

Non-destructive 3D Pathology with open-top Light-sheet Microscopy

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ABSTRACT In order to catalyze a digital pathology transformation, a novel technological approach is needed that offers significant advantages over traditional histopathology in terms of accuracy, throughput, comprehensive 3D sampling of specimens, and superior sample preservation (including nucleic acids). We have developed an open-top light-sheet (OTLS) microscopy platform for slide-free 3D pathology of whole biopsies and surgical specimens. Using machine-learning techniques, we are quantifying structural and molecular biomarkers within intact specimens for prognosticating patient outcomes (indolent vs. aggressive disease) and predicting treatment response. These non-destructive large-volume digital pathology methods are synergistic with the growing fields of radiomics and genomics, which collectively have the potential to improve treatment decisions for individual patients. This talk will also highlight some high-impact applications of OTLS microscopy for preclinical research, including drug development.

BIO Jonathan T.C. Liu is a professor of mechanical engineering, bioengineering, and laboratory medicine & pathology at the University of Washington, where his molecular biophotonics laboratory develops high-resolution optical imaging and computational analysis strategies primarily for surgical guidance and clinical decision support. Dr. Liu received a B.S.E. from Princeton in 1999 and a Ph.D. from Stanford in 2005. He was a postdoc in the Molecular Imaging Program at Stanford (MIPS) from 2005–2010 before joining the biomedical engineering department at Stony Brook in 2010 and then moving to Seattle (UW) in 2014. Dr. Liu's work is funded by the NCI, NIBIB, DoD, NSF, and various foundations.