Optimization of Prostate Biopsy
Review of Technique and Complications

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KEYWORDS

• Prostate needle biopsy • Magnetic resonance imaging • Biopsy core number
• Quinolone-reistant infection

KEY POINTS

- A 12-core systematic biopsy that incorporates apical and far-lateral cores in the template distribution allows maximal cancer detection and avoidance of a repeat biopsy, while minimizing the detection of insignificant prostate cancers.
- End-fire and side-fire ultrasound probes, along with transrectal and transperineal approaches to prostate biopsy, have similar cancer detection rates and complications.
- Magnetic resonance imaging–guided prostate biopsy has an evolving role in both initial and repeat prostate biopsy strategies, potentially improving sampling efficiency, increasing the detection of clinically significant cancers, and reducing the detection of insignificant cancers.
- Hematuria, hematospermia, and rectal bleeding are common complications of prostate needle biopsy, but are generally self-limiting and well tolerated.
- Fluoroquinolones and cephalosporins remain the recommended prophylactic antibiotics, although the frequency of quinolone-resistant infections is increasing.

OPTIMIZING PROSTATE BIOPSY IN CLINICAL PRACTICE: CORE NUMBER AND LOCATION

Cancer Detection Rate

Optimizing prostate cancer detection rates (CDRs) in clinical practice translates into defining the ideal number and location of biopsy cores to maximize clinically significant cancer detection, minimize insignificant cancer detection, and reduce the necessity for repetitive rebiopsy. The recently published American Urological Association (AUA) recommendations on the optimal technique of prostate biopsy and specimen handling,[1] along with an accompanying review article,[2] recommended the use of an extended 12-core biopsy strategy, incorporating far-lateral and apical samples, for initial prostate biopsy. Historically, comparison of CDR between sextant biopsy protocols and extended-core biopsy protocols (involving 10–12 cores) have demonstrated a trend of increasing CDR with greater core number (**Table 1**).[3] Although increasing the cores from 6 to 12 results in a significant increase in CDR, increasing the number of cores to 18 or 21 (saturation biopsy) as an initial biopsy strategy does not appear to result in a similar increase.[4] de la Taille and colleagues[5] found in their cohort of 303 patients that the CDRs using sextant, extended 12-core, 18-core, and 21-core biopsy schemes

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Table 1
Cancer detection rates by number of prostate biopsy cores

	Cancer Detection Rate				
No. of Prostate Biopsy Cores	6	10–12	18	20–21	24
Study					
Eskew et al, 1997	26.1%	40.3%[a]	—	—	—
Naughton et al, 2000	26%	27%	—	—	—
Presti et al, 2000	33.5%	39.7%	—	—	—
Babaian et al, 2000	20%	30%	—	—	—
Elabbady & Khedr, 2006	24.8%	36.4%	—	—	—
Gore et al, 2001	31%	43%	—	—	—
Philip et al, 2004	23%	32%	—	—	—
Shim et al, 2007	22%	28%	—	—	—
Scattoni et al, 2008	—	38.5%	39.9%	—	—
de la Taille et al, 2003	22.7%	28.3%	30.7%	31.3%	—
Pepe & Aragona, 2007	—	39.8%	39.8%	—	49.0%[b]
Jones et al, 2006	—	52%	—	—	45%
Guichard et al, 2007	—	38.7%	41.5%	42.5%	—
Ploussard et al, 2012	32.5%	40.4%	—	43.3%	—

[a] 13-Core extended-biopsy strategy.
[b] 29-Core saturation-biopsy strategy.
Data from Refs.[3–5,19,123–132]

were 22.7%, 28.3%, 30.7%, and 31.3%, respectively. Diagnostic yield improved by 24.7% when the number of cores increased from 6 to 12, but only by 10.6% when the number of cores increased from 12 to 21. In their review of the diagnostic value of systematic prostate biopsies, Eichler and colleagues[6] noted that taking more than 12 cores did not significantly improve cancer yield.

With regard to core location, the AUA white paper highlights the need to sample both apical and far-lateral regions as these appear to increase CDR, but notes that transition-zone sampling does not improve prostate CDR at initial extended biopsy. In a study by Babaian and colleagues[3] evaluating an 11-core biopsy strategy in 362 patients, the CDR was 34% among 85 men undergoing primary biopsy. Among 9 cancers identified uniquely at nonsextant sites, 7 were identified by anterior-horn (far-lateral) biopsies and 2 by transition-zone biopsies. Because the entire apex is composed of peripheral zone, biopsies performed at the apex or lateral apex might not sample the anterior apex. Biopsy cores directed at the anterior apex exclusively contribute to cancer detection in 4% to 6% of men.[7] Moreover, additional extreme anterior apical cores (one on each side) have achieved the highest rate of unique cancer detection ($P = .011$).[8] Transition-zone biopsies, as part of an initial diagnostic strategy, have generally demonstrated a low rate of exclusive cancer detection (2.9%),[9] although in some series CDR did improve with transition-zone sampling ($P = .023$).[4]

Likelihood of Clinically Significant/ Insignificant Prostate Cancer

Among the growing concerns of overdetection of prostate cancer, a potential drawback of increasing core numbers at the time of initial biopsy is the increased likelihood of detecting insignificant prostate cancers. Few reports have shown a higher detection rate of clinically insignificant prostate cancer with extended-biopsy schemes in comparison with sextant,[10] while most studies found no significant differences in the detection rate of insignificant cancers between sextant and extended-biopsy schemes.[11] In a large database study (N = 4072), Meng and colleagues[11] found that increasing the number of biopsy cores did not result in the identification of a disproportionate number of lower-risk tumors. However, increasing the number of cores beyond the extended-biopsy strategy does appear to increase the rate of indolent cancer detection. Haas and colleagues[12] showed that an extended-biopsy 18-core strategy increased the detection rate of insignificant prostate cancers by 22%. Far-lateral and apical-directed biopsy cores