PSMA for the imaging and treatment of patients with prostate cancer

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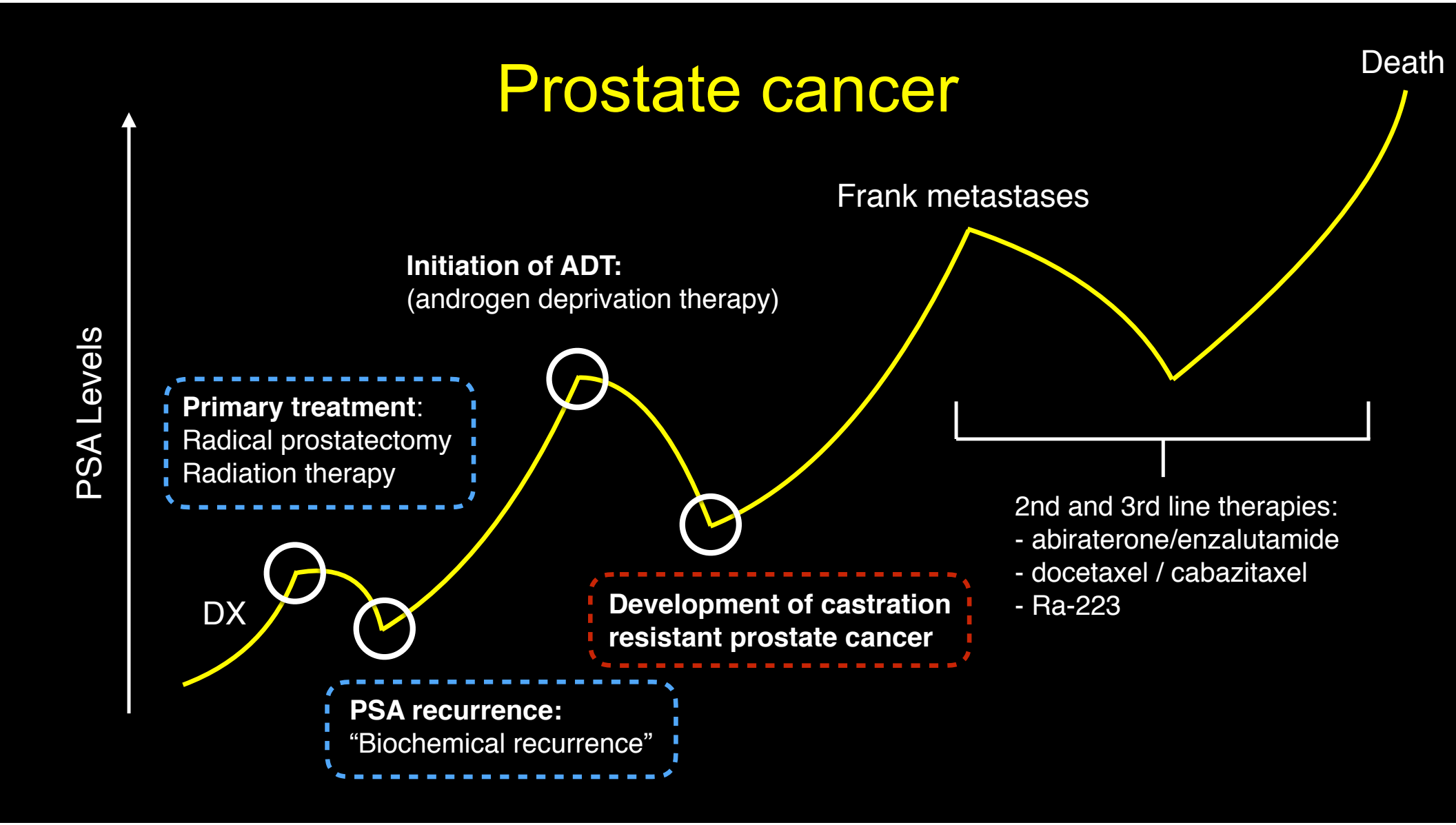

Prostate cancer
Death
PSA Levels
Frank metastases
Initiation of ADT:
(androgen deprivation therapy)
Primary treatment:
Radical prostatectomy
Radiation therapy
DX
PSA recurrence:
"Biochemical recurrence"
Development of castration resistant prostate cancer
2nd and 3rd line therapies:
- abiraterone/enzalutamide
- docetaxel / cabazitaxel
- Ra-223

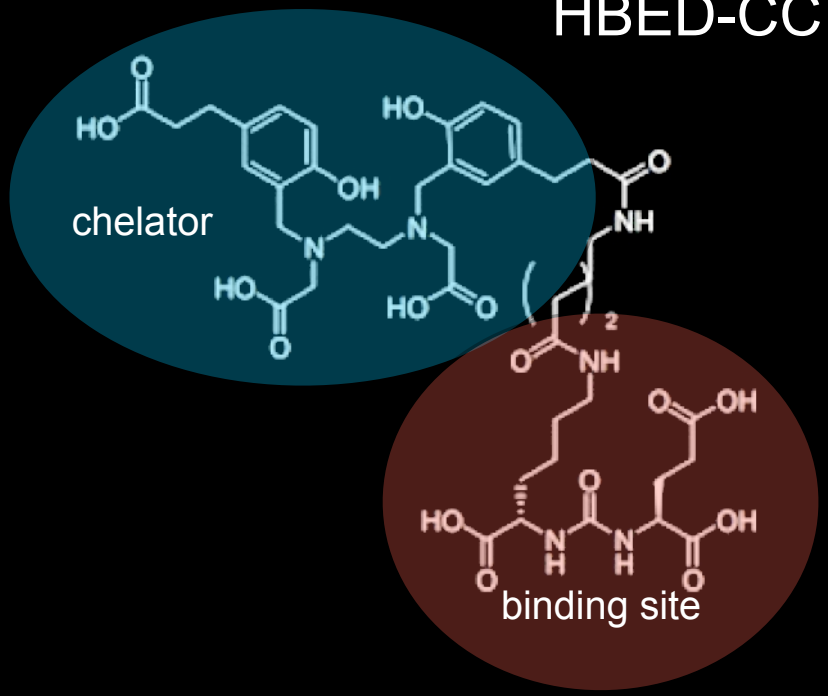
Cross sectional imaging

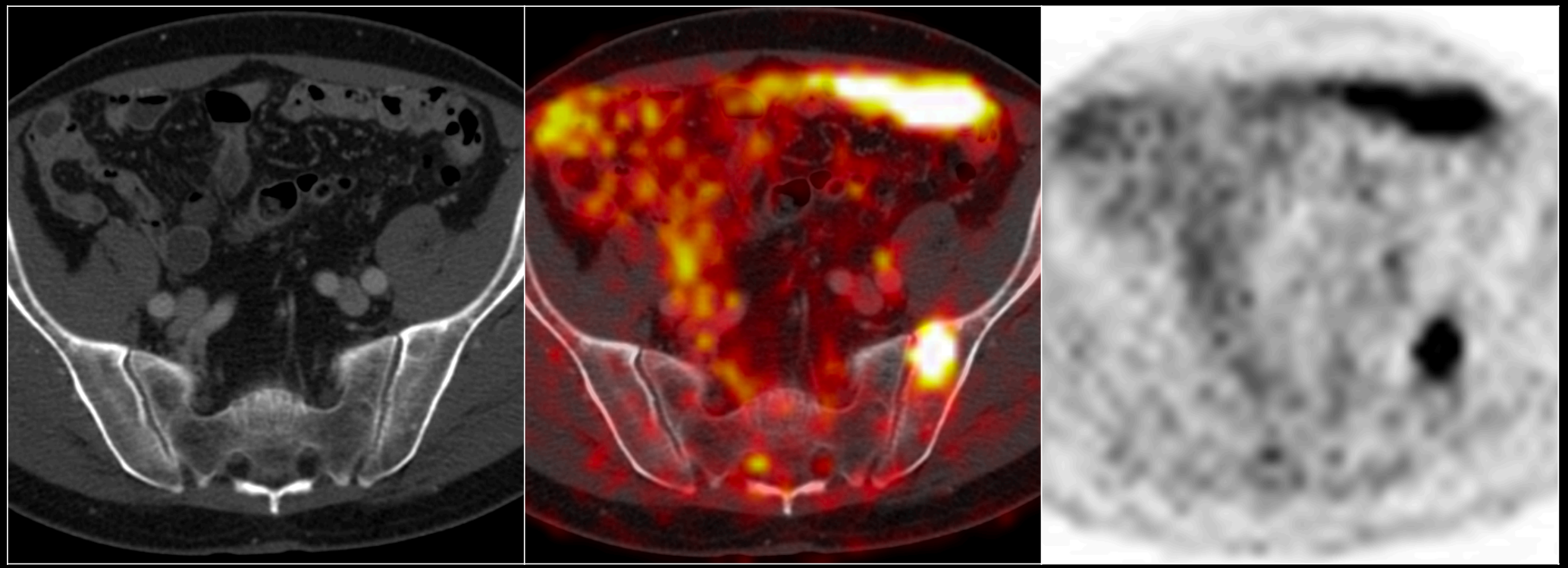
CT	MR
• Fast and convenient • Easy to image whole body • Limited soft tissue discrimination	• Loud, claustrophobic • Slow, only one region • Difficult to image lungs

Both have low sensitivity for metastasis

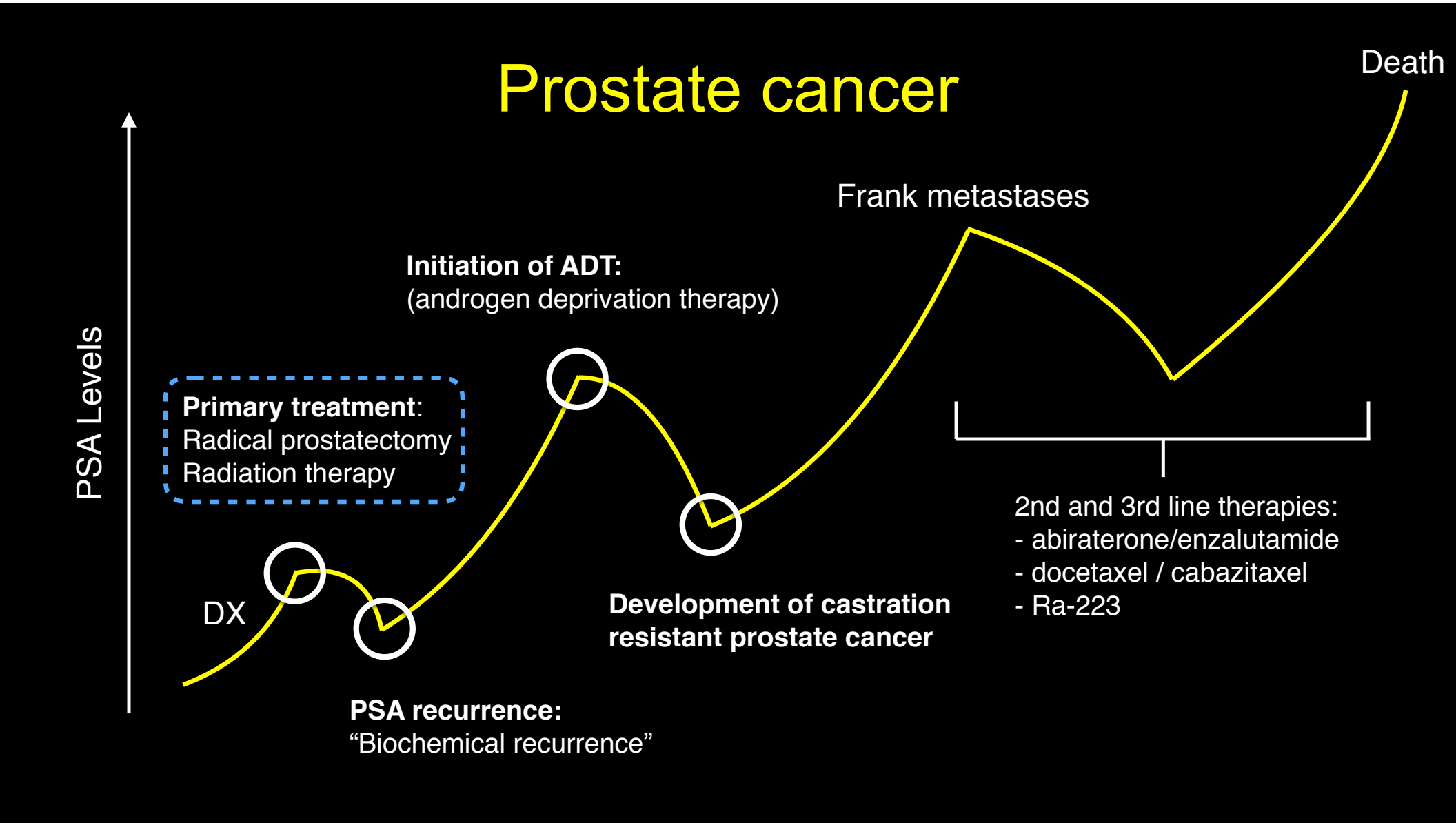
Ga-68 PSMA-11
prostate specific membrane antigen

- “PSMA” is a membrane protein expressed predominantly on prostate cancer cells





Preprostatectomy patients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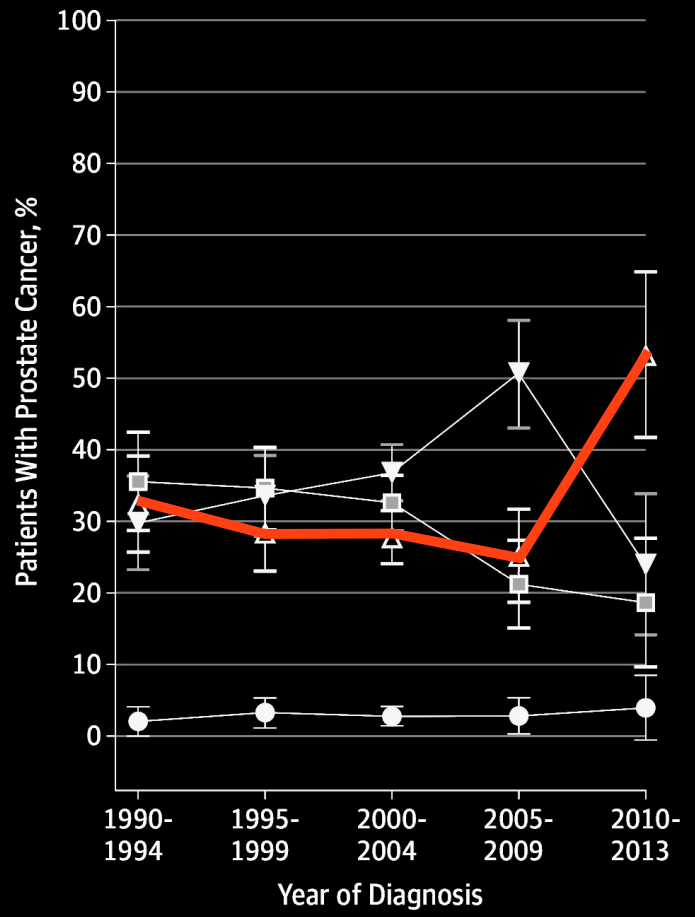
Changing prostatectomy population

More prostatectomies are being performed in high risk patients

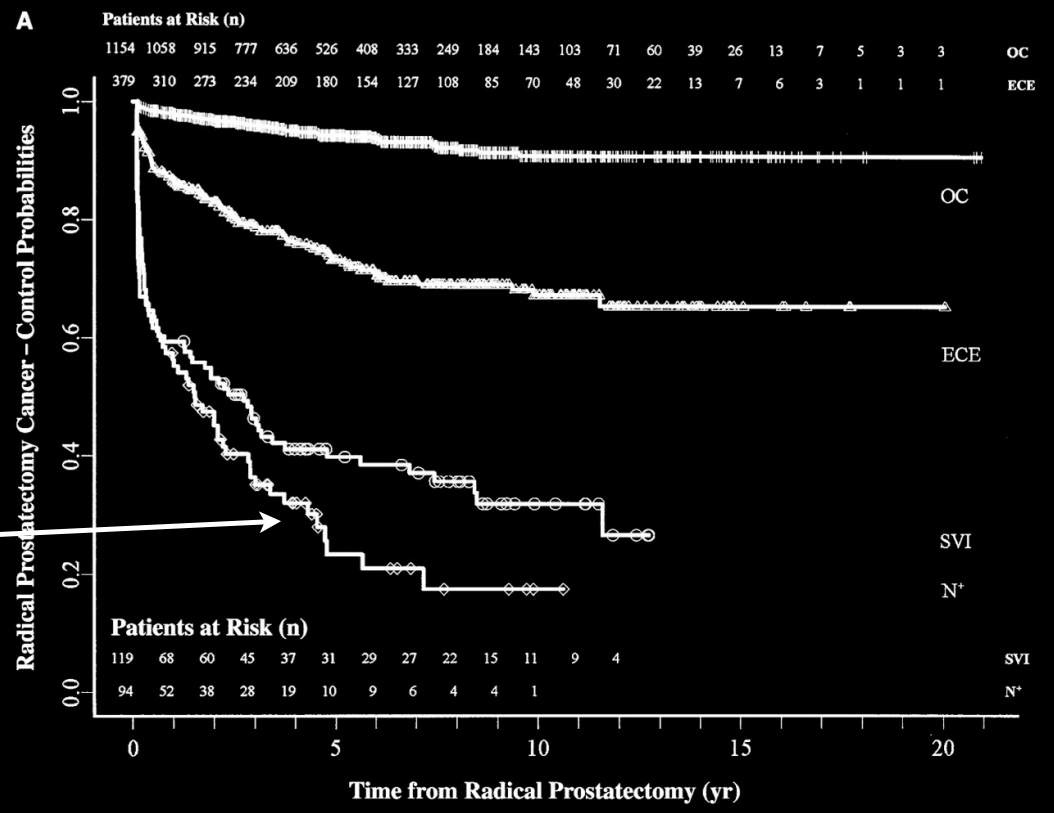


- Active surveillance/watchful waiting
- Radical prostatectomy
- Radiation therapy
- Primary androgen deprivation therapy

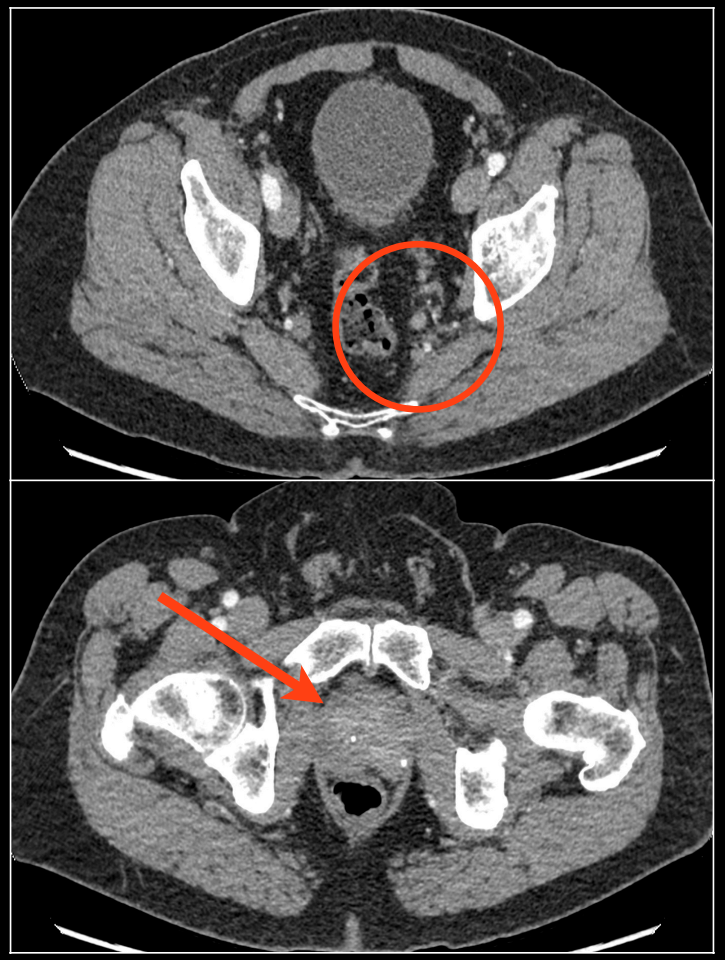
Carroll and Cooperberg, JAMA 2015

Nodal metastases are critical

- Presence of nodes indicates poor cancer specific disease control



72 year old man
with Gleason 4+4



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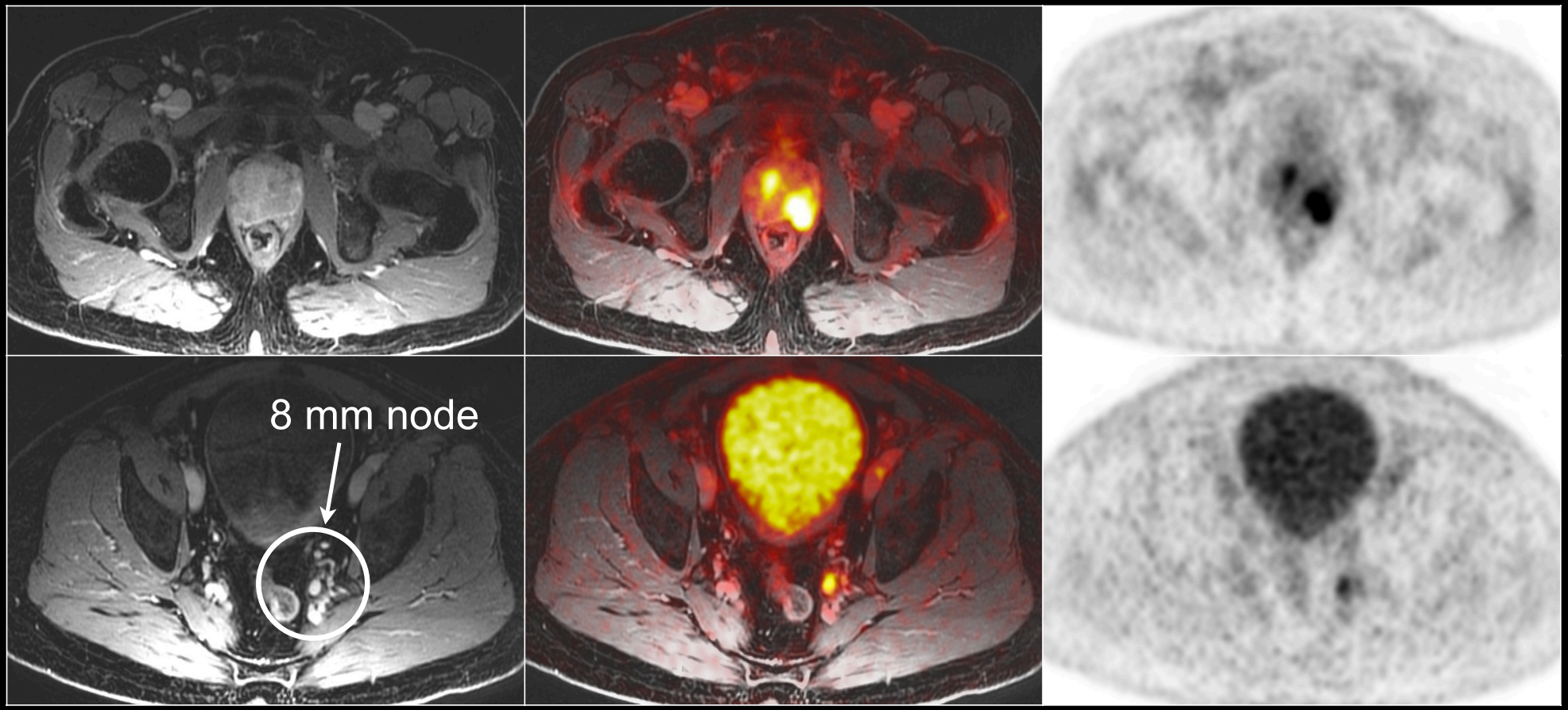
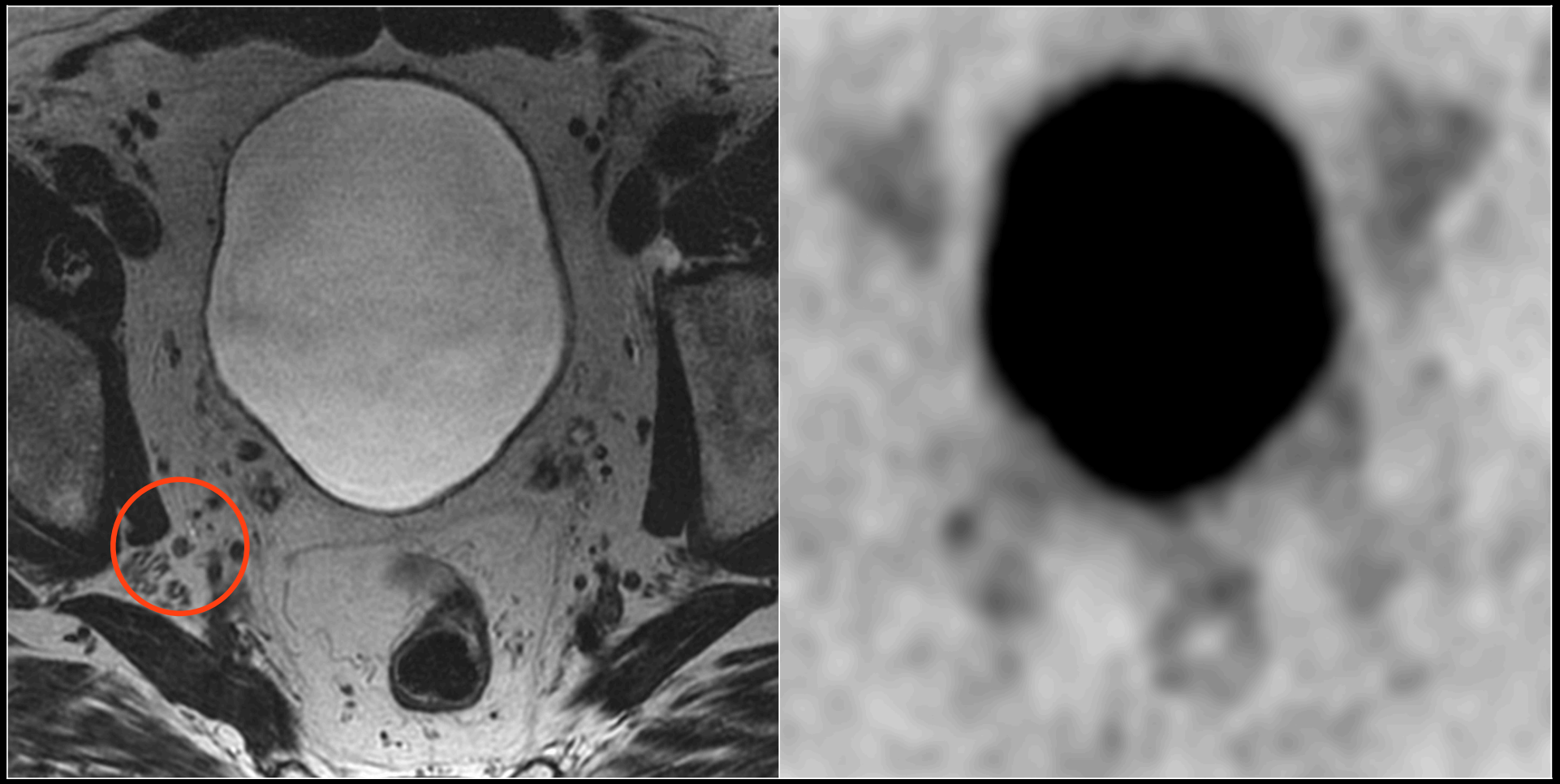
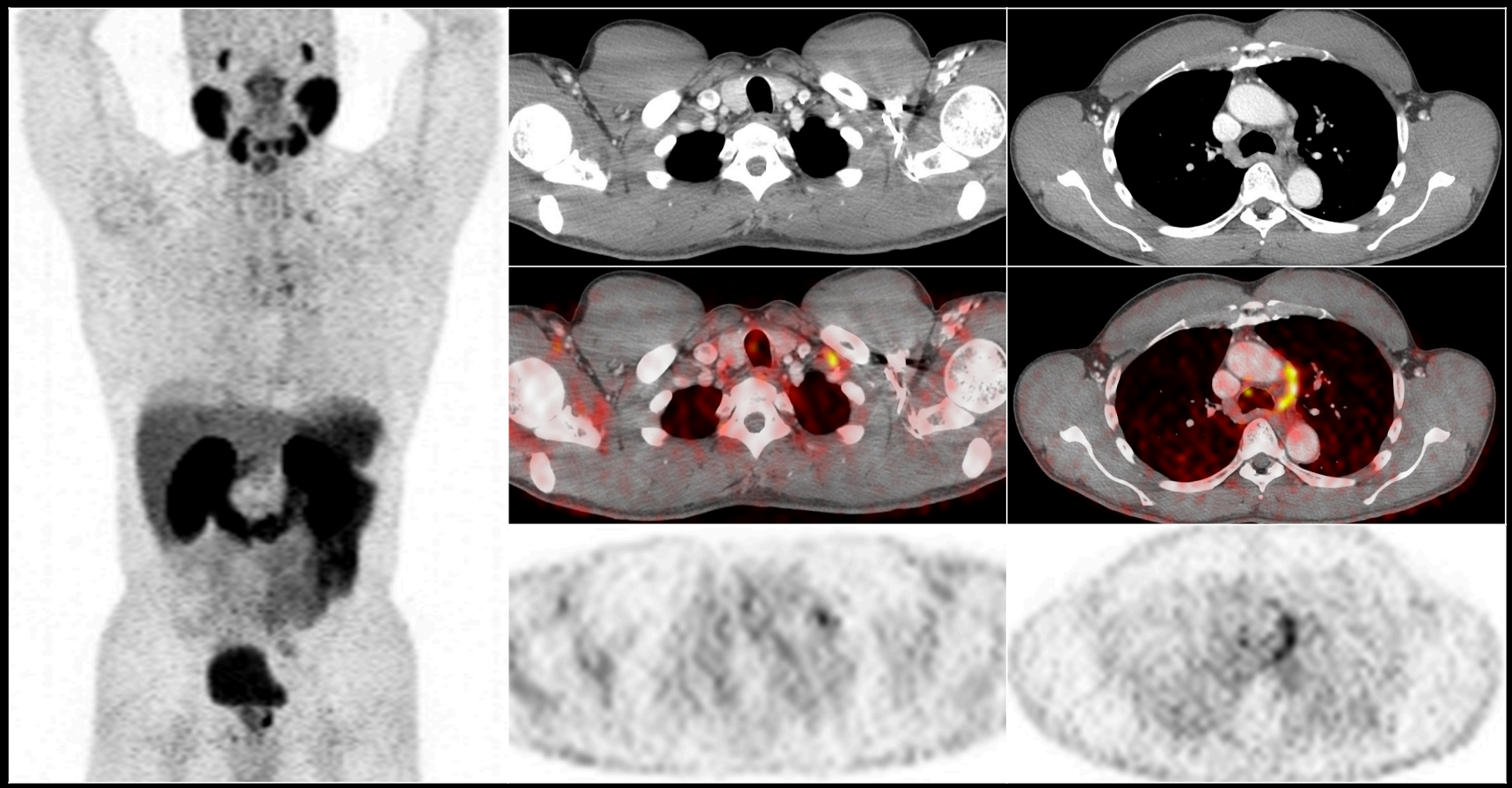
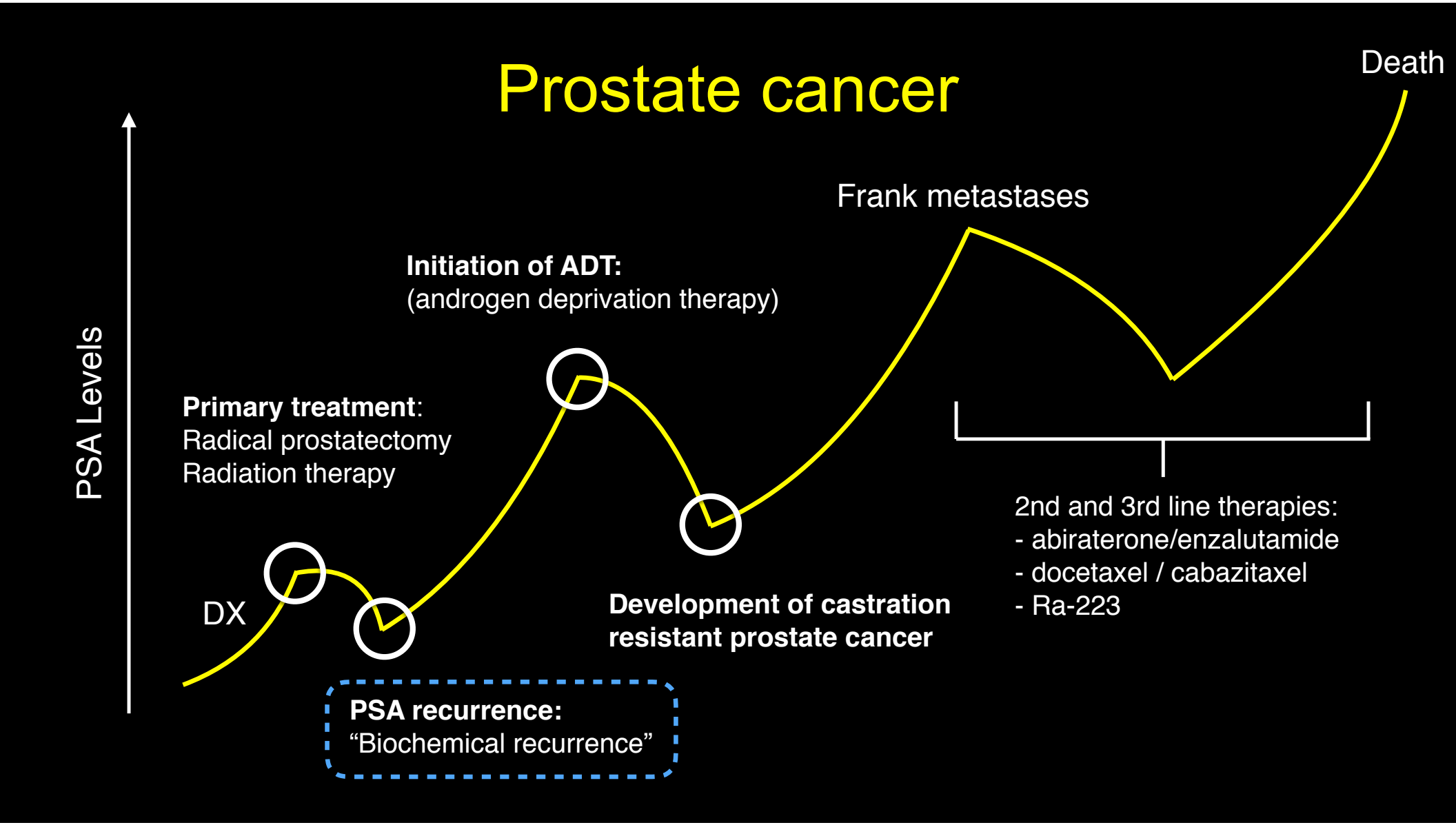




Intermediate risk preprostatectomy patient



Biochemical recurrence patients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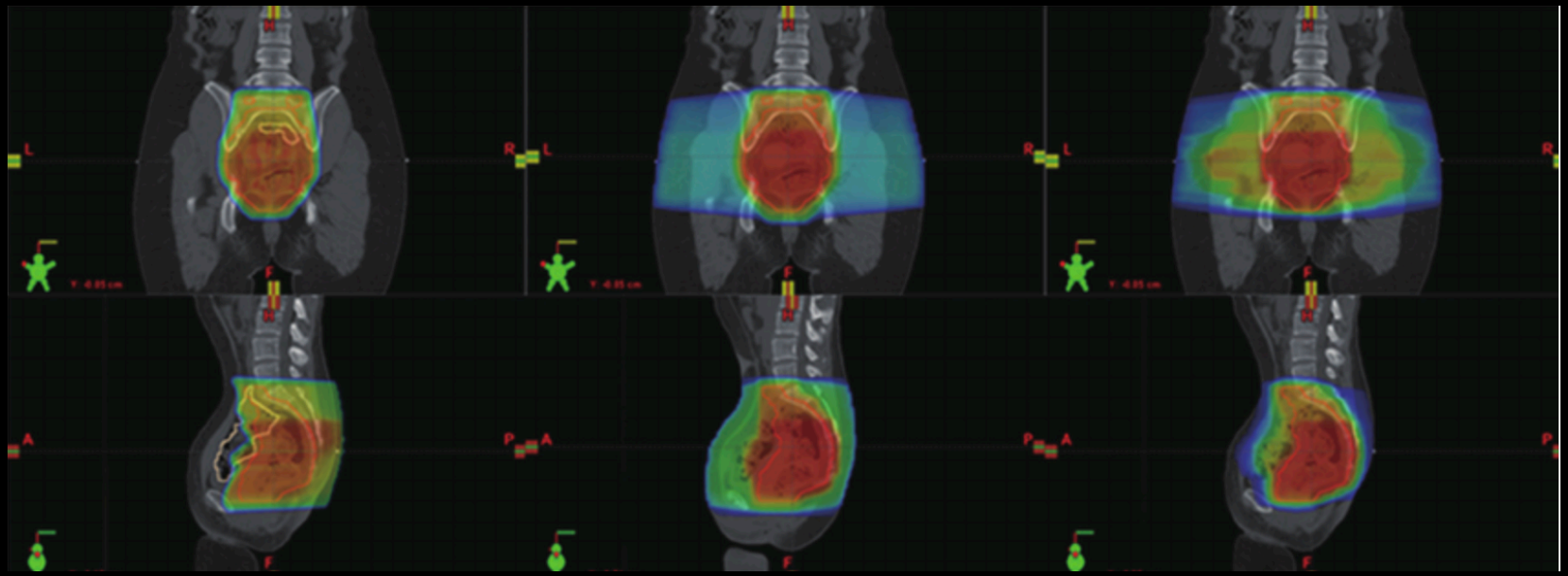
External Beam Radiation Therapy (EBTR)

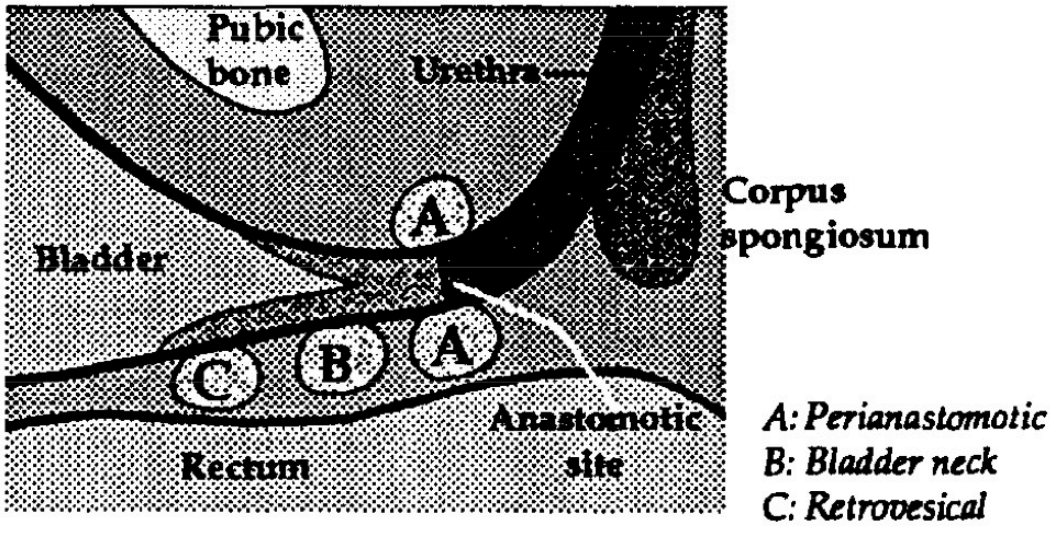


Useful only if you know where the tumor is

Location of recurrence is dependent on technology

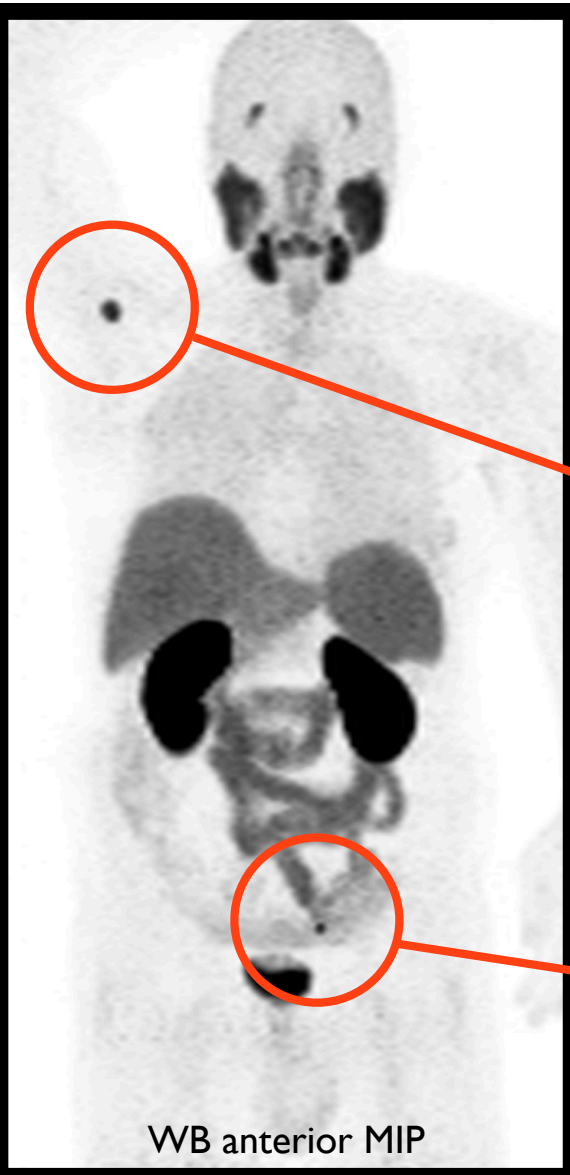
TABLE II. *Sites of local recurrence*

Site	Number of Patients	Percent
Anastomosis	40	66
Posterior	26	43
Lateral	11	18
Anterior	3	5
Bladder neck	10	16
Retrovesical space	8	13
Not visualized	3	5

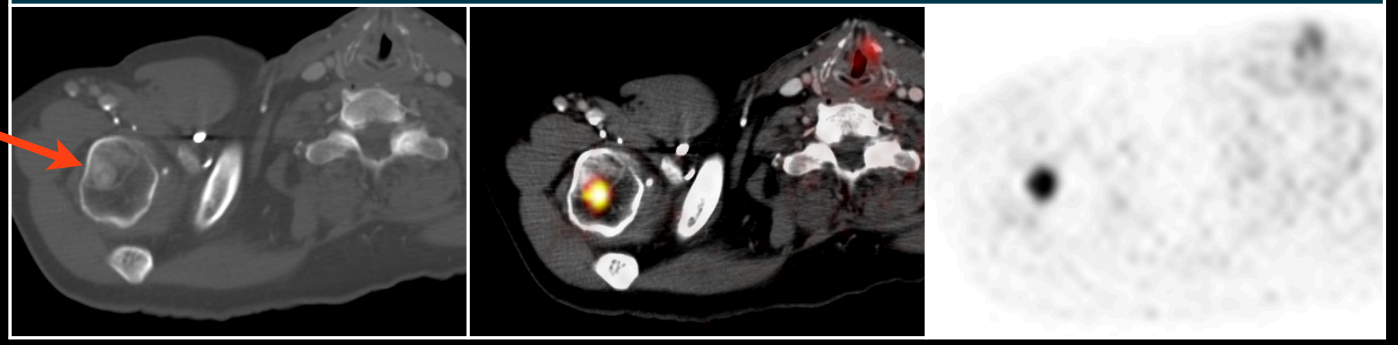


Connolly, 1996 Urology.

69 year old man status post RP
PSA = 0.67



Disease site 1: right humerus



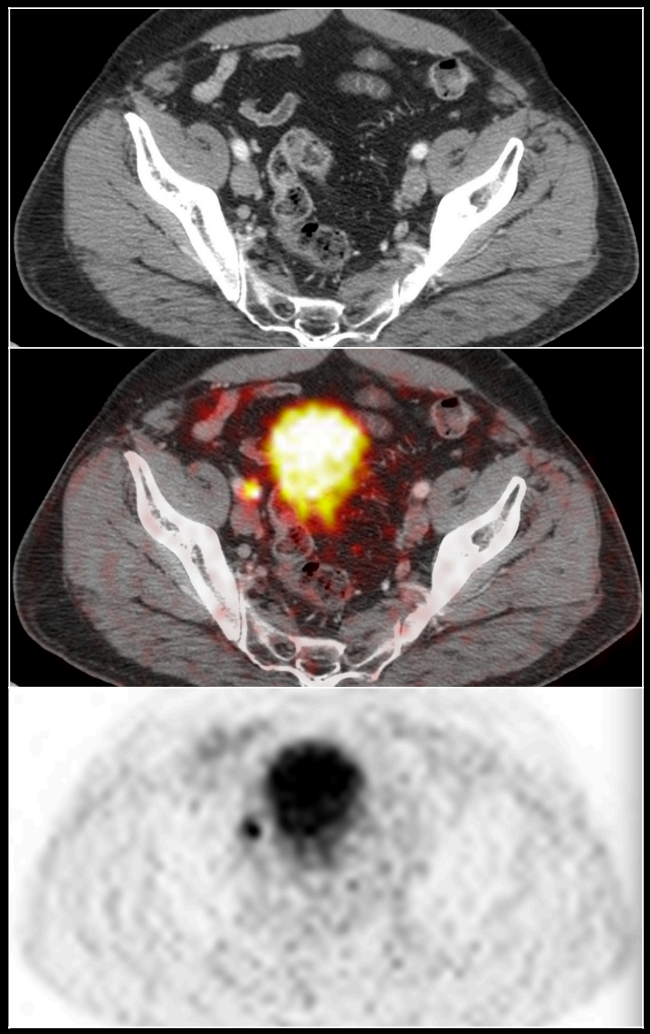
Disease site 2: left internal iliac node

Location of recurrence post-prostatectomy

- 51 patients with recurrence after prostatectomy
  - –All with PSAs less than 2 ng/dL
  - –31 had PSMA positive disease

15 patients would not have been covered with standard pelvic radiation

PSA 0.13

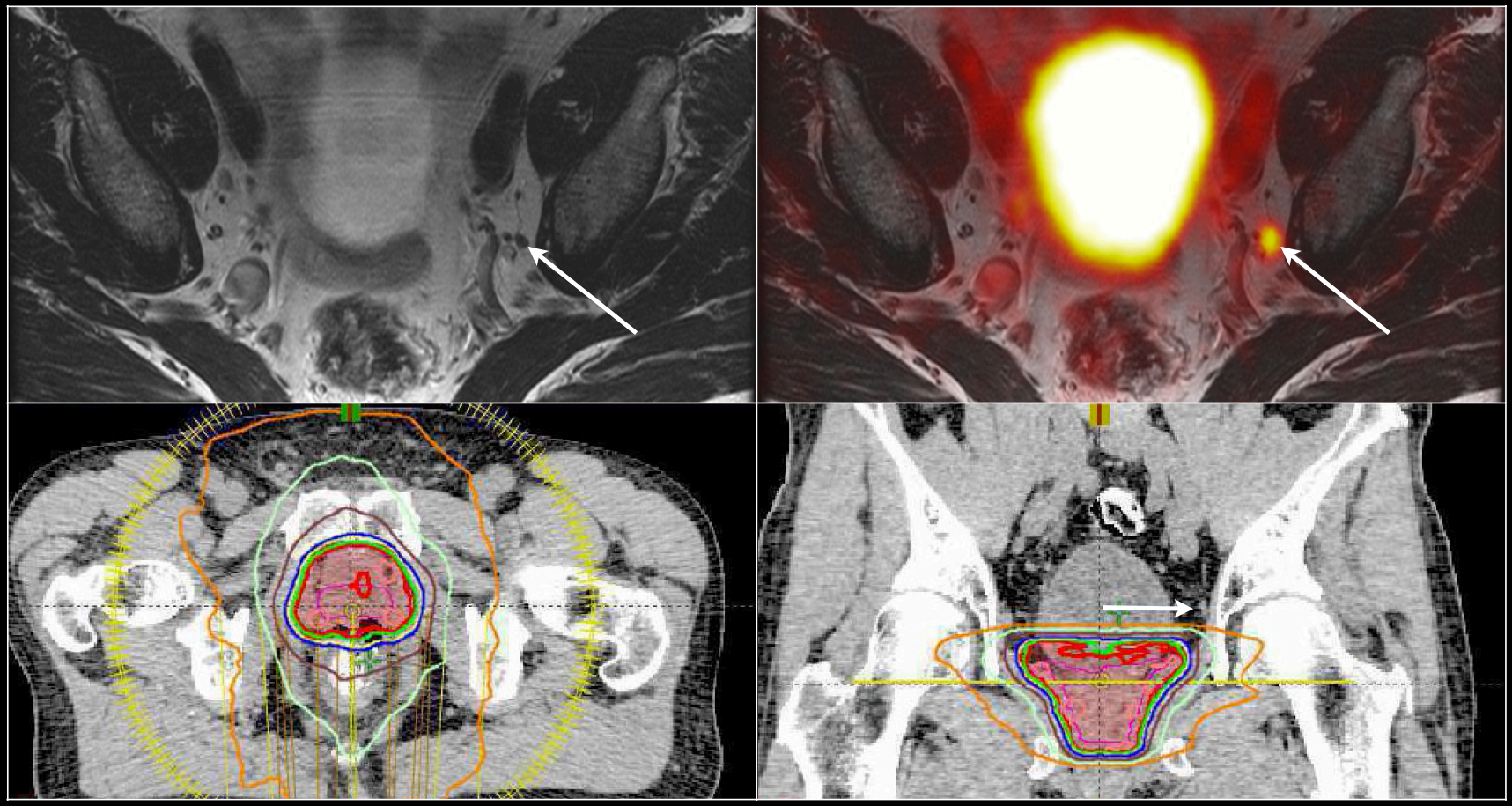


Effect on change in management

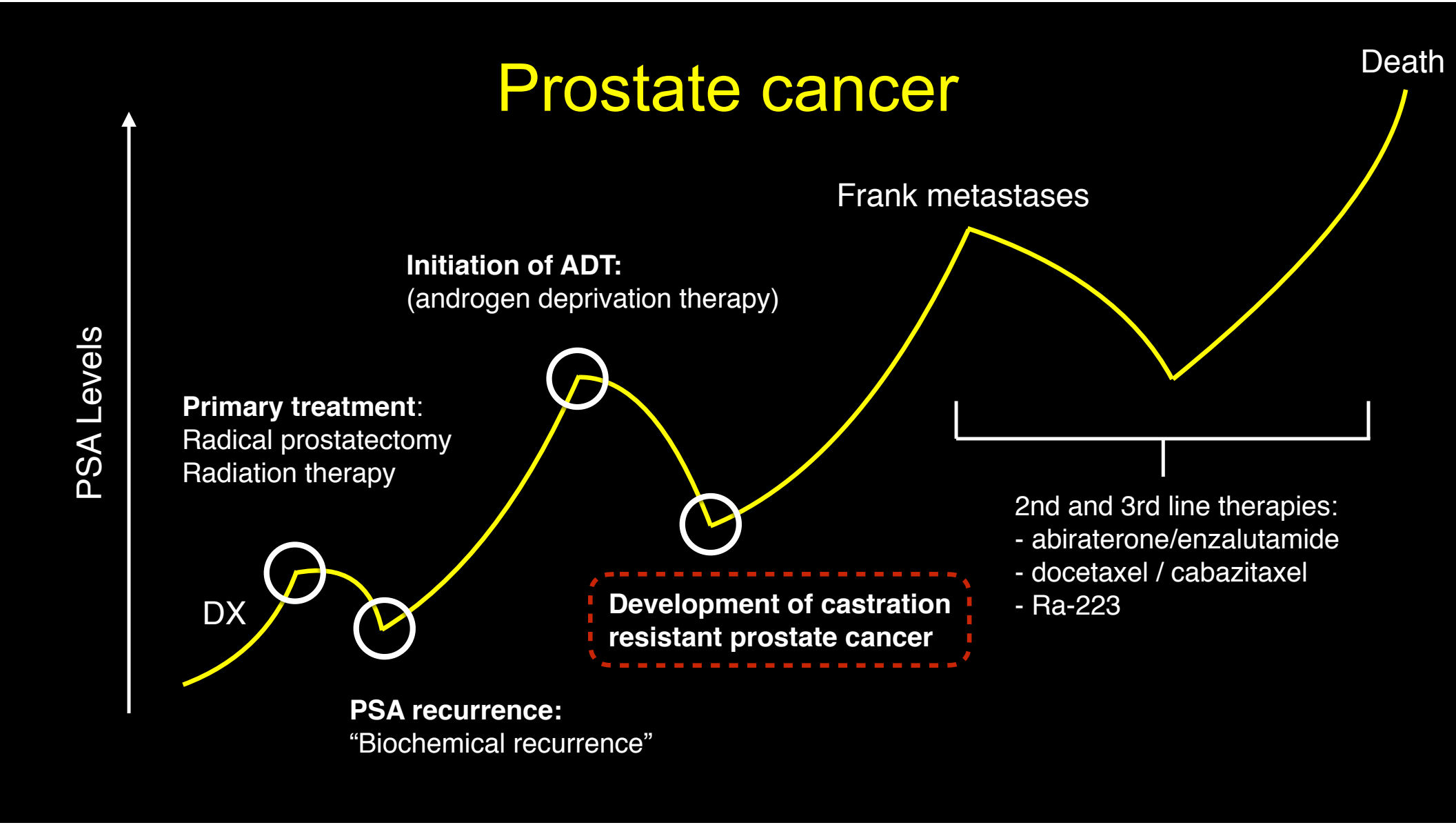
- **49% of patients had a major change in management**:
  - 18 patients were converted from ADT to radiation treatment
  - 15 patients were converted from active surveillance to radiation treatment

Detection of limited metastatic disease converts patients to radiation treatment

Recurrence after radiation therapy



Castration resistent patients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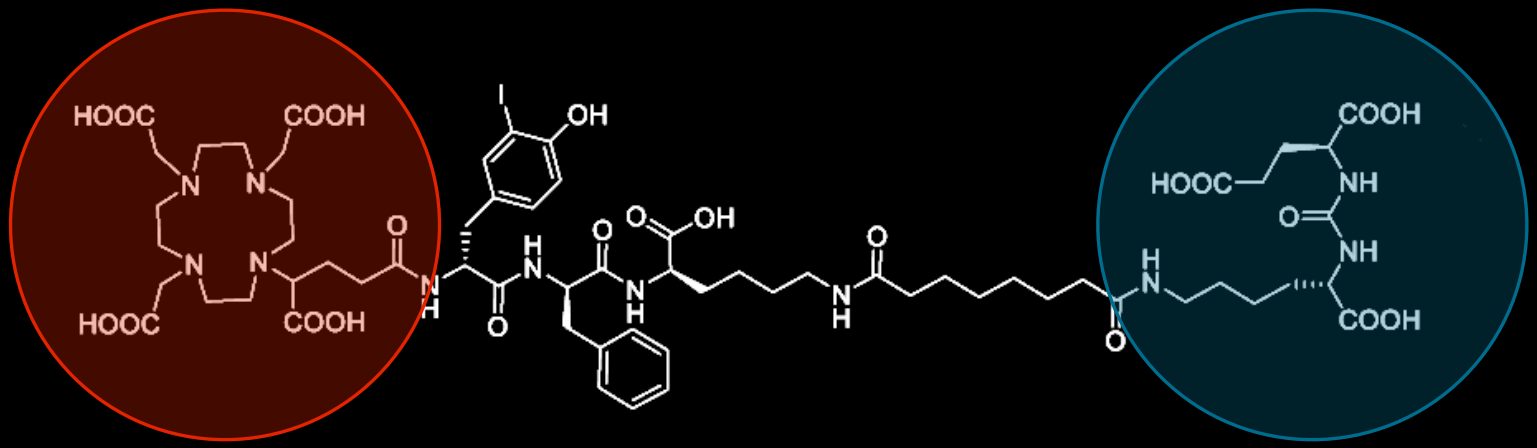
Theranostics

- The use of a compound for both diagnostics and therapeutics

Imaging
Ga-68

Therapy
Lu-177
Y-90



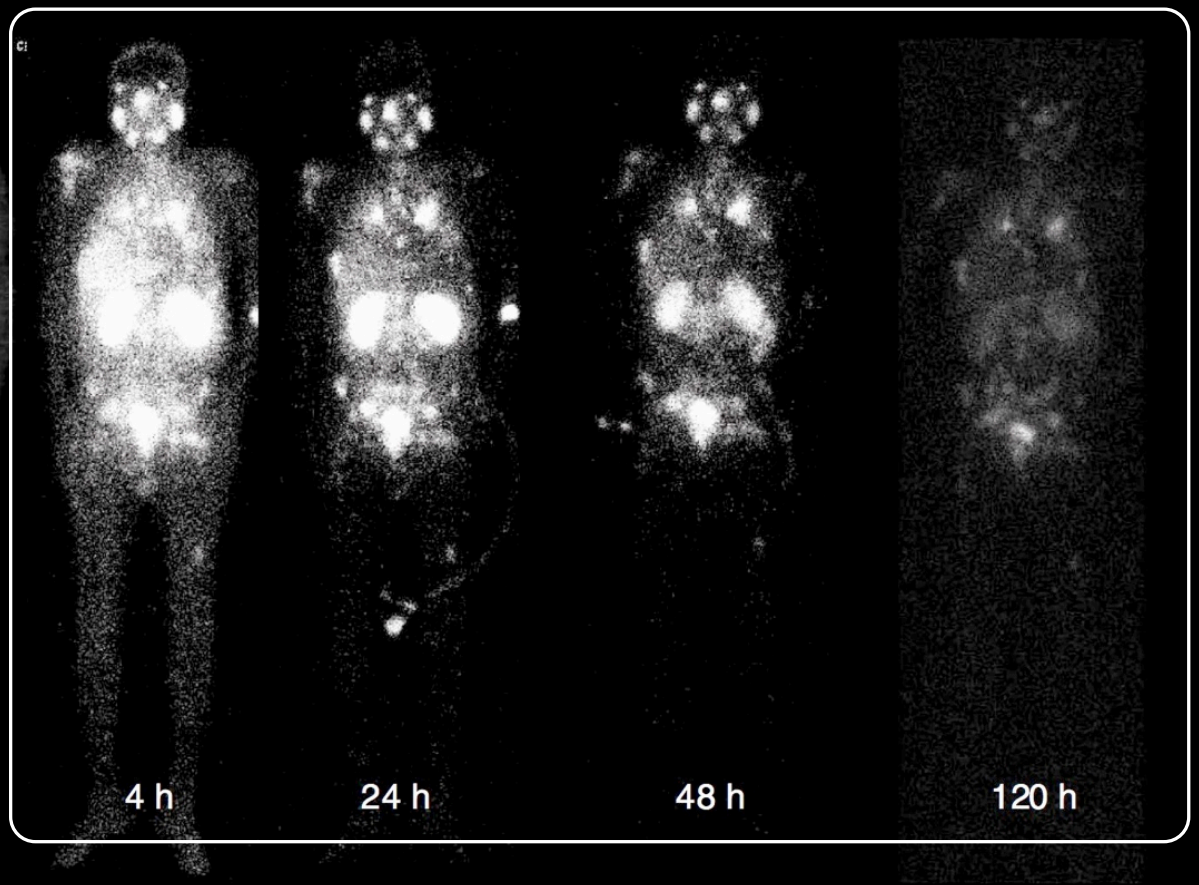
PSMA I&T

Schottelius 2015,
EJNNMI Research

Lu-177-PSMA-617

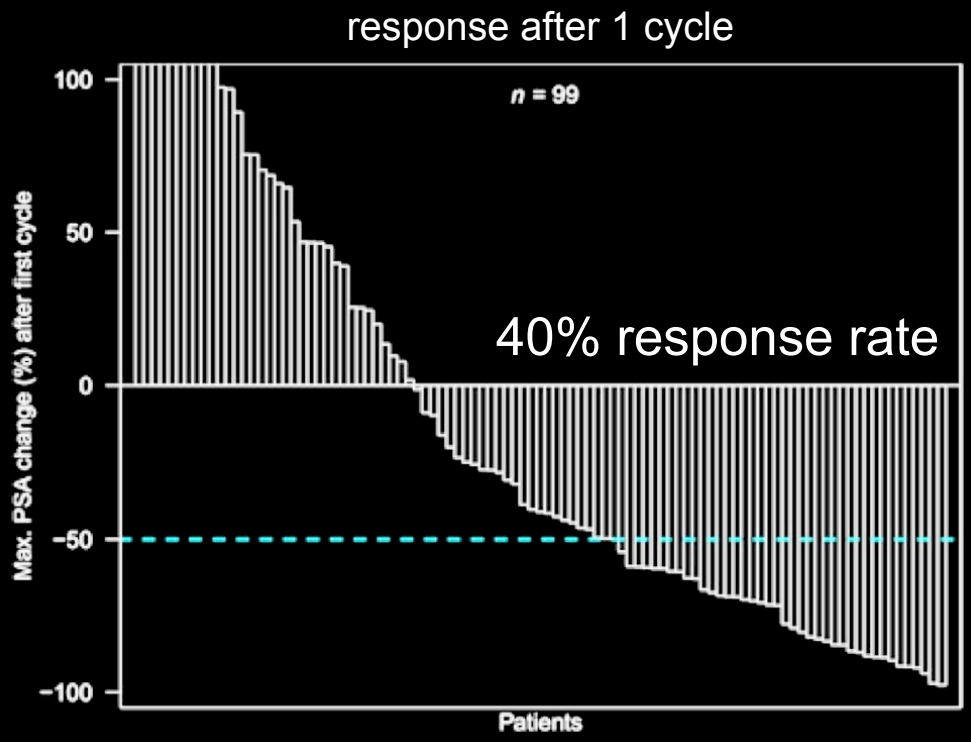
PET

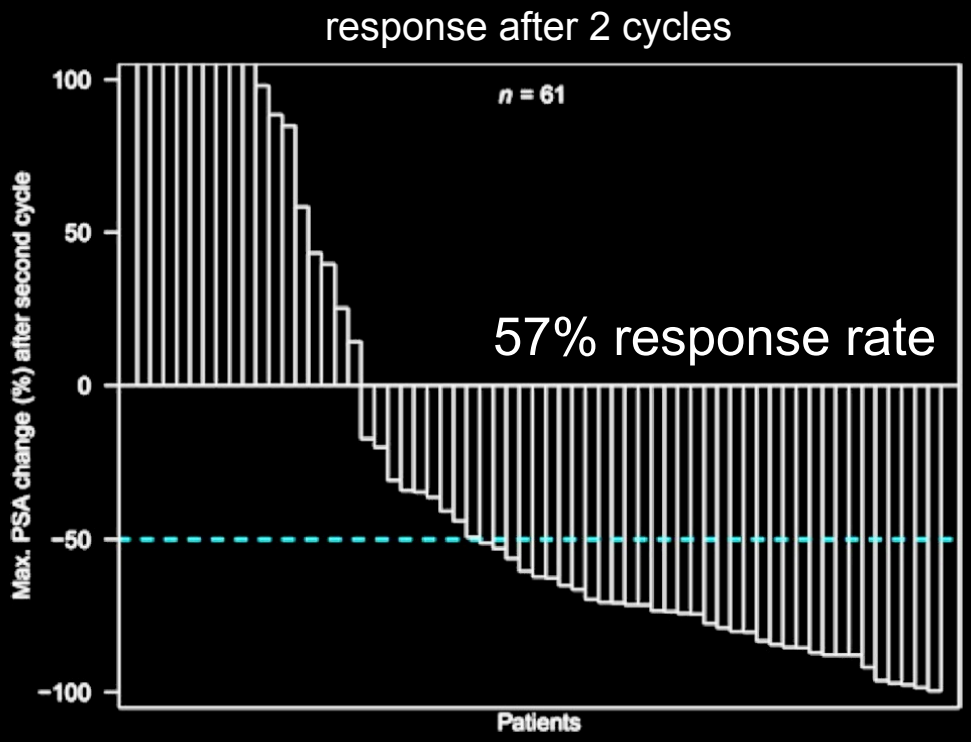
A



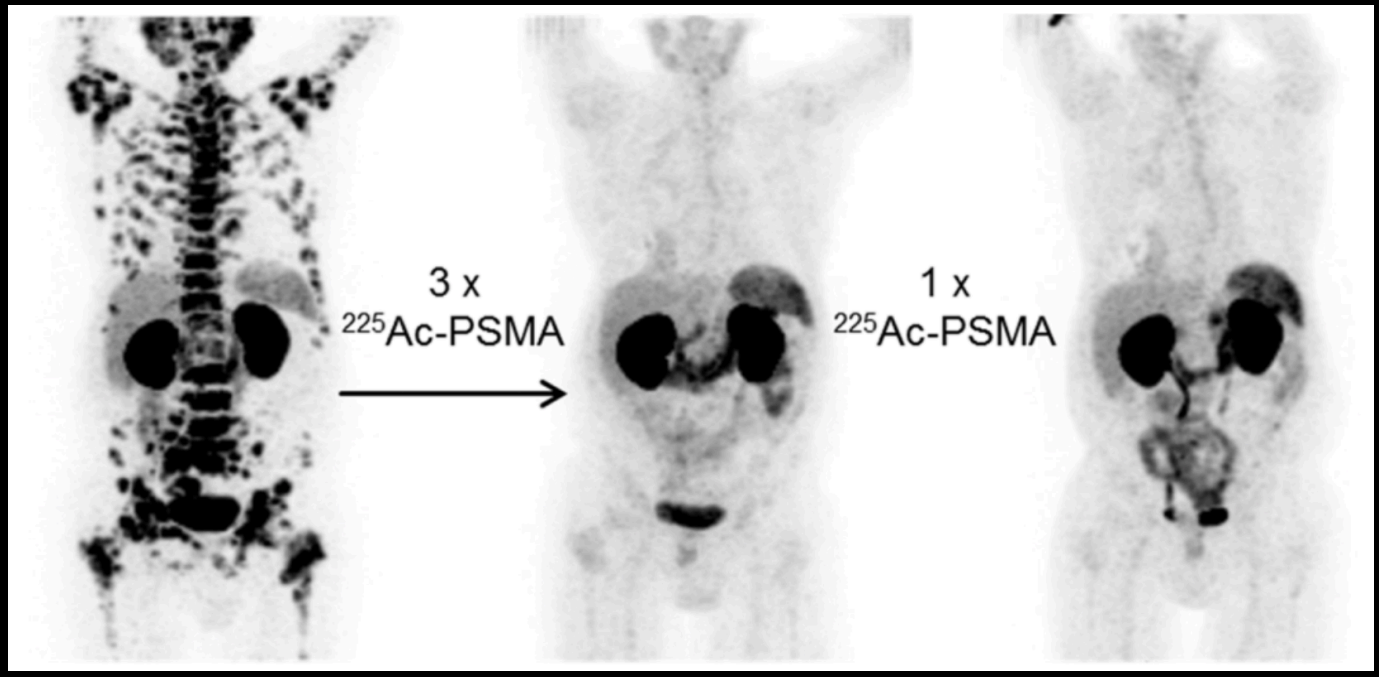
Post-therapy

PSA response after ^{177}Lu-PSMA





Actinium PSMA PRRT



PSA = 2,923 PSA = 0.26 PSA = < 0.1

Summary

1. PSMA PET guides clinical management in patients with prostate cancer
2. UCSF is driving the clinical adoption of PSMA PET
3. Potential of theranostic approaches using PSMA for is just being tapped

UCSF Acknowledgements

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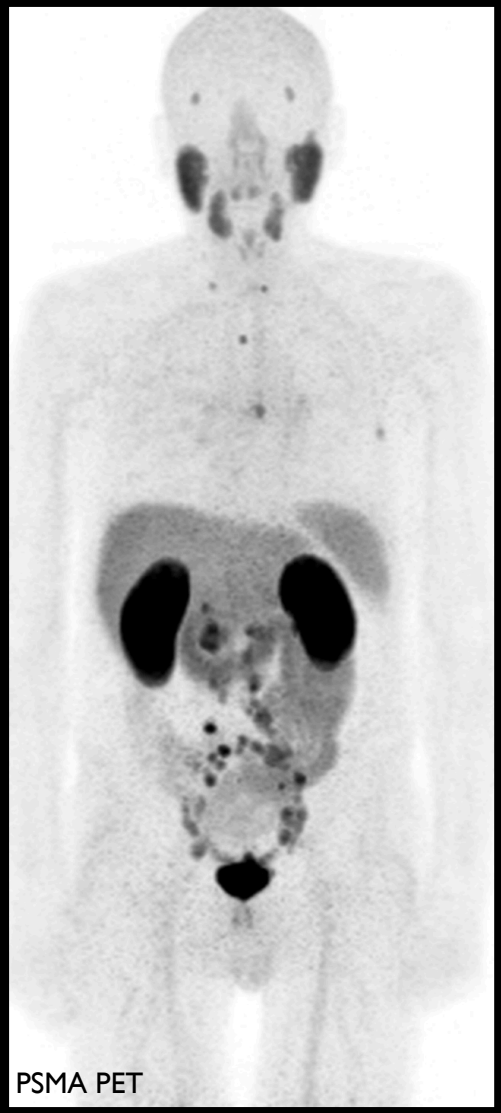

Thank you!

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