



# Charting the Patient Journey: Enhancing Outcomes Through Patient- Centered Digital Pathology

John Groth, MD

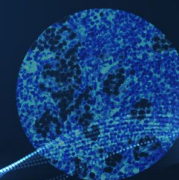
Director of Pathology Informatics, Innovation & Technology

Future of Cancer Data Summit

10-18-2024



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# Disclosures

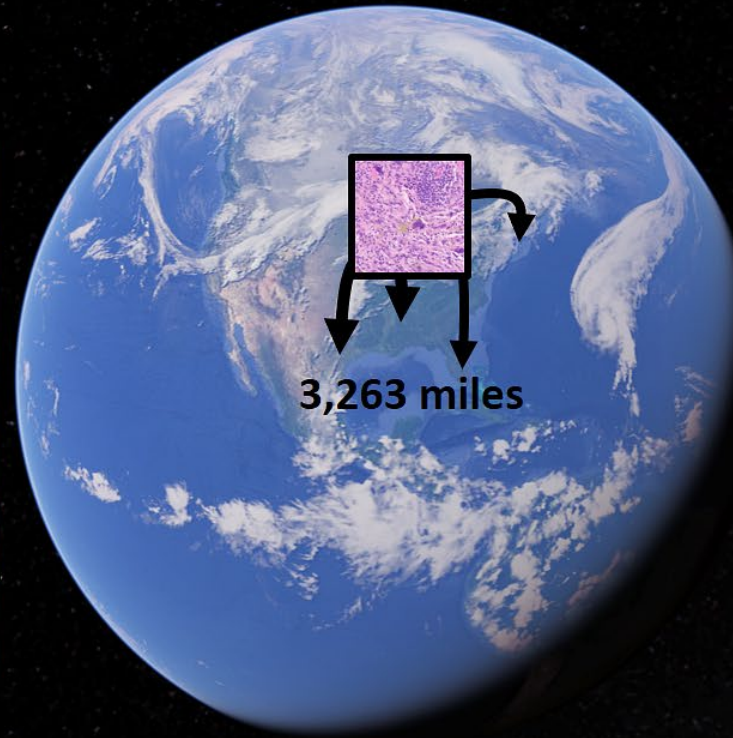
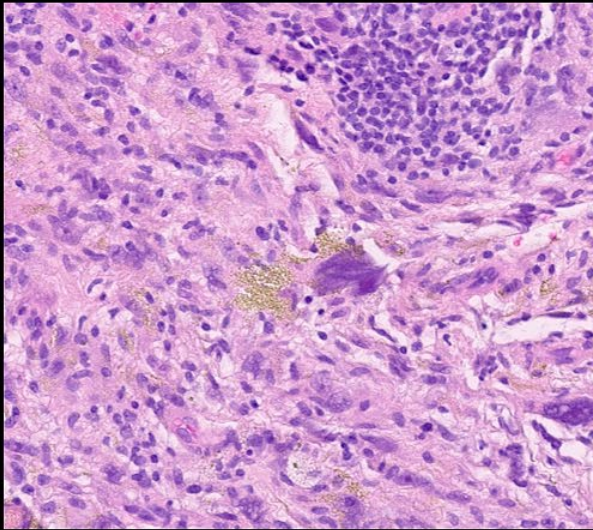
- Nothing to disclose

# Objectives

- Explore the Patient Data Journey in Digital Pathology
- Highlight the Impact of Standardized Digital Pathology Data Practices on Patient Outcomes
- Promote Patient-Centered Approaches in Digital Pathology

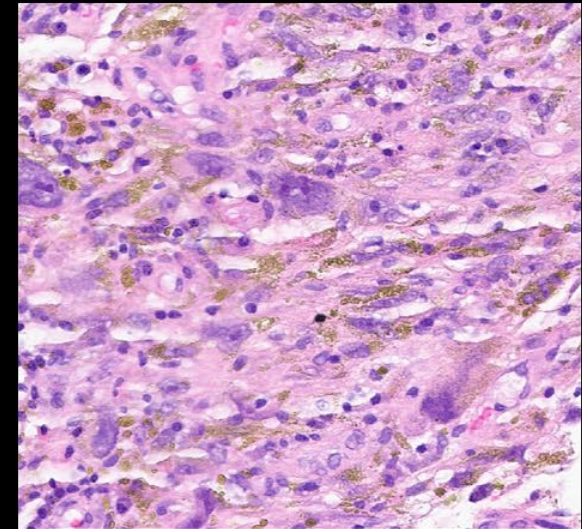
# A Patient's Journey

Pre-radiation Treatment



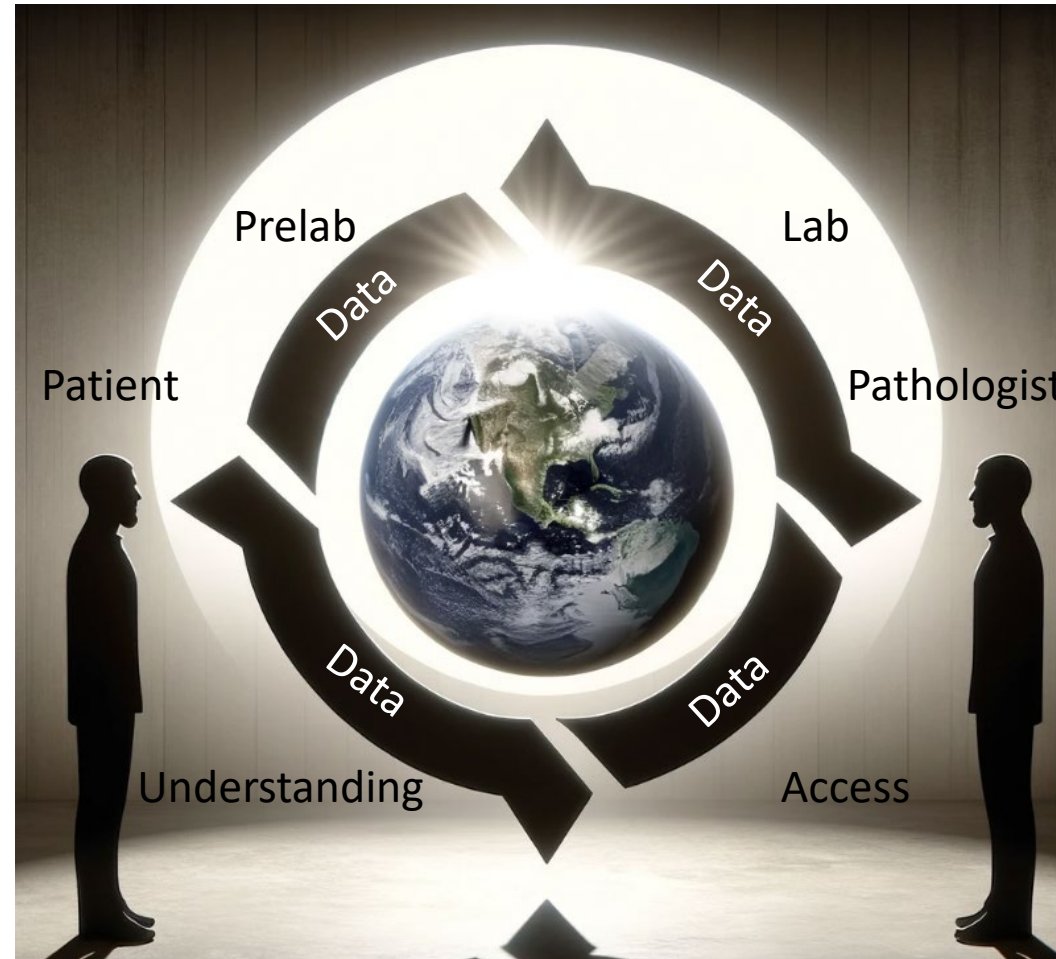
3,263 miles

Post-radiation Treatment



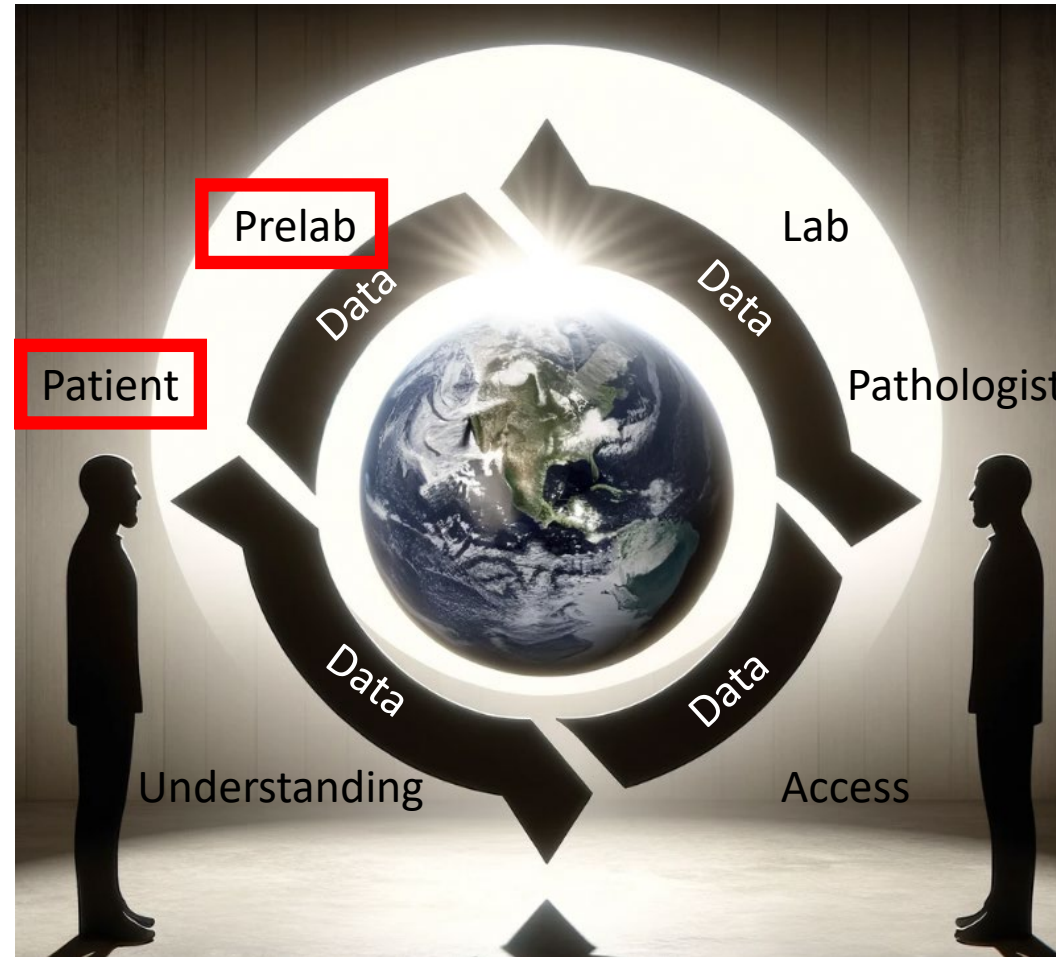


# Patient Centered Digital Pathology



# Patient Centered Digital Pathology

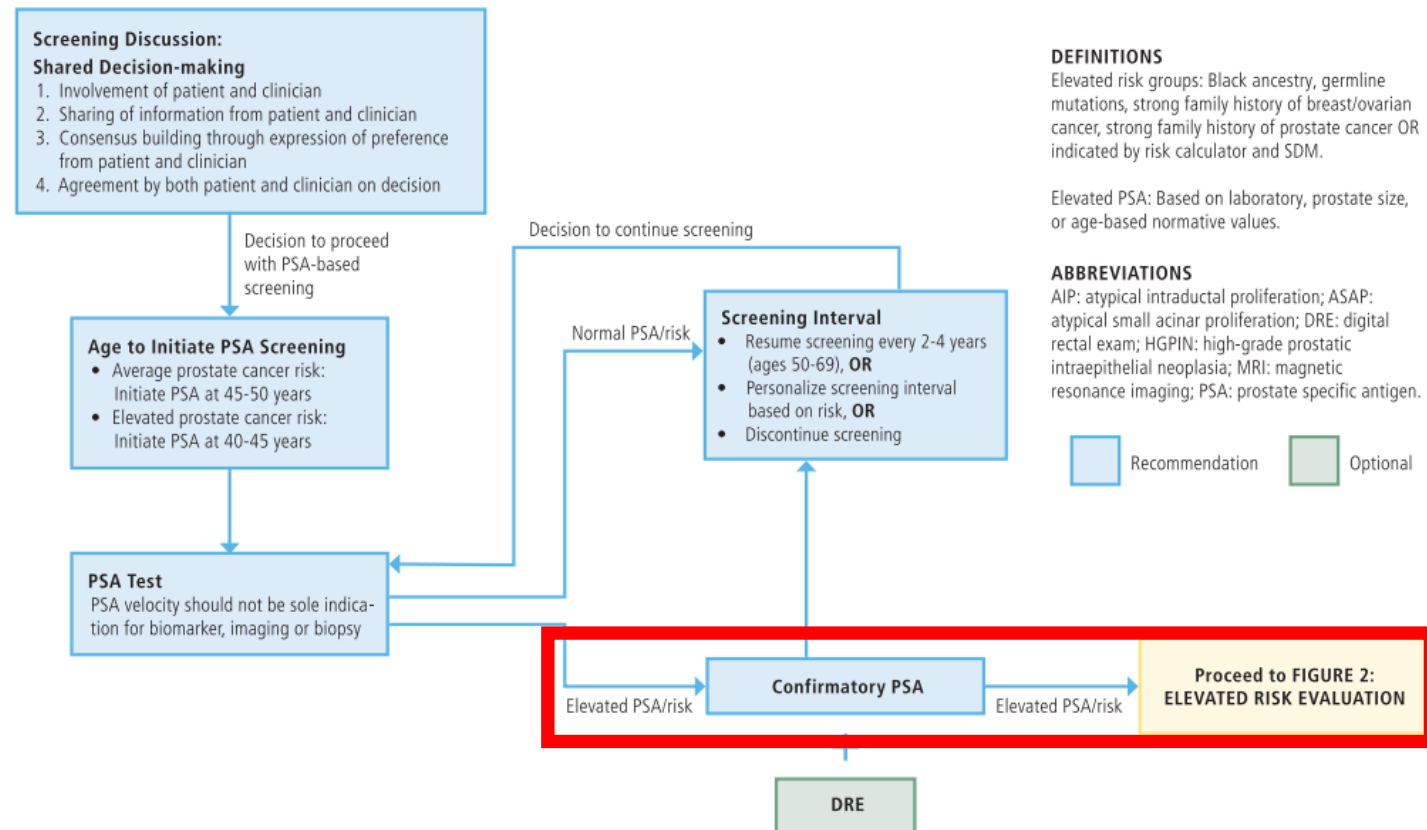
- 47-year-old male presents for routine healthcare.
  - Has increased family risk for cancer.
  - Undergoes PSA screening = elevated
  - Repeat PSA = elevated
  - MRI = PI-RADS 3



# Work-up for Prostate Cancer

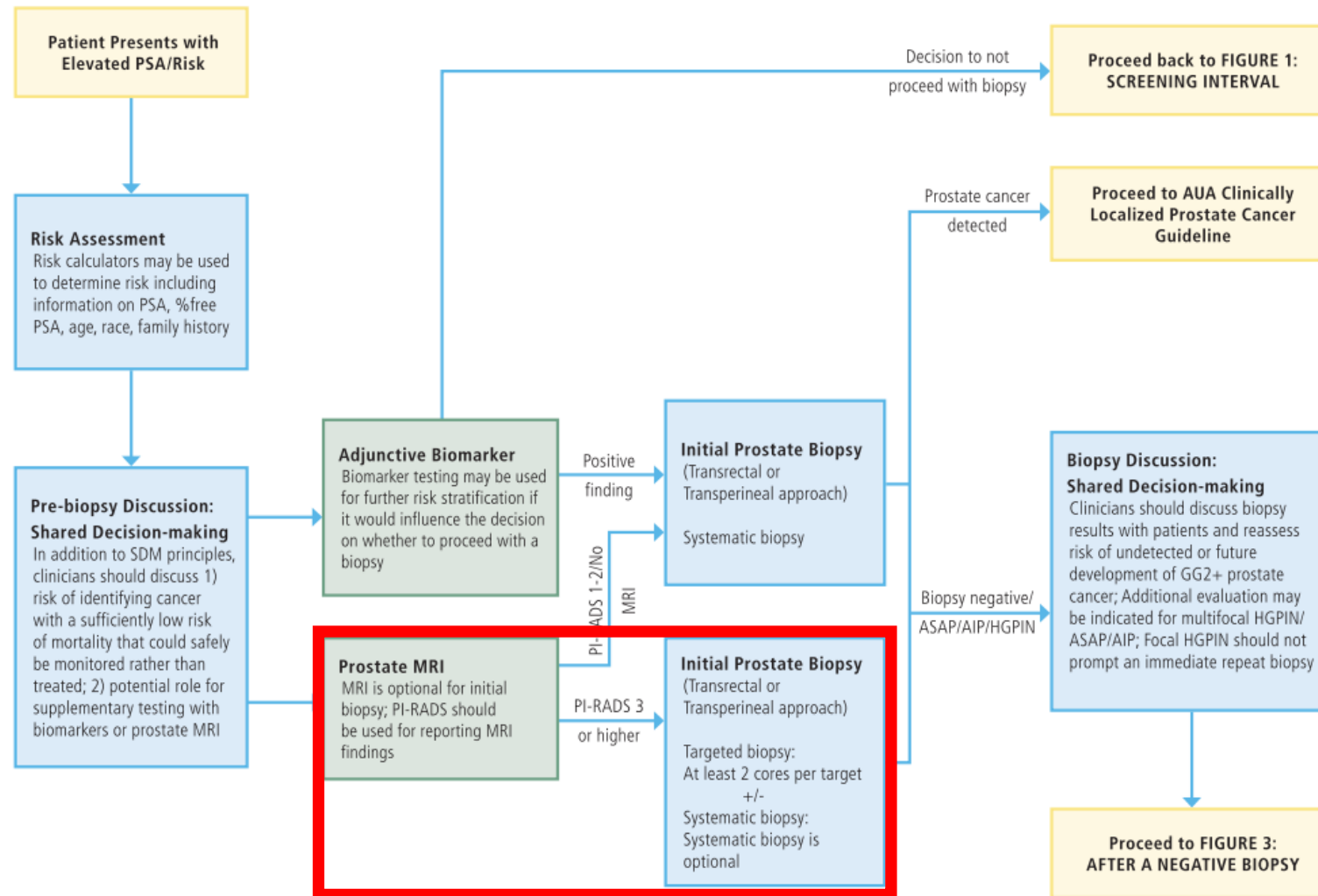
AUA/SUO

## Early Detection of Prostate Cancer Algorithm



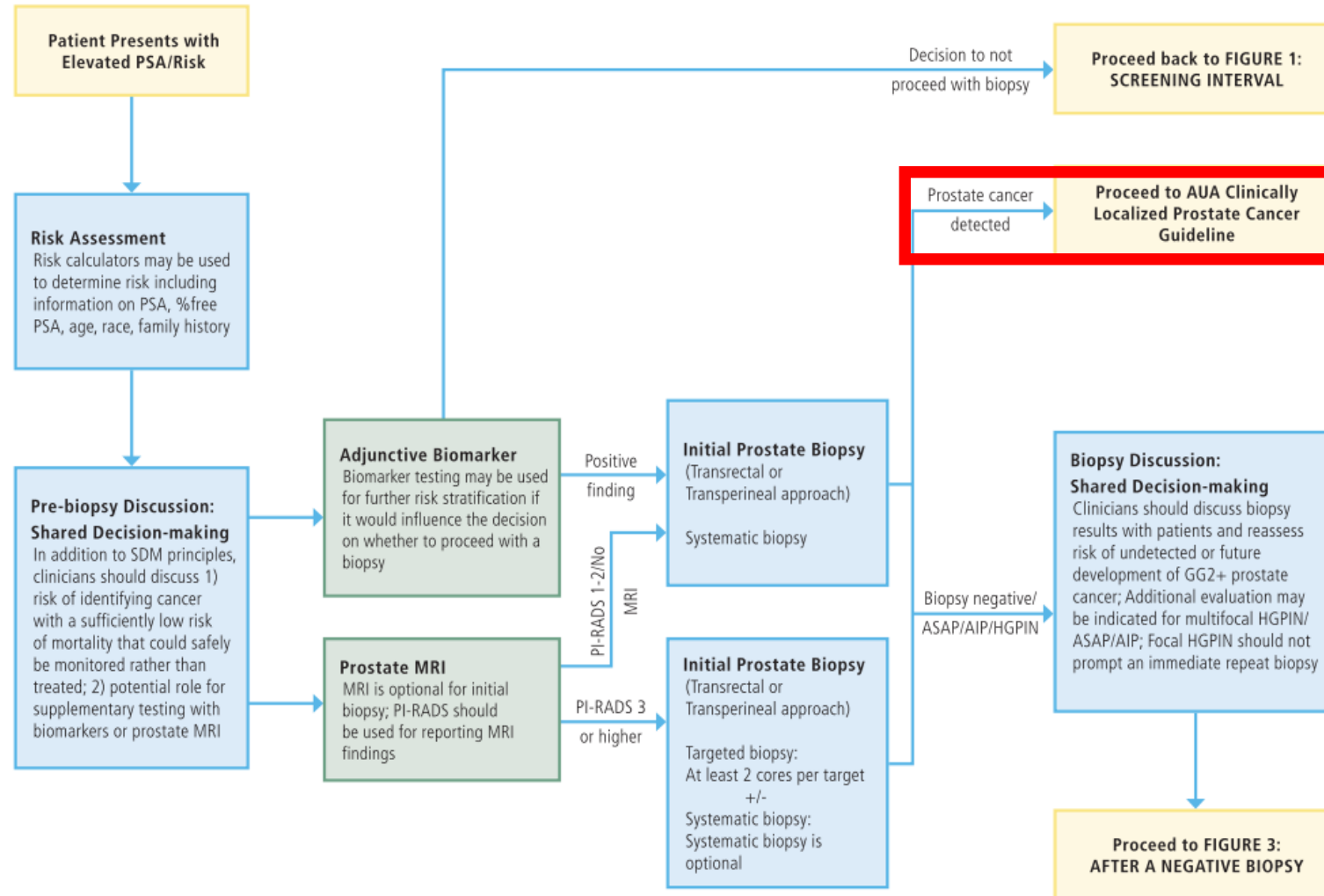
**Figure 1.** Initial screening for prostate cancer

# Work-up for Prostate Cancer



**Figure 2.** Elevated risk evaluation

# Work-up for Prostate Cancer



**Figure 2.** Elevated risk evaluation

# AUA Risk Groups for Prostate Cancer

**Table 3.** Risk Group Classification for Clinically Localized Prostate Cancer

Low-Risk	PSA <10 ng/mL AND Grade Group 1 AND clinical stage T1-T2a
Intermediate-Risk	PSA 10-<20 ng/mL OR Grade Group 2-3 OR clinical stage T2b-c <ul style="list-style-type: none"><li>· Favorable: Grade Group 1 with PSA 10-&lt;20 ng/mL or clinical stage T2b-c and &lt;50%* biopsy cores positive OR Grade Group 2 with PSA&lt;10 ng/mL and clinical stage T1-2a and &lt;50% biopsy cores positive</li><li>· Unfavorable: Grade Group 1 with PSA 10-&lt;20 ng/mL and clinical stage T2b-c OR Grade Group 2 with PSA 10-&lt;20 ng/mL and/or clinical stage T2b-c and/or ≥50%* biopsy cores positive OR Grade Group 3 with PSA &lt;20 ng/mL</li></ul>
High-Risk	PSA ≥20 ng/mL OR Grade Group 4-5 OR clinical stage T3

\* Percent biopsy cores positive is the total number of cores containing cancer divided by total number of cores obtained x 100. This is not the percentage of cancer within a positive core. Regarding assessment of the percent biopsy cores positive for risk stratification, the Panel acknowledges that with the increasing use of pre-biopsy magnetic resonance imaging (MRI) and subsequent targeted biopsies, multiple cores may be obtained from a targeted lesion. Multiple cores from the same lesion should be considered as a single core (ie, for the calculation of percentage cores positive in risk assessment). If all cores are negative, that is considered a single negative core. If one or more cores from the same lesion is positive, that is considered a single positive core, with the highest Gleason score used for risk stratification.



# NCCN Risk Groups for Prostate Cancer



National  
Comprehensive  
Cancer  
Network®

## NCCN Guidelines Version 4.2024 Prostate Cancer

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### INITIAL RISK STRATIFICATION AND STAGING WORKUP FOR CLINICALLY LOCALIZED DISEASE<sup>1</sup>

Risk Group	Clinical/Pathologic Features ( <a href="#">Staging, ST-1</a> )			Additional Evaluation <sup>f,m</sup>	Initial Therapy
Very low <sup>j</sup>	Has all of the following: • cT1c • Grade Group 1 • PSA <10 ng/mL • <3 prostate biopsy fragments/cores positive, ≤50% cancer in each fragment/core <sup>k</sup> • PSA density <0.15 ng/mL/g			• Confirmatory testing can be used to assess the appropriateness of active surveillance ( <a href="#">PROS-F 2 of 5</a> )	<a href="#">PROS-3</a>
Low <sup>j</sup>	Has all of the following but does not qualify for very low risk: • cT1–cT2a • Grade Group 1 • PSA <10 ng/mL			• Confirmatory testing can be used to assess the appropriateness of active surveillance ( <a href="#">PROS-F 2 of 5</a> )	<a href="#">PROS-4</a>
Intermediate <sup>j</sup>	Has all of the following: • No high-risk group features • No very-high-risk group features • Has one or more intermediate risk factors (IRFs): ▶ cT2b–cT2c ▶ Grade Group 2 or 3 ▶ PSA 10–20 ng/mL	Favorable intermediate	Has all of the following: • 1 IRF • Grade Group 1 or 2 • <50% biopsy cores positive (eg, <6 of 12 cores) <sup>l</sup>	• Confirmatory testing can be used to assess the appropriateness of active surveillance ( <a href="#">PROS-F 2 of 5</a> )	<a href="#">PROS-5</a>
		Unfavorable intermediate	Has one or more of the following: • 2 or 3 IRFs • Grade Group 3 • ≥ 50% biopsy cores positive (eg, ≥ 6 of 12 cores) <sup>l</sup>	Bone and soft tissue imaging <sup>g,h</sup> • If regional or distant metastases are found, see <a href="#">PROS-8</a> or <a href="#">PROS-13</a>	<a href="#">PROS-6</a>
High	Has no very-high-risk features and has exactly one high-risk feature: • cT3a OR • Grade Group 4 or Grade Group 5 OR • PSA >20 ng/mL			Bone and soft tissue imaging <sup>g,h</sup> • If regional or distant metastases are found, see <a href="#">PROS-8</a> or <a href="#">PROS-13</a>	<a href="#">PROS-7</a>
Very high	Has at least one of the following: • cT3b–cT4 • Primary Gleason pattern 5 • 2 or 3 high-risk features • >4 cores with Grade Group 4 or 5			Bone and soft tissue imaging <sup>g,h</sup> • If regional or distant metastases are found, see <a href="#">PROS-8</a> or <a href="#">PROS-13</a>	<a href="#">PROS-7</a>

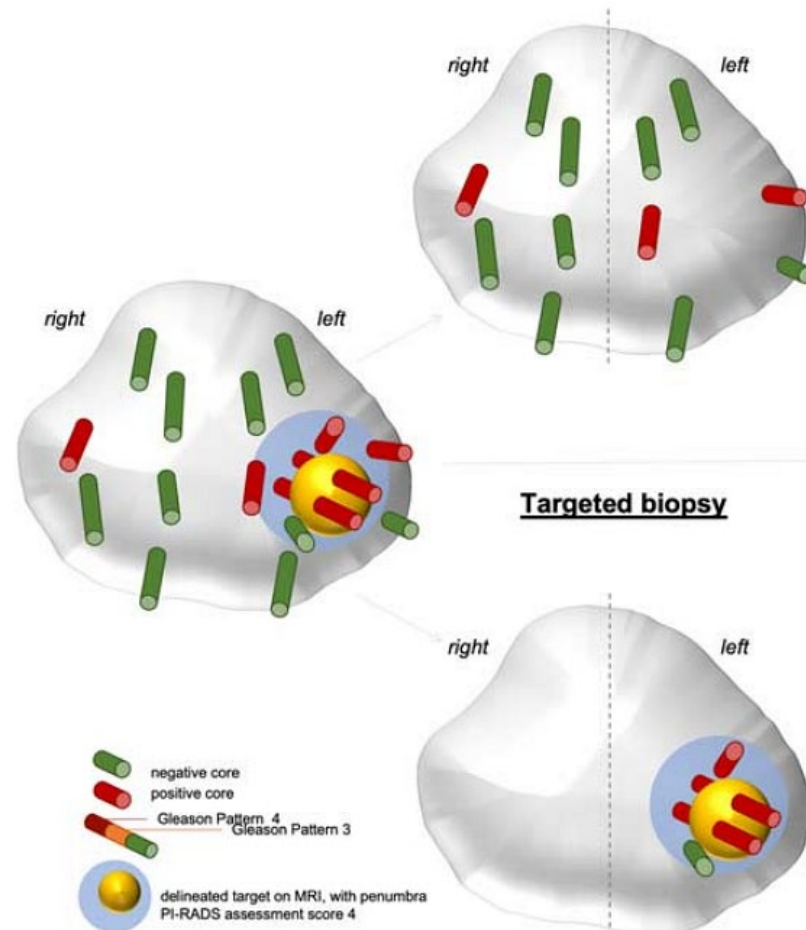
[Footnotes for Initial Risk Stratification and Staging Workup for Clinically Localized Disease \(PROS-2A\).](#)

**Note:** All recommendations are category 2A unless otherwise indicated.  
**Clinical Trials:** NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

# Prostate Biopsy

## Systematic + Targeted biopsy

## Systematic biopsy



# Assess Our Current Practice Prelab Prostate Biopsies

- We recommend packaging no more than two cores in each jar based on our assessment of the literature<sup>1</sup>.
- Single-core site specific labeled submission is ideal, but 2 core submission is also acceptable<sup>2</sup>.

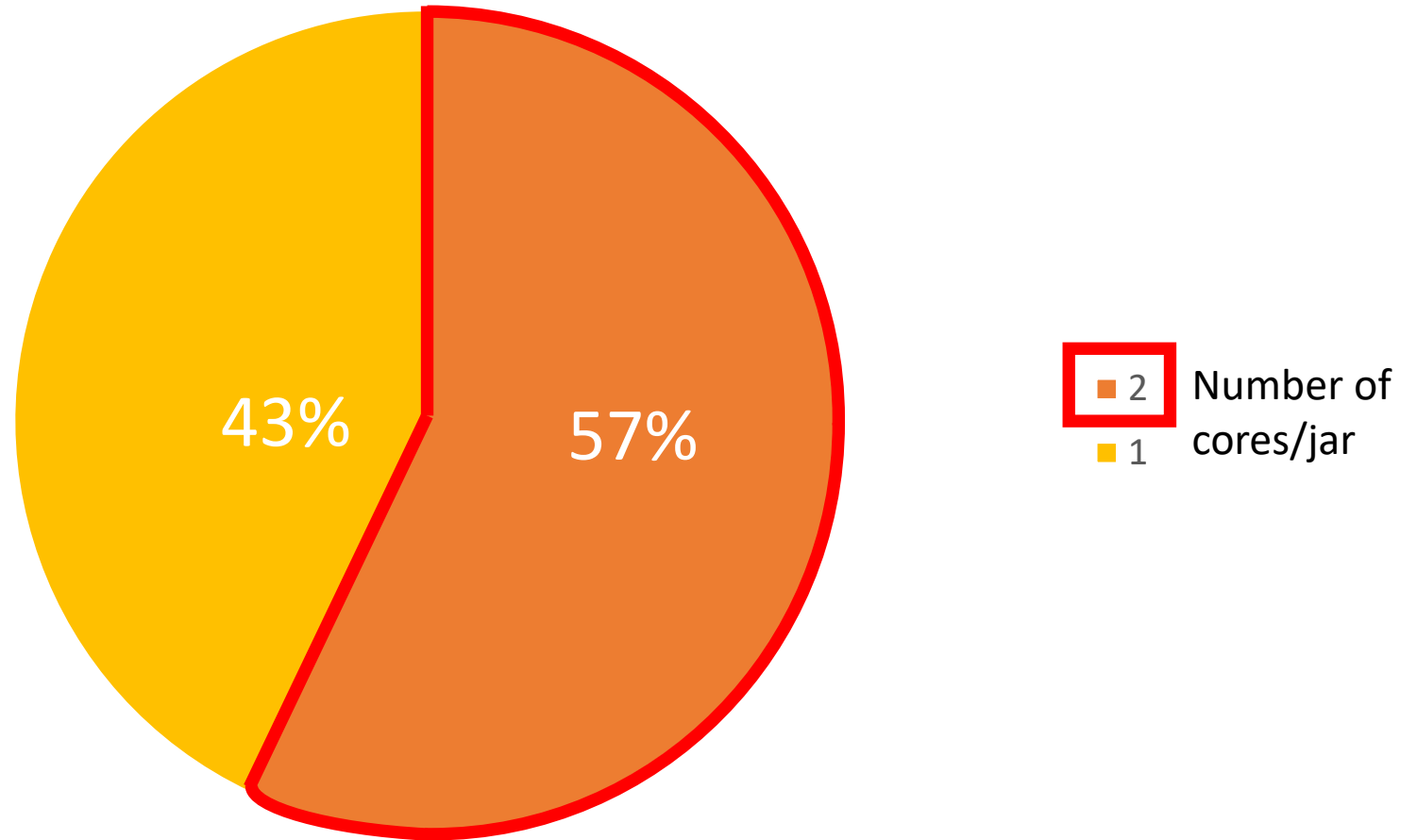
[1. Optimal Techniques of Prostate Biopsy and Specimen Handling - American Urological Association \(auanet.org\)](#)

[2. Prostate.Needle.Case.Bx 1.0.0.1.REL CAPCP.pdf](#)

# Assess Our Current Practice Prelab Prostate Biopsies

- 40.8% received cores in separate containers

# Assess Our Current Practice Prelab Prostate Biopsies



# Assess Our Current Practice Prelab Prostate Biopsies



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**NCCN Guidelines Version 4.2024**  
**Prostate Cancer**

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## INITIAL RISK STRATIFICATION AND STAGING WORKUP FOR CLINICALLY LOCALIZED DISEASE<sup>1</sup>

Risk Group	Clinical/Pathologic Features ( <a href="#">Staging, ST-1</a> )		Additional Evaluation <sup>f,m</sup>	Initial Therapy
	Has all of the following: • cT1c			
Intermediate <sup>j</sup>	Has all of the following: • No high-risk group features • No very-high-risk group features • Has one or more intermediate risk factors (IRFs): ▶ cT2b–cT2c ▶ Grade Group 2 or 3 ▶ PSA 10–20 ng/mL	Favorable intermediate	Has all of the following: • 1 IRF • Grade Group 1 or 2 • <50% biopsy cores positive (eg, <6 of 12 cores) <sup>l</sup>	• Confirmatory testing can be used to assess the appropriateness of active surveillance ( <a href="#">PROS-F 2 of 5</a> )  <a href="#">PROS-5</a>
		Unfavorable intermediate	Has one or more of the following: • 2 or 3 IRFs • Grade Group 3 • ≥ 50% biopsy cores positive (eg, ≥ 6 of 12 cores) <sup>l</sup>	Bone and soft tissue imaging <sup>g,h</sup> • If regional or distant metastases are found, see <a href="#">PROS-8</a> or <a href="#">PROS-13</a>  <a href="#">PROS-6</a>
High	Has no very-high-risk features and has exactly one high-risk feature: • cT3a OR • Grade Group 4 or Grade Group 5 OR • PSA >20 ng/mL		Bone and soft tissue imaging <sup>g,h</sup> • If regional or distant metastases are found, see <a href="#">PROS-8</a> or <a href="#">PROS-13</a>	<a href="#">PROS-7</a>
Very high	Has at least one of the following: • cT3b–cT4 • Primary Gleason pattern 5 • 2 or 3 high-risk features • >4 cores with Grade Group 4 or 5		Bone and soft tissue imaging <sup>g,h</sup> • If regional or distant metastases are found, see <a href="#">PROS-8</a> or <a href="#">PROS-13</a>	<a href="#">PROS-7</a>

18% of Patients could not be place into an NCCN Risk Group  
Two-Sample Independent *t* Test = P <0.05

[Footnotes for Initial Risk Stratification and Staging Workup for Clinically Localized Disease \(PROS-2A\).](#)

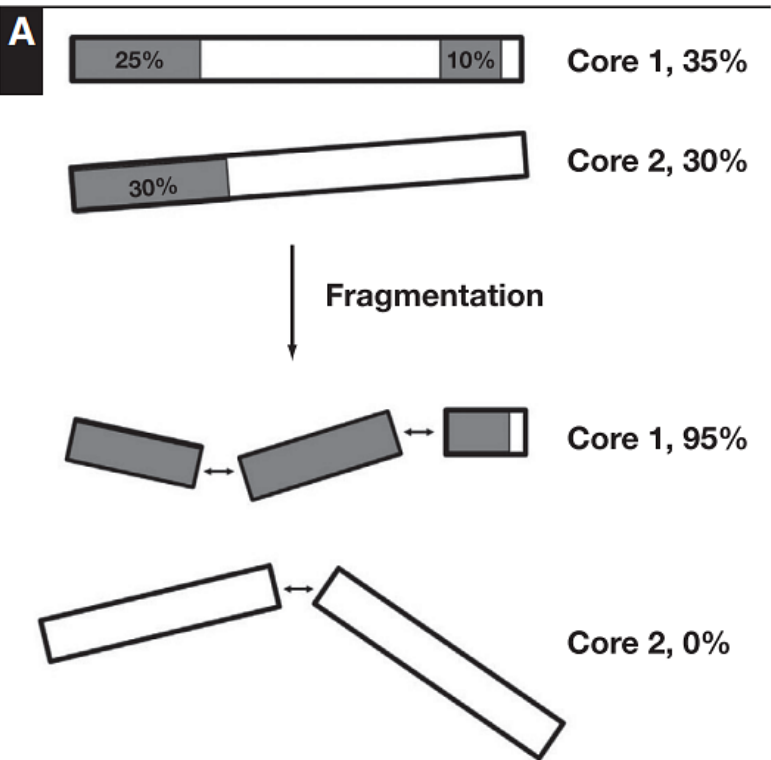
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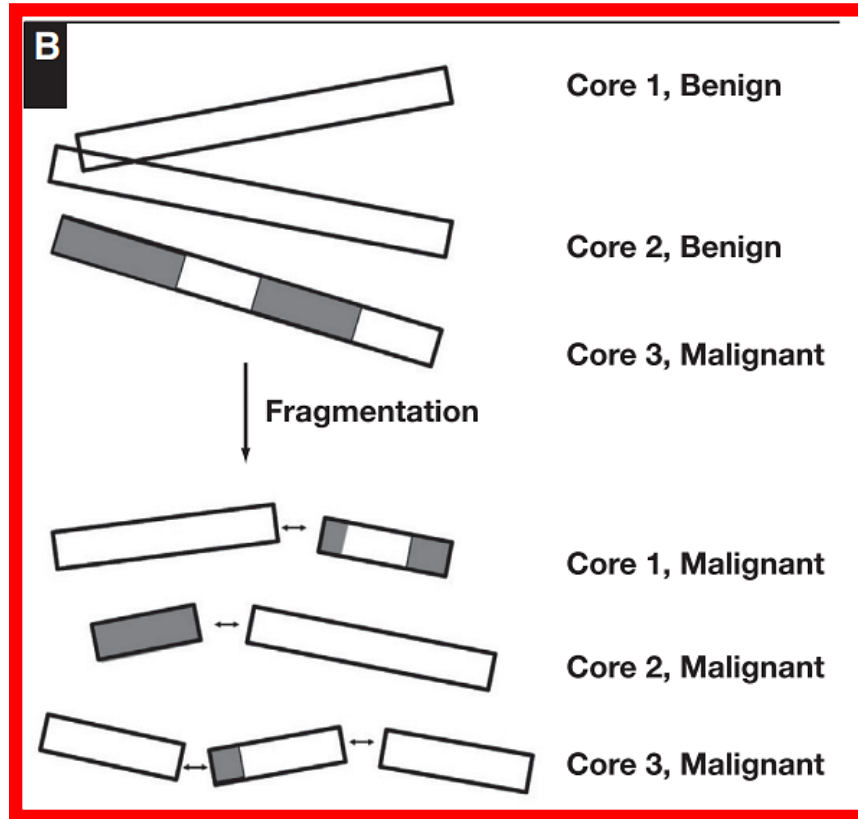
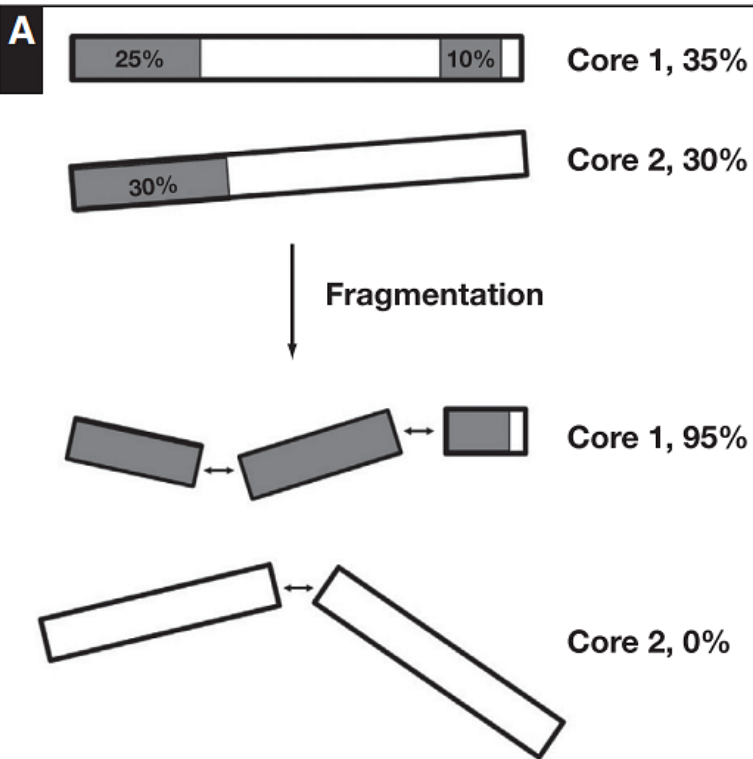
**PROS-2**



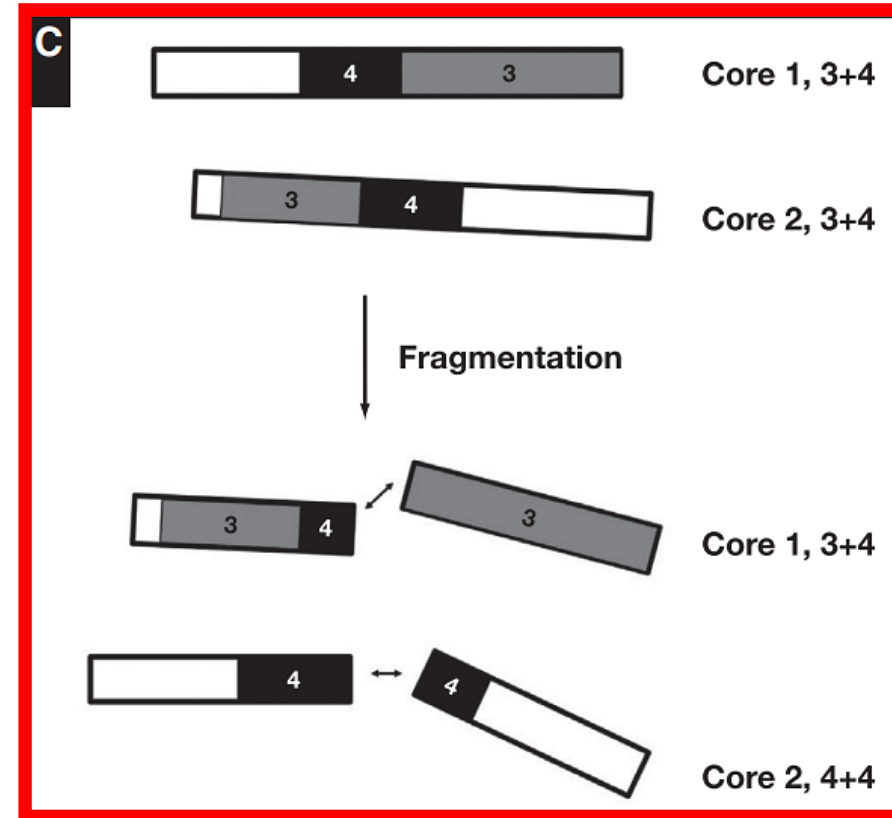
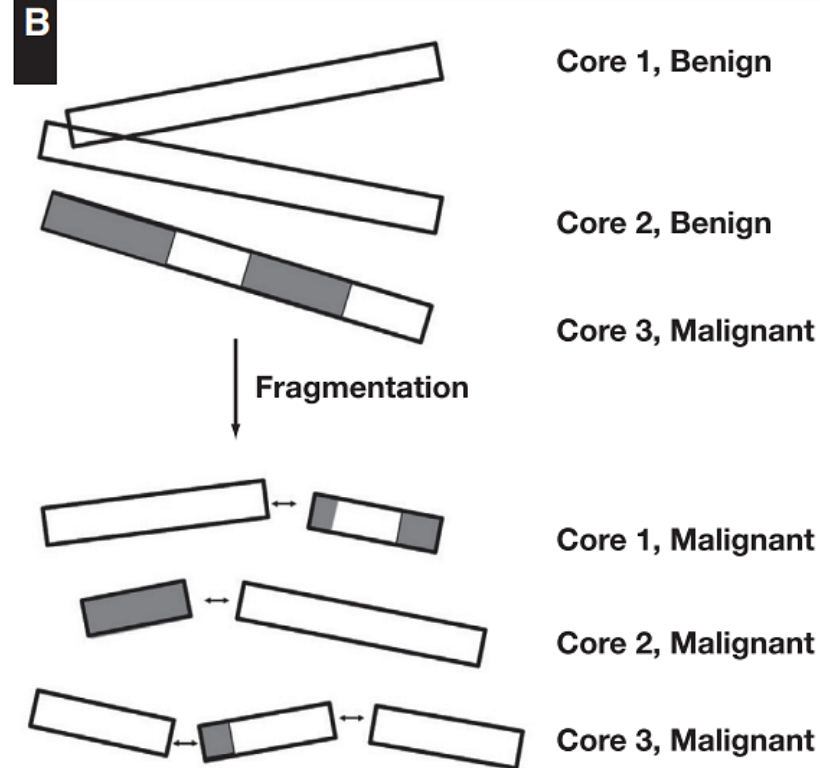
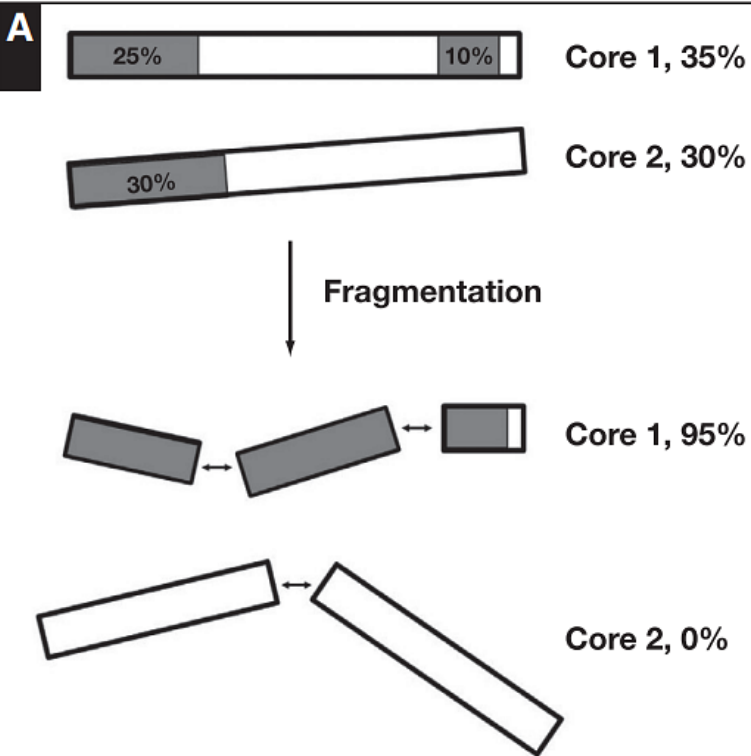
# Why?



# Why?



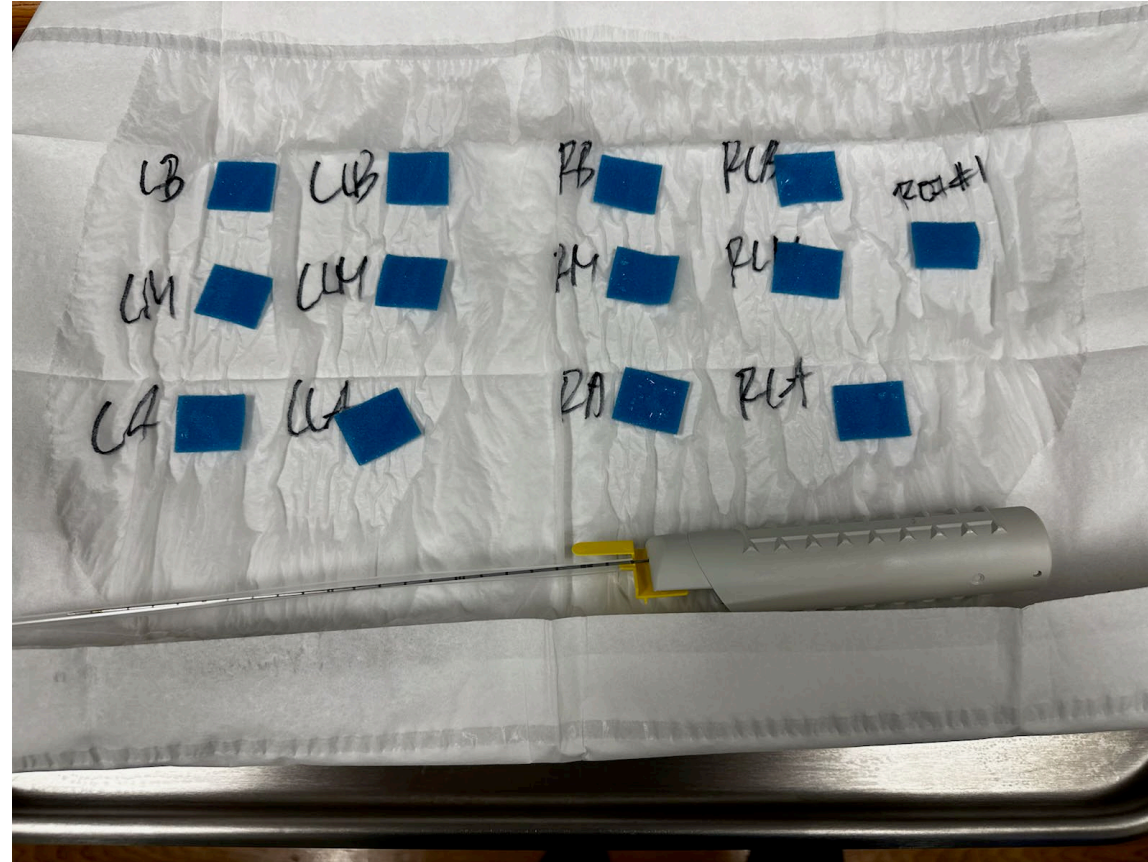
# Why?



# Assess Our Current Practice Prelab Prostate Biopsies

- Conventional PNB methods using 2 core submission/jar significantly limits the ability to place the patient into an NCCN risk group as compared to 1 core/jar.
- Therefore, the current guidelines may need to be updated.
- **We need to go to single core submission for our HealthSystem.**

# Assess Our Current Practice Prelab Prostate Biopsies



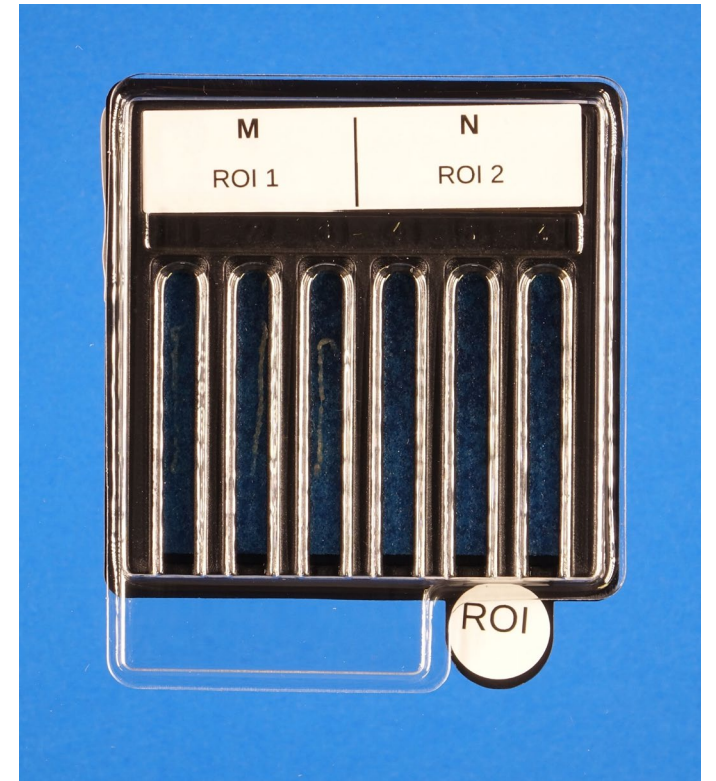
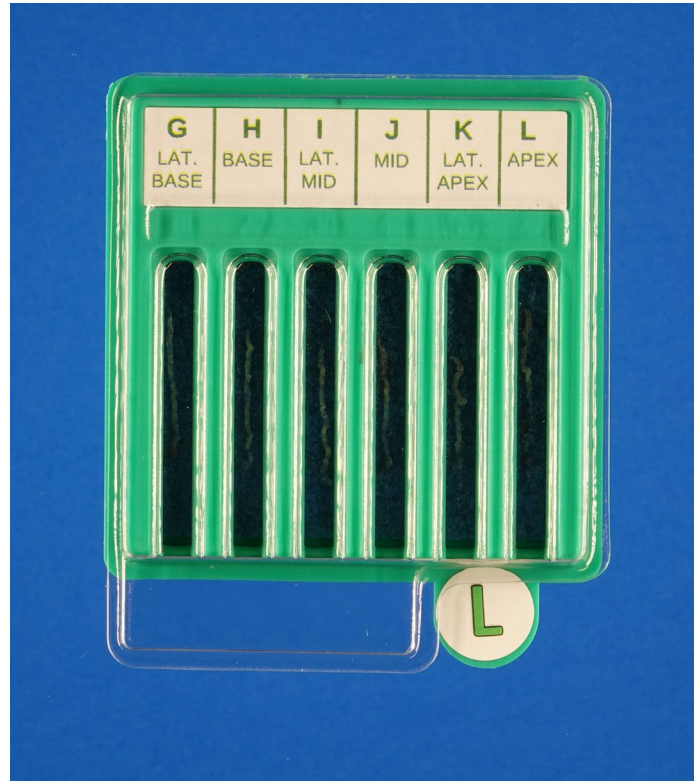
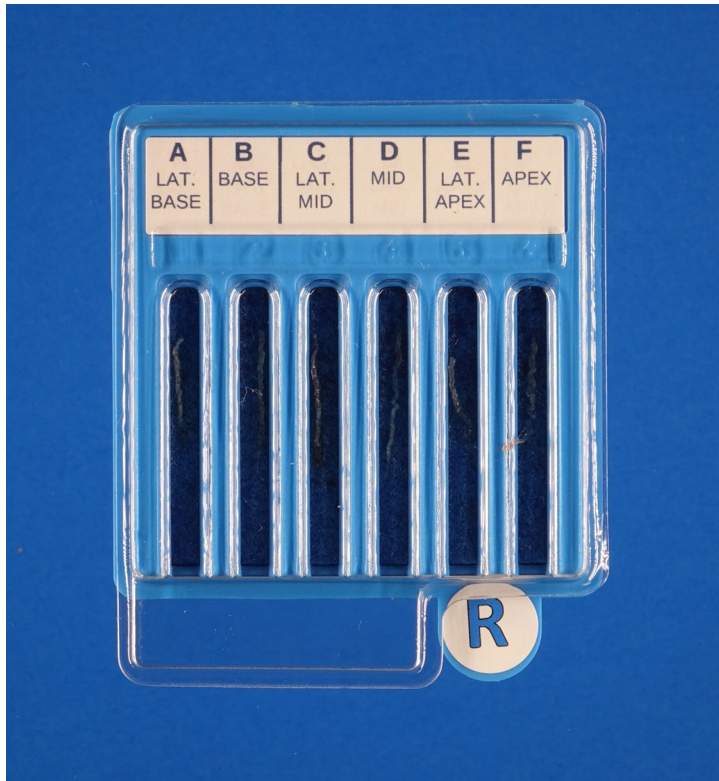
# Prostate Biopsy:

## Alternative collection methods

	Benign	HGPIN	ASAP	Cancer	Total core length	Total cancer length	Cores involved by cancer
Free floating in formalin	66%	5.6%	4.8%	23.6%	93.9 mm	8.6 mm	2.4
Oriented in-between two meshes in a cassette	61.6%	6.4%	1.2%	30.8%	126.5 mm	14.1 mm	2.9



# Assess Our Current Practice Prelab Prostate Biopsies

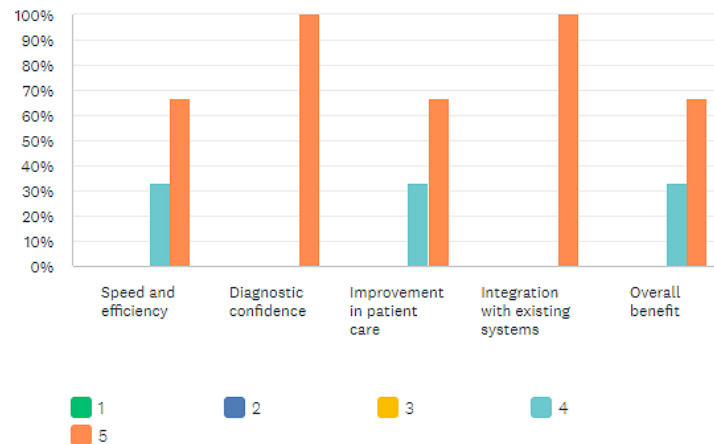


# Assess Our Current Practice Prelab Prostate Biopsies

## Urologists

Please rate the following aspects of the pathology product on a scale from 1 to 5, 1 extremely dissatisfied, 3 neutral and 5 extremely satisfied

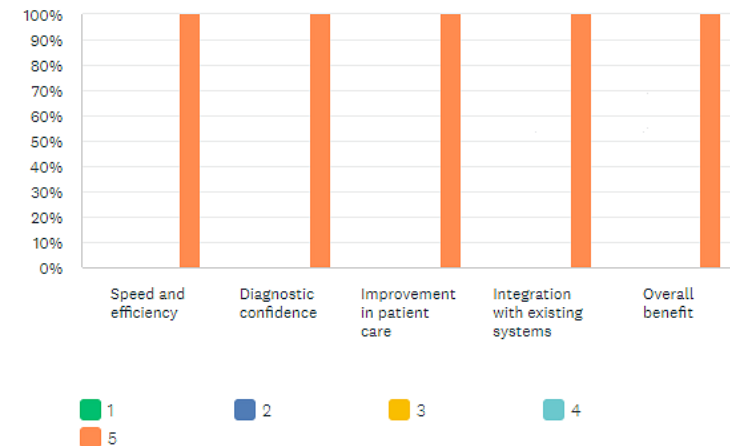
Answered: 3 Skipped: 0



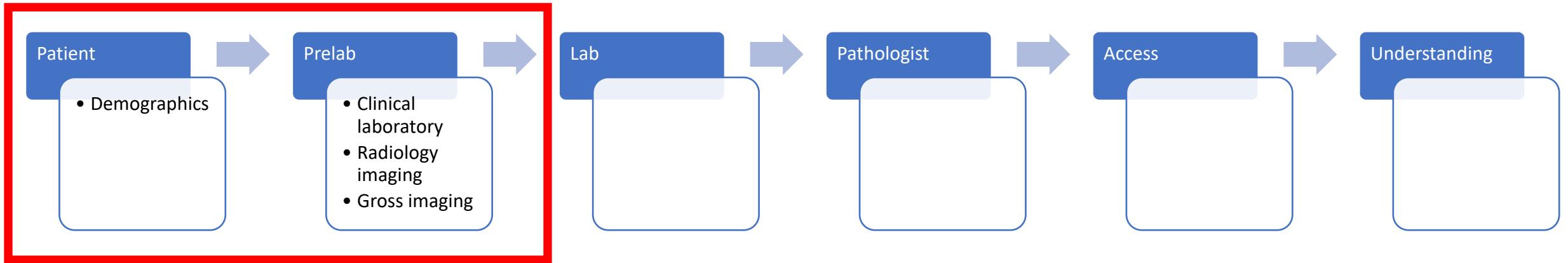
## Urology Medical Assistants

Please rate the following aspects of the pathology product on a scale from 1 to 5, 1 extremely dissatisfied, 3 neutral and 5 extremely satisfied

Answered: 2 Skipped: 0

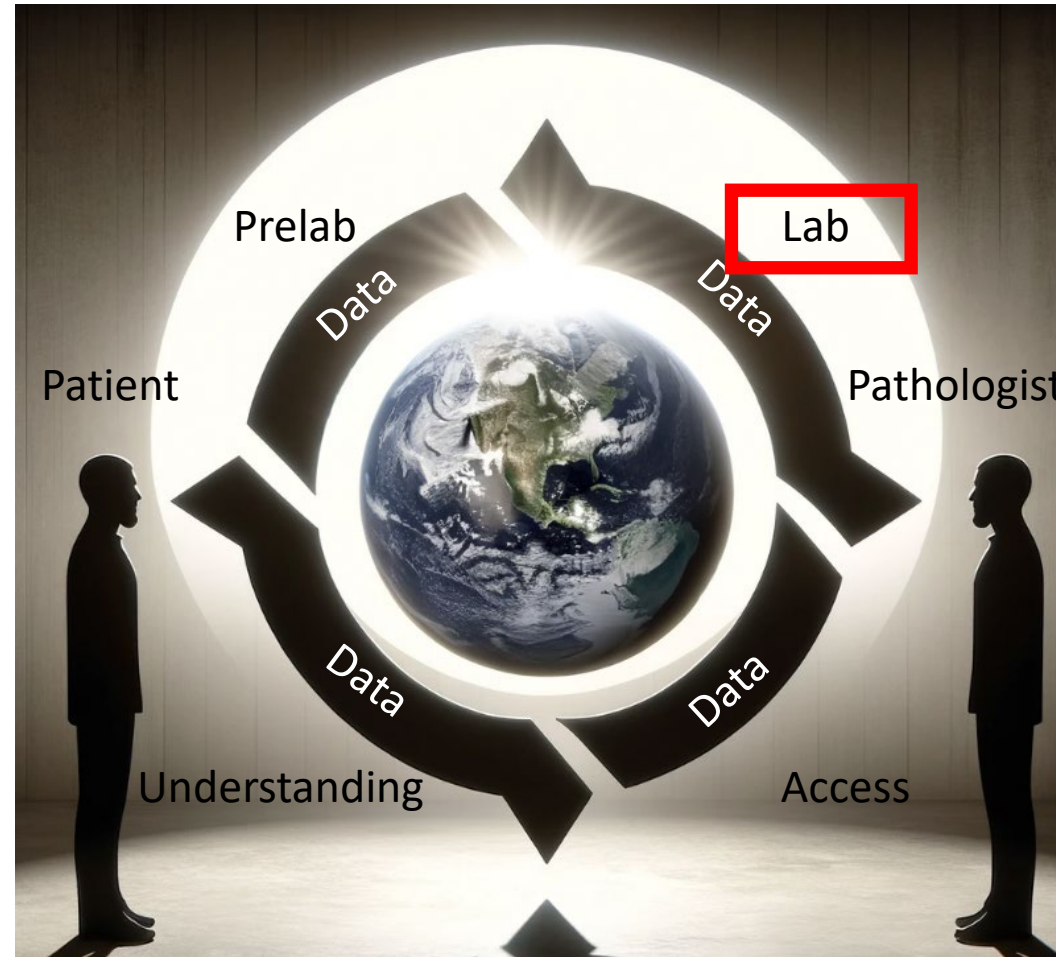


# Data Flow



# Patient Centered Digital Pathology

- 47-year-old male presents for routine healthcare.
  - Has increased family risk for cancer.
  - Undergoes PSA screening = elevated
  - Repeat PSA = elevated
  - MRI = PI-RADS 3





Eye





Eye

10 seconds

30 minutes





30 minutes Visible Light



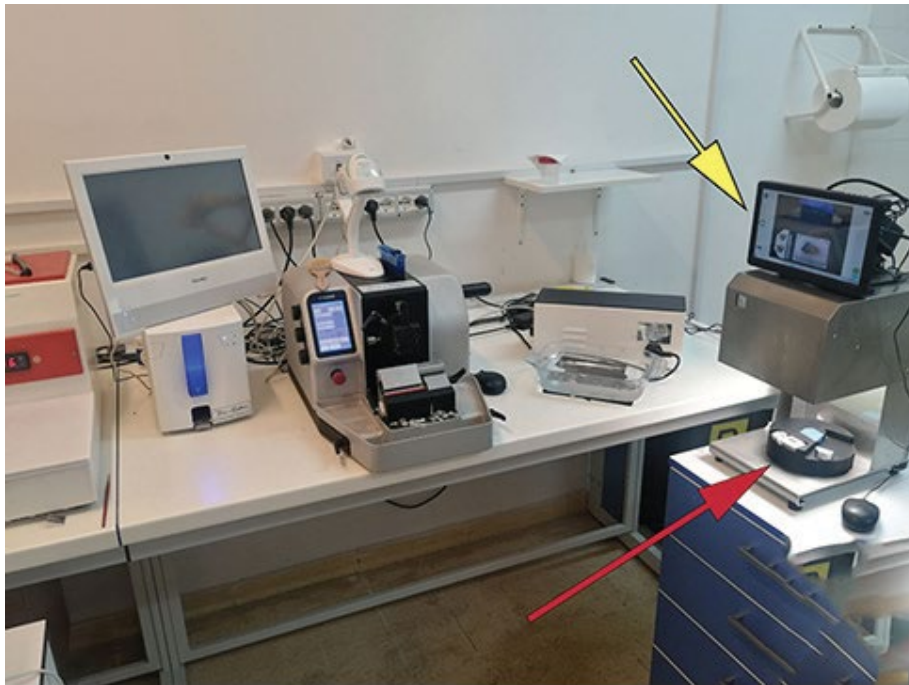
Infrared Light





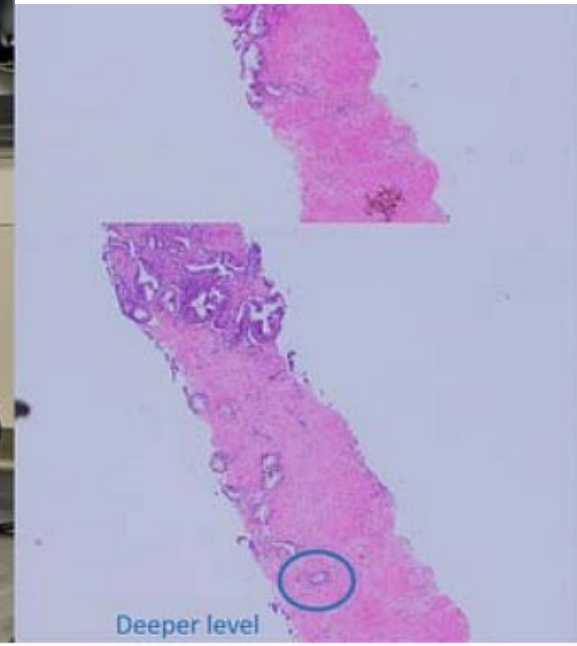
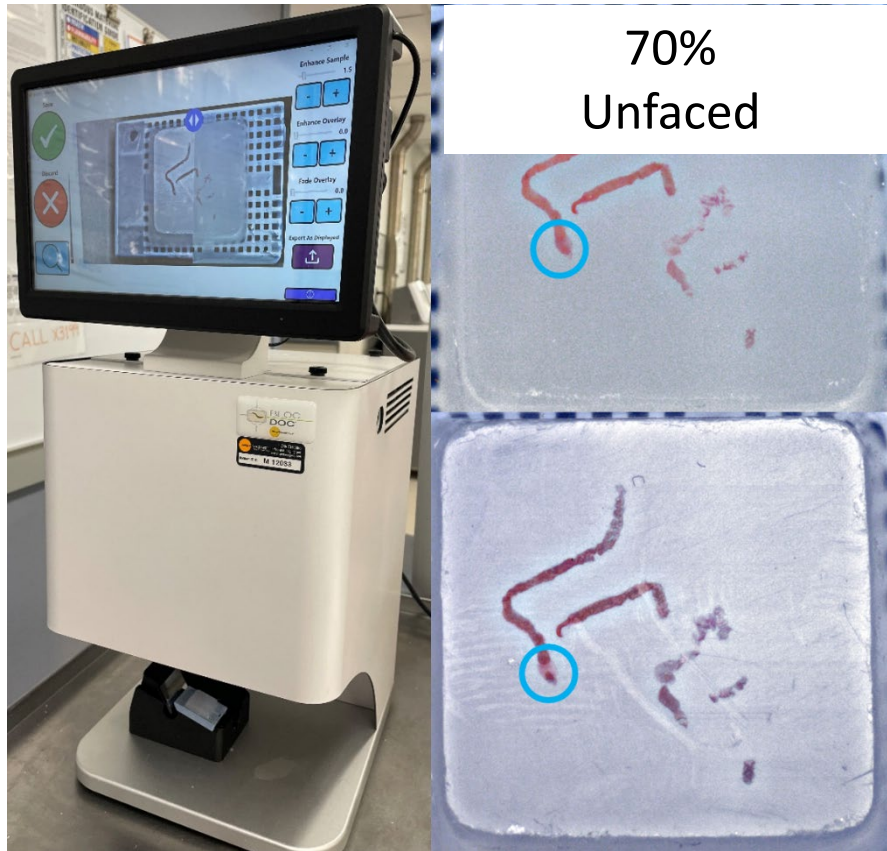


# Assess Our Current Practice Lab Histology



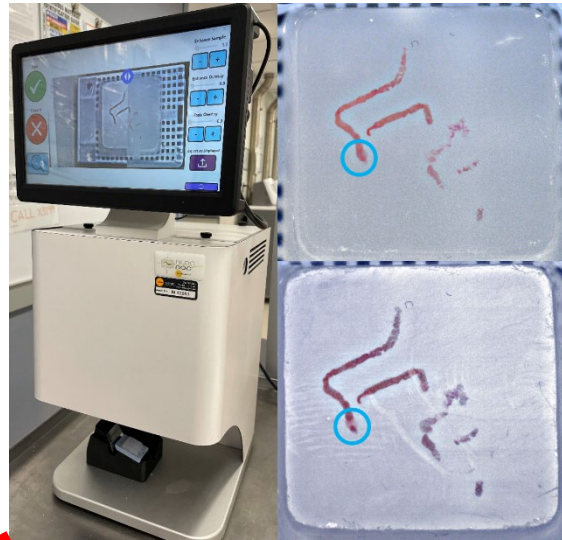


# Assess Our Current Practice Lab Histology



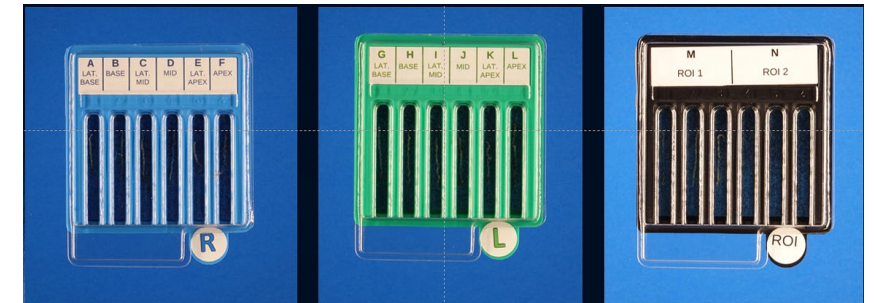
# Assess Our Current Practice Lab Histology

## Old Methods



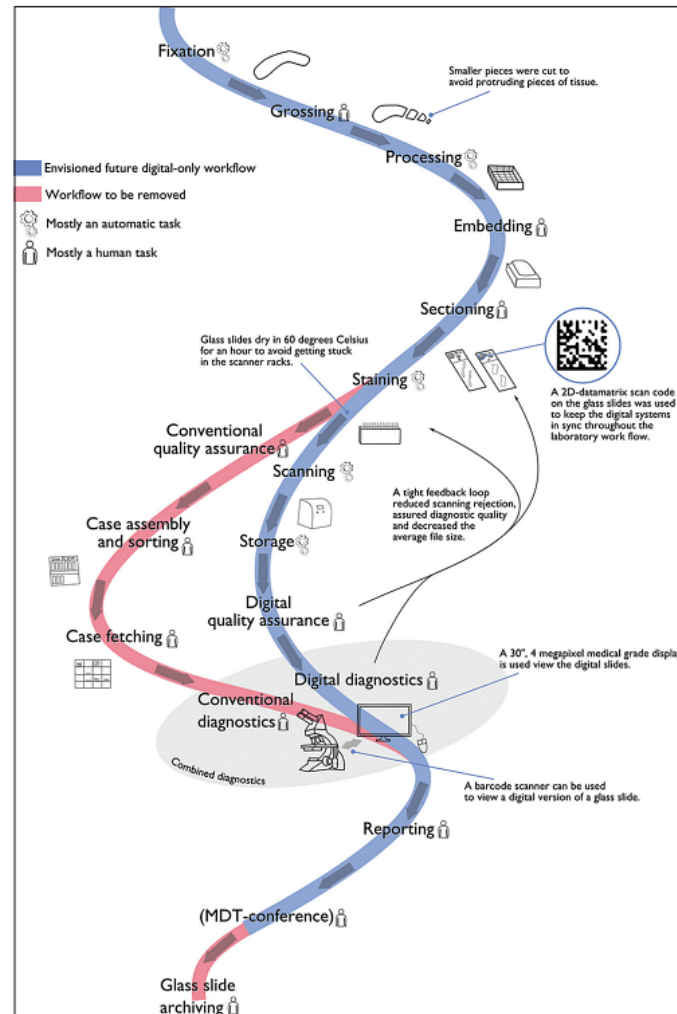
70% Unfaced → 23% Change in diagnosis

## New Method

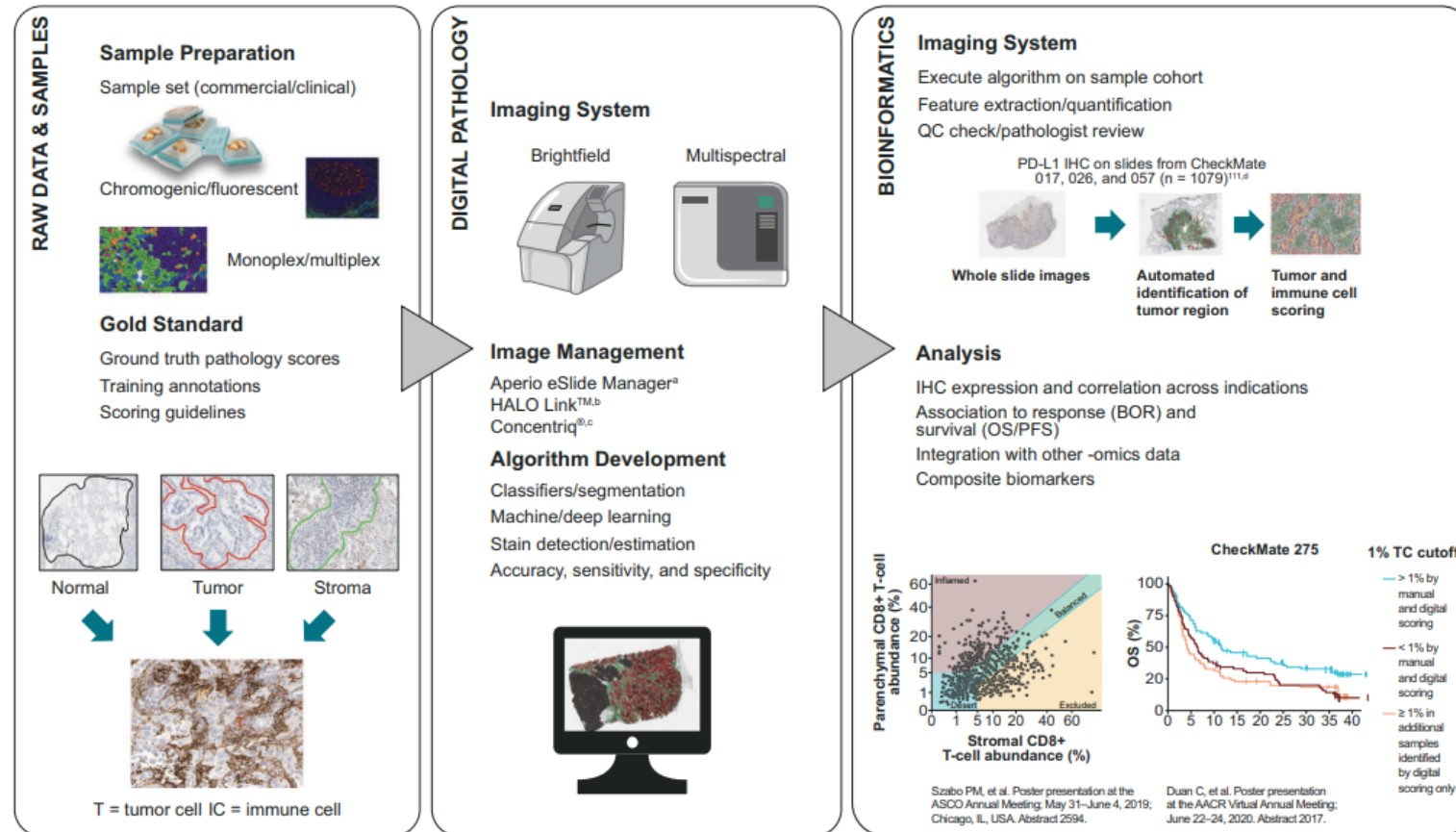


14% Unfaced → 0% Change in diagnosis

# Assess Our Current Practice Lab Whole Slide Imaging Scanning



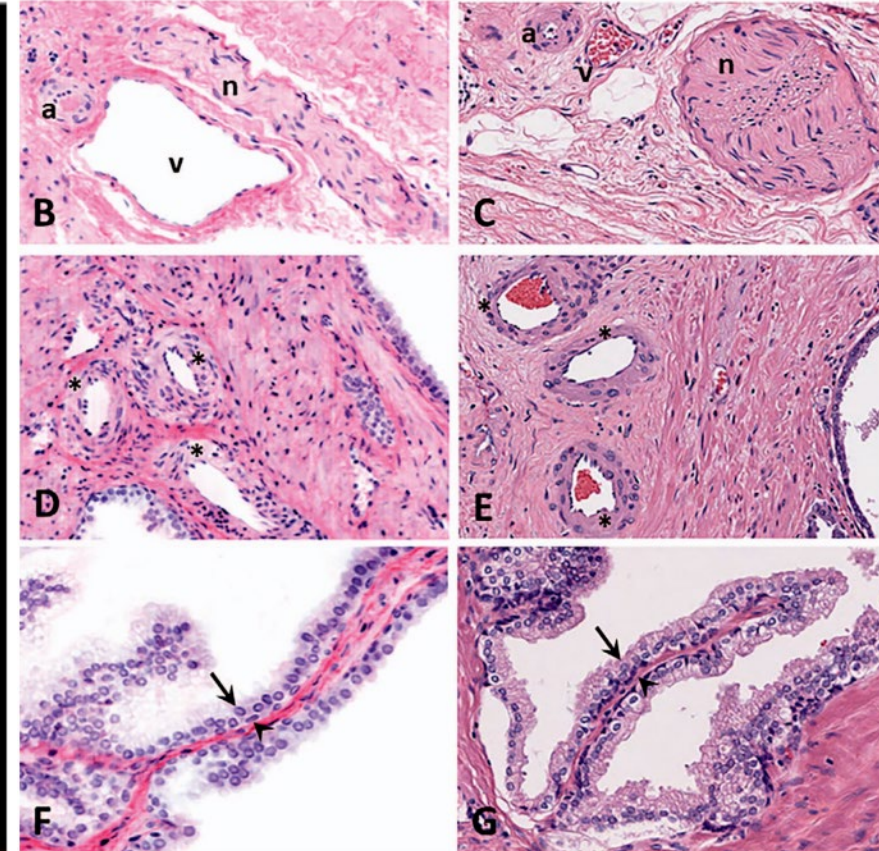
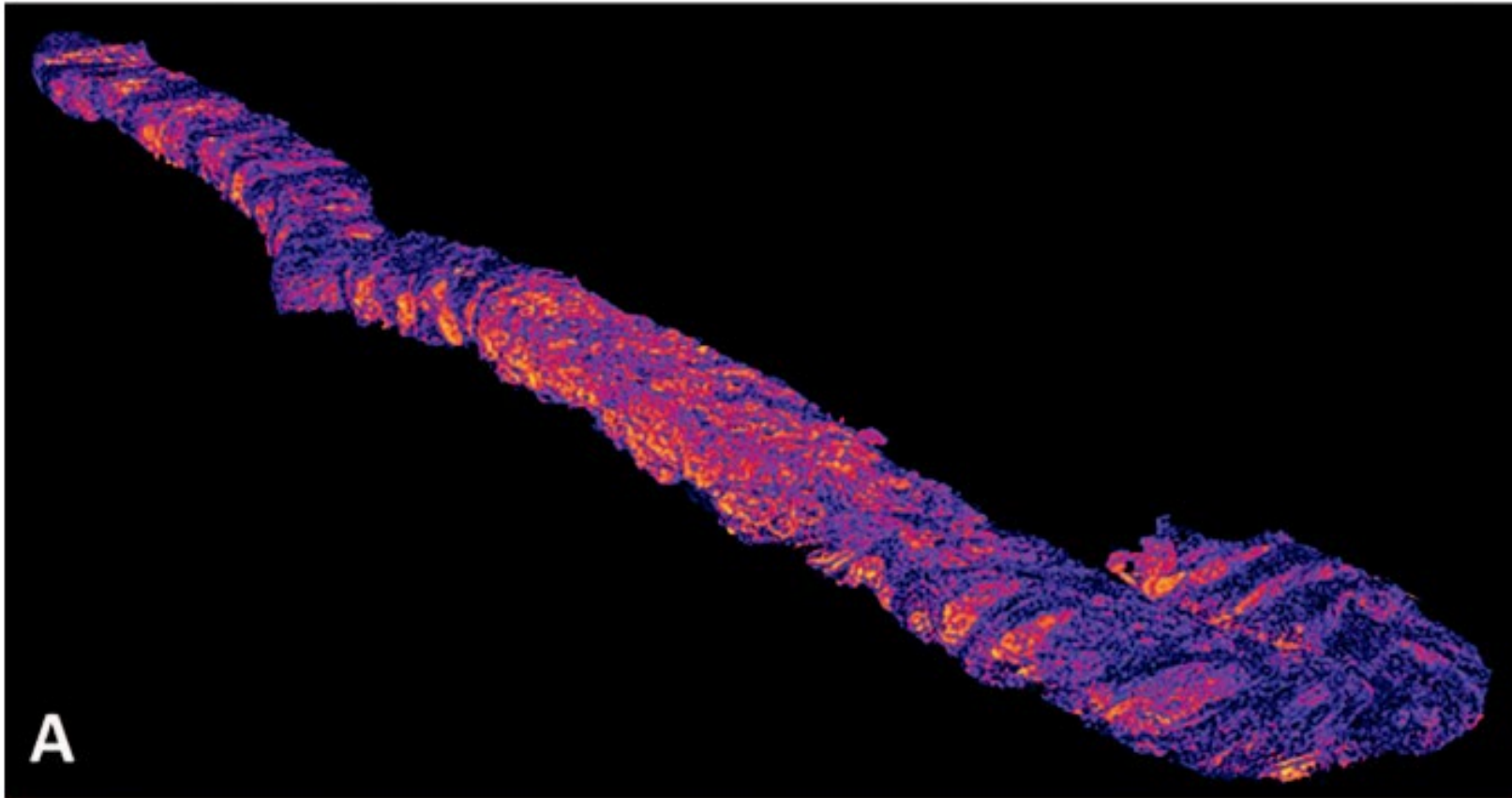
# Assess Our Current Practice Lab Artificial Intelligence



**Fig. 2 Digital prognostic pathology workflow.** BOR best overall response, IHC immunohistochemistry, OS overall survival, PFS progression-free survival, QC quality control. <sup>a</sup>Leica Biosystems; <sup>b</sup>Indica Labs; <sup>c</sup>Proscia; <sup>d</sup>PD-L1 IHC 28-8 pharmDx. Dako/Agilent Technologies.



# Assess Our Current Practice Lab Ex-vivo Slide free Alternatives

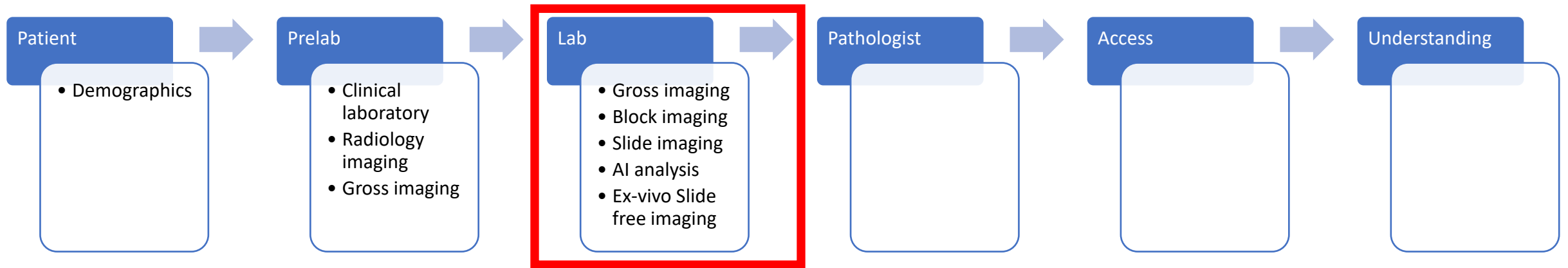


**Figure 1.** Open-top light-sheet microscopy (OTLS) images (from 3D pathology data sets) are labeled as A, B, D, and F, and hematoxylin-eosin (H&E) images (from conventional slide-based histology) are labeled as C, E, and G. A, Volumetric OTLS rendering of an entire prostate core needle biopsy. All other OTLS images are pseudocolored to mimic H&E staining. B and C, Neurovascular bundle with artery (a), vein (v), and nerve (n). D and E, Benign prostatic glands, stroma, and vasculature; arterioles are designated with asterisks. F and G, Benign prostatic glands with luminal epithelium (arrows) and basal epithelium (arrowheads) (original magnification  $\times 20$  [C, E, and G]).

Reder NP, et al. *Arch Pathol Lab Med.* 2019;143:1069–1075

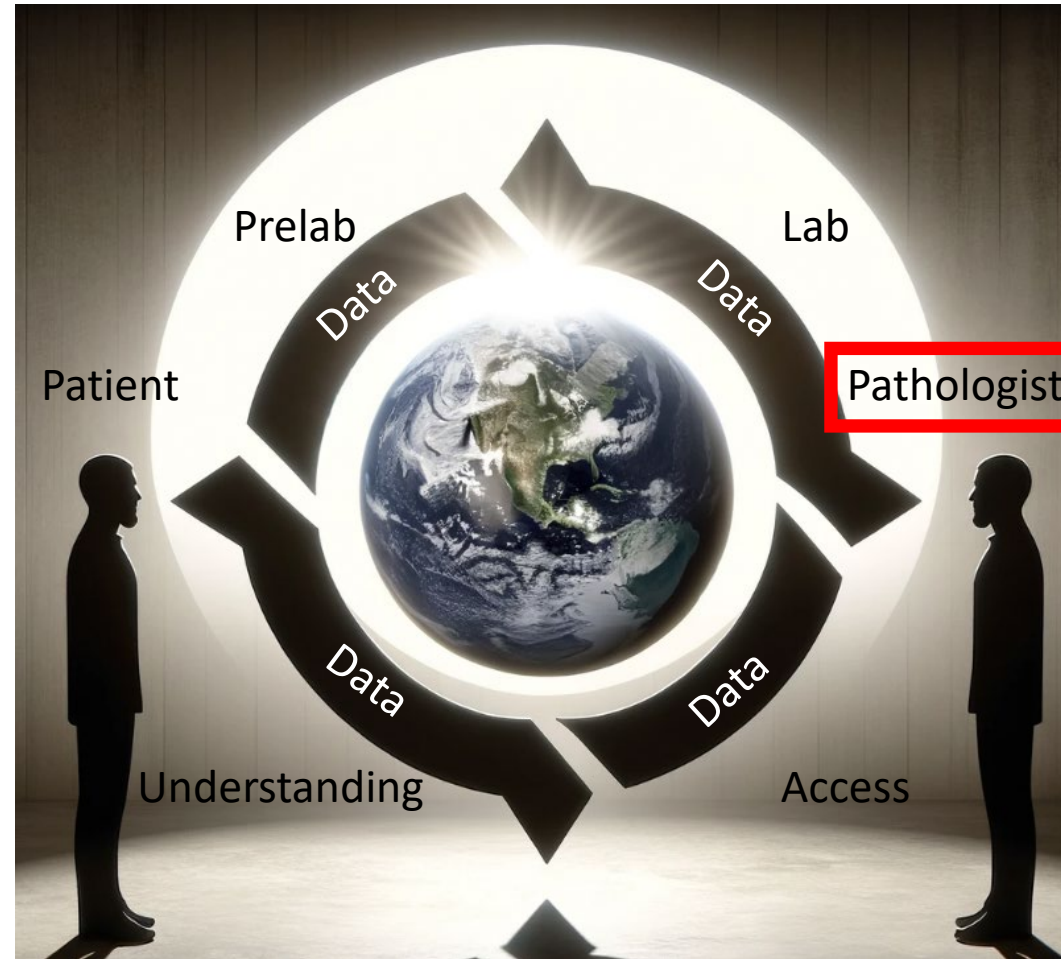


# Data Flow



# Patient Centered Digital Pathology

- 47-year-old male presents for routine healthcare.
  - Has increased family risk for cancer.
  - Undergoes PSA screening = elevated
  - Repeat PSA = elevated
  - MRI = PI-RADS 3



Question(s)?

$$5+5 = ?$$

Question(s)?

$$5+5 = 10$$

# Question(s)?

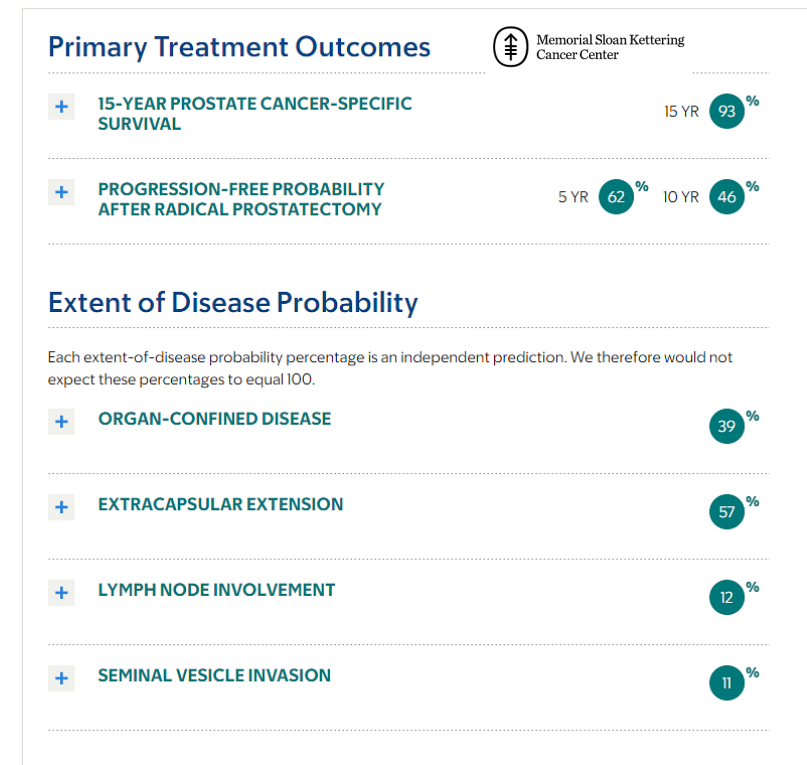
$$5+5 = 10$$

5+5 = 10 = Grade Group 5 Prostate Adenocarcinoma

# Question(s)?

$$5+5 = 10$$

5+5 = 10 = Grade Group 5 Prostate Adenocarcinoma =



# Question(s)?

$$5+5 = 10 =$$



# Assess Our Current Practice Pathologist Narrative Reporting

**Table 1. Reports from July 2000**

<b>Report Type</b>	<b>Number of Reports</b>	<b>Number of Sentences</b>
Progress notes (PN)	13,888	229700
Chest X-ray (CXR)	6,645	34489
Emergency department (ER)	4,533	193205
Surgical pathology (SP)	3,906	64265
Operative notes (OP)	3,376	80936
History & physical exams (HP)	3,260	150581
Computed tomography (CT)	2,597	29041
Discharge summaries (DS)	2,360	53701
Magnetic resonance imaging (MRI)	1,132	10480
Mammography (MAM)	463	2271
Total	42,160	848,669

- 60 negation phrases with just 7 of the phrases accounting for 90% of the negations
- Between 39% and 83% of all clinical observations were identified as absent



# Assess Our Current Practice Pathologist Narrative Reporting

**Table 2. Most Frequently Used Negation Phrases**

	ER	PN	HP	DS	CXR	CT	OP	SP	MAM	MRI
no (n=62436)	51.2%	52.9%	52.7%	41.7%	63.2%	55.0%	39.7%	50.4%	63.2%	43.4%
denies (n=17845)	21.0%	13.2%	16.4%	4.9%			1.1%	0.1%		
without (n=9538)	5.6%	11.1%	8.6%	9.3%	0.6%	6.1%	6.0%	4.1%	13.3%	2.2%
not (n=7591)	4.9%	7.6%	5.8%	8.9%	1.3%	1.0%	15.8%	16.4%	0.3%	3.7%
no evidence (n=5488)	3.0%	2.9%	2.5%	5.2%	26.7%	23.4%	16.9%	5.6%	13.6%	29.5%
with no (n=3009)	2.2%	2.1%	2.2%	4.6%	3.5%	3.4%	4.4%	6.8%	0.6%	
negative for (n=2979)	4.1%	0.7%	2.5%	3.5%		0.1%	0.4%	1.6%		3.2%
denied (n=1576)	1.4%	0.7%	1.2%	4.8%			0.6%	0.3%		
to rule out (n=932)	0.6%	0.5%	0.8%	2.4%	0.1%	0.0%	3.1%	1.3%		
no significant (n=820)	0.7%	0.6%	0.5%	0.9%	0.1%	1.2%	1.1%	2.2%		5.7%
w/o evidence (n=397)	0.2%	0.2%	0.1%	0.5%	0.6%	3.8%	1.2%	0.2%		3.2%
no new (n=368)	0.1%	0.4%	0.4%	0.2%	0.3%	1.6%	0.1%		3.1%	
no abnormal (n=105)	0.0%	0.1%	0.1%	0.0%		1.2%	0.0%	0.1%		2.1%
no suspicious (n=55)		0.1%	0.0%	0.0%		0.1%		0.1%	5.3%	2.5%

\* Cells represent the percentage of negations in the report type triggered by the negation phrase. For example, 51.2% of all negations in ER reports were triggered by “no.” Empty cells indicate the negation phrase did not trigger in the report type.

# Assess Our Current Practice Pathologist Narrative Reporting

## **Just Say No to the Use of No**

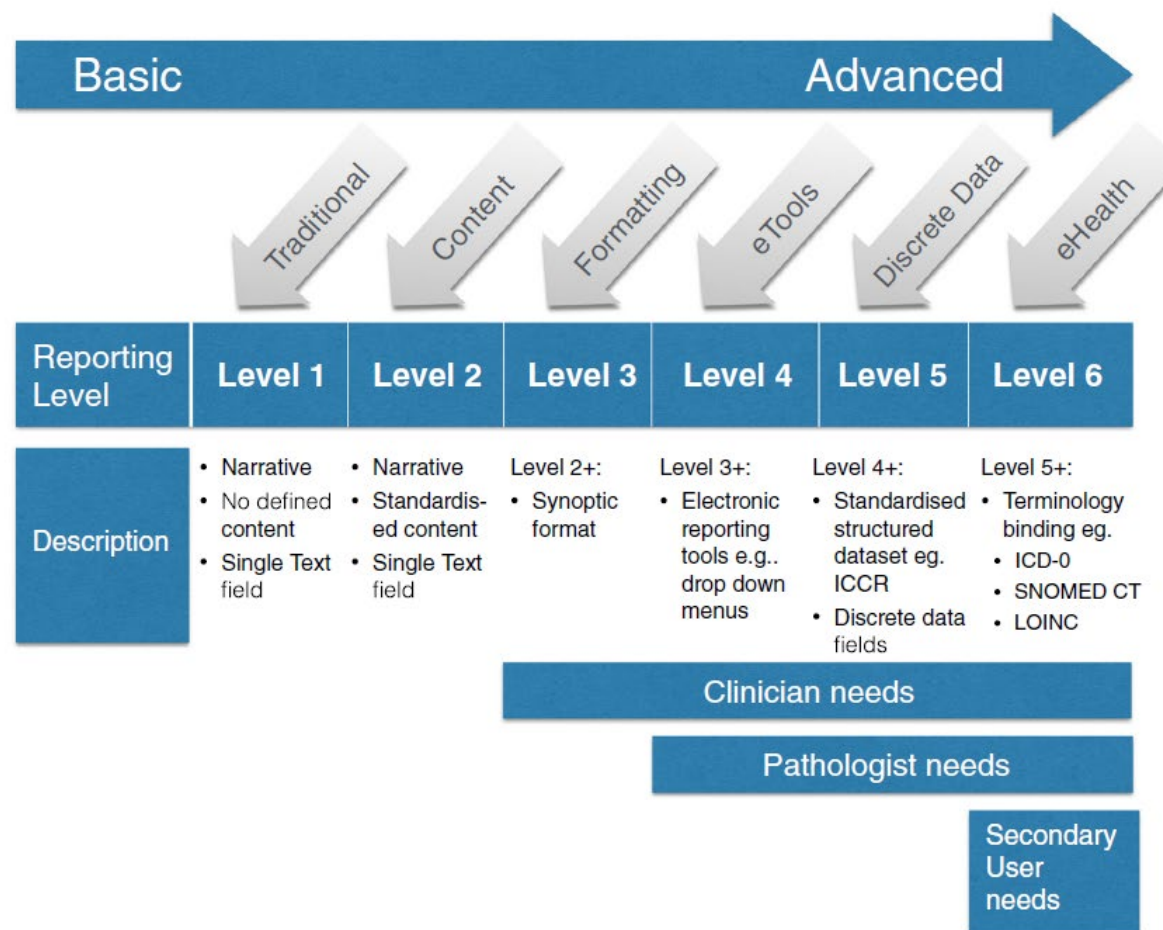
### **Alternative Terminology for Improving Anatomic Pathology Reports**

*Megan A. Renshaw; Edwin W. Gould, MD; Andrew Renshaw, MD*

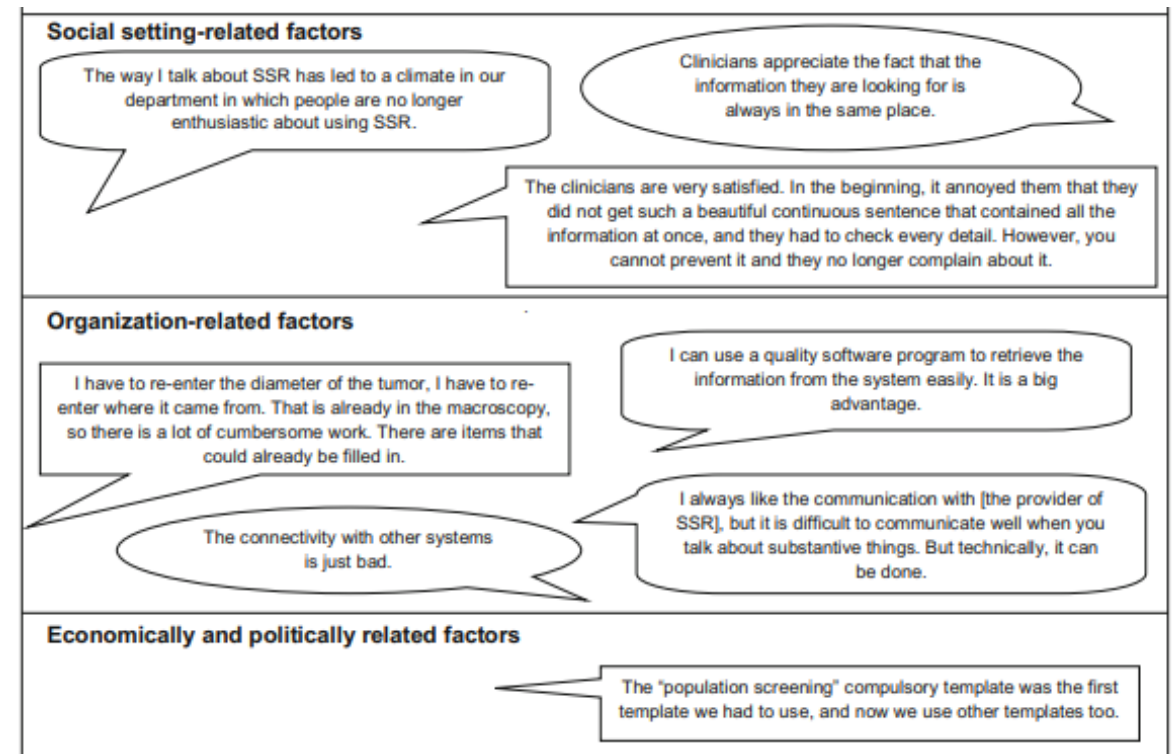
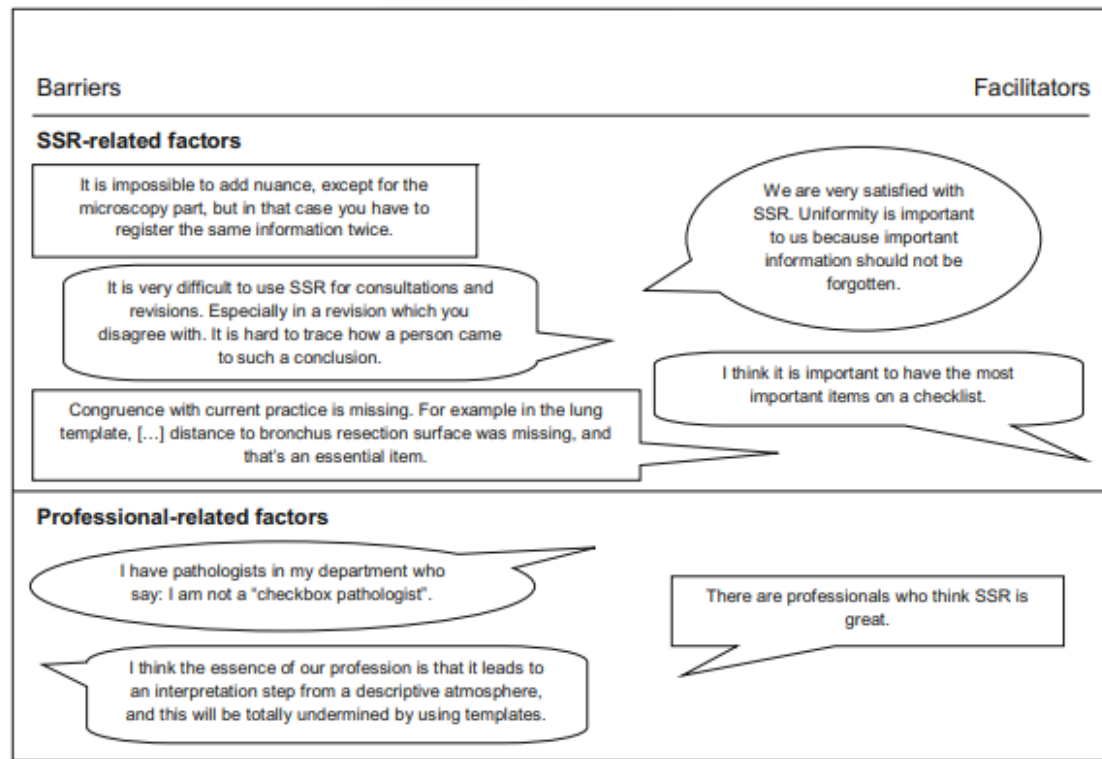
Alternative Terminology for No and Not	
Original Phrase	New Phrase
No malignant cells identified	Negative or benign
Lymph node with no tumor seen	Benign lymph node
Lymph node with no evidence of malignancy	Benign lymph node
No perineural invasion	Perineural invasion absent, negative for perineural invasion
No specific pathologic change	Unremarkable
Dysplasia, no invasion seen	Dysplasia present, invasion absent

# Assess Our Current Practice Pathologist Structured Reporting

**Fig. 1** Implementation of structured reporting in the Ontario project [20] identified six levels. *Level 1* follows the traditional text-based model in which there is no defined content or formatting. Synoptic-like reporting in most countries currently conforms to *Level 3*. The benefits of data aggregation, analysis and population-level quality measurement and interventions require *Level 6* reporting

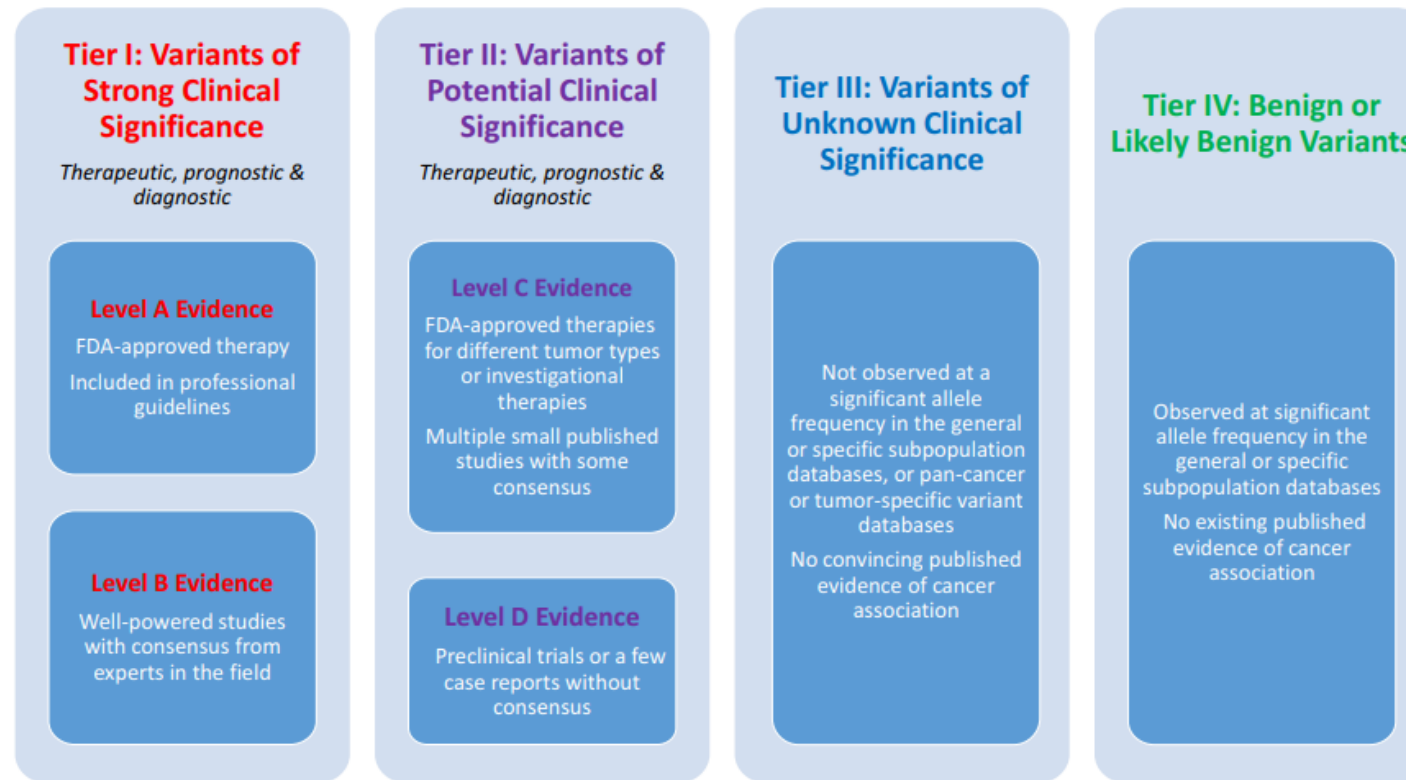


# Assess Our Current Practice Pathologist Structured Reporting Barriers vs Facilitators



**Fig. 1** Pathologists' illustrative quotes about barriers and facilitators in standardized structured reporting in the Netherlands. SSR, standardized structured reporting

# Assess Our Current Practice Pathologist Beyond SP Report (Molecular, etc.)



**Figure 2** Evidence-based variant categorization. Somatic variants are classified into four tiers based on their level of clinical significance in cancer diagnosis, prognosis, and/or therapeutics. Variants in tier I are of strongest clinical significance, and variants in tier IV are benign or likely benign variants. FDA, Food and Drug Administration.



# Patient Results

## FINAL DIAGNOSIS:

A) Prostate gland, right lateral base, needle core biopsy:  
• Benign prostate tissue.

B) Prostate gland, right base, needle core biopsy:  
• Benign prostate tissue.

C) Prostate gland, right lateral mid, needle core biopsy:  
• Benign prostate tissue.

D) Prostate gland, right mid, needle core biopsy:  
• Benign prostate tissue.

E) Prostate gland, right lateral apex, needle core biopsy:  
• Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.  
• Tumor involves 1/1 core, 25 % (3 mm).

F) Prostate gland, right apex, needle core biopsy:  
• Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.  
• Tumor involves 1/1 cores, 60% of involved core (6 mm).

G) Prostate gland, left lateral base, needle core biopsy:  
• Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.  
• Tumor involves 1/1 core, <5 % (0.3 mm).

H) Prostate gland, left base, needle core biopsy:  
• Benign prostate tissue.

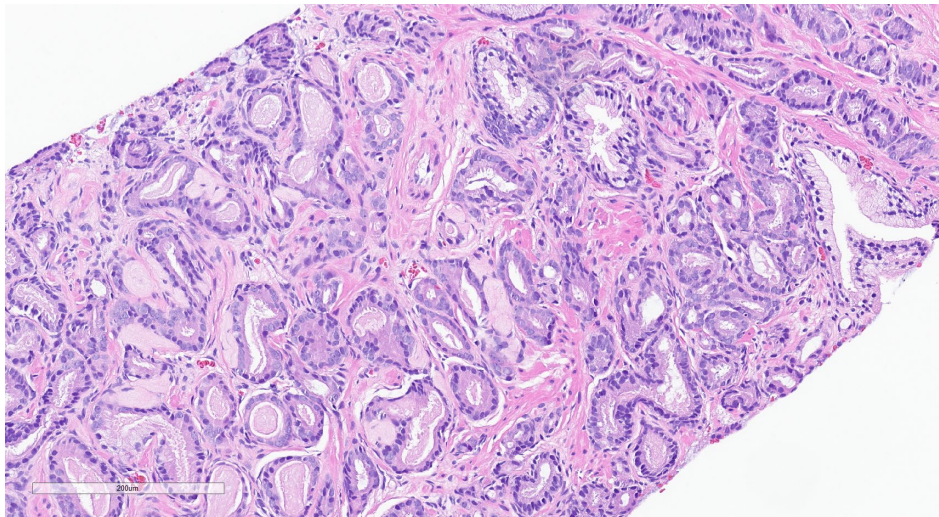
I) Prostate gland, left lateral mid, needle core biopsy:  
• Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.  
• Tumor involves 1/1 core, 5 % (1 mm).

J) Prostate gland, left mid, needle core biopsy:  
• Benign prostate tissue.

K) Prostate gland, left lateral apex, needle core biopsy:  
• Benign prostate tissue.

L) Prostate gland, left apex, needle core biopsy:  
• Benign prostate tissue.

M) Prostate gland, roi, needle core biopsy:  
• Benign prostate tissue.



## Prostate Cancer Report Summary



### Interpretation

The patient's polygenic risk score (PRS) is associated with an **increased risk** for prostate cancer. Increased risk is defined as having a risk greater than or equal to 1.5 times ( $\geq 1.5x$ ) the population average for developing the disease.

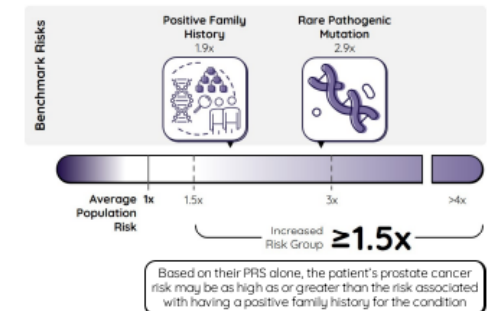
## Additional Information

Cancer occurs when cells lose the ability to replicate normally. Prostate cancer is when this occurs in the prostate, a gland only found in men or people assigned male at birth (AMAB). Prostate cancer is the most prevalent non-skin cancer in those who are AMAB. Approximately 15% of cases will metastasize to other parts of the body without medical intervention. Early-stage prostate cancer is often asymptomatic, making early detection through screening and surveillance key to preventing advanced or metastatic disease.

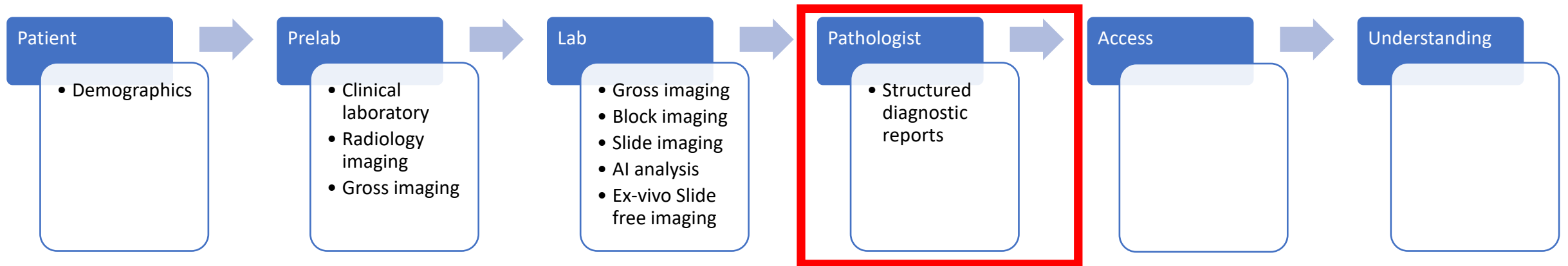
### Genetic Risk Contextualized

The patient's polygenic risk score (PRS) is associated with an increased risk for prostate cancer. For context, one's prostate cancer risk increases:

- 1.9x with a positive family history for prostate cancer<sup>2</sup>
- 2.9x with a rare pathogenic mutation (specifically, in the *ATM*, *BRCA2*, *CHEK2*, and/or *HOXB13* genes)<sup>2</sup>

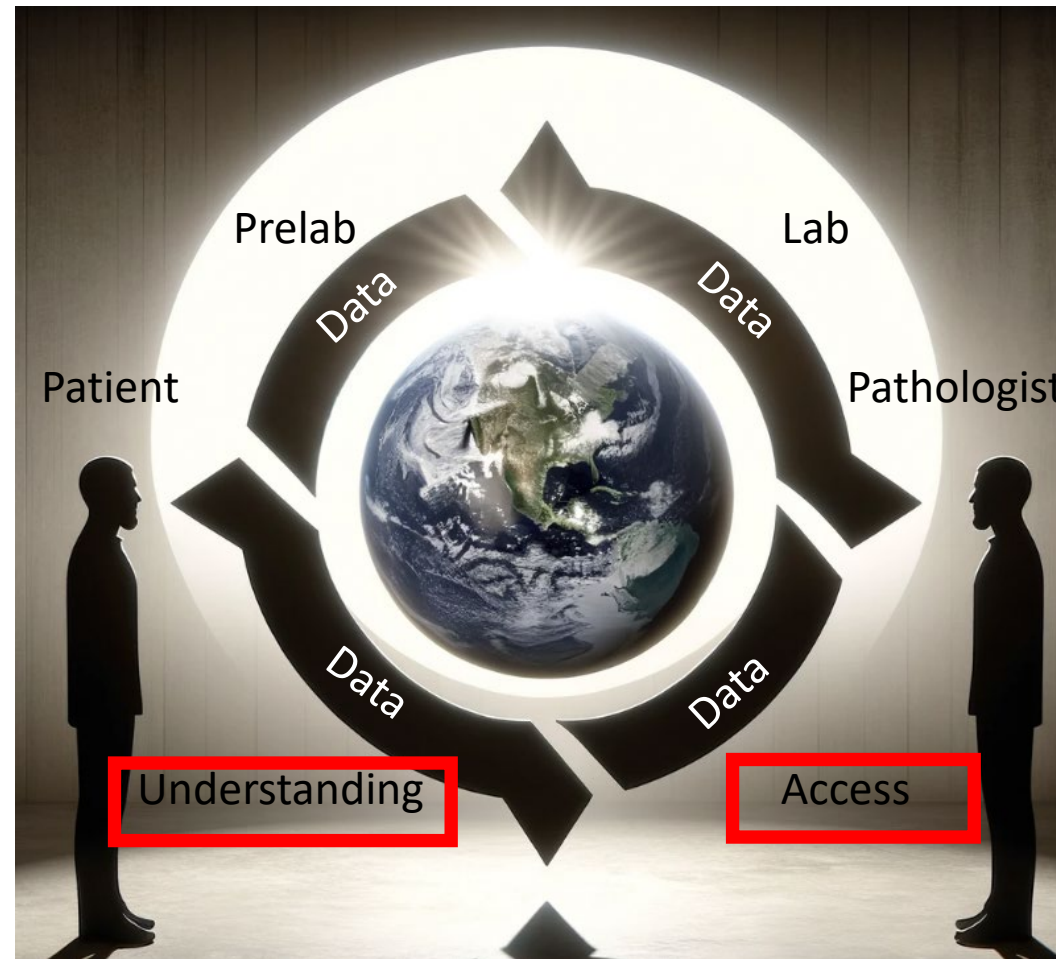


# Data Flow



# Patient Centered Digital Pathology

- 47-year-old male presents for routine healthcare.
  - Has increased family risk for cancer.
  - Undergoes PSA screening = elevated
  - Repeat PSA = elevated
  - MRI = PI-RADS 3
  - Low-risk Prostate cancer
  - PRS elevated





# Assess Our Current Practice for Patient Access



**FEDERAL REGISTER**

The Daily Journal of the United States Government



Ⓡ Rule

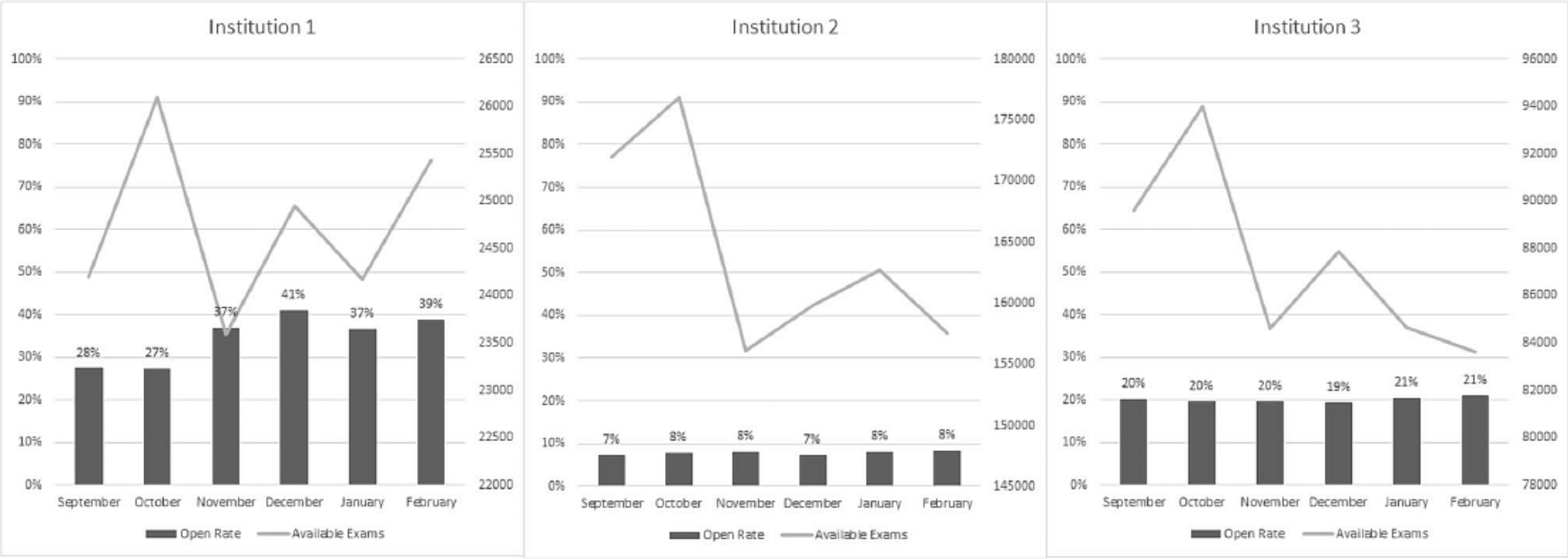
## **21st Century Cures Act: Interoperability, Information Blocking, and the ONC Health IT Certification Program**

A Rule by the Health and Human Services Department on 05/01/2020



[Federal Register :: 21st Century Cures Act:  
Interoperability, Information Blocking, and the ONC  
Health IT Certification Program](#)

# Assess Our Current Practice for Patient Access Radiology Images



**Fig. 2** Patient open rates for radiology exam viewing at each institution. Monthly aggregates are shown. The bars represent the proportion (%) of available imaging exams that were viewed

by the patients. The lines represent the total number of radiology exams with viewable images (scale on right)

# Assess Our Current Practice for Patient Access Digital Pathology Images

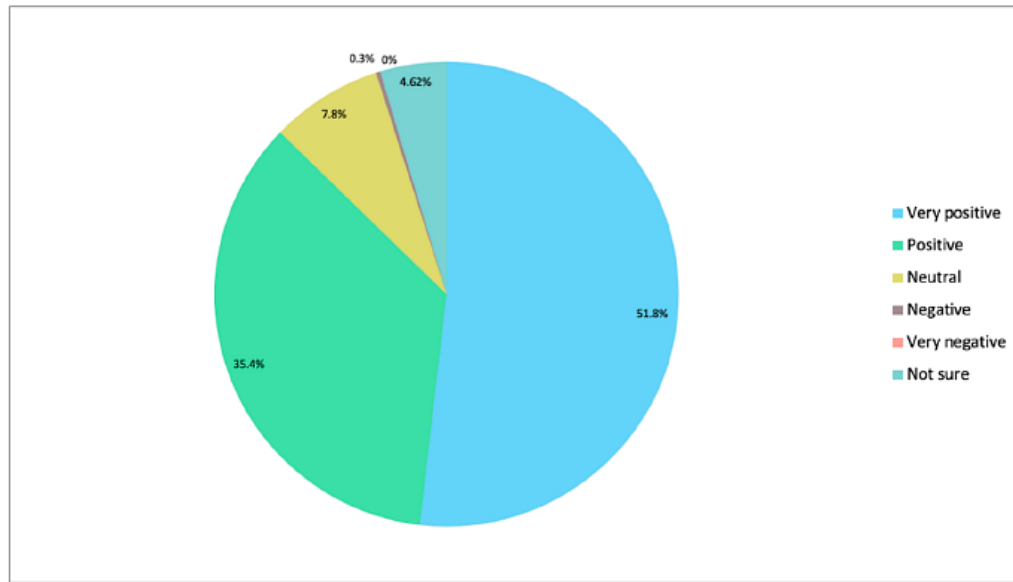


Figure 2. Responses to the question "Some histopathology departments are now going 'digital'. Slides containing prostate biopsy tissue can now be scanned and viewed digitally on a screen rather than through a microscope. This makes a permanent digital record of the biopsy which reduces the chances of any issues with viewing slides. This also allows histopathologists to easily get a second opinion on a diagnosis. Do you see this change in diagnosing prostate cancer as a positive or negative?" (Please see online supplementary material, Question S7).

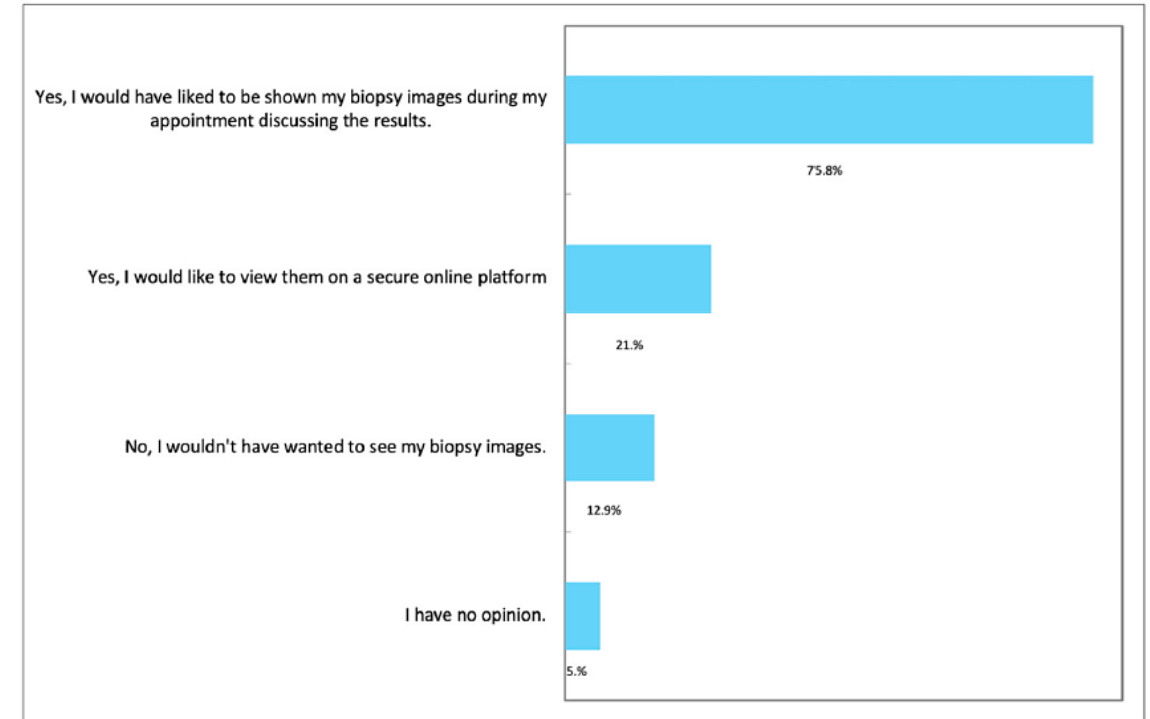


Figure 3. Respondents' views on viewing digital biopsy images (please see online supplementary material, Question S8). Respondents were able to choose more than one option.

# Assess Our Current Practice for Patient Access



## Digital Imaging Adoption Model (DIAM)

**STAGE 7\*: External Image Exchange and Patient Engagement**

**STAGE 6\*: Clinical Decision Support and Value-Based Imaging**

**STAGE 5\*: Advanced Imaging Analytics**

**STAGE 4: Fully Integrated Image Management With Efficient Enterprise-Wide Image Sharing Across Different Service Areas**

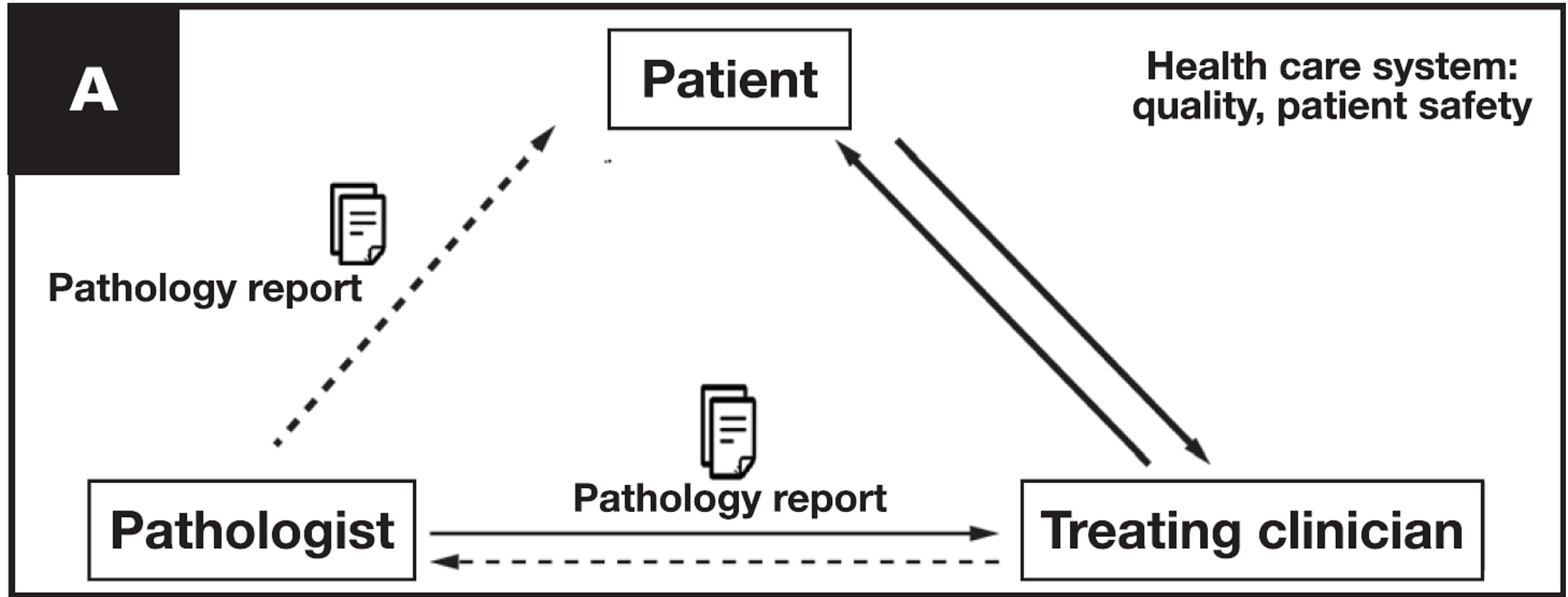
**STAGE 3: Imaging Governance and Strategy; Workflow and Process Safety**

**STAGE 2: Electronic Image Management Covering a Variety of Images Across the Enterprise**

**STAGE 1: Electronic Image Management Covering the Service Area(s)**

**STAGE 0: Little or No Electronic Management**

# Assess Our Current Practice for Patient Understanding





# Examine the Current State of Communication Between Pathologists and Patients

8. Please look at this sample pathology report below and circle what you think is the diagnosis.

Brigham and Women's Hospital  
Department of Pathology  
75 Francis Street, Boston, MA 02115

CLIA License No.: 22D0705149  
Laboratory Director: Dr. Christopher D.M. Fletcher

Physician:  
Procedure Date: 01/03/2017

Resident:  
Pathologi

PATHOLOGIC DIAGNOSIS:

A. SKIN, CHEST, SHAVE BIOPSY:  
Lobular capillary hemangioma, ulcerated and inflamed.

CLINICAL DATA:  
History: Chest lesion  
Operation: Shave biopsy  
Clinical Diagnosis: Nodular melanoma

TISSUE SUBMITTED:  
A/1. Skin: Chest

GROSS DESCRIPTION:  
The specimen is received in formalin, in one part, labeled with the patient's name, unit number and "Chest", and consists of an irregular, tan-white skin shave (1.6 x 1.2 cm). The epithelial surface displays a tan-white, pedunculated nodule (1.0 x 0.9 x 0.6 cm), located 0.2 cm to the nearest radial margin. The base is inked and the specimen serially sectioned and entirely submitted.

Micro A1-A2: 4 frags, ESS.

- **12% circled the correct diagnosis**
- 35.1% circled the incorrect diagnosis
- 47.6% did not circle any diagnosis
- 61.6% felt that the report was somewhat easy or very easy to understand
- **92.4% were somewhat or very worried** after reading the pathology report, although the pathologic diagnosis was benign
- 7.6% felt somewhat or very reassured by the result

# Examine the Current State of Communication Between Pathologists and Patients

## Google receives more than 1 billion health questions every day

Jackie Drees - Monday, March 11th, 2019



An estimated 7 percent of Google's daily searches are health-related, according to Google Health Vice President David Feinberg, MD, *The Telegraph* reports.

Google's total daily health-related searches amount to 70,000 each minute, according to the report.

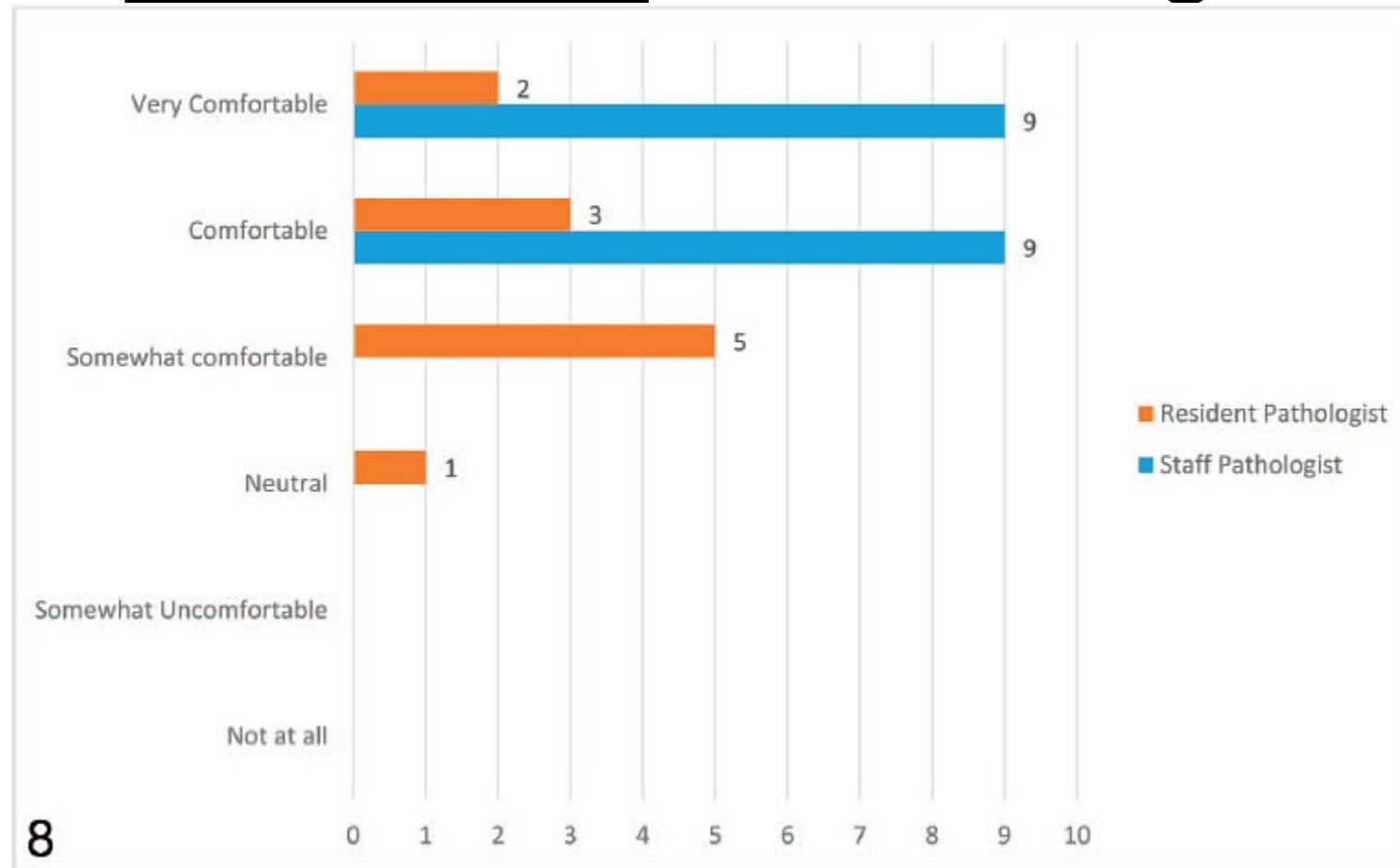
[Google receives more than 1 billion health questions every day  
\(beckershospitalreview.com\)](http://beckershospitalreview.com)

# Examine the Current State of Communication Between Pathologists and Patients

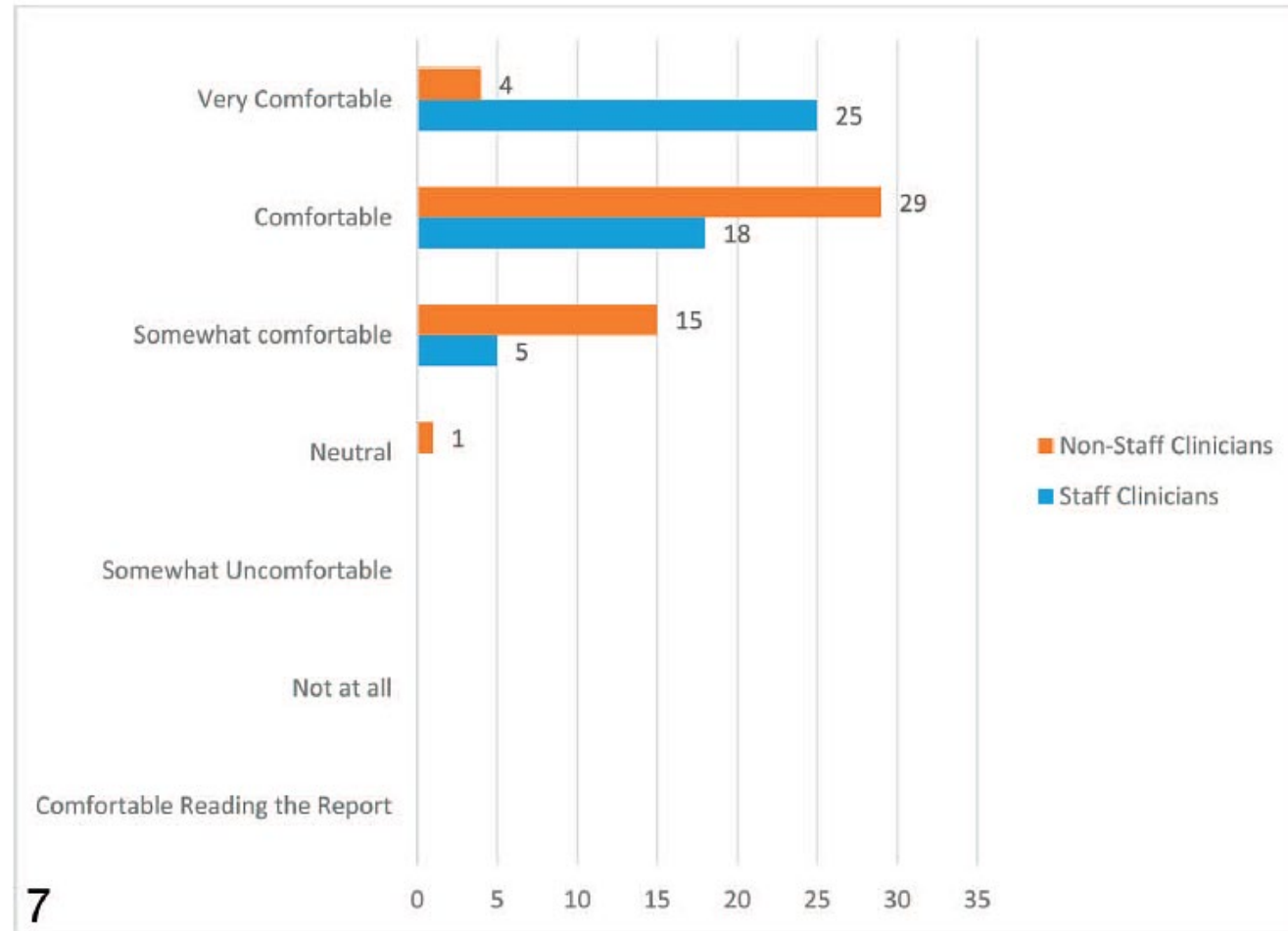
**Table 2** Readability assessment scores for pathology patient education materials based on 9 readability assessments with scores that correspond to academic grade level

Readability assessment	Score	SD
Fry Readability	11.4	3.4
Raygor Readability Estimate	11.1	3.6
New Fog Count	9.1	2.9
Coleman-Liau Index	10.6	2.4
New Dale-Chall	10.0	2.8
FORCAST Formula	10.5	0.9
Gunning Fog Index	12.3	2.9
Simple Measure of Gobbledygook	12.6	2.3
Flesch-Kincaid Grade Level	10.2	3.0
Overall	10.9	3.0

# Examine the Current State of Communication Between Pathologists and Treating Clinicians



# Examine the Current State of Communication Between Pathologists and Treating Clinicians



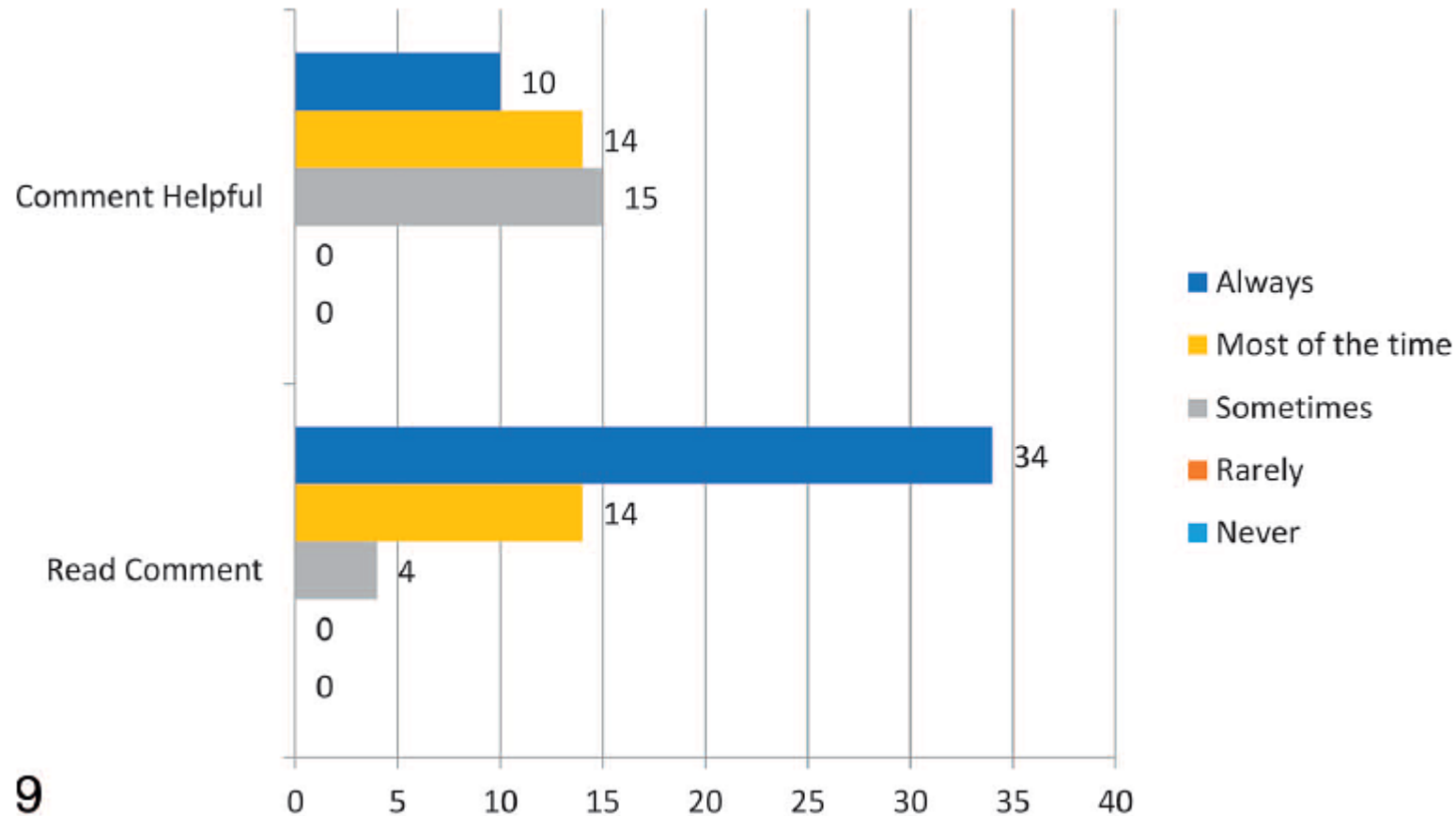
7

# Examine the Current State of Communication Between Pathologists and Treating Clinicians

Table 2. Standard Deviations of Each Group by Percentage							
	Diagnostic	Consistent With	Favor	Suggestive Of	Suspicious For	Compatible With	Cannot Rule Out
Staff clinicians	3.79	13.57	15.71	17.77	20.36	21.70	23.33
Nonstaff clinicians	6.79	17.23	14.98	17.17	18.67	24.30	24.20
Staff pathologists	2.52	6.03	10.99	20.75	22.93	24.05	19.91
Resident pathologists	3.17	18.56	14.84	12.30	13.44	16.03	16.01



# Examine the Current State of Communication Between Pathologists and Treating Clinicians



9

# Examine the Current State of Communication Between Pathologists and Treating Clinicians

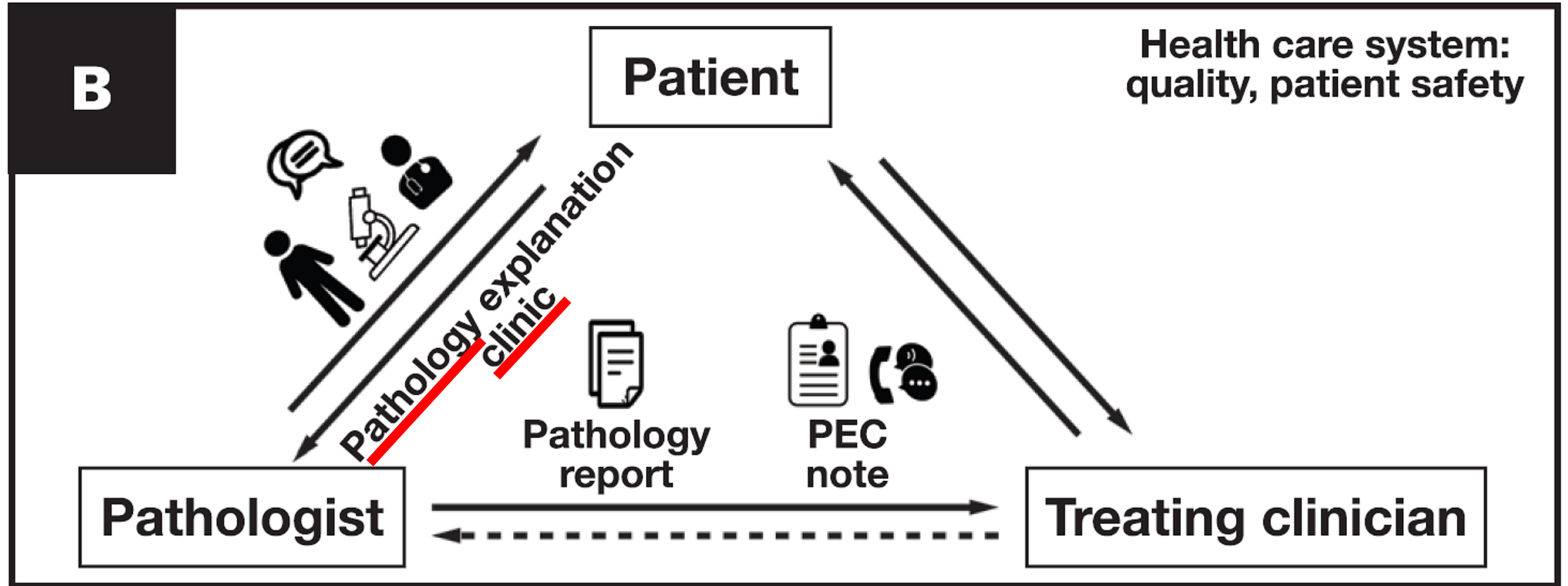
Clinicians Are From Mars and Pathologists  
Are From Venus

Clinician Interpretation of Pathology Reports

Table 1. Discordance Rate (%) by Report Format and Clinical Experience						
Experience*	Format			All	n	
	Original	Modernized	New			
Attending, pgy 6+	18	24	34	25	15	
Housestaff, pgy 2–5	26	32	34	31	11	
Student, pgy 1	33	28	48	37	8	
All	24	28	37	30	34	

\* pgy indicates postgraduate year.

# Examine the Current State of Communication Between Pathologists and Patients & Treating Clinicians

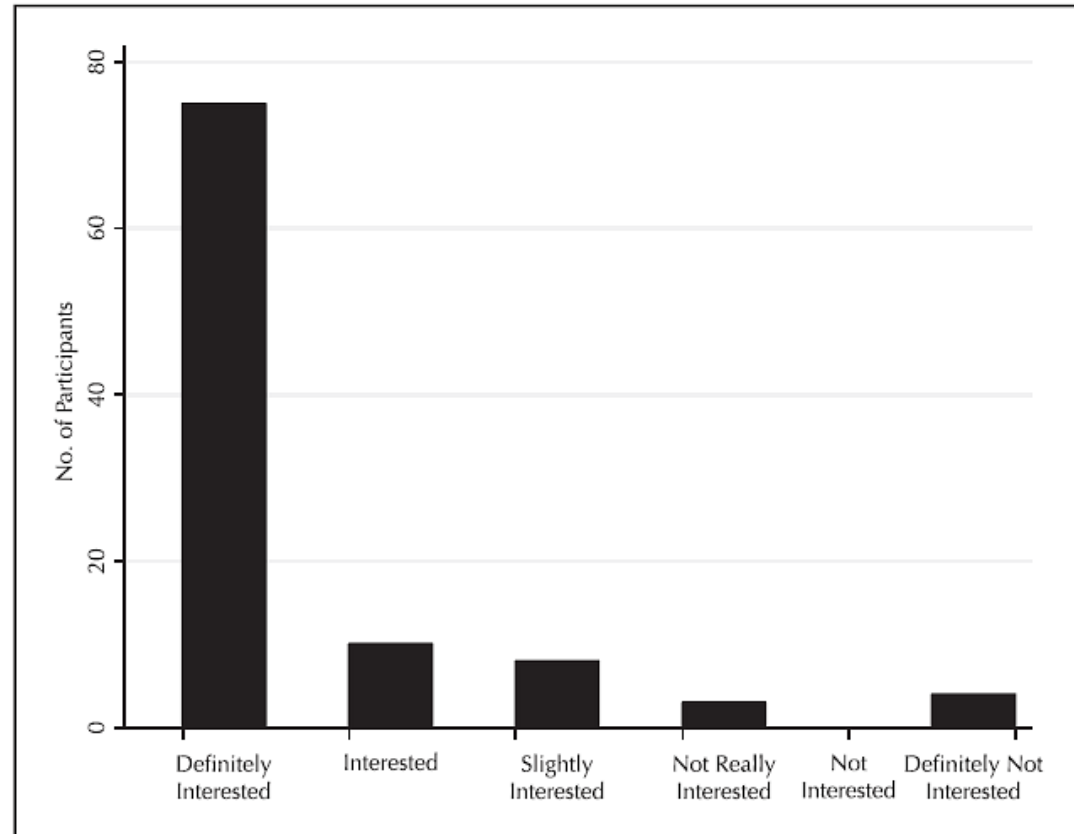


# Pathology Clinics: Are Patient's Interested?

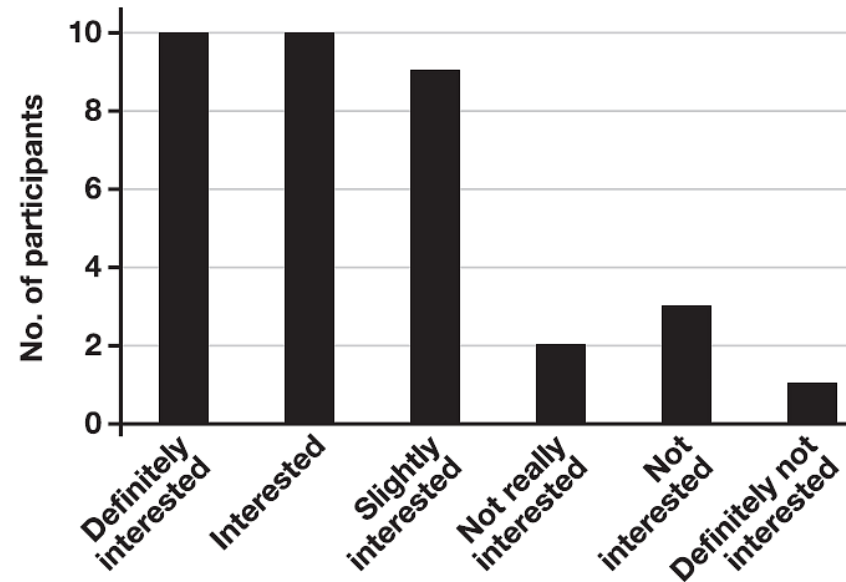
**Figure 2.** Participant interest levels. The majority of participants (85 of 100; 85%) were either definitely interested or interested in meeting their pathologist and seeing a slide of their tissue.

Table 1. Demographics and Type of Cancer in Participants (N = 100)	
Characteristic	Value
Mean age, y	54.4
Gender, No. (%) female	73 (73)
Type of cancer, No. (%)	
Breast	29 (29)
Other (eg, lung, adrenal, neck, colorectal)	27 (27)
Prostate	10 (10)
Gynecologic	9 (9)
Leukemia/lymphoma	7 (7)
Sarcoma	6 (6)
Caregiver <sup>a</sup>	7 (7)
Multiple	3 (3)
Missing	2 (2)

<sup>a</sup> Some respondents were not cancer patients but rather caregivers of cancer patients.

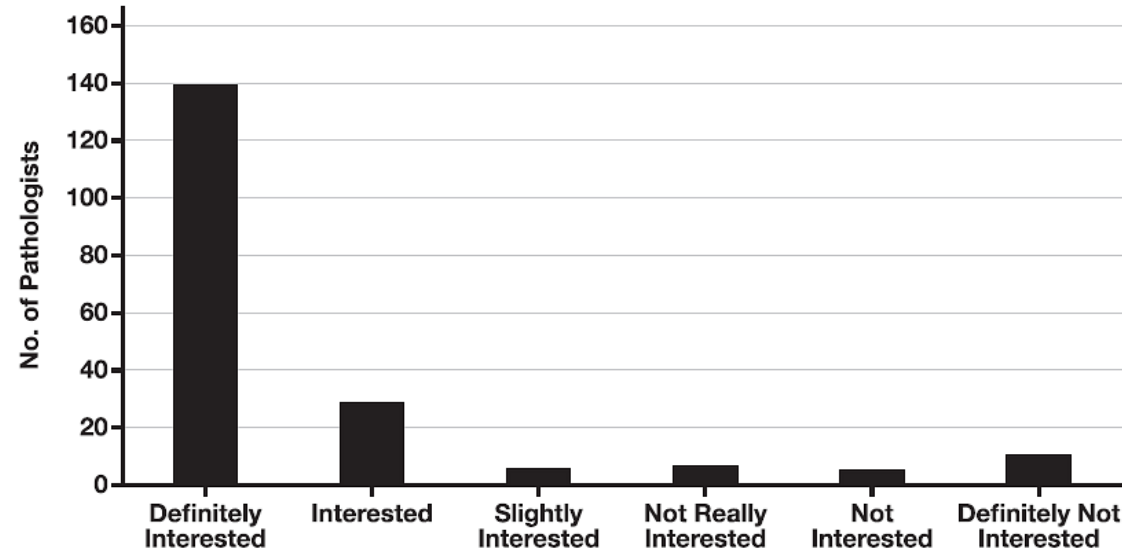


# Pathology Clinics: Are Treating Clinicians Interested?



**FIGURE 2** Clinician interest levels. Most participating clinicians (29 of 35 [83%]) showed some level of interest, ranging from slightly interested to definitely interested, in their patients participating in a pathology explanation clinic.

# Pathology Clinics: Are Pathologists Interested?



■ **Figure 1** ■ Pathologist interest levels. The majority of participating pathologists (169 of 197 [85.8%]) were either definitely interested or interested in meeting with patients to discuss their pathology report and show patients a microscopic slide of their tissue. Participating pathologists were asked to assume that their time was adequately reimbursed and that the primary clinicians had already told the patients their diagnosis.



# Pathology Clinics: Are these Clinics Helpful?

**Table 1. Characteristics of the 31 Patients Participating in the Patient-Pathologist Consultation Program**

Variable	Value
Sex, No. (%)	
Female	28 (90)
Male	3 (10)
Age, y	
Median	59
Range	32–83
Disease, No. (%)	
Breast cancer	18 (58)
Hematologic malignancies	6 (19)
Other solid malignancies	5 (16)
Nonmalignant disease	2 (6)

**Table 2. Top-Box Scoring and Mean Scores on the Patient Survey From the 18 Respondents**

Question	Strongly Agree, %	Mean Score (Range)
Did you think there was enough time to address your questions and concerns?	78	4.7 (2–5)
Was the description of your biopsy results by the pathologist presented in language that was clear and understandable to you?	83	4.7 (2–5)
Did viewing your slides give you a better understanding of your disease?	72	4.6 (3–5)
Now that you have seen the disease “face to face” do you feel more empowered in managing your disease?	78	4.5 (2–5)
Would you be interested in coming back for multiple consultation sessions as part of your treatment management?	44	4.0 (1–5)
Would you recommend the experience to another patient?	89	4.9 (4–5)

# Pathology Clinics: Are these Clinics Helpful?

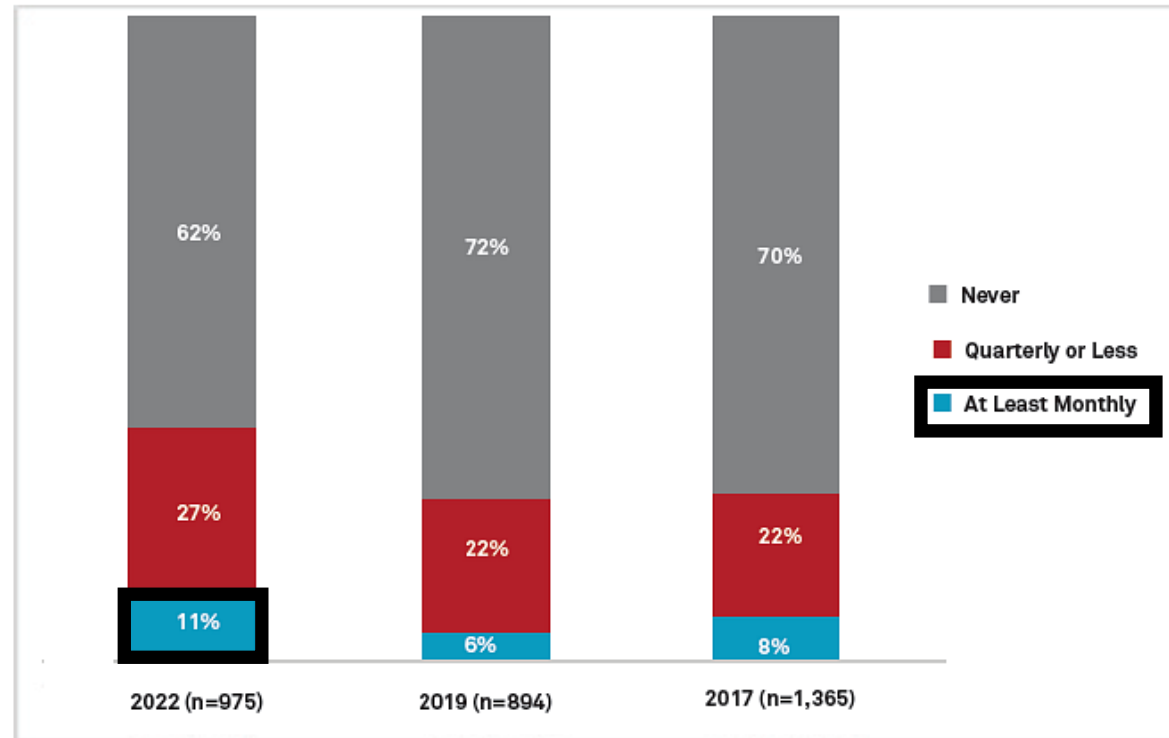
**TABLE 3.** Treatment Plan Change Resulting From Patient-Pathologist Clinic

Patient No.	Primary Site and Diagnosis	Pathologist Recommendation	Change in Treatment Plan
1	Cervical and retroperitoneal lymphadenopathy with malignant mesenchymal tumor	Pathology revision resulted in diagnosis change to carcinoma of unknown primary	Patient was treated as unknown primary carcinoma
2	Metastatic breast	Pathology revision altered diagnosis of IDC to ILC	Change in hormonal treatment regimen SERM to AI
3	Metastatic breast	Revision of HER2 status	Change in HER2 status from 0 to 1 promoted clinical trial options

Abbreviations: AI, artificial intelligence; HER2, human epidermal growth factor receptor 2; IDC, invasive ductal carcinoma; ILC, invasive lobular carcinoma; SERM, selective estrogen receptor modulator.

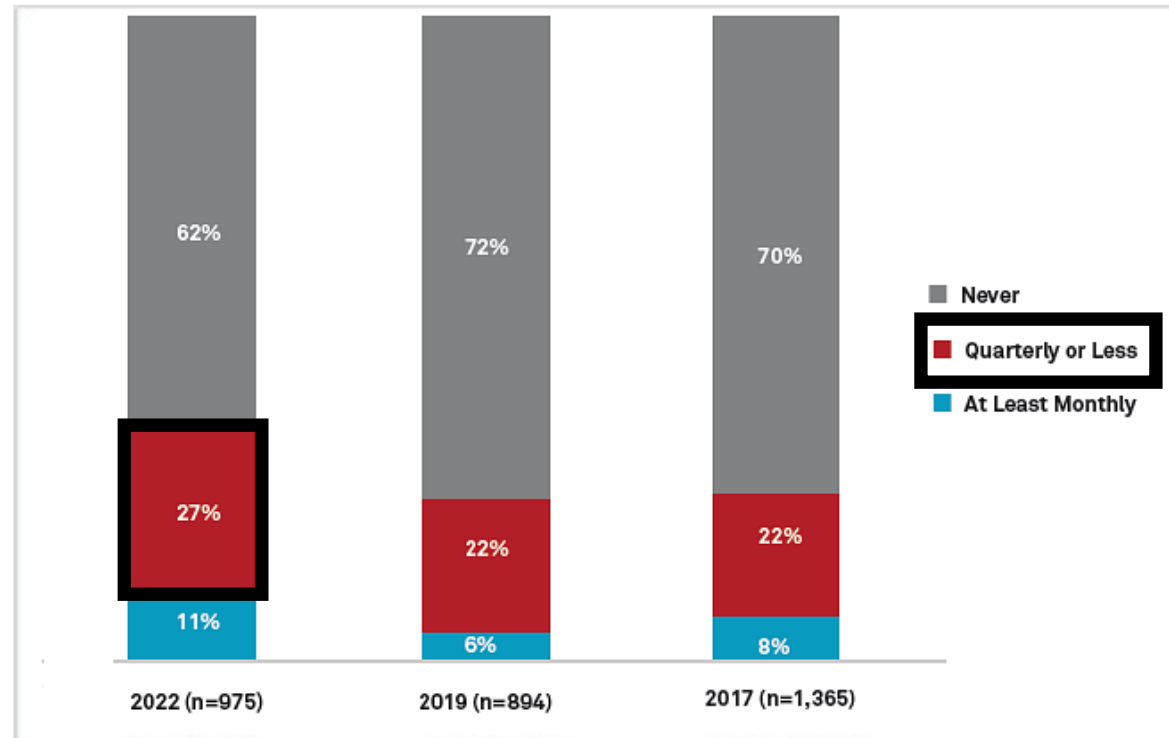
# Pathology Clinics: Are these Clinics Happening?

**Figure B-7:** Percent of Respondents Who Have Discussions with Patients about the Interpretation of Test Results via Telephone or Virtual Visit, 2017-2022



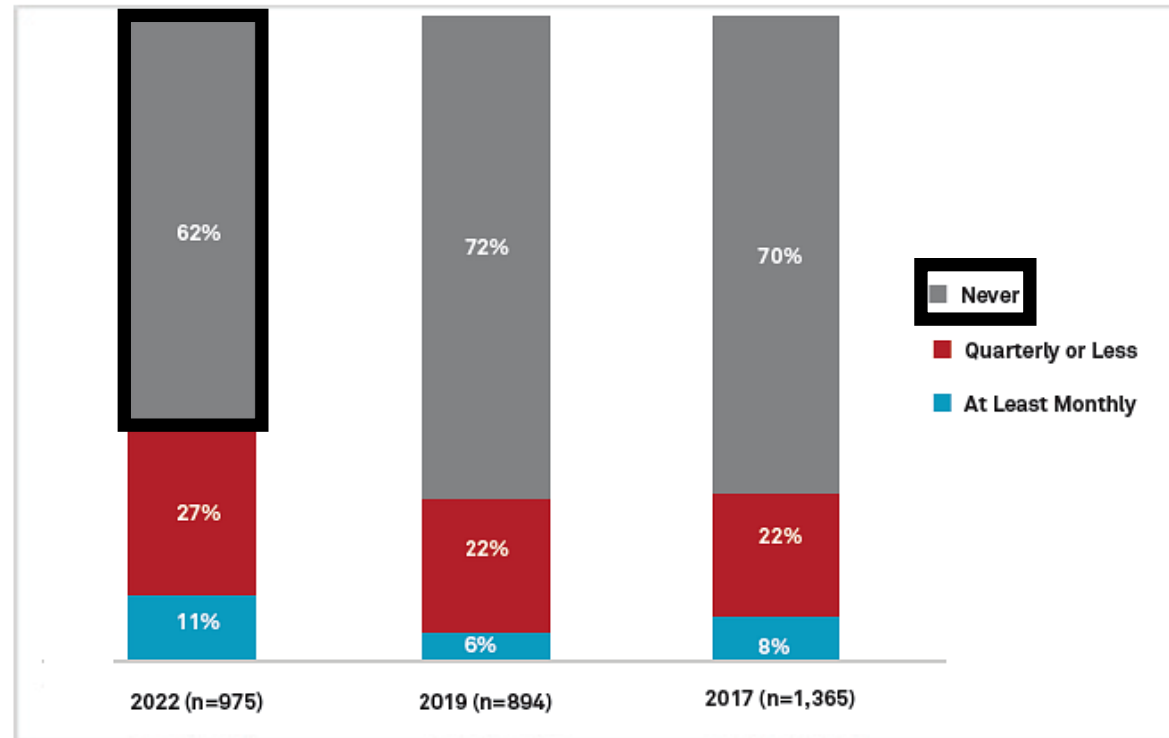
# Pathology Clinics: Are these Clinics Happening?

**Figure B-7:** Percent of Respondents Who Have Discussions with Patients about the Interpretation of Test Results via Telephone or Virtual Visit, 2017-2022



# Pathology Clinics: Are these Clinics Happening?

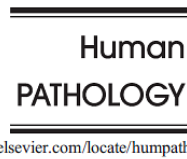
**Figure B-7:** Percent of Respondents Who Have Discussions with Patients about the Interpretation of Test Results via Telephone or Virtual Visit, 2017-2022





# Patient Centered Pathology Report (PCPR)

Human Pathology (2014) 45, 2192–2201



Education in pathology

## Surgical pathology and the patient: a systematic review evaluating the primary audience of pathology reports☆☆☆



Matthew Mossanen MD<sup>a,\*</sup>, Lawrence D. True MD<sup>b</sup>, Jonathan L. Wright MD, MS<sup>a</sup>,  
Funda Vakar-Lopez MD<sup>b</sup>, Danielle Lavalley PhD<sup>c</sup>, John L. Gore MD, MS<sup>a</sup>

<sup>a</sup>Department of Urology, University of Washington, Seattle, WA 98195, USA

<sup>b</sup>Department of Pathology, University of Washington, Seattle, WA 98195, USA

<sup>c</sup>Department of Surgery, Surgical Outcomes Research Center, University of Washington, Seattle, WA 98195, USA

1. Recurrent themes in proposed improvements in reports included content standardization, variation in terminology, clarity of communication, and quality improvement.
2. No articles discussed patients as their target audience.
3. No study evaluated the health literacy level required of patients to comprehend pathology reports.
4. **Potential impact of PCPRs**

# Patient Centered Pathology Report (PCPR)

**Table 3** Strategies that would help the implementation and design of patient-centered pathology reports

Strategy	Description	Aim	Potential application
Clear section headings [42,74,75]	Organizing each section of the report with straightforward titles	Create distinct and easy to identify section headings	Use of clear titles that are in bold and underlined font
Formatting of the report [42]	Ensuring the report fits 1 page may help eliminate confusion and simplify the document	Allow patients to more easily navigate the document outside of the original clinical encounter	Creating a condensed, 1-page document with all relevant information
Minimize distracting details and superfluous information [42]	Omitting portions of the pathology report, which may not be necessary to patient understanding	Improve patient retention by increasing attention spent on salient details	Omitting gross pathologic descriptions and immunohistochemistry staining information
Include images to illustrate concepts [76-78]	Pictures designed by physicians with the input of patients	Well-positioned pictures can aid physician explanations	Including an illustration of a bladder with the extent of tumor involvement may help patients conceptualize the disease.
Use comprehensible language to improve readability [48-50,79]	Using simple language and avoiding medical jargon to reach patients with limited health literacy	Optimizing the amount of information through clear, simple wording will increase understanding	Ensuring medical jargon is avoided and using language that is clear
Including a patient-centered report with the original report [14,64]	Summarizing results in an attached report allows inclusion of elements deemed important by physicians	Establishes a patient-centered element to cancer care by uniting both documents	Addition of a patient-centered pathology report to the standard pathology report provided to physicians
Cognizance of psychosocial impact of cancer [80]	Empathetic detailing of clinical results to ensure humanistic approach	Compassionate explanation of terms may alleviate anxiety and fear while improving retention	Using a narrative format will help patients understand the information in the report
Conduct patient advisory board focus groups [78]	Enlist patient with a history of the condition to establish an iterative process	Allow input of patients to guide the development of documents and resources	Directly allowing focus groups to review potential reports and offer feedback
Humanistic cancer care [64,81,82]	Cancer care devoted to appreciating value of patient experience	Improved communication and compassion are associated with improved patient satisfaction	Efforts to explain a diagnosis more empathetically build rapport and trust between patient and provider

# Patient Centered Pathology Report (PCPR)

Table

Average readability indices (RIs) for standard and modified pathology reports

Report subject	Standard report mean RI	Modified report no.1 <sup>a</sup>	Modified report no. 2 <sup>b</sup>
Radical nephrectomy	10.8	9.8	<b>9.5</b>
Partial nephrectomy	10.9	9.9	<b>9.3</b>
Radical cystectomy	12.0	12.0	12.0
TURBT	12.0	11.5	11.5
Radical prostatectomy	10.5	<b>11.5</b>	<i>10.6</i>
Prostate biopsy	10.3	10.3	10.0
RPLND	11.8	11.4	11.2
Radical orchiectomy	11.5	10.9	<b>10.4</b>

Bold numbers indicate  $P < 0.05$  for  $t$  test comparing readability of standard report vs. modified report.

Italic numbers indicate  $P < 0.05$  for  $t$  test comparing readability of modified reports.

<sup>a</sup>Modified report no. 1 omits gross specimen description and immunohistochemistry results.

<sup>b</sup>Modified report no. 2 omits gross specimen description and immunohistochemistry results and replaces oncologic and histologic terms with lay terms.

# Patient Centered Pathology Report (PCPR)

## Prostate

### Why do we do biopsies?

Doctors screen for prostate cancer with a blood test called PSA and a rectal exam. These tests help decide who should have more tests. A biopsy is the main way that we diagnose prostate cancer. These are your results:

Diagnosis:	Prostate cancer	Amount:	67% of samples have cancer
Grade:	Gleason score 3+4	Risk category:	Intermediate risk

### What did it show?

Based on looking at your prostate cells under the microscope, there is prostate cancer.

### How much cancer is there?

To understand how much of your prostate is involved by cancer, we look at how many biopsy samples had cancer. You had cancer in 8 out of 12 samples (67%)

### How bad is it?

Grade tells us how aggressive the tumor cells look under the microscope. Cancers with a higher score are more likely to multiply and spread. In prostate cancer the grade is known as the Gleason Score. This score is made up of two numbers ranging from 3 to 5. The first number shows the most common grade under the microscope and the second number is the next most common grade. The scale *starts* at Gleason score 3 + 3 = 6 (lowest grade) to Gleason score 5 + 5 = 10 (highest grade). **YOUR GLEASON SCORE IS: 3 + 4 = 7.**

### What is the overall risk to my life?

To find your risk, there are many factors to use, such as your PSA, rectal exam (T stage) and your biopsy results. Based on your biopsy results you have intermediate risk disease, but knowing your PSA and rectal exam findings may affect your overall risk. This information should not replace the need to talk to your doctor in more detail.

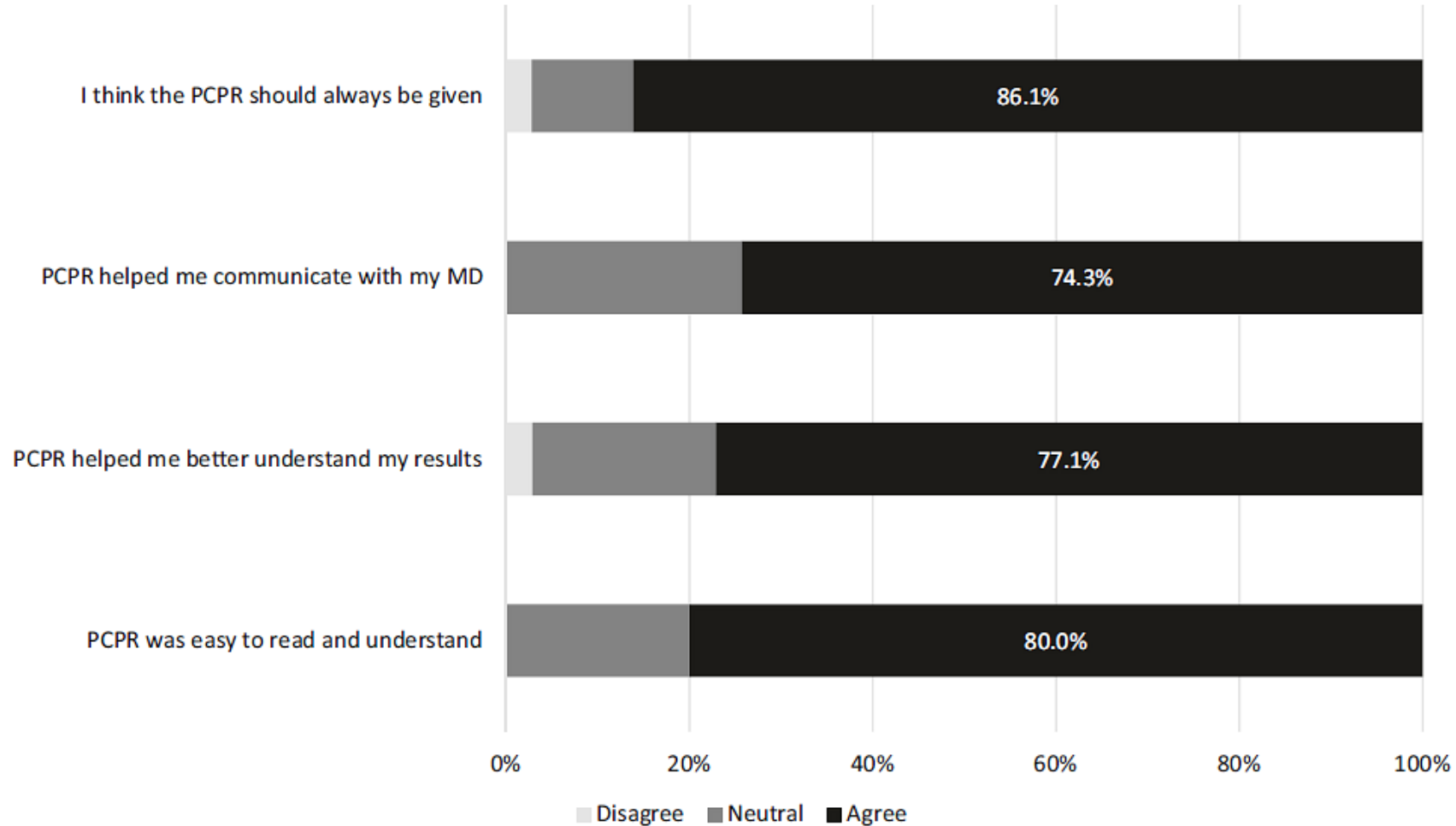
Risk category	Low	Intermediate	High
Gleason score	3 + 3 = 6	3 + 4 = 7 4 + 3 = 7	4 + 4 = 8 3 + 5 = 8 5 + 3 = 8 4 + 5 = 9 5 + 4 = 9 5 + 5 = 10
PSA (ng/ml)	<10	10-20	>20
Clinical T stage (based on rectal exam)	No/small nodule (T1-2a)	Medium nodule (T2b)	Large nodule (>T2c)

### Was there anything else?

N/A

Please use the following space to **write down any questions** you may have, to discuss with your doctor:

# Patient Centered Pathology Report (PCPR) Prostate





# Patient Centered Pathology Report (PCPR)

## Barriers

RE-AIM	Definition for PCPR context	Experiences	Recommendations
Reach	Feasibility	Bladder, breast, prostate, GI polyps	Expansion
Effectiveness	Impact	Improved patient knowledge, acceptability	Improve usability
Adoption	Uptake	Limited pathologist buy-in	Address barriers
Implementation	Barriers/ Facilitators	Barriers related to clinical complexity and logistics	Need for more sophisticated tools, such as AI
Maintenance	Barriers/ Facilitators	Barriers related to IT and EHR technology and continuously changing guidelines	Need to align with policy making. Advocate for organizational incentives resources

# TIME



Hi ChatGPT



Hello! How can I assist you today?



What do you think of a TIME cover story with the title, "The AI Arms Race Is Changing Everything?"



As an AI language model, I don't have personal opinions or beliefs, but I can provide some context and information on the subject.

"The AI Arms Race is Changing Everything" could be an attention-grabbing and thought-provoking title for a cover story on AI. A cover story in a widely-read publication like TIME could help raise public awareness about the potential risks and benefits of this trend, and stimulate discussions on how to ensure that AI is developed and deployed in a responsible and ethical manner.

It's important to note that the title of the story could also be interpreted as sensationalist or alarmist, and may not accurately reflect the complexities ■

by  
ANDREW R. CHOW  
& BILLY PERRIGO  
(humans)

# Patient Centered Pathology Report (PCPR)

## Prostate AI Generated

**A) Prostate gland, right apex, needle core biopsy:**

- Adenocarcinoma, acinar type, Gleason score: (4 + 3 = 7), Grade group 3; Gleason pattern 4 (90% of tumor).
- Tumor involves 2 cores, and 30% (4 mm) and 30% (3 mm) of the cores respectively.
- Cribriform pattern is present.

**B) Prostate gland, right mid, needle core biopsy:**

- Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.
- Tumor involves 1 core, and 90% (11 mm) of the core.

**C) Prostate gland, right base, needle core biopsy:**

- Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.
- Tumor involves 1 core, and <5% (<5 mm) of the core.

**D) Prostate gland, left apex, needle core biopsy:**

- Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.
- Tumor involves 1 core, and 20% (11 mm) of the core.

**E) Prostate gland, left mid, needle core biopsy:**

- Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.
- Tumor involves 1 core, and 70% (8 mm) of the core.

**F) Prostate gland, left base, needle core biopsy:**

- Adenocarcinoma, acinar type, Gleason score: (3 + 3 = 6), Grade group 1.
- Tumor involves 1 core, and 50% (8 mm) of the core.

# Patient Centered Pathology Report (PCPR)

## Prostate AI Generated

### Introduction

Hi there! It seems like you've just gotten your prostate biopsy results, and you probably have a bunch of questions. That's totally understandable! Let's break down what all these medical words mean for you.

#### 1. Why do we do biopsies?

Biopsies are done to check for cancer cells in your prostate. This information helps your doctors decide the best way to treat you.

#### 2. What did it show?

Your biopsy found:

Cancer in all six areas: All the cores have cancer cells, with different grades.

Variety of scores: Most cores have a Grade group 1 (less severe), but one core is Grade group 3 (more severe).

#### 3. How much cancer is there?

Cancer was found in every area looked at. The amount of cancer in these areas varies from less than 5% to up to 90%.

#### 4. How bad is it?

Most cores have a Gleason score of 6 (Grade group 1), which is less severe. But one core has a Gleason score of 7, with 90% of it being a more aggressive type. This one is a bit more serious.

#### 5. What is the overall risk to my life?

The majority of your cancer is low-grade (Grade group 1). However, one core with Grade group 3 does make your situation a bit more serious. You'll want to talk to your doctor about this.

#### 6. Was there anything else?

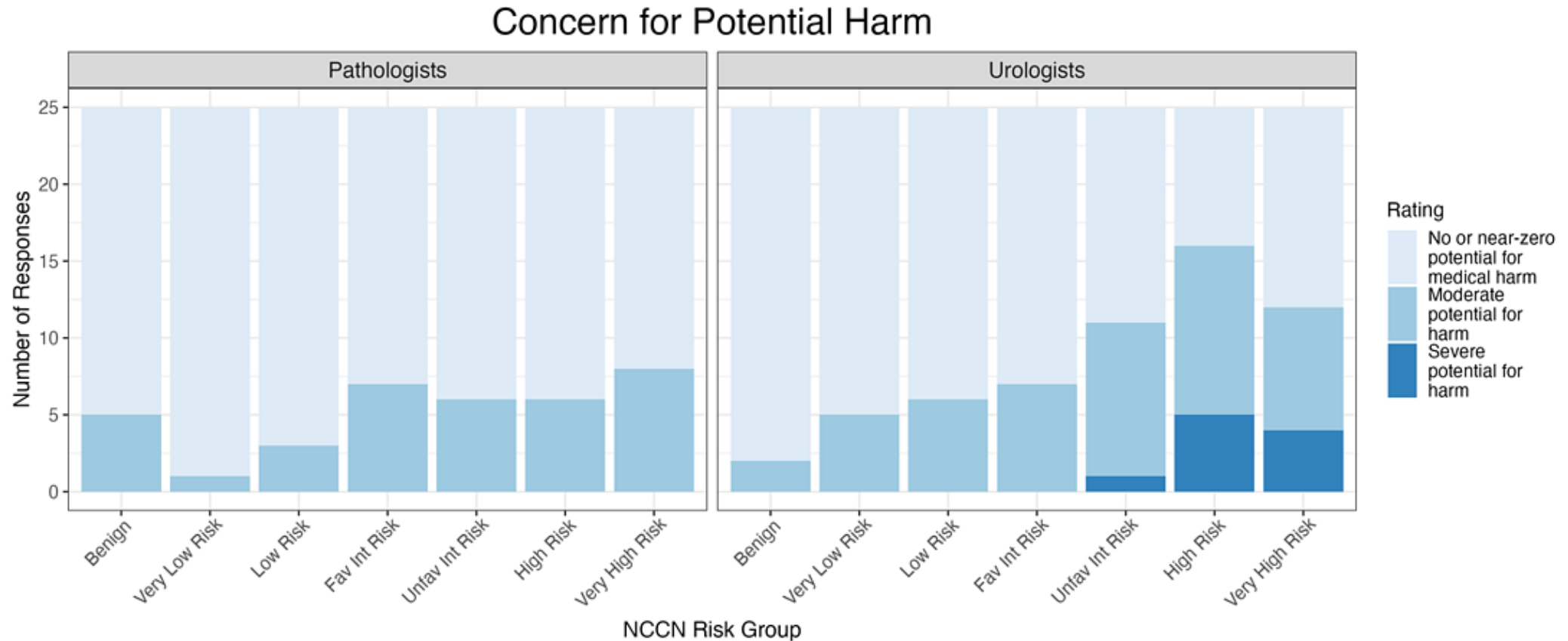
All the areas tested have adenocarcinoma, which is a type of prostate cancer. One core shows a 'cribriform pattern,' which might mean that the cancer could be more aggressive.

### Conclusion

Your biopsy found cancer in all areas checked, with most being low-grade but one area being more severe. What comes next is a chat with your healthcare team to figure out your treatment plan.

Note: This is a simplified summary of your results. For complete information and a tailored treatment plan, please talk to your healthcare team.

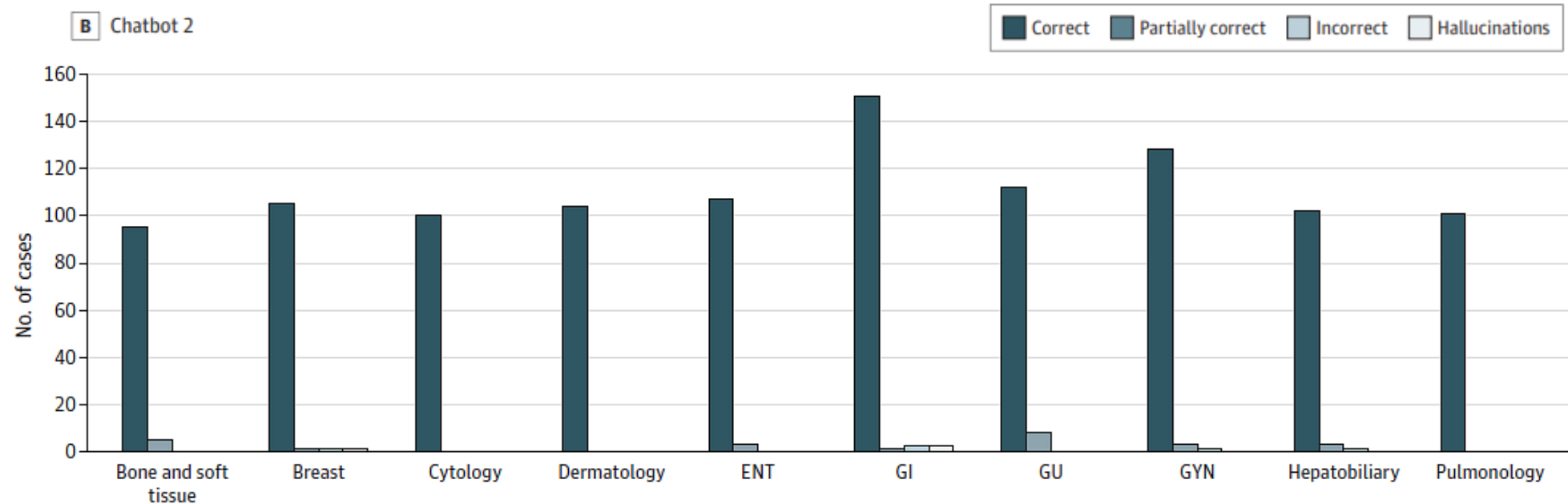
# ChatGPT and Generative AI in Pathology PCPR





# ChatGPT and Generative AI in Pathology PCPR

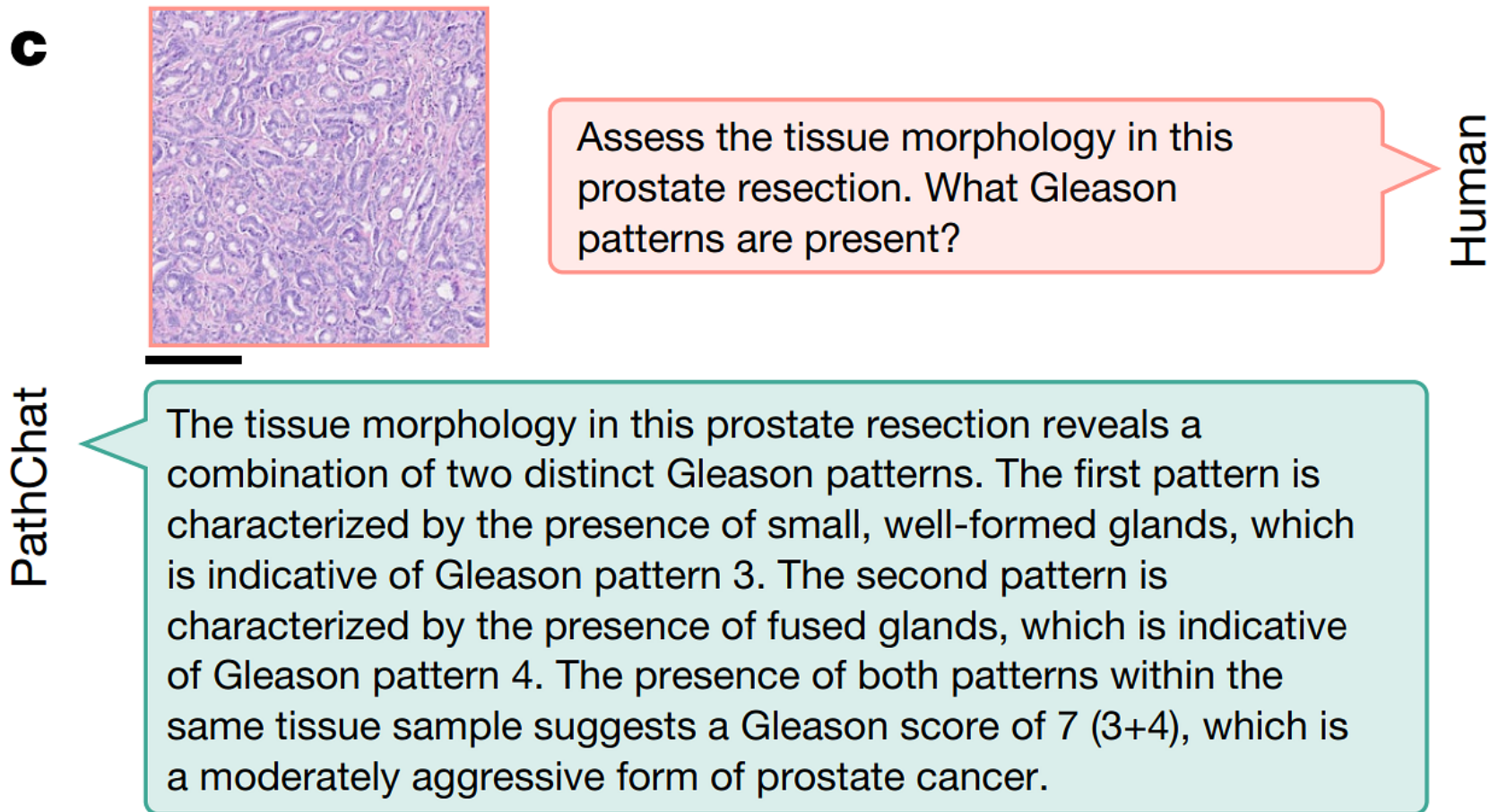
Figure 1. Medical Accuracy of Chatbot Interpretation of Simplified Reports by Subspecialty



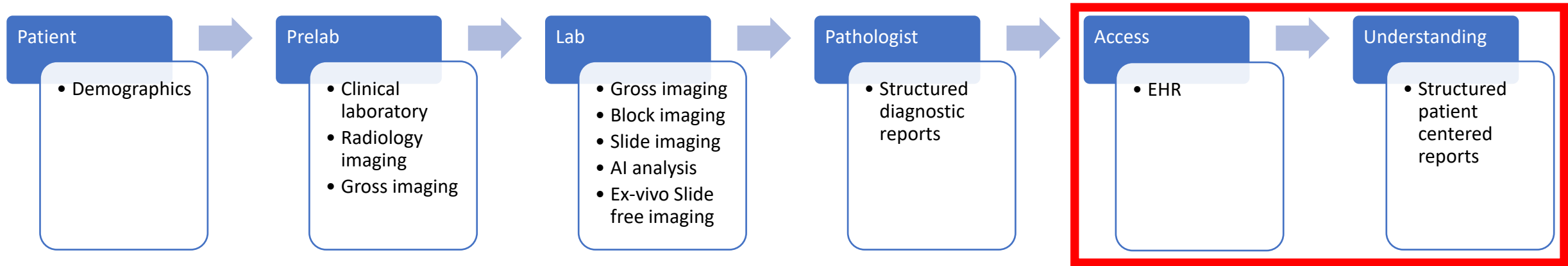
ENT indicates otorhinolaryngologic; GI, gastrointestinal; GU, genitourinary; and GYN, gynecologic.

# PathChat and Generative AI in Pathology

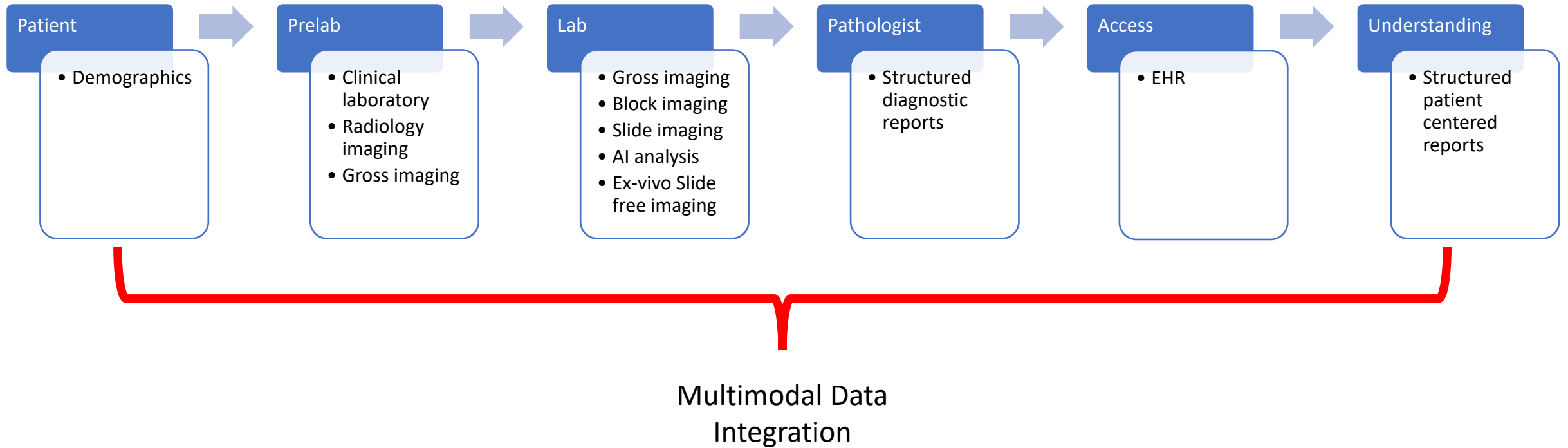
## PCPR



# Data Flow

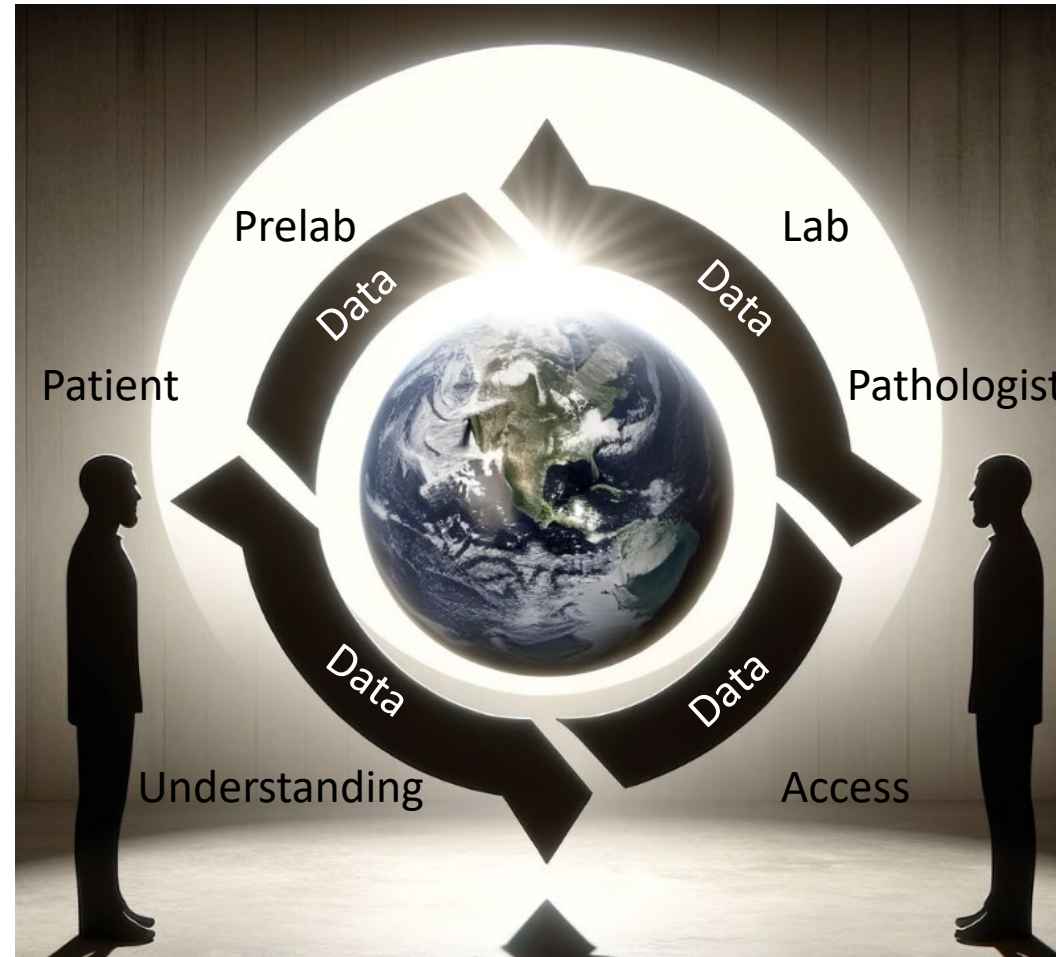


# Data Flow



# Patient Centered Digital Pathology

- 47-year-old male presents for routine healthcare.
  - Has increased family risk for cancer
  - Undergoes PSA screening = elevated
  - Repeat PSA = elevated
  - MRI = PI-RADS 3
  - Low-risk Prostate cancer
  - PRS elevated

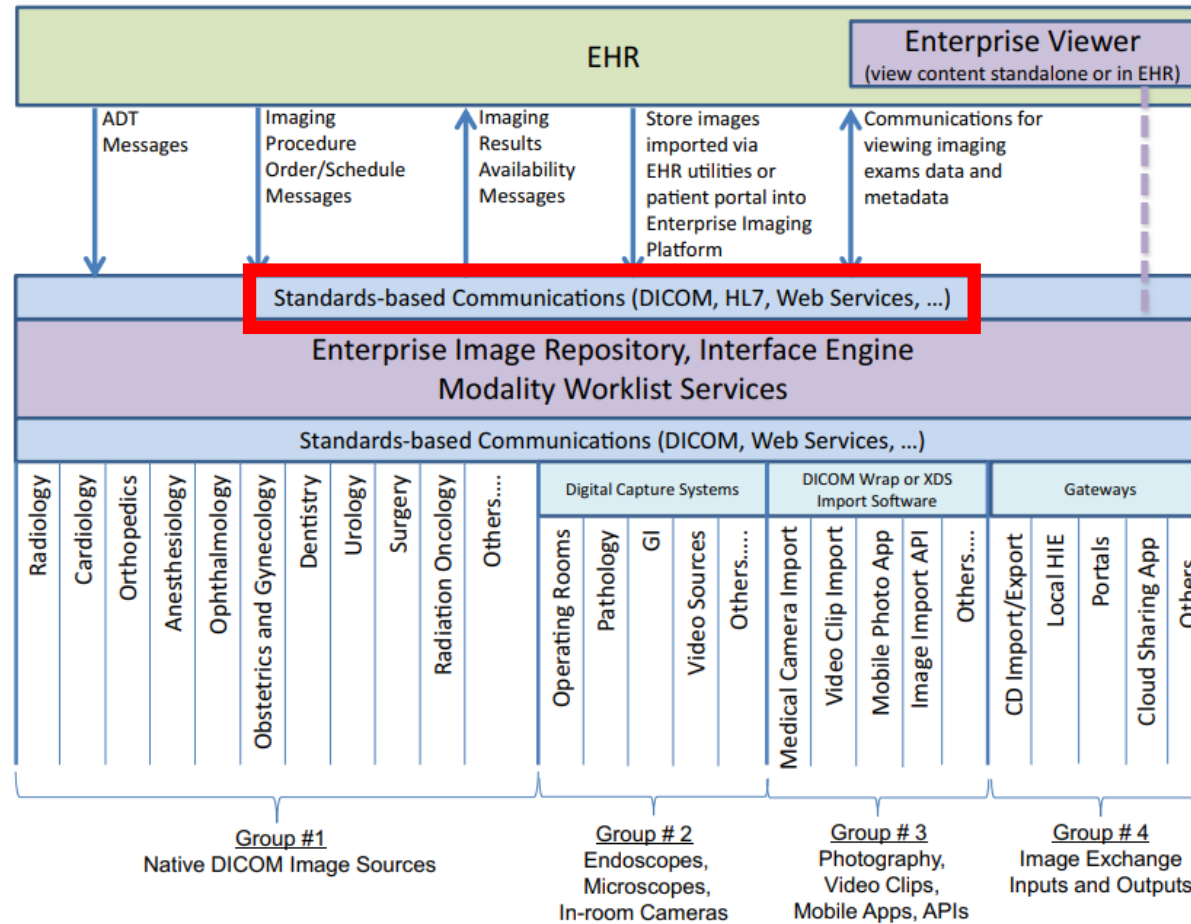


# Enterprise Imaging

- **Definition**: A set of strategies, initiatives and workflows implemented across a healthcare enterprise to consistently and optimally capture, index, manage, store, distribute, view, exchange, and analyze all clinical imaging and multimedia content to enhance the electronic health record.

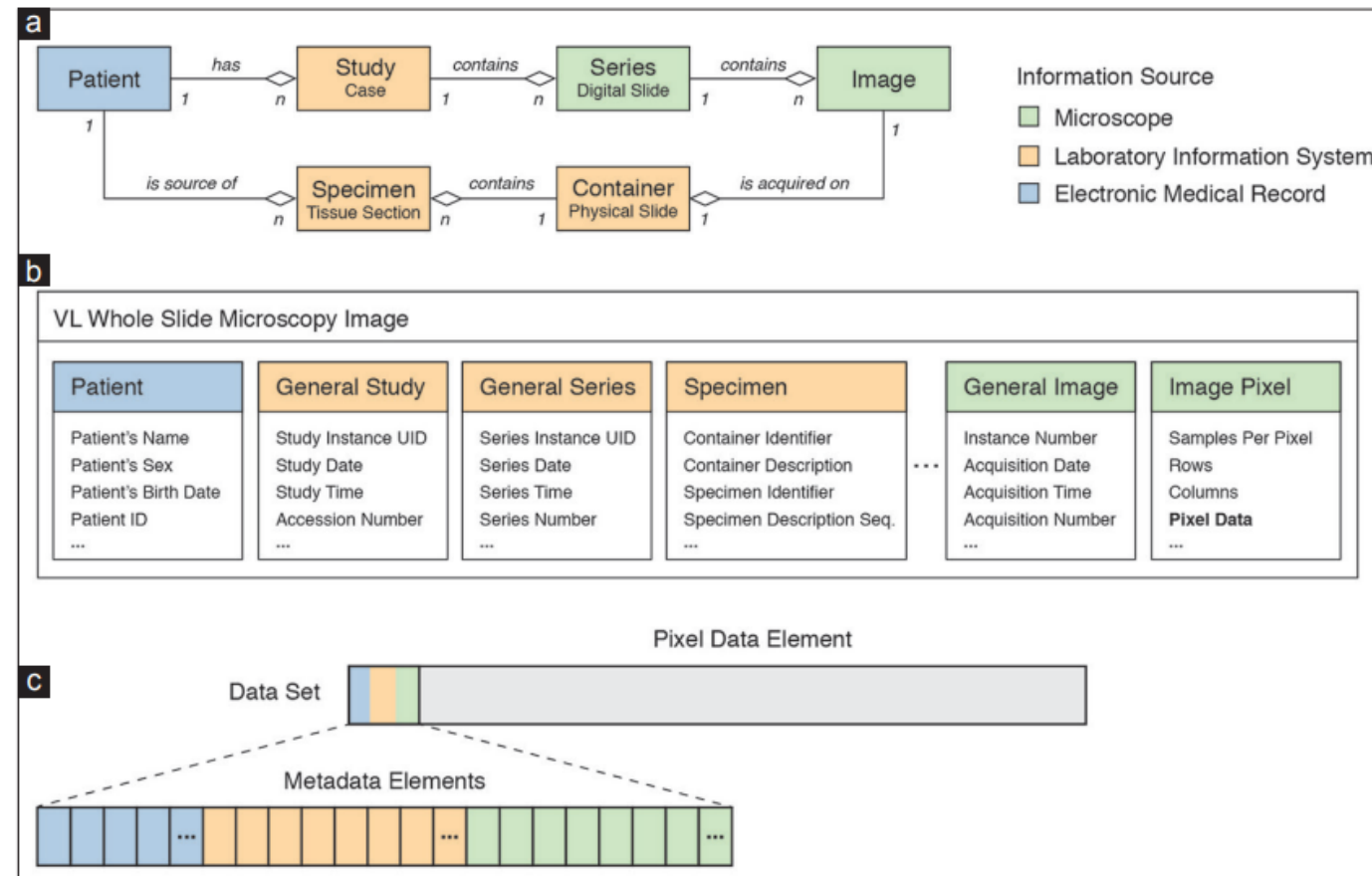


# Enterprise Imaging



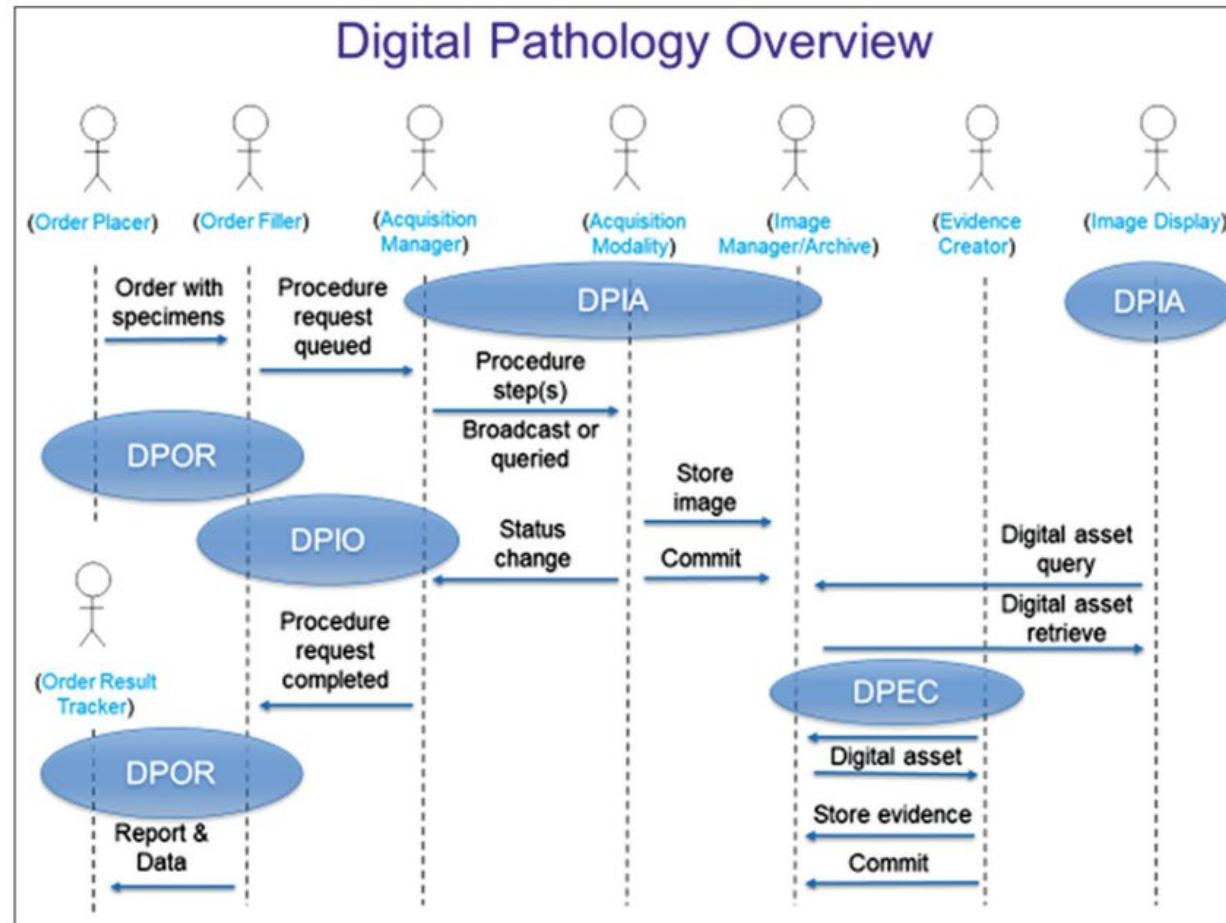
**Fig. 1** An Enterprise Imaging platform provides the standards-based, enterprise infrastructure to support departmental imaging workflows. This includes modality worklist services, image archival, index, enterprise viewer application viewing within or outside the EHR, query/retrieve of imaging content from most departments, as well as image exchange capabilities

# Digital Imaging and Communications in Medicine (DICOM<sup>®</sup>)



**Figure 1:** Representation of digital pathology information in DICOM.

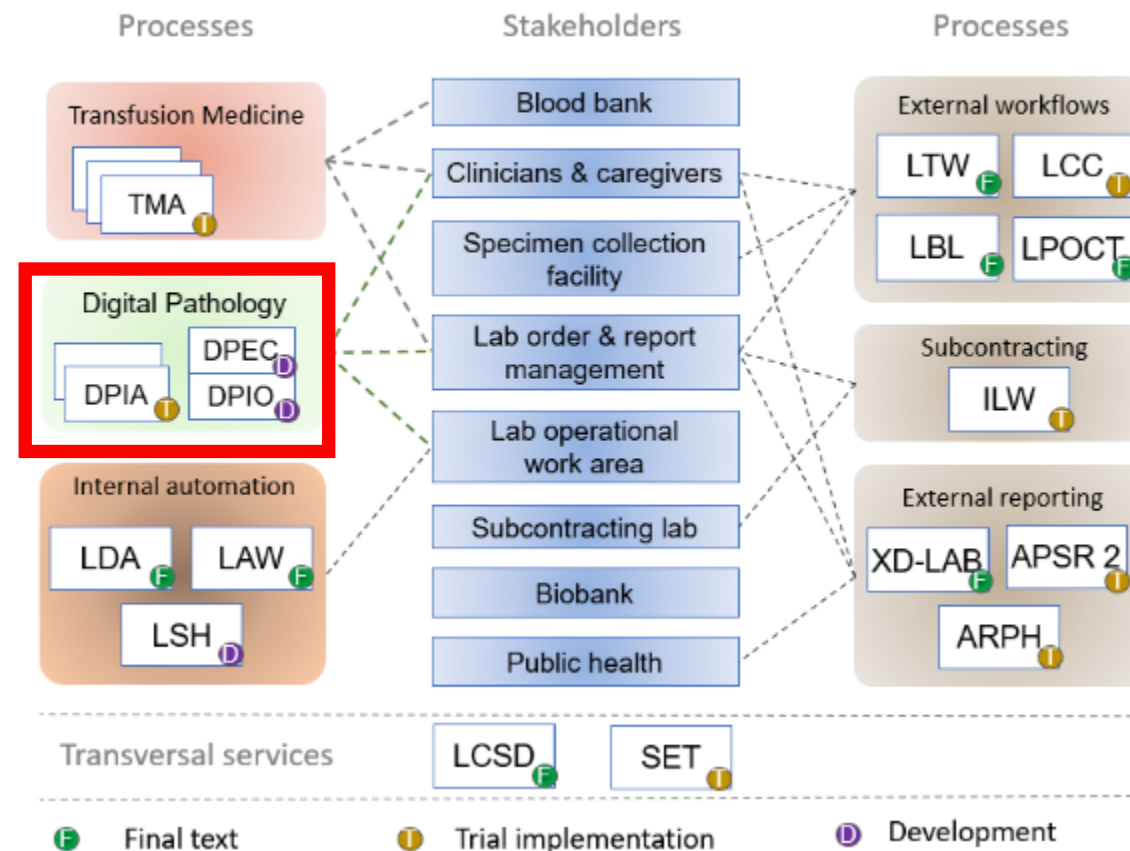
# Integrating the Health-care Enterprise Pathology and Laboratory Medicine (IHE PaLM)



**Figure 4:** Actors and transactions involved in the digital pathology workflow. The digital pathology image acquisition profile has been published. Digital pathology ordering and reporting, digital pathology image ordering, and digital pathology evidence creation profiles represent future development

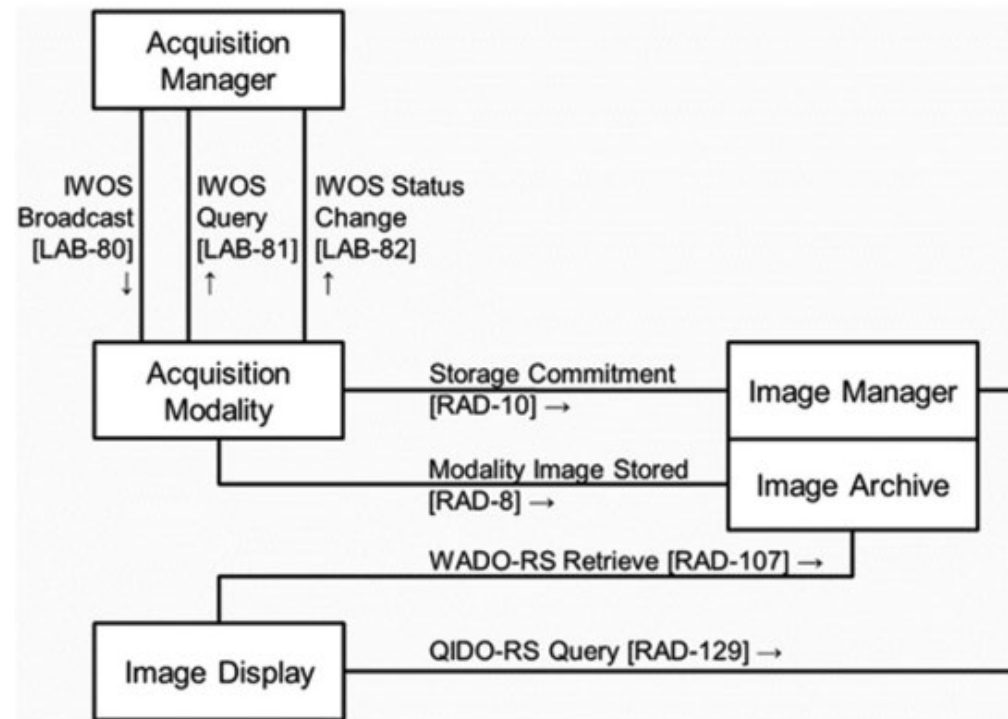
# Integrating the Health-care Enterprise Pathology and Laboratory Medicine (IHE PaLM)

## Overview of the PaLM profiles



# Integrating the Health-care Enterprise Pathology and Laboratory Medicine (IHE PaLM)

## Digital Pathology Image Acquisition (DPIA)



**Figure 6:** Digital pathology image acquisition profile: Transactions to acquire, store, and display images. IWOS stands for “Image Work Order Steps”

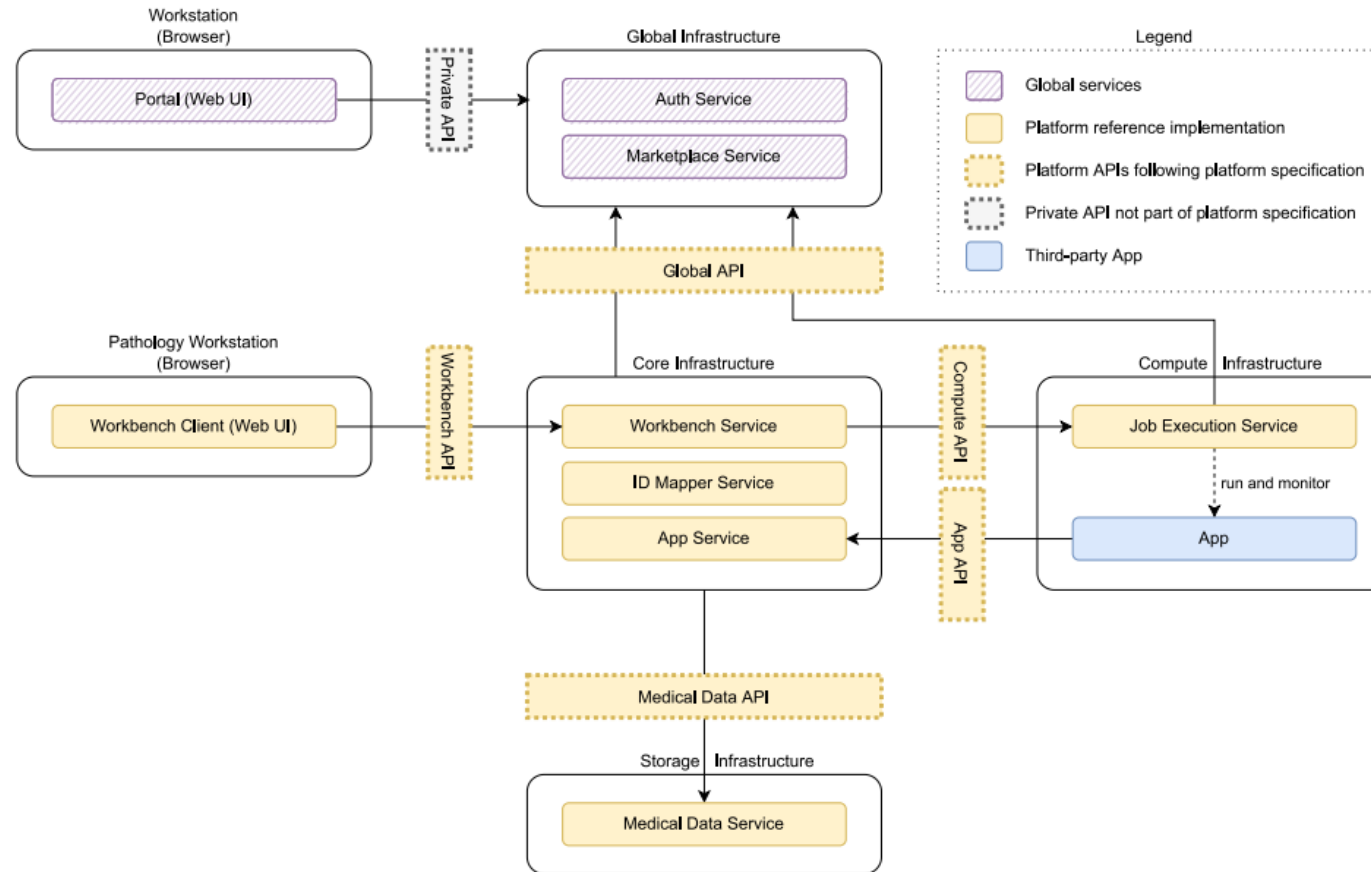
# Anatomic Ontology Assessment SNOMED CT

**Table 4** Ontology viability assessment for use in enterprise imaging

Ontology	Viable: Yes/No	Why	Why not
LOINC	No		<p>Radiology-specific (RadLex dictionary)</p> <p>No anatomy mapping across imaging specialties and/or between surface and internal anatomy</p> <p>Note: may require SNOMED CT to achieve cross-discipline relativity</p>
ICD-11	No		<p>Major gap between surface and functional anatomy and no true hierarchical approach</p> <p>ICD-11 determines anatomy by diagnosis/pathology (result of the imaging)</p>
SNOMED CT	Yes	<p>Broad medical specialty support</p> <p>Global presence</p> <p>Anatomy determination driven by body part/region being imaged (procedure code for orders-based imaging) and separately reason for exam</p>	<p>Although not free to all, it is free to many (member countries)</p> <p>*Availability of the SNOMED CT Authoring Platform and the Reference Set &amp; Translation tool may be an area of further discussion</p>

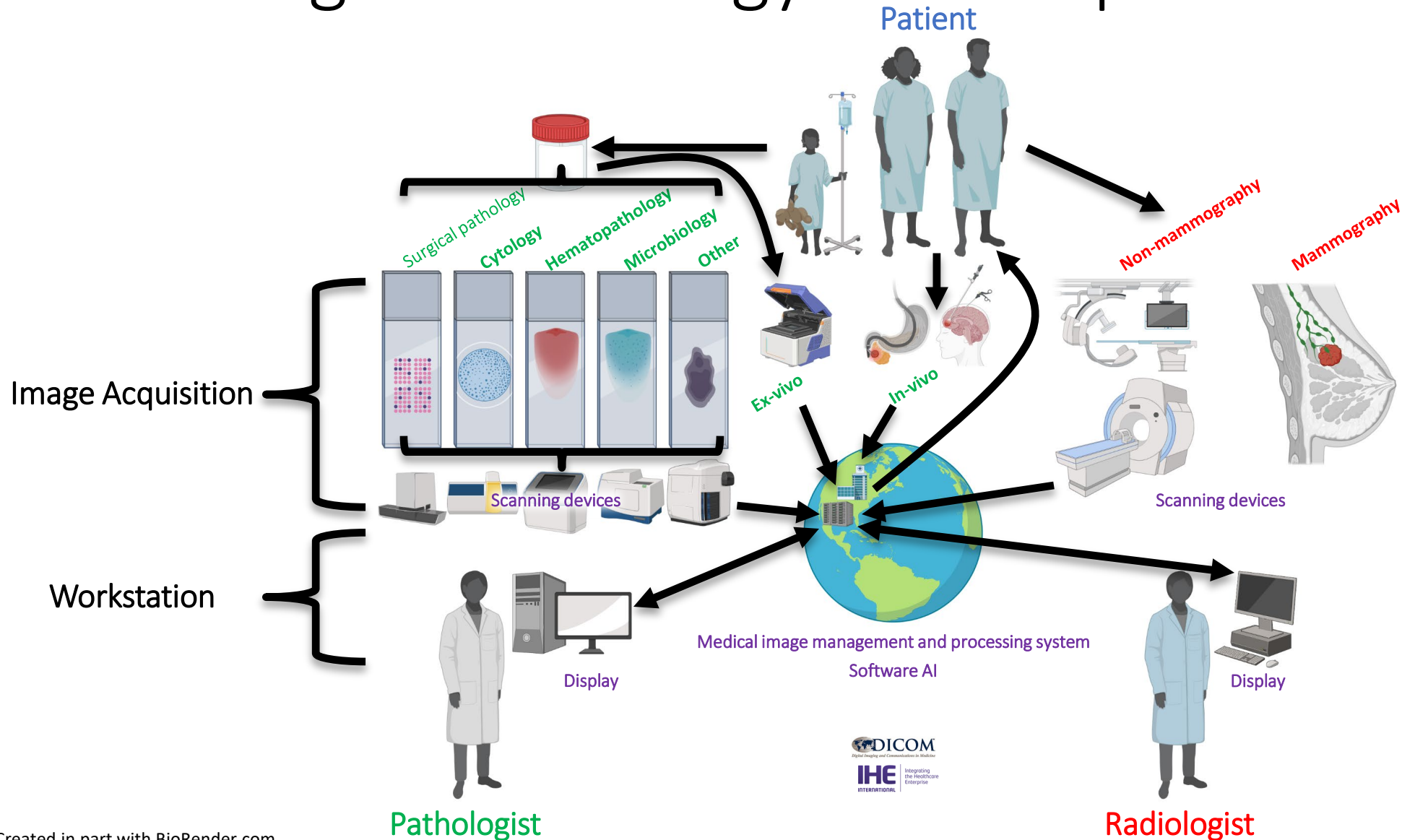


# Ecosystem for Pathology Diagnostics with AI Assistance (EMPAIA)

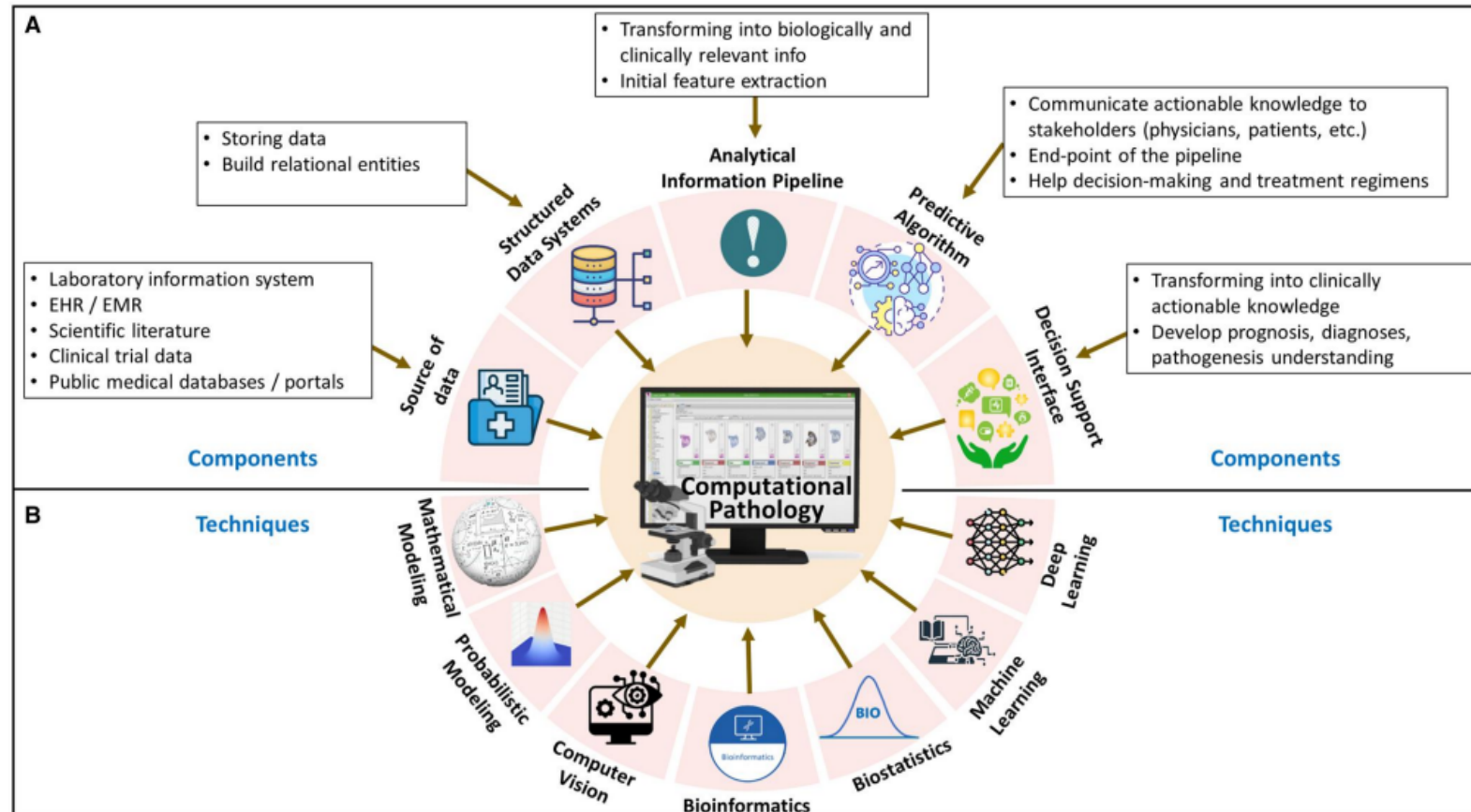


**Fig. 1.** Platform Architecture: Global Services for central user-/organization-management, authentication, and app distribution are rendered in purple. Decentralized Platform Services for pathology laboratories are rendered in yellow. Solid arrows denote the direction of HTTP API requests.

# Digital Pathology in Enterprise Imaging

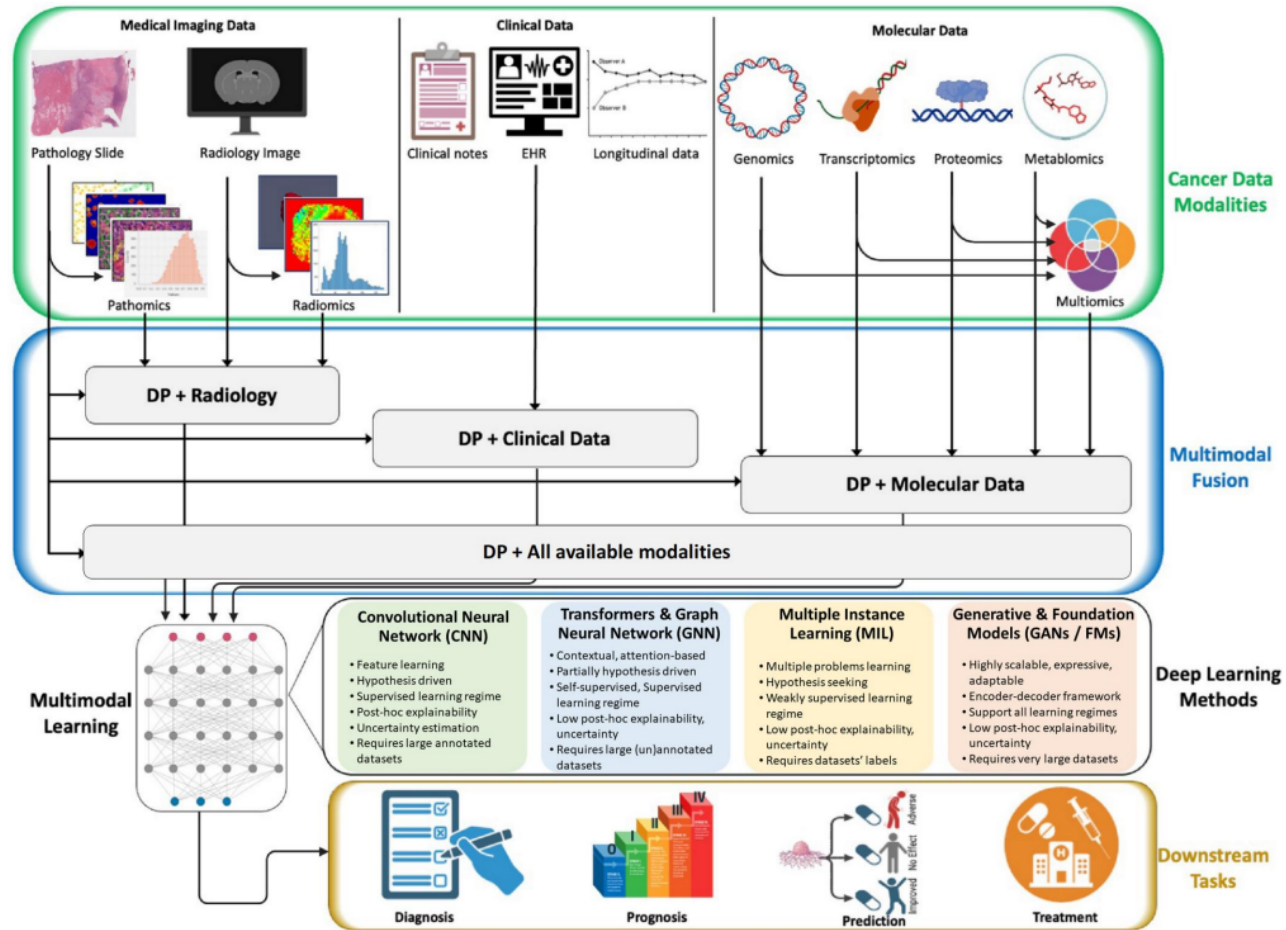


# Multimodal Data Integration



**Figure 1.** A template of the future road map for Digital Pathology (DP) and CPATH is presented. (A) Components of DP and CPATH are depicted, which include sources of input data, structured database systems, analytical information extraction pipeline, predictive algorithms, and decision support end-point interfaces. (B) Existing DP and CPATH techniques frequently used in research include mathematical models, probabilistic modelling, computer vision, bioinformatics, biostatistics, ML, and deep learning.

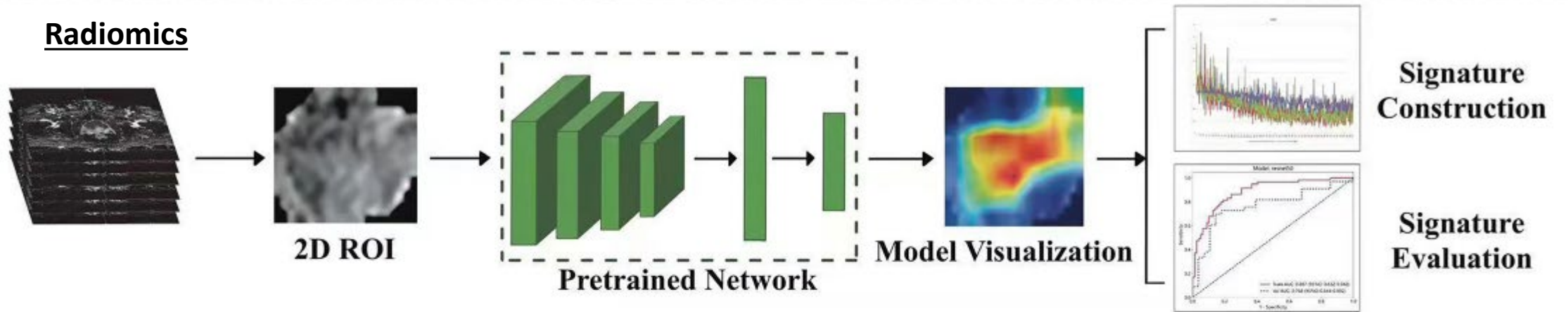
# Multimodal Data Integration



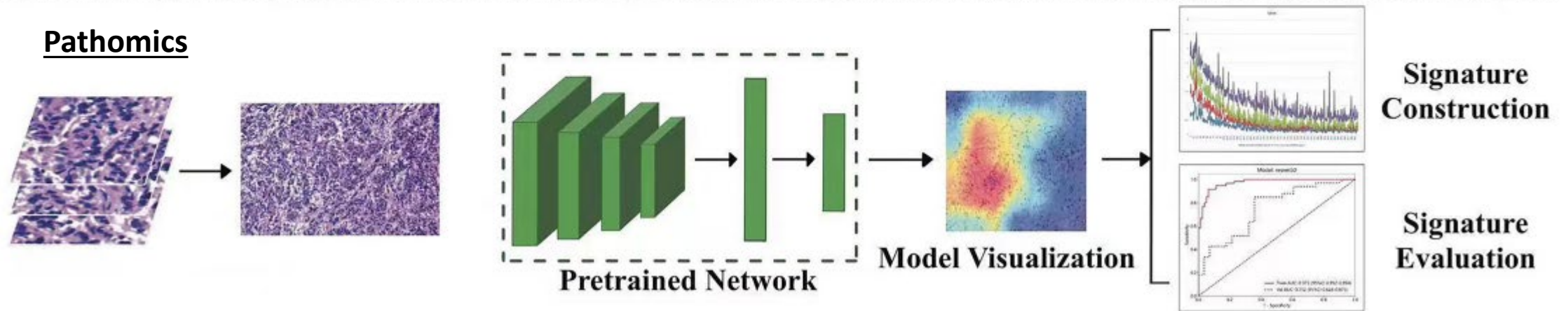
**Figure 2.** A schematic layout of multimodal learning in cancer care is presented. Multiple data modalities include histopathology images and data (including features extracted from gigapixel images referred to as pathomics features), radiological images and radiomics features (extracted from radiology images), clinical information, and molecular data. Various data modalities can be fused together by AI models to perform a range of downstream tasks, including disease diagnosis, prognosis, prediction, treatment planning, and post-treatment surveillance and monitoring. Data fusion can be performed at different levels and in many different ways using AI models only or a mixture of manual processing and AI models.

# Multimodal Data Integration Prostate

## Radiomics

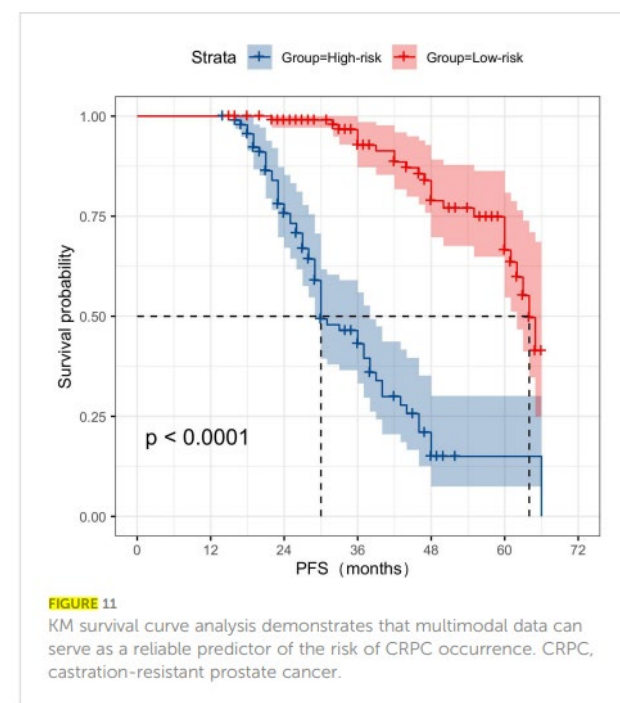
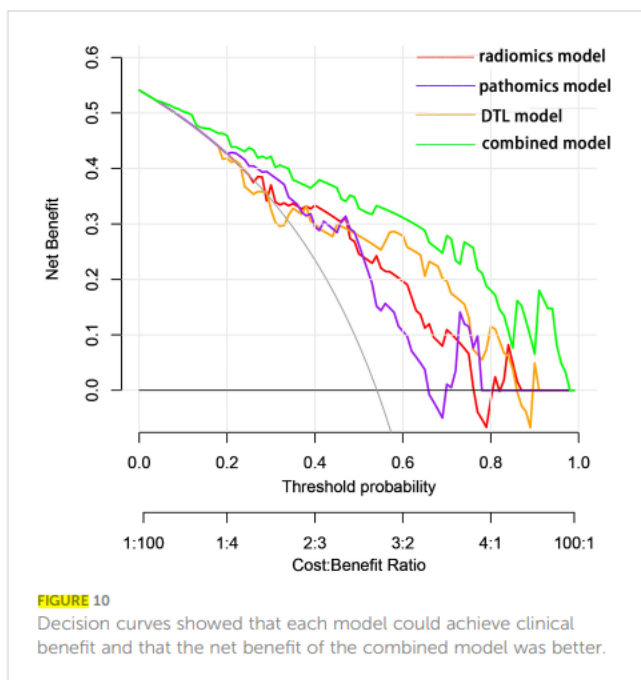
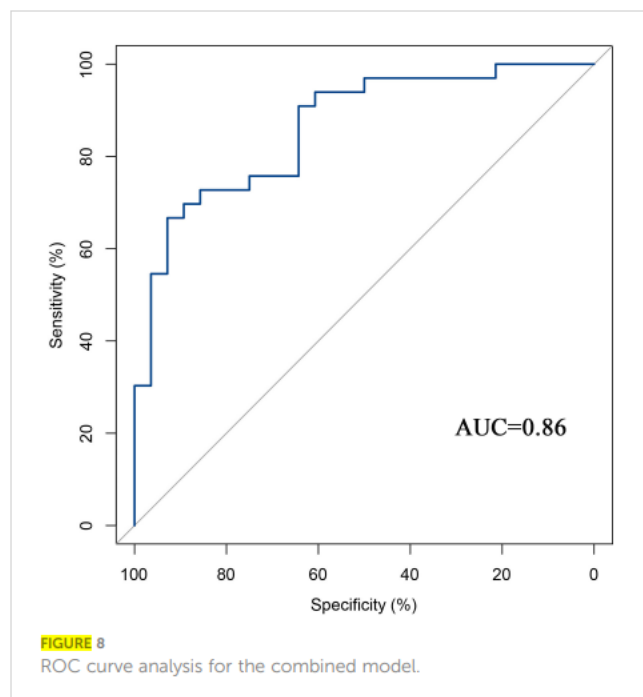


## Pathomics





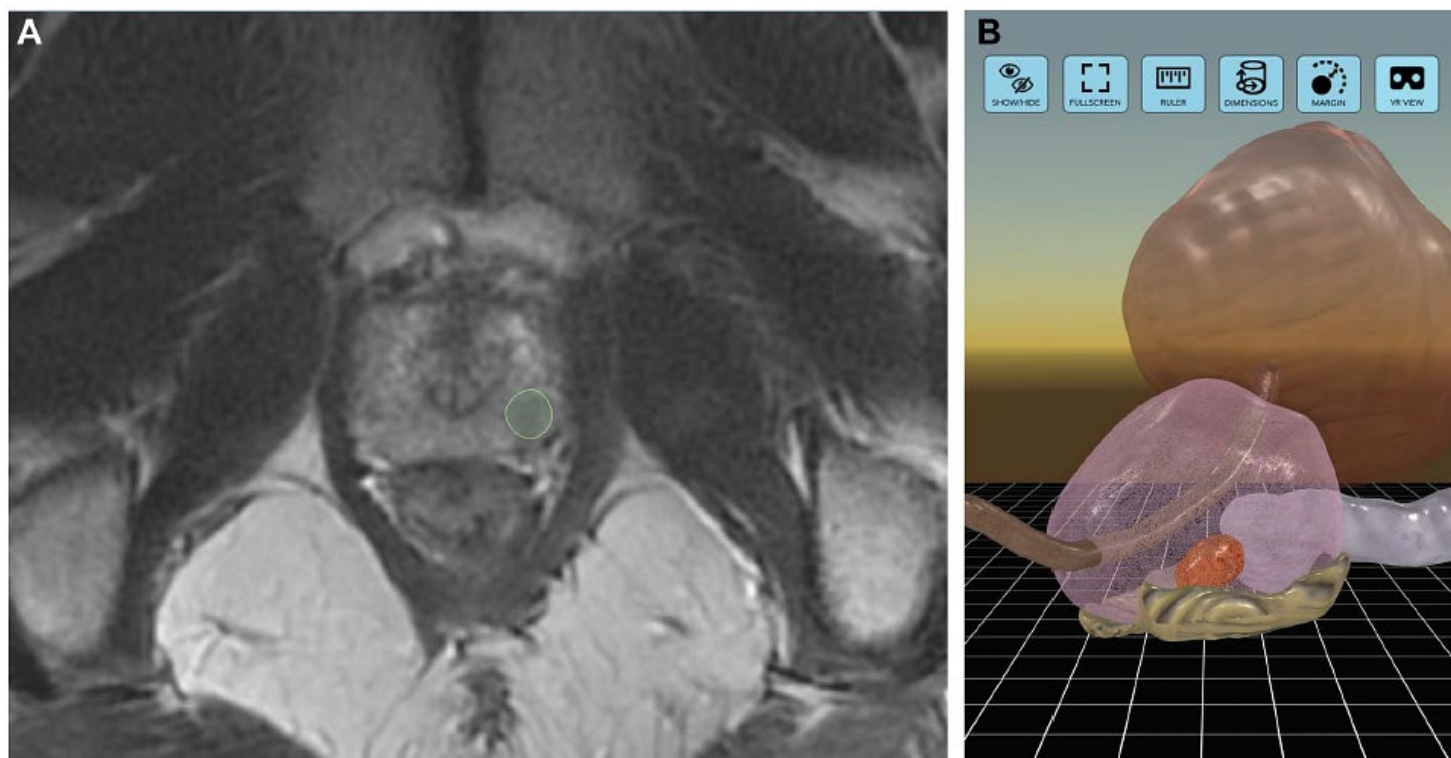
# Multimodal Data Integration Prostate



The integration of multimodal data effectively improves the prediction of risk for the progression of Prostate cancer to Castrate resistant prostate cancer



# Multimodal Data Integration Prostate



**Figure 2.** A, MRI image of prostate showing lesion (outlined). B, 3D model of prostate showing anatomical structures, lesions and color-coded segments from prostate biopsy.

Metric	Control (%)	Intervention (%)
Margin positive rates	33	25
Detectable postoperative PSA	31	9
Nerve sparing surgery	78	92

# Summary

- Explored the Patient Data Journey in Digital Pathology
- Highlighted the Impact of Standardized Digital Pathology Data Practices on Patient Outcomes
- Promote Patient-Centered Approaches in Digital Pathology



Thank you!

Future of Cancer Data Summit

10-18-2024



COLLEGE of AMERICAN  
PATHOLOGISTS

