ACR Prostate MR course

MRI-Targeted Prostate Biopsy

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Disclosures

- Consulting agreement – Koelis
- Research support and consulting agreement with Blue Earth Diagnostics
• To review the different approaches for use of mpMRI to help guide prostate biopsy, with emphasis on MR/US fusion biopsy techniques
MRI-Targeted Bx methods

- Any Bx technique where an MRI exam is used to determine the location of a suspicious target prior to biopsy

**MRI-guided ("In-bore") Bx**

*Pro:* direct visualization of target
*Cons:* time and cost

**MR/US fusion Bx**

**Cognitive**

**Software based**
# Software based MR/US fusion Bx

<table>
<thead>
<tr>
<th>Electro-magnetic tracking</th>
<th>Electro-mechanical tracking</th>
<th>Organ based-tracking</th>
<th>Simple image fusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>UroNav</td>
<td>Artemis</td>
<td>Trinity</td>
<td>BkFusion</td>
</tr>
<tr>
<td>DynaCAD</td>
<td>ProFuse</td>
<td>MrDraw</td>
<td>MIM Symphony</td>
</tr>
<tr>
<td>Philips</td>
<td>Eigen Health</td>
<td>Koelis</td>
<td>GE Healthcare</td>
</tr>
</tbody>
</table>

Margolis et al. PMID: 27187163
**MR/US fusion Bx**

**Transrectal Bx**

**Pro**
- Widely available
- LA

**Con**
- Risk of urosepsis
- Difficult to sample anterior lesions

**Transperineal Bx**

**Pro**
- Near zero risk of urosepsis
- Better access to anterior lesions

**Con**
- Risk of urinary retention
  > discomfort (but can be done with LA)

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• Image acquisition and interpretation
  • PI-RADS v2.1
  • Proprietary software for annotation of the images
Gland segmentation and creation of targets

- **2D or 3D T2-WI**: Higher spatial resolution and less susceptible to artifacts
- Usually up to 3-4 targets to avoid increase in morbidity, duration of procedure and time/cost for path processing
• Gland segmentation and creation of targets
  
  • **2D or 3D T2-WI**: Higher spatial resolution and less susceptible to artifacts
  
  • Usually up to 3-4 targets to avoid increase in morbidity, duration of procedure and time/cost for path processing
• Gland segmentation and creation of targets
  • **2D or 3D T2-WI**: Higher spatial resolution and less susceptible to artifacts
  • Usually up to 3-4 targets to avoid increase in morbidity, duration of procedure and time/cost for path processing
• Target the **Index Lesion** first (Bx can deform the gland)
• At least 2 cores/target
• Q: Which PI-RADS lesions do you target/biopsy?
• A:
  • All PI-RADS 5 and 4
  • Some PI-RADS 3
    ➢ Consider patient’s risk
    ➢ PSAD (serum PSA/gland volume)
      • PI-RADS ≤ 3 and PSAD < 0.15 ng/ml/cc have low risk for GG ≥ 2\textsuperscript{1,2}
  • No PI-RADS 1 and 2

1. PMID: 28258784
2. PMID: 31200846
• Q: Do we still need to perform SBx?
• A: It depends

➢ Negative mpMRI\(^1\) – NPV (median):
  • All cancers: 82.4% (IQR, 69.0-92.4%)
  • CS PCa: **88.1%** (IQR, 85.7-92.3)

➢ Positive mpMRI:
  • SBx should be considered at a minimum in the same side of MRI-target to enhance detection of CS PCa\(^2\) (73.5% -> 96%)

\(^1\)Moldovan PC, et al. Eur Urol 2017 - PMID: 28336078
\(^2\) Bryk DJ, et al. Urology 2017 - PMID: 27871829
67-year-old, PSA 7.53 ng/mL, negative SB x 1

FINAL DIAGNOSIS

1. Prostate, left base biopsy (A) - Adenocarcinoma of the prostate, Gleason score 3+4=7, involving two of two cores, 30% and 30%, 3 mm and 3 mm. Pattern 4 comprises 10% of the tumor (cribriform pattern).

2. Prostate, left mid biopsy (B) - Adenocarcinoma of the prostate, Gleason score 3+4=7, involving two of three cores, 80% and 10%, 6 mm and 1 mm. Pattern 4 comprises 10% of the tumor (cribriform pattern).

3. Prostate, left apex biopsy (C) - Adenocarcinoma of the prostate, Gleason score 3+4=7, involving one of two cores, 10%, 2 mm. Pattern 4 comprises 10% of the tumor (cribriform pattern).

FINAL DIAGNOSIS

1. Prostate, T1 left transitional zone, biopsy (A) - Benign prostatic tissue.

2. Prostate, T2 left lateral base, biopsy (B) - Benign prostatic tissue.

JKM/HLH/mal/07/24/2014

8. Prostate, left base to apex transitional zone, target 2 biopsy (H) - Adenocarcinoma of the prostate, Gleason score 3+4=7, involving three of three cores, 100%, 95%, 95%, 16 mm, 15 mm, 15 mm respectively. Pattern 4 comprises 10% of the tumor (cribriform pattern).
Elevated PSA and prior negative systematic Bx

Transrectal Bx: negative
Transperineal Bx: GS 3 +4
After the biopsy...

- Critical importance to develop a **feedback system** to enable MRI and MRI-guided Bx accuracy evaluation
- Informal review and formal case discussions in conferences, tumor boards, and periodic radiologic–pathologic correlation

- **ACR Prostate Cancer MRI Center Designation**
  - Requires facility to perform MRI-targeted prostate Bx (of any kind) or to have an agreement with a facility capable of performing the Bx
  - Facility must have a method for rad-path correlation
Thank you!