5-2-2012

Diagnostic Patterns and Immunohistochemical Stain Usage in Extended Core Prostate Biopsies: Comparisons Between Genitourinary and Non-Genitourinary Pathologists

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Diagnostic Patterns and Immunohistochemical Stain Usage in Extended Core Prostate Biopsies: Comparisons Between Genitourinary and Non-Genitourinary Pathologists

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ABSTRACT

Background: Ancillary immunohistochemical (IPOX) stains are useful in clarifying diagnostically challenging pathologic specimens. In diagnostic workup of prostate needle biopsies, stains for basal cells and α-methylacyl coenzyme A racemase (AMACR) are routinely used to support or refute the diagnosis of prostate cancer. Although useful, these stains add cost and must be used judiciously. There is a lack of firm guidelines establishing the proper utilization of IPOX studies in prostate pathology. Therefore, differences in patterns of stain use and diagnoses may exist, related to expertise of the pathologist.

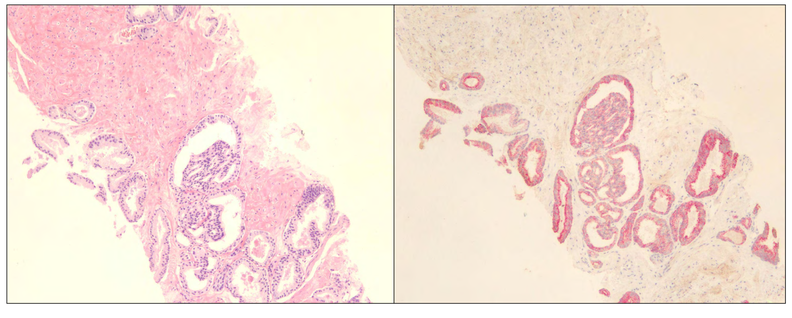
Objectives: The purpose of this study was to compare patterns of diagnoses and IPOX stain use in extended core prostate biopsies between genitourinary (GU) and non-genitourinary (non-GU) pathologists in the University of Massachusetts Medical Center Pathology department.

Methods: By computer search of medical records, consecutive extended core prostate biopsies (6+ cores) from years 2006-2011 were identified. Using Current Procedural Terminology (CPT) billing data, the number of cores and number of IPOX stains were retrieved. Prostate biopsy diagnoses were recorded. Pathologists who diagnosed prostate biopsies meeting computer search criteria were divided into two groups based on expertise: genitourinary and non-genitourinary. Differences in the patterns of IPOX use and diagnoses between the two groups were analyzed.

Results: GU pathologists diagnose significantly higher rates of prostate cancer and atypical small acinar proliferation and significantly lower rates of high-grade prostatic intra-epithelial neoplasia. Both groups order IPOX stains less as the percentage of Gleason score 4 disease increases in moderately differentiated cancers and as extent of disease increases. The average rate of IPOX use is not significantly different in the two groups. However, GU pathologists order IPOX stains significantly less in cancer cases and more in HGPIN cases. Finally, the variability in rate of IPOX usage is higher in the non-GU group.

Conclusion: Significant differences exist in patterns of IPOX usage between GU and non-GU pathologists in extended core prostate biopsies in this single institution study. Notably, the range of average number of IPOX stains ordered per case was much wider for non-GU pathologists, suggesting both over- and underutilization of stains in this group. This suggests the need for guidelines and continuing education focused on this issue to standardize practice, an intervention likely to improve quality of diagnoses and to reduce unnecessary costs.

Figure 1. Left Image: A relatively small focus of prostate cancer is present in this biopsy (H&E, 200x). Although the focus is small, glomeruloid pattern is present, a microscopic feature that is only present in prostate cancer and absent in all benign mimickers. **Right Image:** Same focus stained with PIN-4 immunostain shows lack of basal cells and increased AMACR expression, confirming the diagnosis of cancer. An expert genitourinary pathologist may be more likely to recognize the glomeruloid pattern as pathognomonic for cancer and thus less likely to order ancillary stains in this case.



RESULTS

Table 1. Summary of all cases. HGPIN = High grade intraepithelial neoplasia. ASAP = atypical small acinar proliferation suspicious but not diagnostic of cancer.

Diagnosis	GU	Non-GU	p-value
Benign	591 (42.8%)	535 (47.94%)	0.01
HGPIN	92 (6.7%)	134 (12.0%)	<0.001
ASAP	93 (6.7%)	48 (4.3%)	0.009
Cancer	605 (43.8%)	399 (35.8%)	<0.001
Total	1381	1116	

- GU pathologists diagnose significantly higher rates of prostate cancer and atypical small acinar proliferation.
- GU pathologists diagnose significantly lower rates of high-grade prostatic intra-epithelial neoplasia.

Table 2. Distribution of Gleason grades of cancer cases. * Includes all cases where highest Gleason score recorded was Gleason score 8, 9 or 10. No Gr indicates Gleason score could not be assigned. PNI = Perineural invasion.

	Highest Gleason Score of Cancer						
	3+3=6	**3+4=7**	**4+3=7**	**8,9,10***	**No Gr**	**PNI**	**Total**
GU	276 (45.6%)	139 (23.0%)	85 (14.1%)	102 (16.9%)	3 (0.5%)	186 (30.7%)	605
Non-GU	198 (49.6%)	92 (23.1%)	53 (13.28%)	56 (14.0%)	0	121 (30.3%)	399
p-value	0.22	1	0.78	0.25	0.028	0.94	

- There are no significant differences in the distribution of the Gleason scores or rate of perineural invasion in cancer cases between the two groups of pathologists.

Table 3. Distribution of extent of disease in cancer cases. Unilateral disease, Focal = one positive core 10% or less involvement. Unilateral disease, One Core, non-focal = One positive core greater than 10% involvement. Unilateral disease, Multiple Cores = Multiple ipsilateral positive cores. Bilateral Disease, Focal = Bilateral positive cores (One side or both sides with only one positive core). Bilateral Disease, Multiple Cores = Multiple positive cores bilaterally.

	Unilateral Disease			Bilateral Disease		
	Focal	**One Core, non-focal**	**Multiple Cores**	**Focal**	**Multiple Cores**	**Total**
GU	92 (15.2%)	56 (9.3%)	195 (32.2%)	123 (20.3%)	139 (23.0%)	605
Non-GU	62 (15.5%)	41 (10.3%)	130 (32.6%)	89 (22.3%)	77 (19.3%)	399
p-value	0.93	0.59	0.95	0.48	0.18	

- There are no significant differences in the distribution of extent of disease in cancer cases between the two groups of pathologists.

Table 4. Rate of IPOX usage by tumor Gleason grade. Rate of IPOX usage = billed IPOX units (88342) / billed biopsy units (88305) x 4. The rate was multiplied by four to correlate with "Triple stains / 12 jar extended core biopsy".

	Highest Gleason Score of Cancer				
	3+3=6	**3+4=7**	**4+3=7**	**8,9,10**	**No Gr**
GU	1.34	0.35	0.11	0.48	0.93
Non-GU	1.62	0.58	0.37	0.28	NA

- Both groups of pathologists order IPOX stains less as the percentage of Gleason score 4 increases in moderately differentiated cancers.

RESULTS (continued)

Table 5. Rate of IPOX use by extent of disease.

	Unilateral disease			Bilateral Disease	
	Focal	**One Core, non-focal**	**Multiple Cores**	**Focal**	**Multiple Cores**
GU	1.9	0.99	0.69	0.78	0.14
Non-GU	2.13	0.97	0.91	0.98	0.39

- Both groups of pathologists order IPOX stains less as extent of disease increases.

Table 6. Rates of IPOX use by diagnosis, average rate of IPOX ordering, and range of IPOX ordering.

	Benign	**HGPIN**	**ASAP**	**Cancer**	**Average IPOX Rate**	**Range of IPOX Use**
GU	0.41	1.13	2.28	0.79	0.75	0.68-0.86
Non-GU	0.38	0.71	2.09	1.02	0.72	0.20-2.17
p-value	0.75	0.03	0.57	0.03	0.67	

- The average rate of IPOX stain ordering is not significantly different between the two groups of pathologists.
- However, GU pathologists order IPOX stains significantly less in cancer cases and more in HGPIN cases.
- The range of average number of IPOX stains ordered per case is much wider for non-GU pathologists.

CONCLUSION

- Significant differences exist in patterns of diagnostic outcome and IPOX stain usage between genitourinary and non-genitourinary pathologists for extended core prostate biopsies in this single institution study.
- The extreme variability in the range of IPOX stain ordering rates observed in the non-GU pathologists as compared to the GU pathologists suggests that there is both over- and underutilization of IPOX stains in the non-GU group.
- The results suggest the need for guidelines and continuing education focused on this issue to standardize practice, an intervention likely to improve quality of diagnoses and to reduce unnecessary costs.

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