Xiaochuan Pan, Ph.D., The University of Chicago

Intraoperative Assessment of Lumpectomy Tumor Margin for Reduction of Re-operation Rate in Breast Conserving Surgery

Abstract:

Breast cancer (BC) is the 2nd most common cancer in women in the US. Breast conserving surgery (BCS) is used as a part of the BC treatment for a majority (~70%) of the cases. In BCS, the specimen of negative margin containing tumor is excised with a minimum rim of normal tissues, as opposed to removal of the entire breast in mastectomy. Positive margins, i.e., BC residual close to specimen edges, if missed, can lead to a high recall rate (i.e., a high re-operation rate,) resulting in increased conversion to mastectomy, patient suffering, and significant cost burden. It is thus of significance to intraoperatively differentiate BC from normal tissue in the lumpectomy specimen for accurate positive-margin identification (PMI) that can be used to guide the surgeon to remove the residual BC within the breast cavity during the BCS. In the talk, I will discuss a translational project in which we develop X-ray-based microCT technique for accurate intraoperative PMI that is tailored specifically to meet the key clinical workflow constraints in BCS. The technique is with unique functionalities and utilities empowered by innovative physics- and AI-based algorithms, thus allowing for point-care, intraoperative PMI and for reducing the undesirably high recall rate (i.e., the high re-operation rate) in current BCS. The project also accumulates a valuable database of quantitative images of breast malignant tissues, which facilitates advanced AI informatics, including machine-learning- and deep-learning-based analysis and decision making in clinical research and applications.