Precision comparison of bone scan and [18]FDG PET/CT for bone staging in patients with high-risk prostate cancer at biopsy

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Disclosure

- None

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Introduction

- Accuracy of [18] FDG PET/CT for prostate cancer staging is limited.
- Detection rates for metastasis were similar between ^{18}F-choline and ^{18}F-FDG PET-CT in recurrent and metastatic PCa.
- FDG-PET captation is a poor prognostic marker in metastatic PCa

Beauregard, 2010

Jadvar 2015, *Mireilles 2010*, *Jadvar, 2013*

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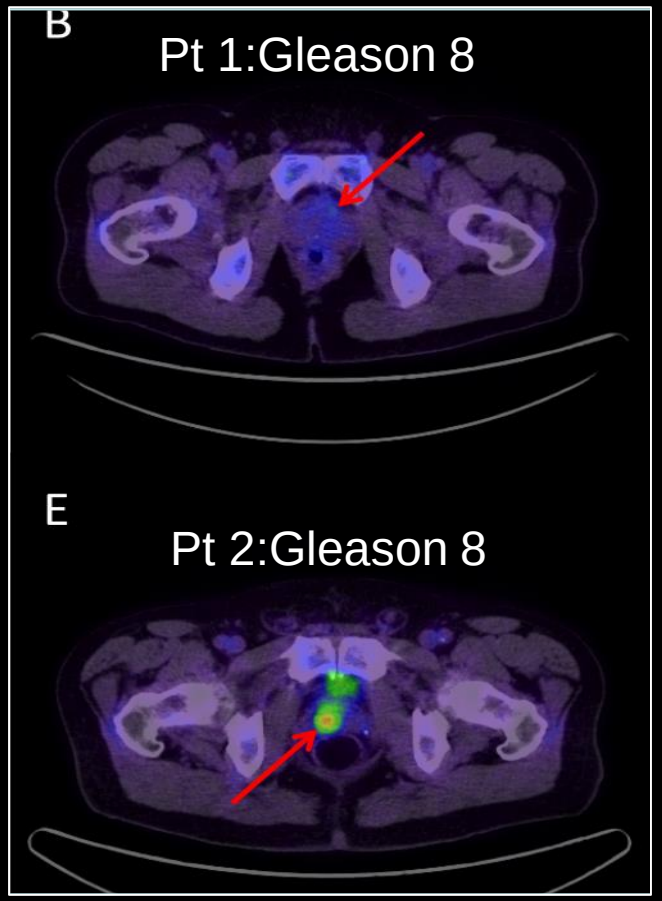
Introduction

- Gleason 8-10 cancer at biopsy
  - FDG-PET/CT+BS
  - Radical prostatectomy
- High intraprostatic FDG uptake (SUVmax) was predictive of
  - Adverse pathological prognostic factors
  - Early biochemical recurrence
  - Shorter time to castration resistance

^{18}FDG-PET/CT



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Lavallée et al. Eur Urol Focus. 2018 https://doi.org/10.1016/j.euf.2018.03.008

Objectives

1. Compare the diagnostic accuracies between FDG-PET/CT and bone scintigraphy at primary staging of patients with Gleason $\geq$ 8 PCa at biopsy;
2. Determine if FDG-PET/CT alone can be used as a staging procedure in these patients.

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Methods

- Between 2010 & 2016
  - 261 PCa patients with Gleason ≥ 8 at biopsy
  - Staging with bone scan + FDG PET/CT
- Imaging analysis
  - True positive for metastatic status:
    - Concordant findings between both imaging modalities
    - Discordant findings between imaging modalities=reference standard definition for true positive
      - biopsy
      - follow-up imaging showing progression
      - concordance with a third imaging technique
  - False positive
    - patients underwent curative treatment with complete biochemical response

Results

Patients and tumor characteristics

Number of patients (all, n))	261
Patients with bone metastasis (n)	33
Average age (years±SD)	66 ± 8,3
Chronology between bone scan & FDG-PET/CT	
Average (days±SD)	23 ± 50,5
Median	12
% pt with bone scan done before FDG-PET/CT	78
% FDG-PET/CT done before Bone scan	22
PSA (ng/mL)	
No metastasis	7,6
Mono metastasis	15,7
Oligo metastasis (<5 metastasis)	29,0
Pluri metastasis	84,0
Median Gleason sum at biopsy	
No metastasis	8
Mono metastasis	8
Oligo metastasis	9
Pluri metastasis	9

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Results

FDG-PET/CT and bone scan accuracies in mono, oligo and plurimetastasis patients

	Bone scan	FDG-PET/CT	Total
Patients with bone metastasis	26 (78,8%)	33 (100%)	33
Plurimetastasis	16 (100%)	16 (100%)	16
Oligo metastasis	6 (66,7%)	9 (100%)	9
Mono metastasis	4 (50,0%)	8 (100%)	8
False positive	5 (2,2%)	3 (1,3%)	227

FDG PET/CT detect 21% more bone mets

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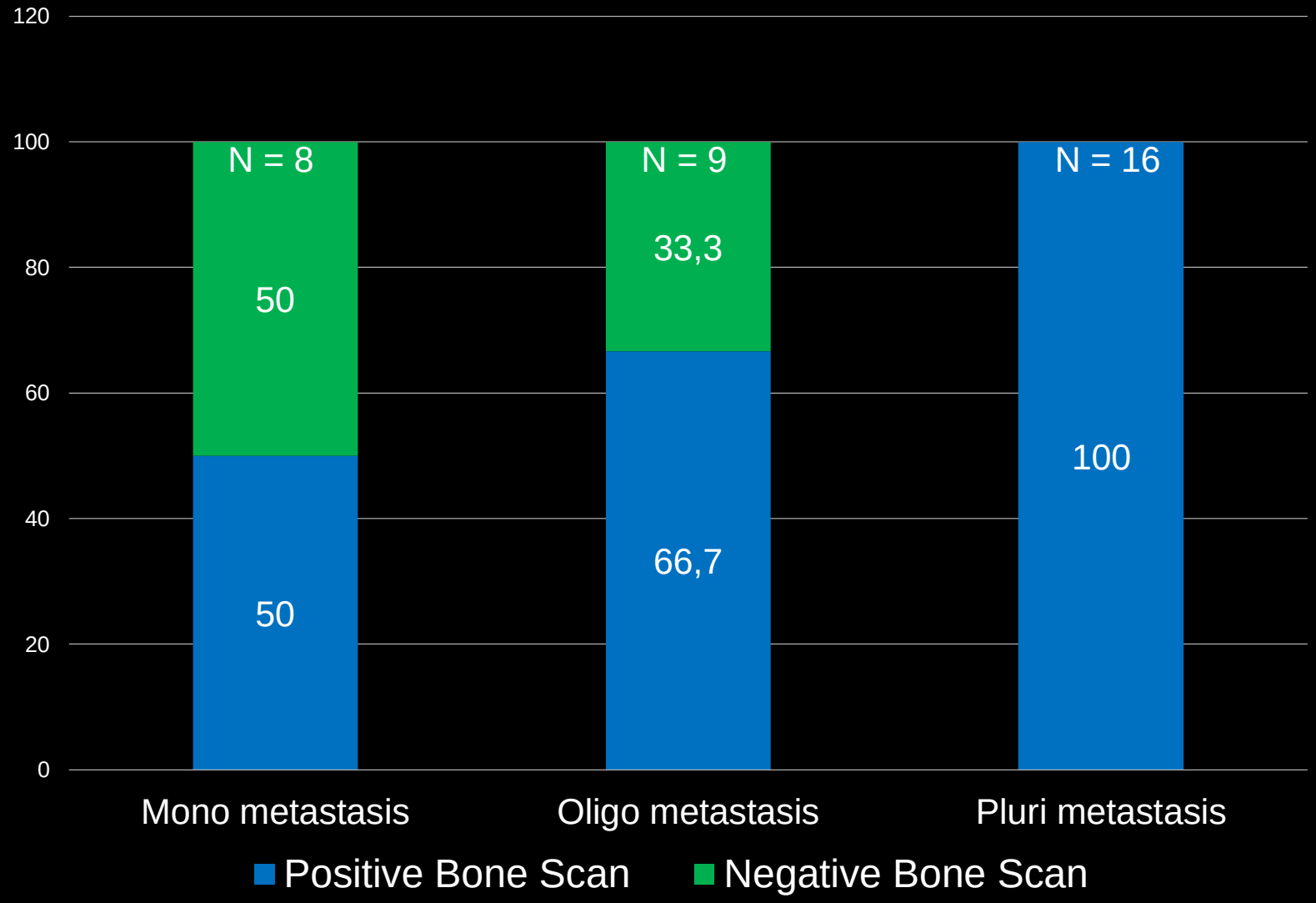
% missed metastatic patients by bone scan in mono, oligo and pluri metastasis



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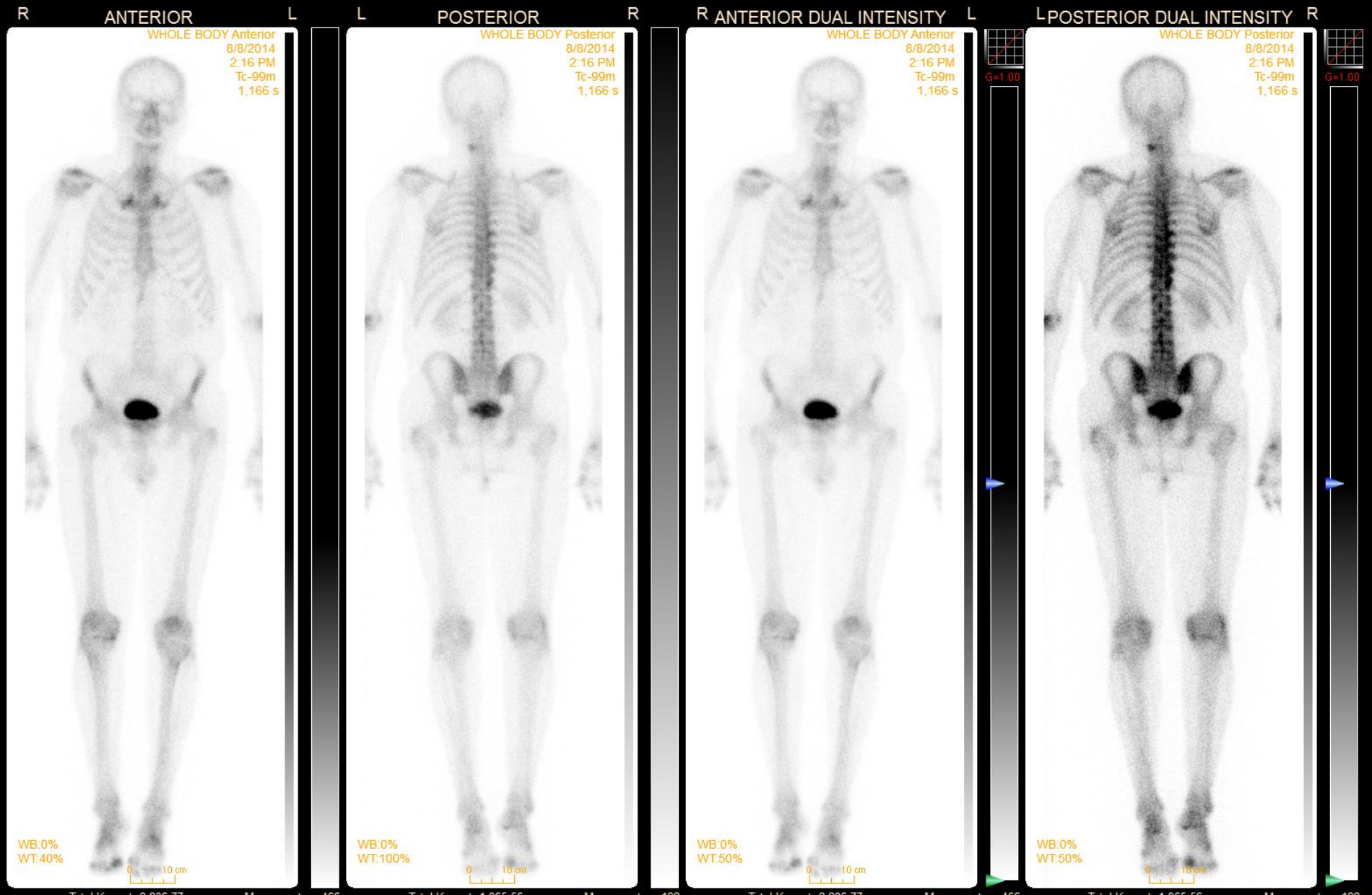
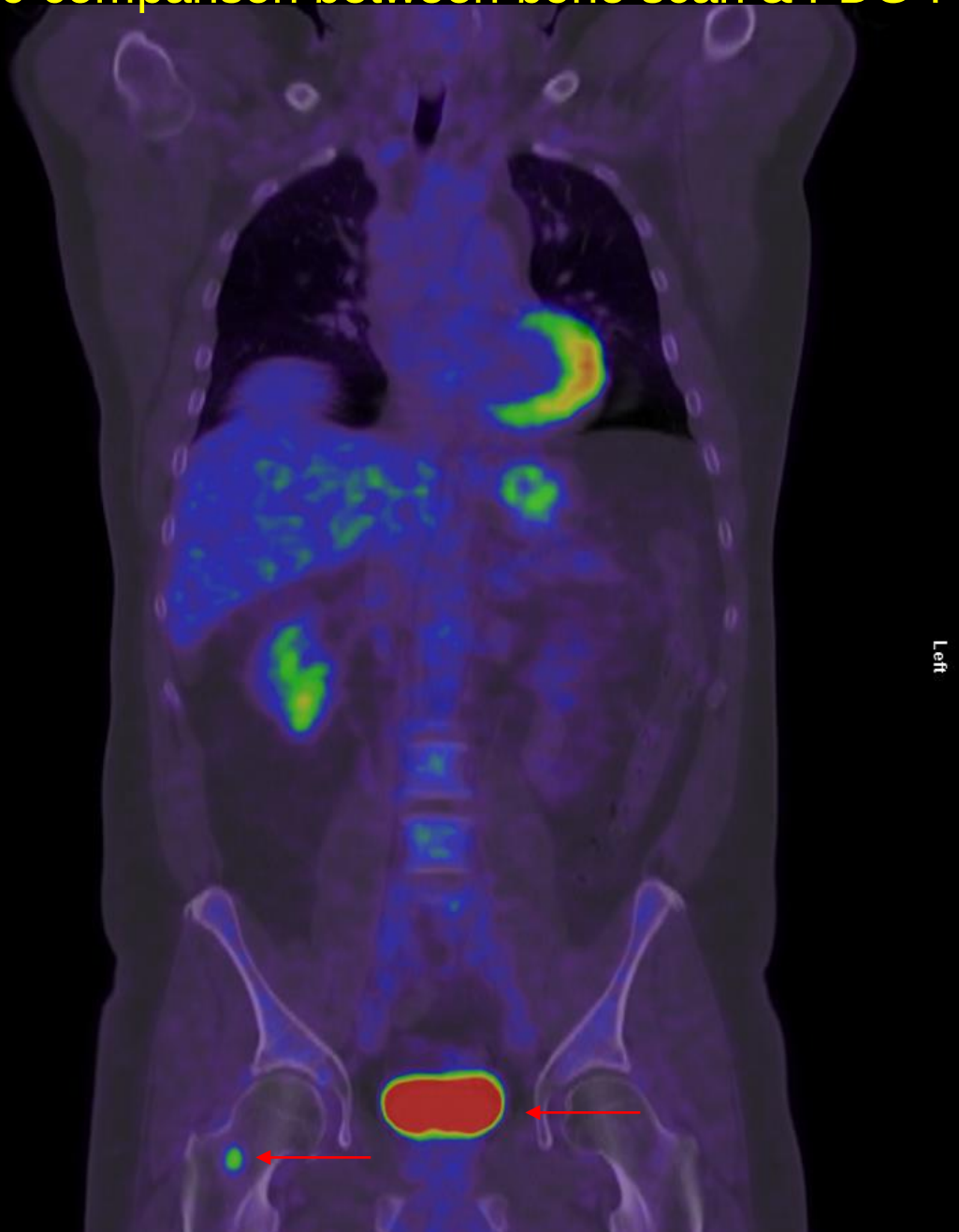
Radiologic comparison between bone scan & FDG-PET/CT



Radiologic comparison between bone scan & FDG-PET/CT



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Results

Sensibility and Specificity in Bone scan and FDG-PET/CT

	Bone Scan	FDG-PET/CT
Sensibility (%)	78,8	100,0
Specificity (%)	97,8	98,7
PPV (%)	83,9	91,7
NPV (%)	97,0	100,0

Results

Comparision of patients with bone scan + or – when FDG PET/CT is +

	Patients	PSA (median)	Gleason (median)	Median time elapsed between Bone scan & FDG PET/CT (days)
FDG PET/CT + & Bone scan -	7	20,7	9	**34**
FDG PET/CT + & Bone scan +	26	68,5	9	**24**

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Limitations

- Retrospective study
- Time and chronology between FDG PET-CT and bone scan may have impacted results?
- Single reader, no interobserver validation
- Unblinded to the other imaging
- Reference truth standard was correlation b/w modalities

Conclusions

- For patients with Gleason ≥ 8 prostate cancers at biopsy, FDG PET/CT can be used to help clinical decision :
  - at least as accurate and maybe superior to bone scintigraphy for bone metastasis detection
    - detects **21%** more patients with bone metastasis than bone scan
  - FDG uptake in the prostate is associated with:
    - shorter time to biochemial failure after RP
    - LN positivity
    - shorter time to castration resistance

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