CASE STUDY

Paige

Paige Breast Lymph Node Improves Pathologist Diagnostic Accuracy and Efficiency in Proof-of-Concept Study

Paige AI

Paige Breast Lymph Node

This novel proof-of-concept study was designed to measure the impact of using Paige Breast Lymph Node, an AI system that aids in the diagnosis of metastases in breast cancer lymph node slides, in a clinical setting.

UNITED STATES

Study Design

3 pathologists reviewed Breast whole-slide images both assisted and unassisted by Paige Breast Lymph Node to then compare variance in their efficiency and accuracy.

Results revealed that AI can enhance diagnostic accuracy and efficiency

Breast Lymph Node helped reduce total read times by over 55%

~66%
Reduction
for slides suspicious for cancer

~50%
Reduction
for benign slides

2 of the 3 pathologists

improved their sensitivity in detecting suspicious for cancer foci by using Paige Breast Lymph Node

70% Pathologist **efficiency improvements** when assisted by Paige Breast Lymph Node

55%
Breast Lymph Node helped **reduce total slide read times**

25%
Sensitivity improvements
on micromets and ITCs

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Abstract

Paige conducted a novel proof-of-concept study to measure the impact of using Paige Breast Lymph Node, a clinical AI application designed to aid in the diagnosis of metastastatic breast cancer, in a clinical setting. The objective of this study was to evaluate pathologist performance in suspicious for cancer breast lymph node slides unassisted and assisted by Paige Breast Lymph Node. The study revealed that assistance from Paige Breast Lymph Node significantly improved pathologist read efficiency and diagnostic accuracy1.

Introduction

Digital pathology offers numerous enhancements to traditional pathology workflows, including streamlined slide viewing, improved efficiency, and greater pathologist satisfaction. One of the most promising advantages of digital pathology is the ability to apply artificial intelligence (AI) to assist pathologists in diagnosis and decision making. Identifying cancerous breast lymph node metastases is an area where AI can be particularly useful, as effective diagnosis requires the assessment of isolate tumor cells (ITCs) and micrometastases, which are often time-consuming and difficult to detect. Further, the accuracy of these diagnoses is important to dictating treatment and improving patient outcomes. AI offers an opportunity to aid pathologists in efficiently and accurately signing out these difficult cases.

However, adoption of digital pathology and AI technologies remains slow, and there is much to be understood about the practical role of these advancements. This study works to fill in those gaps, by examining the impact of introducing specially designed AI applications to the complicated work of diagnosing breast lymph node slides.

Paige Breast Lymph Node is an AI designed to guide pathologists to areas suspicious for metastases in breast lymph node slides. The system was trained using vast datasets comprising tens of thousands of slides, layered with advanced Machine Learning algorithms that enable Paige Breast Lymph Node to detect metastases of any size and prioritize cases for review. When incorporated into the pathologists' read workflow, the outcomes of this study reveal that Paige Breast Lymph Node can significantly improve both efficiency and diagnostic accuracy. This promising proof-of-concept will enable Paige to work alongside pathologists to usher in a new era of pathology that ultimately improves the future of cancer care.

Study methodologies

3 pathologists were assigned to randomized cohorts where they were either assisted or unassisted by Paige Breast Lymph Node technology during their initial slide reads. They then underwent a minimum 3-week washout period before they read the slides again, this time unassisted if they were assisted initially, or assisted if they were unassisted initially. When assisted by Paige Breast Lymph Node, the pathologists were shown areas of interest on whole slide images (WSI's) that were suspicious for cancer. When unassisted, the pathologist was shown only the WSI with no focus location indicators. Pathologists reported their sensitivity on cancer slides, specificity on benign slides, read times on each type of slide, and their total read time after both reads. The differences in read time, sensitivity, and specificity of unassisted pathologist reads and Paige Breast Lymph Node-assisted reads were evaluated.

Results[1]

The differences between unassisted read times and Paige Breast Lymph Node-assisted read times was evaluated. Assistance by Paige Breast Lymph Node helped reduce total read times by over 55%. Importantly, the total reduction in slides suspicious for cancer was approximately 66%. The total reduction for benign slides was approximately 50%.

The largest efficiency improvements were on hard micromets (0.2-0.5mm), easy micromets (0.5-2mm) and ITCs. Pathologist efficiency when assisted by Paige Breast Lymph node improved by a total of 70% across all slide types.

The differences between unassisted sensitivity and specificity and Paige Breast Lymph Node-assisted sensitivity and specificity was also evaluated. In total, 2 of the 3 pathologists in the study improved their sensitivity in detecting suspicious for cancer foci when assisted by Paige Breast Lymph Node. For the remaining pathologist, the Breast Lymph Node read sensitivity was non-inferior. Additionally, Paige Breast Lymph Node was non-inferior to all 3 pathologists' specificity in classifying non-suspicious (benign) slides. Again, the largest sensitivity improvements were on small micromets (0.2-0.5mm) and ITCs, where sensitivity improved by over 25%.

Conclusion

This study demonstrates the impact that AI can have on pathologists' performance when applied to practical breast lymph node diagnoses. The results indicate that use of AI, even in difficult and complex analysis, can save time while improving accuracy, a promising outcome for pathologists and patients alike.

[1]Based on an investigational clinical study involving 3 pathologists and data from 148 patients.