# Automated Pathology Annotation and Decision Support Tool Using Artificial Intelligence

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Technology description

Diagnostic pathology tool

Morphologic classification of disease remains a valuable, timely and cost-effective diagnostic tool as well as an important means of triaging samples for molecular testing. It is estimated that over 70% of treatment decisions are based on laboratory results including careful microscopic analysis of patient tissue. However, morphologic classification is prone to inter-observer variability and can lead to errors in pathology diagnosis. Studies have estimated a 6.8% discrepancy rate between pathologists, 21% of which are major (Benign vs. Cancer). This means that significant errors effect 0.5%-1.7% of patients (i.e., 10,000 errors/million). Here, we introduce a decision support tool coined "brAIn": "biologicalrendering throughArtificialIntelligence andneural networks. brAIn is an automated tool which uses a convolutional neural network to analyze and accurately annotate pathology slides. This technology enables a higher degree of precision by transforming pathology from "qualitative art" into "quantitative science". It aims to improve patient care through quality assurance and error prevention, improve efficiency through a reduction in diagnostic turnaround time and cost. A cloud-based version of brAIn aims to provide increased access to this diagnostic aid for remote and underserviced centers globally. Moreover, by using machine learning to help precisely define morphology and triage for molecular testing, this tool could help tailor more precise intra-operative surgical procedures, improve stratification of patients to appropriate clinical trials, and guide personalized treatment regimens.
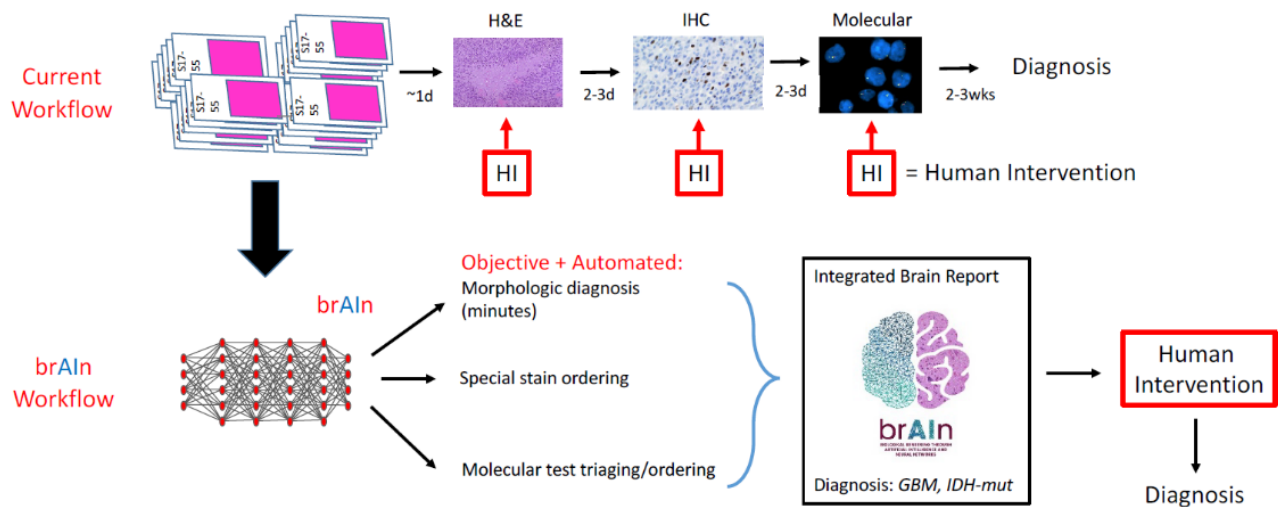
brAIn uses deep learning to perform rapid histomorphologic analysis. The prototype has shown high concordance to pathologist and immunohistochemistry-based annotations. It has been demonstrated to be compatible with standard pathology workflows, and to provide prompt whole-slide annotation and lesion classification in <3 minutes.

Application area

Novel automated system for quantitative diagnostic pathology

Institution

University Health Network

Inventors

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