

# of Artificial Intelligence Solution for Prostate Biopsies

Emre Karakok<sup>1</sup>, Deniz Baycelebi<sup>1</sup>, Murat Oktay<sup>1</sup>, Serdar Balci<sup>1</sup>, Yildirim Karslioglu<sup>1</sup>, Fadime Gul Salman<sup>1</sup>, Harun Ozalp<sup>2</sup>, Fatma Aktepe<sup>1</sup>, Ilknur Turkmen<sup>1,2</sup>

1) Department of Pathology, Memorial Hospitals Group, Türkiye

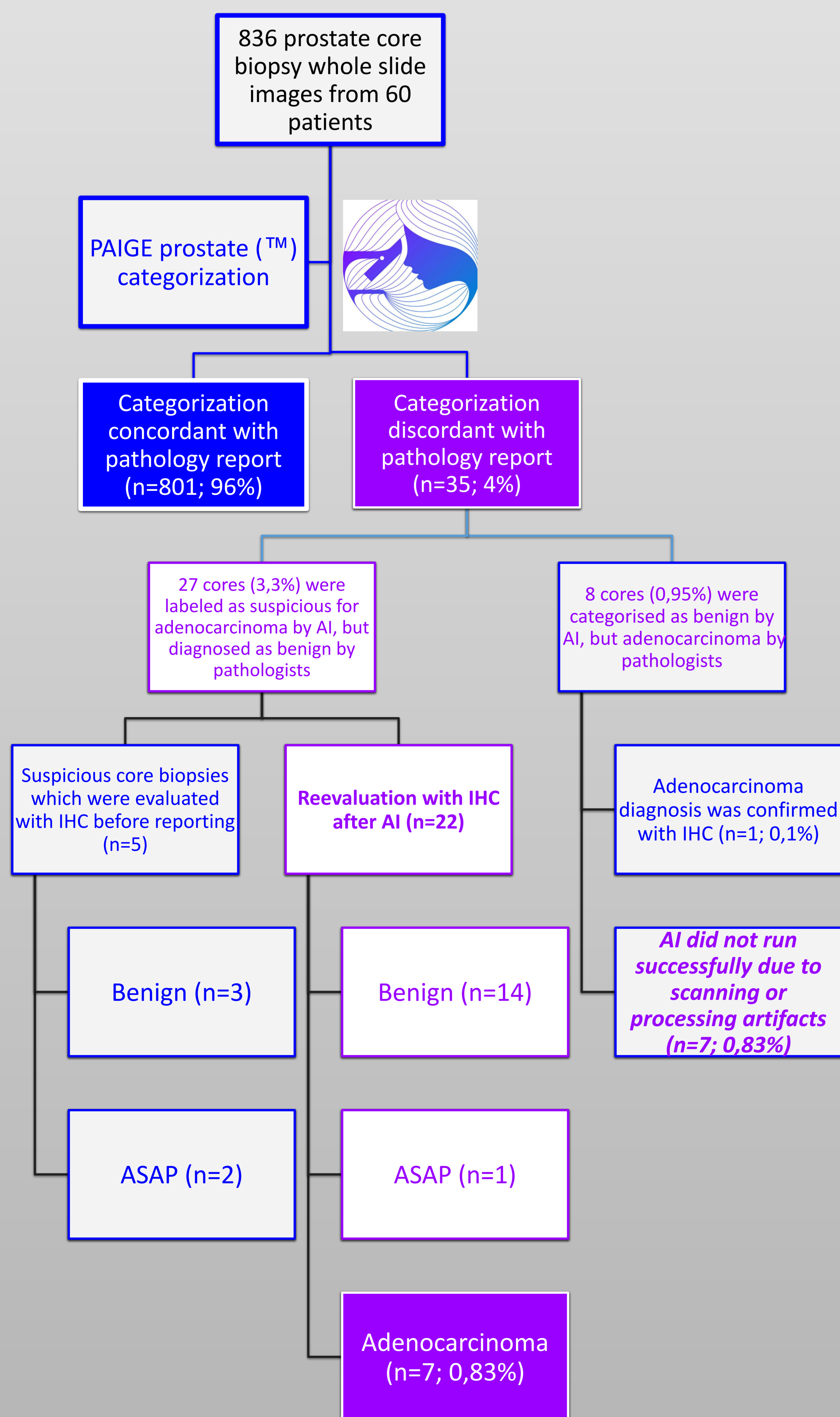
2) Biruni University, Faculty of Medicine, Türkiye

## Introduction

- AI builds the future in pathology. We have implemented routine digital pathology diagnosis in two years, later started evaluating image analysis solutions. Here we discuss retrospective evaluation of the PAIGE Prostate (™) on our cohort.

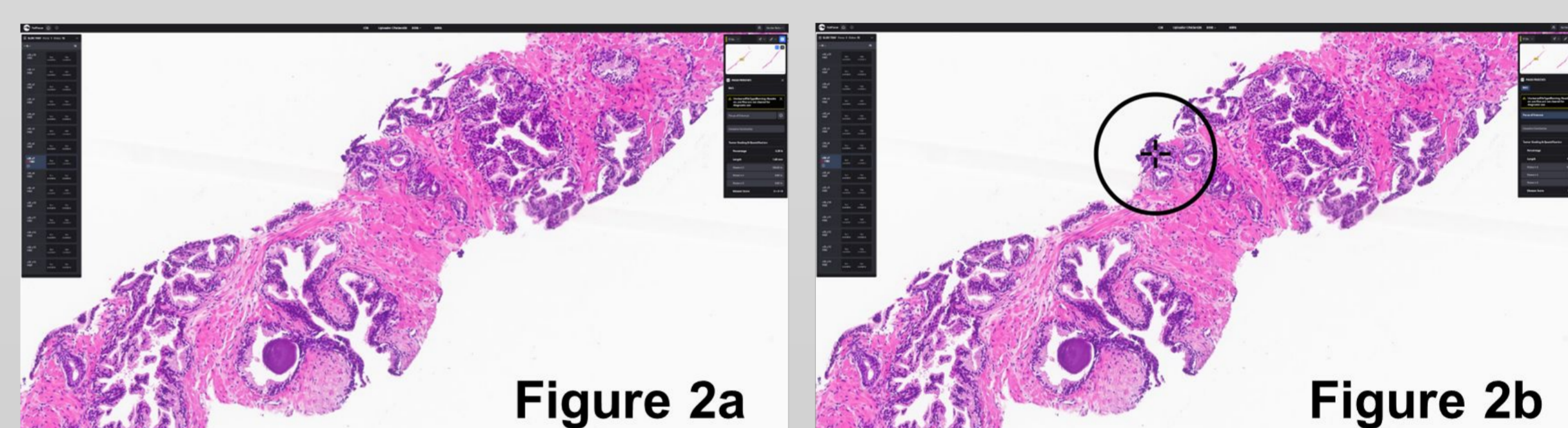
## Materials and Methods

- 836 prostate core biopsies of 60 consecutive cases included (scanned Aperio AT2, with 20x or 40x, diagnosed on Sectra). Images were anonymised before uploading. Report diagnoses were compared with AI.

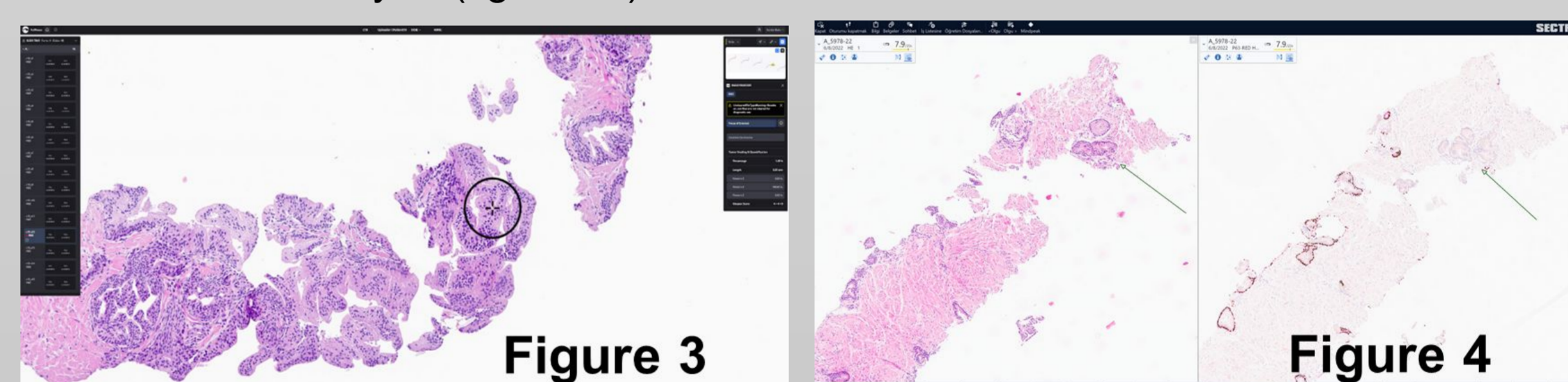


## Results

- 836 biopsy cores evaluated. 601(72%) were labeled as benign both by AI and pathologists; 200(24%) as adenocarcinoma both by AI and pathologists.
- 27 cores were labeled as suspicious for adenocarcinoma by AI, but diagnosed as benign by pathologists. Among these: 5 cores were also suspected by pathologists before reporting, and 3 diagnosed as benign, 2 as ASAP after IHC confirmation. Remaining 22 were reevaluated by an expert pathologist with IHC after AI. 14 were finalised as benign, 1 ASAP, 7 adenocarcinoma. These foci were minute and 3+3 grade.
- 8 cores were categorised as benign by AI, but adenocarcinoma by pathologists (3 blurred, 4 processing artifacts thus excluded from further analysis). One labeled as benign by AI, but adenocarcinoma by pathologists with IHC confirmation.
- When evaluated on a case basis with final IHC confirmation, AI had overdiagnosis in 4 cases.
- Overall, AI had 92.1% and 90% positive predictive value, 99.8% and 100% negative predictive value on core and case-based analysis, respectively.**

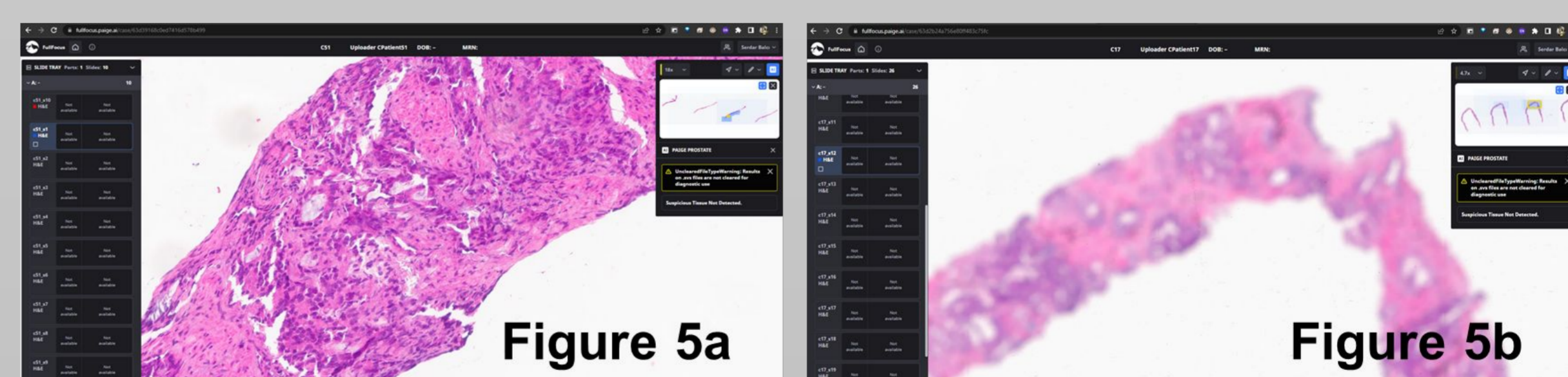


**Figure 2:** The core biopsy whole slide image (figure 2a) was labeled as adenocarcinoma by AI (figure 2b).



**Figure 3:** A benign core biopsy was labeled as suspicious for adenocarcinoma by AI.

**Figure 4:** A core biopsy was categorised as benign by AI, but adenocarcinoma diagnosis was confirmed with IHC.



**Figure 5:** AI could not detect suspicious tissue, due to processing (figure 5a) and blurred (figure 5b) artifacts.

## Discussion

- The PAIGE Prostate was found to be helpful for prostate biopsy interpretation.
- Processing and scanning artifacts cause errors, thus images should be checked for quality.
- AI found minute tumors missed by pathologists, which had no impact on patient management since other cores also contained tumor.
- AI sensitivity with pathologists' specificity will improve patient care.

**Figure 1:** Study flow chart detailing the cases and distribution of the categorization.