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Multidisciplinary Process for Quality Improvement of Multiparametric MRI of the Prostate and Prostate Biopsies

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Introduction

- Multiparametric MRI of the prostate is now a standard part of the workflow in diagnosing prostate cancer and recommended by national and international urologic associations
- We perform over 6000 prostate MRIs per year with ~ 1/4 going to biopsy per year, nearly all of them MRI/ultrasound fusion targeted biopsies
- Quality improvement and assurance is necessary to maintain high accuracy and to limit unnecessary biopsies

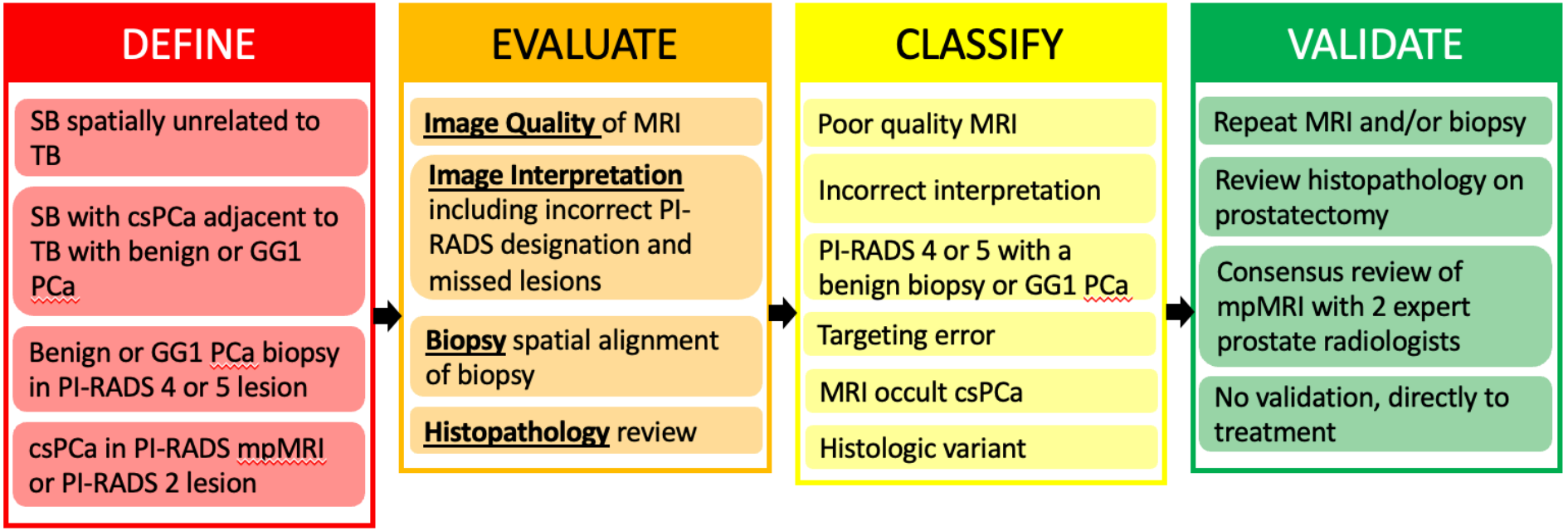
Objectives

- To develop a multi-disciplinary structured system for reviewing discordant results from MRI/ultrasound fusion biopsies
- To evaluate causes of discordant radiology/pathology results of MRI/ultrasound fusion biopsies

Methods

- Evaluated consecutive patients from a single urologist who had MRI of the prostate and subsequent targeted biopsy from 1/25/2022 to 2/13/2023
  - MRIs included institution and outside institution scans
- Urologist identified discordant cases:
  - PI-RADS 4/5 with benign biopsy results
  - PI-RADS 1/2 with clinically significant prostate cancer (csPCa)
- Multi-disciplinary (radiology, urology, pathology) structured evaluation of discordant results
- Analysis:
  - Descriptive statistics were performed

Discordant Pathway



Structured evaluation of discordant results from defining the presentation of discordance to evaluating to classifying the type of discordance to validating the discordance.

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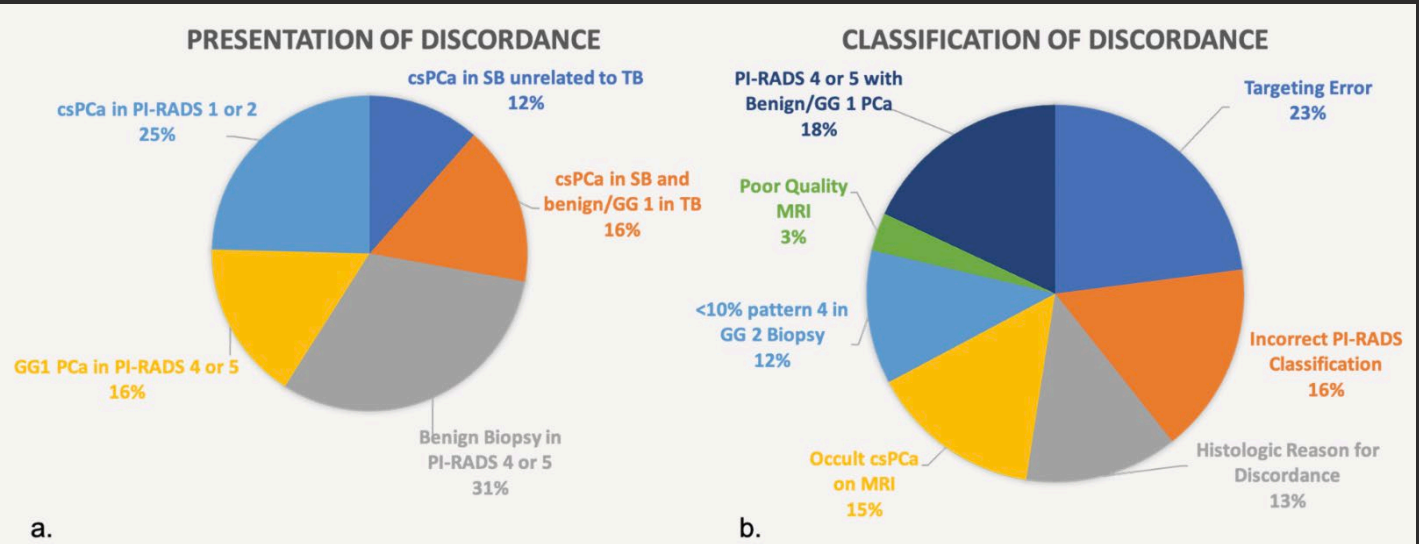
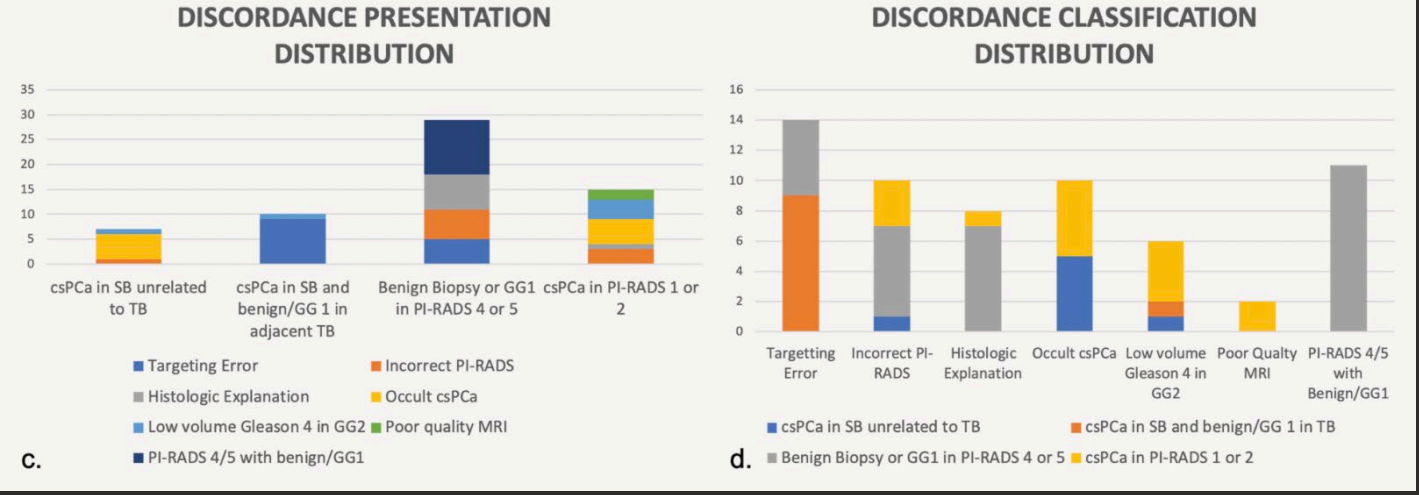
Results

- 472 total biopsies performed during the time period
- 61 discordant cases

Description	#
Patient Age	47-82 years, mean 69±7
Time Between MRI and Biopsy	2-419 days, mean 69±47 days
Total # Discordant Cases	61
# Studies performed at outside institution	12/61 (18.8%)
Post Treatment	8/61 (13.1%) (7 focal therapy, 1 SBRT)





csPCa = clinically significant prostate cancer

GG = Gleason Grade Group

SB = systematic biopsy

TB = targeted biopsy

PI-RADS = Prostate Imaging Reporting and Data System

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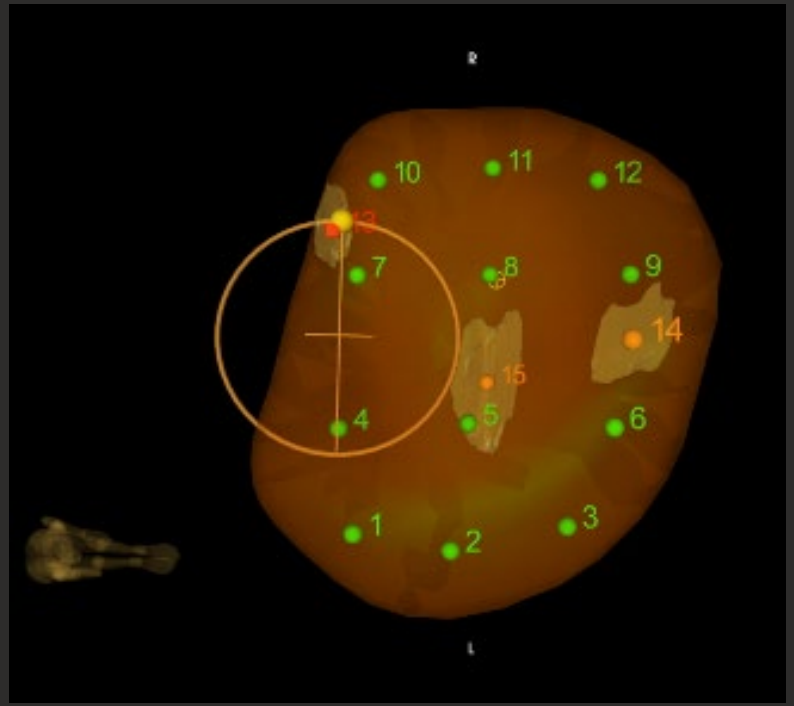
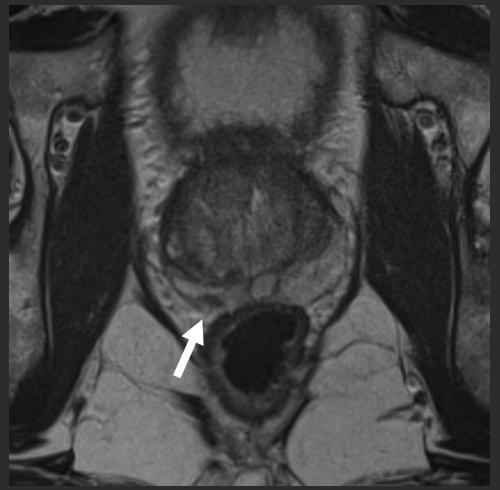
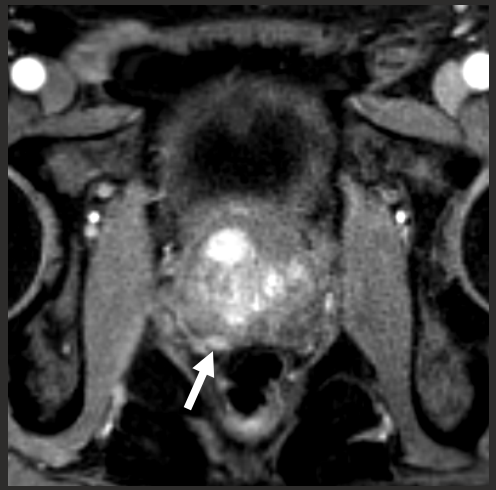
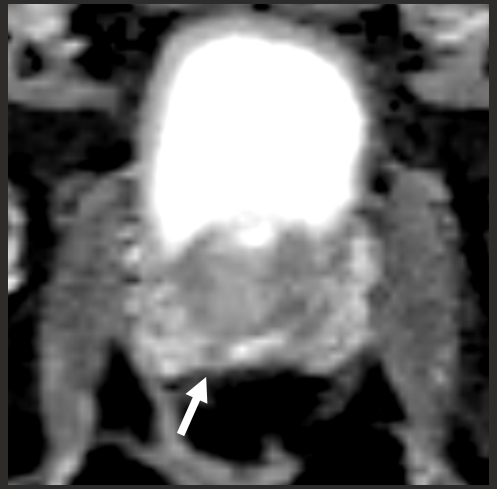
Targeting Error

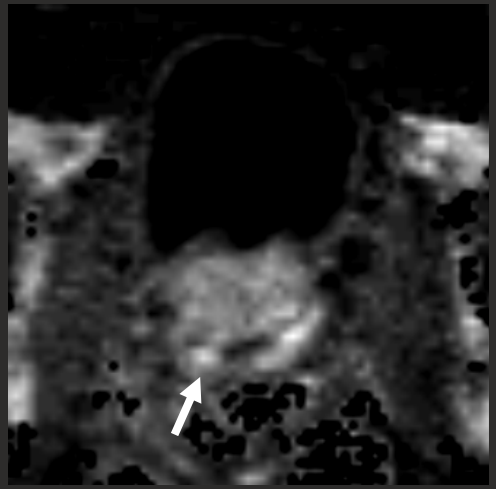


GG2 in #7, Benign in target #13

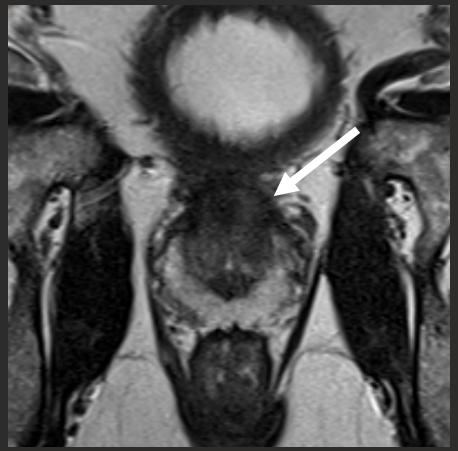


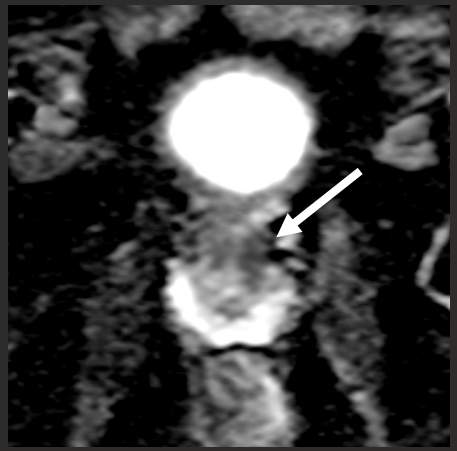


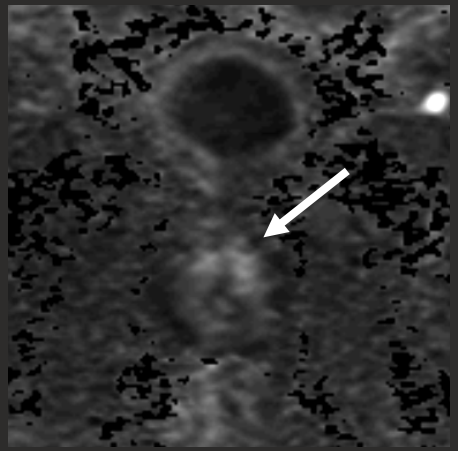




Interpretation Error

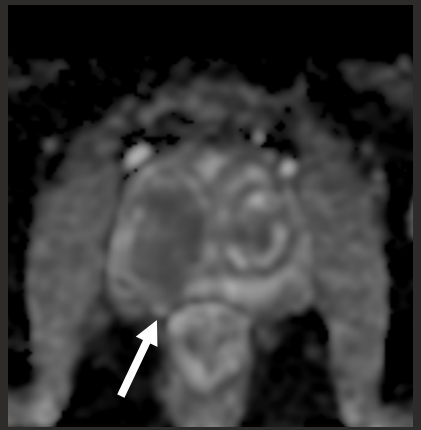


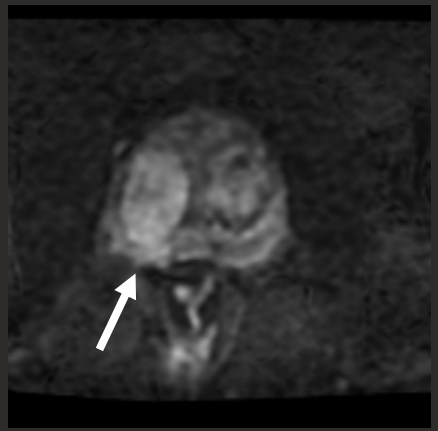




GG2 in a PI-RADS 2 lesion. Re-evaluated to be PI-RADS 3 given the high restricted diffusion.

Histologic Explanation





PI-RADS 4 lesion biopsied to be benign. Acute and chronic inflammation may be the cause for appearance on MRI

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Results

- 14 patients with targeting errors:
  - 13 transrectal approach; 1 transperineal approach
  - Size of lesions: 4mm-13mm, mean 8mm
  - Prostate gland size: 28 cc to 110 cc (mean 53 cc)
  - 12 peripheral zone, 2 transition zone lesions
  - 1 targeted with an external MRI
- 10 patients with incorrect PI-RADS
  - All MRIs performed in the institution
  - 1 lesion not identified (seen by microUS at time of biopsy)
  - 3 originally classified as PI-RADS 2, reclassified to PI-RADS 4 on review
  - 6 designated as PI-RADS 4, reclassified to PI-RADS 2 on review

Discussion

- 42% of discordances were either targeting error, incorrect PI-RADS, or due to poor quality MRI
  - These are areas for quality improvement
- 33% of discordances were patients with benign biopsies in PI-RADS 4/5 and occult clinically significant prostate cancer in PI-RADS 1/2
  - These areas are fodder for research investigation

- Next Steps:
  - Analyzing and identifying reasons for targeting errors and incorrect PI-RADS
  - Implementing actions
    - Peer review conferences
  - Re-evaluating after actions
  - Scaling the quality maintenance

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