a surgical adjuvant for identifying IDH-mutant glioma tissue. This article is protected by copyright. All rights reserved.

DOI: 10.1002/jbio.202200291
PMID: 36510639