AI-based tool offers exciting advancement in pancreatic cancer diagnostics

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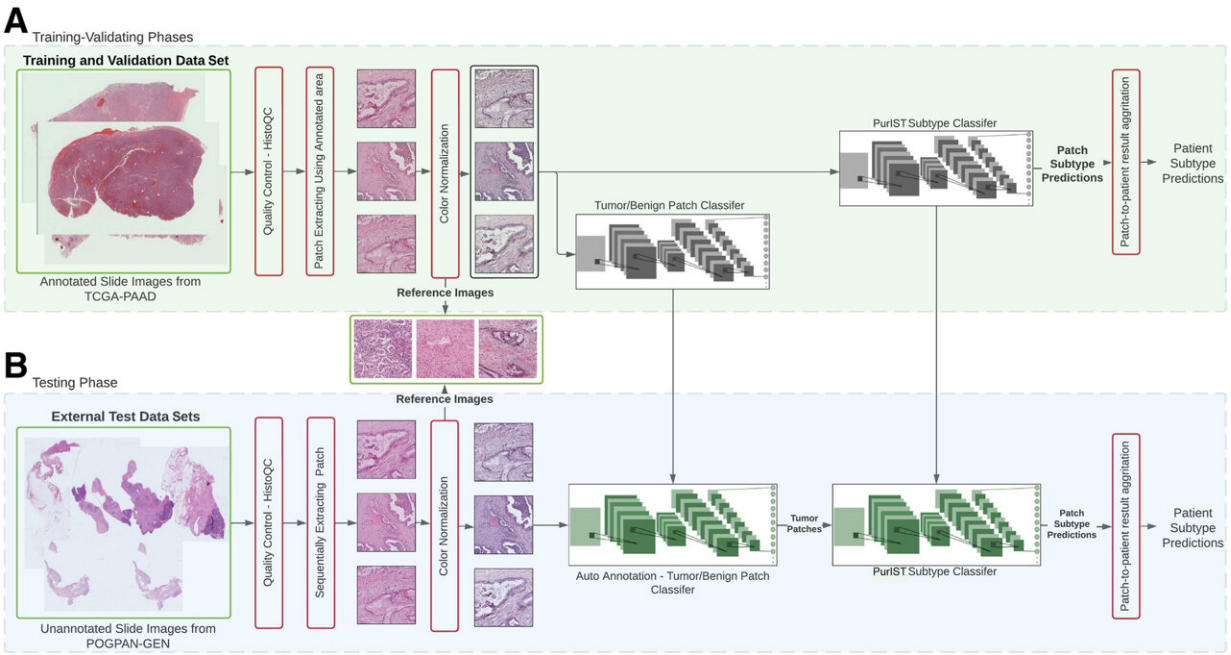

The proposed pipeline for training, validating, and testing a model aimed at classifying pancreatic ductal adenocarcinoma slides into Purity Independent Subtyping of Tumors (PurIST) molecular subtypes. Credit: *The American Journal of Pathology* (2024). DOI: 10.1016/j.ajpath.2024.08.006

Researchers have successfully developed a deep learning model that classifies pancreatic ductal adenocarcinoma (PDAC), the most common form of pancreatic cancer, into molecular subtypes using histopathology images. This approach achieves high accuracy and offers a rapid, cost-

effective alternative to current methods that rely on expensive molecular assays.

The new study, published in the *American Journal of Pathology*, promises to advance personalized treatment strategies and improve patient outcomes.

PDACs have recently surpassed breast cancer as the third leading cause of cancer mortality in Canada and the United States. Surgery can cure approximately one-fifth of PDAC cases if they are detected early. Although surgical intervention is provided to these patients, the five-year survival rate remains at 20%. Approximately 80% of patients have already developed metastatic disease at diagnosis, and most of these patients succumb to the disease within a year.

The aggressiveness of PDAC poses a formidable challenge when using sequencing technologies to determine a patient care plan. The disease's rapid clinical deterioration demands swift action to identify eligible individuals for targeted therapies and inclusion in clinical trials. However, current turnaround times for molecular profiling, which range from 19 to 52 days from the time of biopsy, fall short of meeting these time-sensitive demands.

Co-lead investigator David Schaeffer, MD, Department of Pathology and Laboratory Medicine, University of British Columbia, Vancouver General Hospital, and Pancreas Center BC, explains, "More and more potentially actionable subtypes to personalize treatment for pancreatic cancer patients are being discovered. However, the subtyping is still entirely based on genomic methodology based on DNA and RNA extracted from tissue.

"This methodology is outstanding if sufficient tissue is present, which is not always the case for PDAC tumors given the difficult anatomical

location of this organ. Our study provides a promising method to cost-effectively and rapidly classify PDAC molecular subtypes based on routine hematoxylin-eosin–stained slides, potentially leading to more effective clinical management of this disease."

The study involved training deep learning AI models on whole-slide pathology images to identify the molecular subtypes of PDAC—basal-like and classical—using hematoxylin and eosin-(H&E) stained slides. H&E staining is a cost-effective and widely available technique that is routinely performed with fast turnaround times in pathology laboratories for diagnostics and prognostication.

The models were trained on 97 slides from The Cancer Genome Atlas (TCGA) and tested on 110 slides from 44 patients in a local cohort. The best-performing model achieved an accuracy of 96.19% in identifying the classical and basal subtypes in the TCGA dataset and 83.03% on the local cohort, highlighting its robustness across different datasets.

Co-lead investigator Ali Bashashati, Ph.D., School of Biomedical Engineering, and Department of Pathology and Laboratory Medicine, University of British Columbia, notes, "The sensitivity and specificity of the model was 85% and 100%, respectively, making this AI tool a highly applicable tool for triaging patients for molecular testing.

"Also, the main achievement of this study is the fact that the AI model was able to detect the subtypes from biopsy images, making it a highly useful tool that can be deployed at the time of diagnosis."

Dr. Bashashati concludes, "This AI-based approach offers an exciting advancement in pancreatic cancer diagnostics, enabling us to identify key molecular subtypes rapidly and cost-effectively."

More information: Pouya Ahmadvand et al, A Deep Learning

Medical Xpress

Approach for the Identification of the Molecular Subtypes of Pancreatic Ductal Adenocarcinoma Based on Whole Slide Pathology Images, *The American Journal of Pathology* (2024). DOI: 10.1016/j.ajpath.2024.08.006

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