Background
Prostate cancer is one of the most common cancers in men. Artificial intelligence (AI) algorithms can be used to facilitate diagnosis and improve objectivity. Preanalytical factors (fixation and staining of biopsy) prior to scanning can vary between labs and may impact the quality of whole slide images (WSIs). In this study, the performance of an AI algorithm (INIFY Prostate*) was evaluated on WSIs from two labs by two independent pathologists.

Methods
INIFY Prostate viewer: Graphical user interface for the pathologist to view, zoom, pan and annotate WSIs as well as measure and outline cancer areas

Table 1: Comparison of INIFY Prostate* predictions on WSIs from different sites

<table>
<thead>
<tr>
<th>Result per lab</th>
<th>Specificity (area %)</th>
<th>Sensitivity (area %)</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tufts all scanners</td>
<td>99.5% (3.37)</td>
<td>99.9% (0.01)</td>
<td>INIFY Prostate predictions work equally well for WSIs from non-differing labs, resulting in the same sensitivities (p=0.35), and similar specificities (p=0.04).</td>
</tr>
<tr>
<td>Wexner all scanners</td>
<td>98.5% (0.73)</td>
<td>99.9% (0.01)</td>
<td>100% (0.01)</td>
</tr>
</tbody>
</table>

INIFY Prostate predictions: Outlined suspicious cancer areas on prostate biopsy WSIs suspicious by INIFY = cancer areas + other suspicious areas to be evaluated by pathologist

Figure 1: INIFY Prostate*

30 prostate biopsy slides (20 cancer, 10 benign) from unique cases were selected: 15 at Tufts Medical Center Boston (Tufts) and 15 at Ohio State University Wexner Medical Center (Wexner). The slides were scanned on 3 different scanners at Wexner generating 90 WSIs. The algorithm (INIFY Prostate*) was applied to predict suspicious cancer areas and tumor volume (% area of biopsy involved). Two pathologists then reviewed the algorithm's annotations in INIFY Prostate* viewer to identify false positive and false negative areas. The algorithm's performance (sensitivity and specificity) was compared for the two labs.

$\text{Sensitivity} = \frac{TP}{TP + FN}$

$\text{Specificity} = \frac{TN}{TN + FP} + \text{area [cm]}$

$\text{FP} = \frac{FP}{FP + TN}$

$\text{FN} = \frac{FN}{TP + FN}$

$\text{TP} = \frac{TP}{TP + FN}$

$\text{TN} = \frac{TN}{TN + FP}$

Results
The difference in the performance of INIFY Prostate* regarding WSIs from different labs was minor.

Table 2: Comparison of INIFY Prostate* predictions when used by different pathologists

<table>
<thead>
<tr>
<th>Result per pathologist</th>
<th>Specificity (area %)</th>
<th>Sensitivity (area %)</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathologist 1: all scanners</td>
<td>97.9% (0.01)</td>
<td>99.3% (0.03)</td>
<td>100% (0.01)</td>
</tr>
<tr>
<td>Pathologist 2: all scanners</td>
<td>98.5% (0.06)</td>
<td>99.5% (0.03)</td>
<td>100% (0.04)</td>
</tr>
</tbody>
</table>

There was no significant difference in the performance of the INIFY Prostate* algorithm when evaluated independently by two different pathologists.

Conclusions
INIFY Prostate* predictions work very well on WSIs from both labs with nonsignificant differences regarding sensitivity. The findings suggest though that preanalytical factors may affect WSI characteristics and therefore the algorithm's specificity. In addition, INIFY Prostate* yields similar performance by two pathologists, suggesting similar user experience.