



Prostate Cancer: Radiation Therapy Options for Recurrence

PATRICK SWEENEY, MD

U CHICAGO/ADVENT HEALTH CANCER CENTER

HINSDALE, ILLINOIS

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Prostate Cancer

- Most common cancer in American men
- 288,300 new cases/year
- 34,700 deaths
- Average age at diagnosis: 66

Prostate Cancer

- 2nd leading cause of cancer death
- Most men do not die of prostate cancer
- **20-30%** of prostate cancer recurs
- **80%** of recurrent patients live 5 years

Prostate Cancer

288,300 new cases/year in US

▶ 80-85% localized

▶ 12% regional

▶ 4% metastatic

} Stage
IV

Prostate Cancer Recurrence

What is it?

Prostate Cancer Recurrence

- ▶ Cancer has not been cured by the initial treatment
- ▶ PSA test
- ▶ Can be:
 - ▶ LOCAL- prostate or prostate fossa
 - ▶ REGIONAL- lymph nodes
 - ▶ METASTATIC- bones, nodes, organs

Prostate Cancer Recurrence: Treatment Options

- ▶ No therapy
- ▶ Surgery
- ▶ Radiation
- ▶ Hormone Therapy
- ▶ Chemotherapy
- ▶ Combinations of the above

Localized* Prostate Cancer: Treatment Options *at Diagnosis

- ▶ **Surgery**
- ▶ **External Beam Radiation
Therapy**
- ▶ **Brachytherapy**
- ▶ **Active surveillance**

What is Radiation Therapy (RT) ?

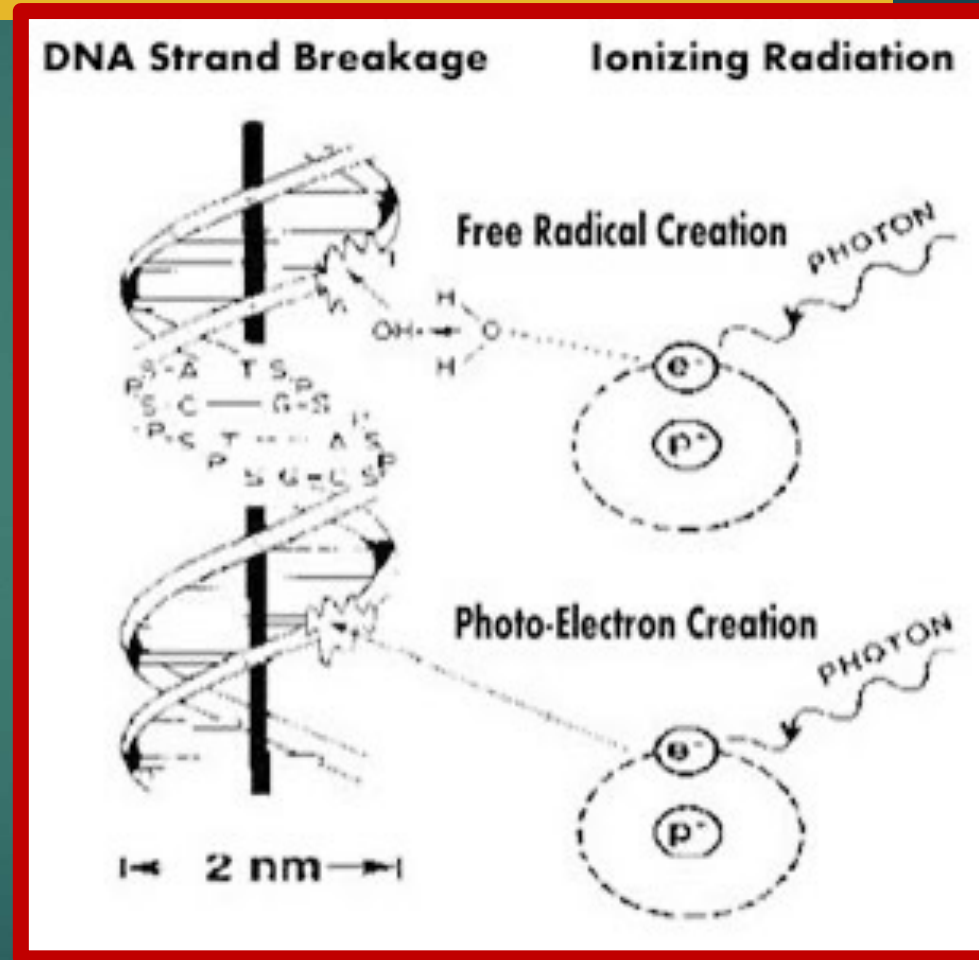
A cancer treatment that uses high doses of RT to kill cancer cells and shrink tumors



Varian

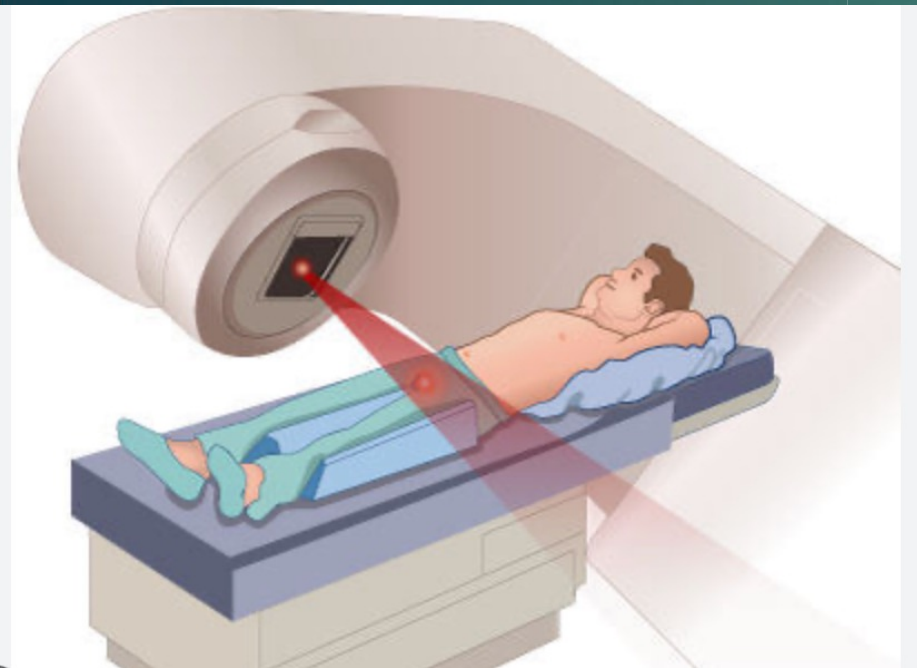
How dose RT work?

- Damaging DNA in cells to prevent them from dividing
- Tumor cells cannot repair damage
- Normal cells can repair damage

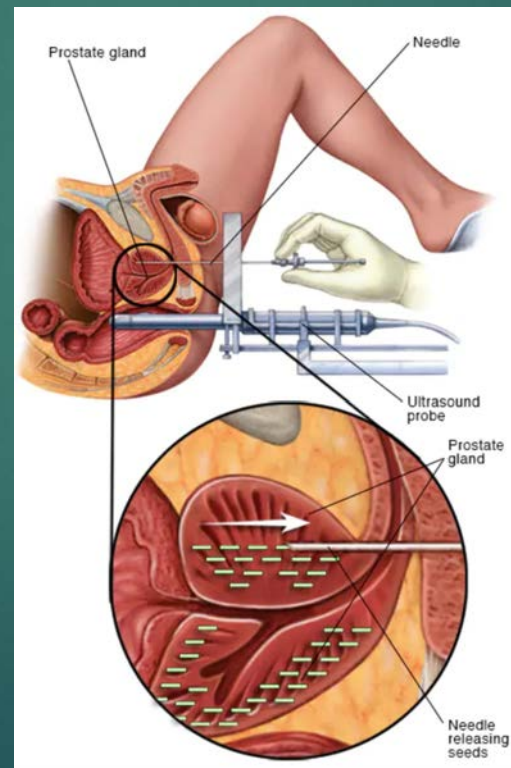


Types of Radiation Therapy

External Beam Radiation



Brachytherapy

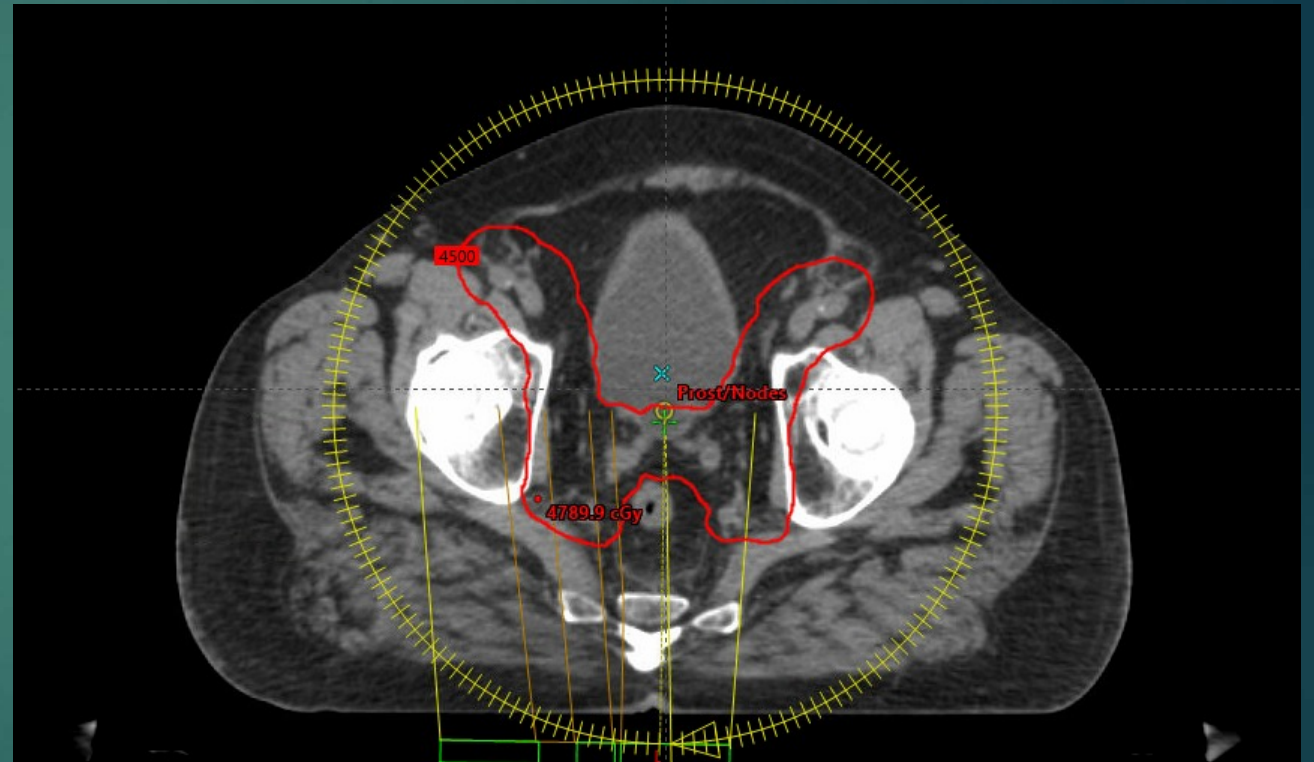


Radiopharmaceuticals



External Beam Radiation: Intensity Modulated Radiation Therapy (IMRT)

- ▶ Advanced type of radiation
- ▶ Beams are shaped to match shape of tumor
- ▶ Arcs of radiation
- ▶ Minimizes dose to normal tissues



Risk Stratification of Localized Prostate Cancer

	LOW	INTERMEDIATE	HIGH
PSA	0-10	10-20	>20
GLEASON SCORE	5-6	7	8-10
CLINICAL STAGE	T1C/T2A	T2B/T2C	T3/T4

Take into account age and health

Radiation Therapy for LOCALIZED Prostate Cancer

- ▶ **Low risk** RP, IMRT, brachytherapy, **AS**
- ▶ **Intermediate risk** RP, IMRT, brachytherapy +/- ADT
- ▶ **High risk** RP, IMRT +/- brachytherapy + ADT

ADT: androgen deprivation therapy

Age old question.....Which is better?

- ▶ Radical prostatectomy
- ▶ Brachytherapy
- ▶ IMRT/IGRT
- ▶ Active surveillance

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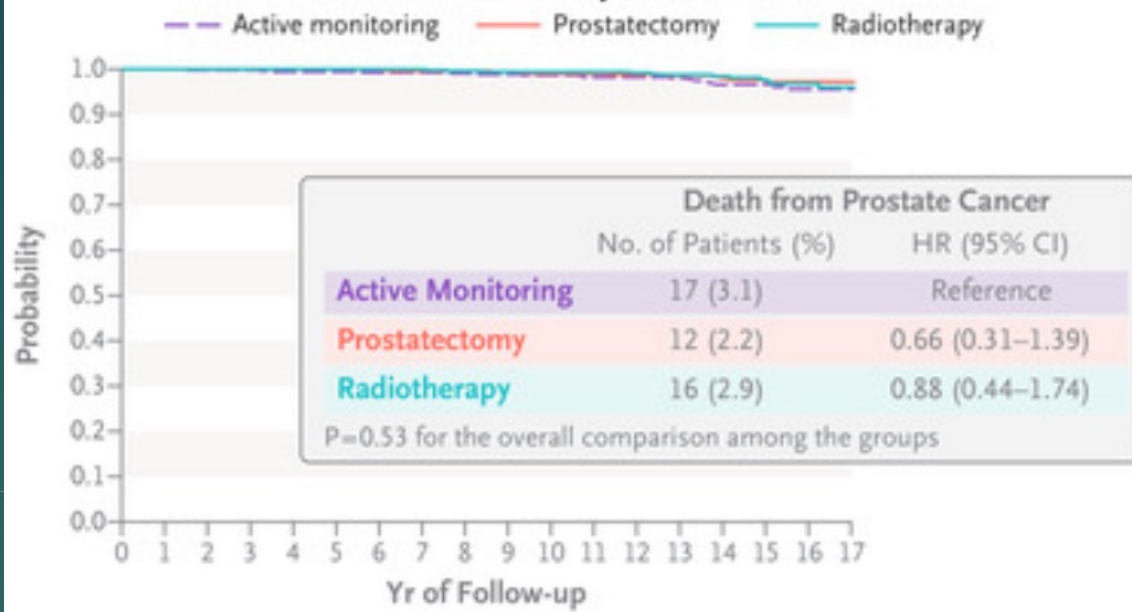
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Fifteen-Year Outcomes after Monitoring, Surgery,
or Radiotherapy for Prostate Cancer

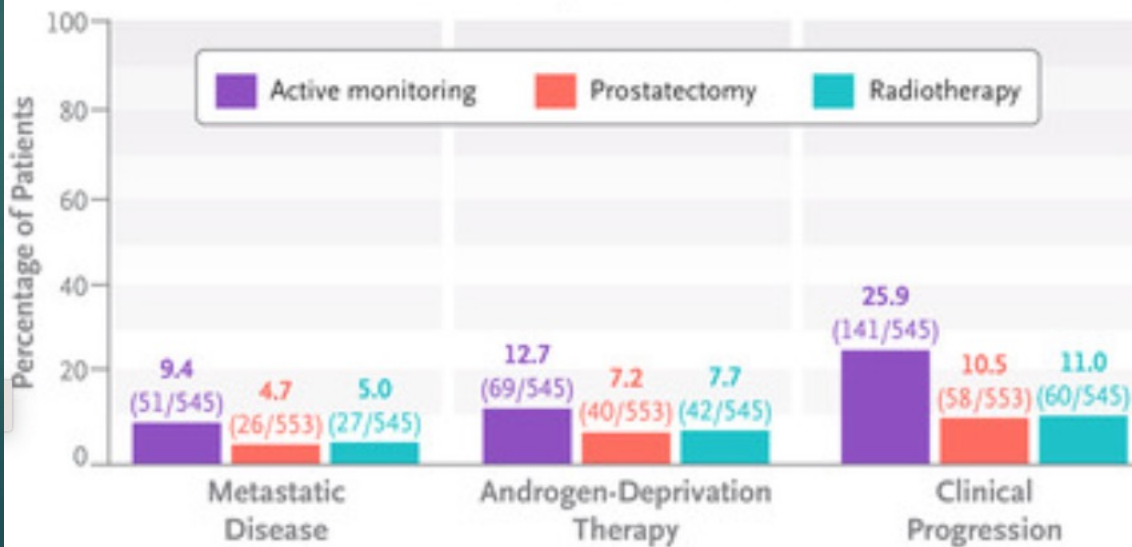
ProtecT Trial: UK

- **550** patients in each arm
- More than 1/3 had intermediate or high risk cancer
- Randomized: RP, Radiation, AS
- Median f/u is **15 years**

Prostate Cancer–Specific Survival



Secondary Outcomes



What is recurrence of prostate cancer?: **BIOCHEMICAL RECURRENCE**

- ▶ **After surgery** PSA should be undetectable. Any rise indicates recurrence
- ▶ **After radiation therapy: *PHOENIX DEFINITION***
 - ▶ a rise of **2 ng/ml** after a nadir



Biochemical Failure

PSA rise after treatment

70% will develop clinical failure

Clinical Failure

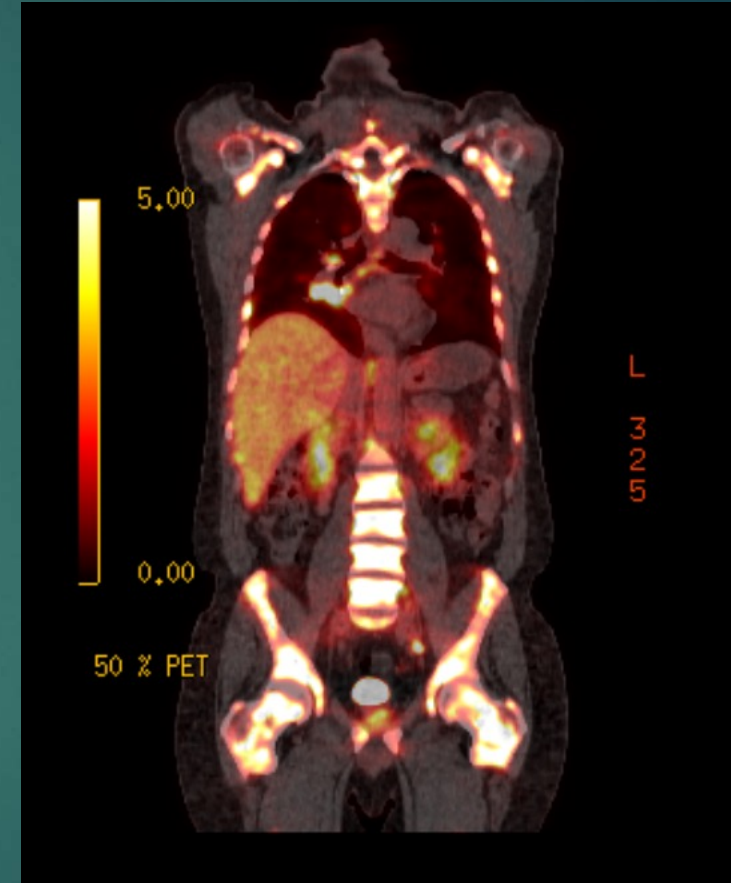
*Local, regional or distant
recurrence*

How do we determine Clinical Failure?

- ▶ Imaging
 - ▶ Bone scan
 - ▶ CT
 - ▶ MRI
 - ▶ **PSMA PET SCAN**
- ▶ Biopsy

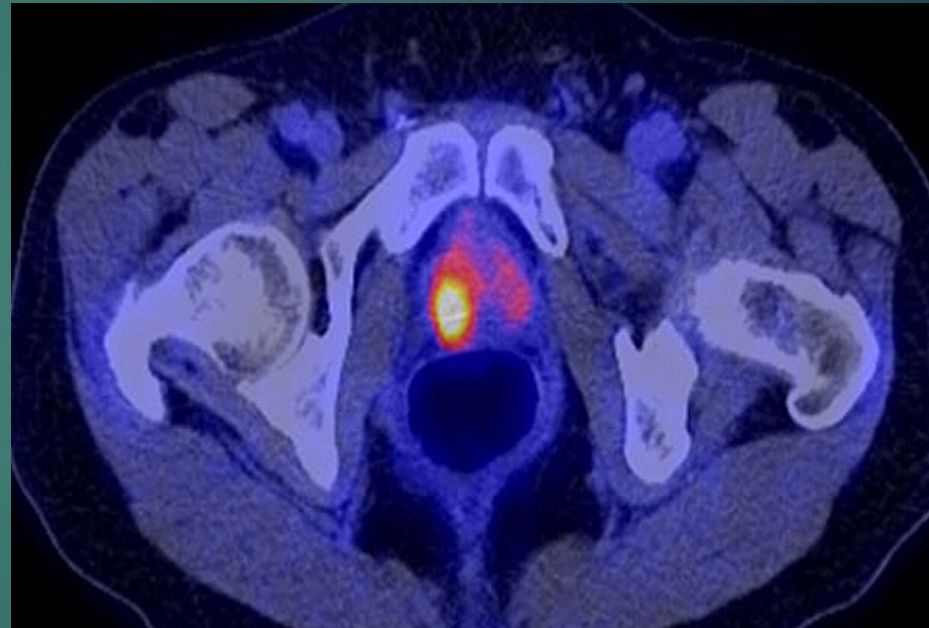
PSMA-PET Scans

- ▶ Uses imaging agent that binds to prostate cancer cells
- ▶ Over 90% of prostate cancers overexpress PSMA



EXTENT of DISEASE: PSMA PET SCAN

- ▶ ***Local: prostate***
- ▶ Regional: nodes
- ▶ Distant: bone or other



What do we do when prostate cancer recurs?

- ▶ After surgery: RT to prostate fossa +/- nodes, +/- ADT
- ▶ After radiation therapy:
 - ▶ Surgery
 - ▶ Brachytherapy
 - ▶ HIFU
 - ▶ Cryotherapy
 - ▶ **SBRT**

Stereotactic Body Radiation (SBRT)

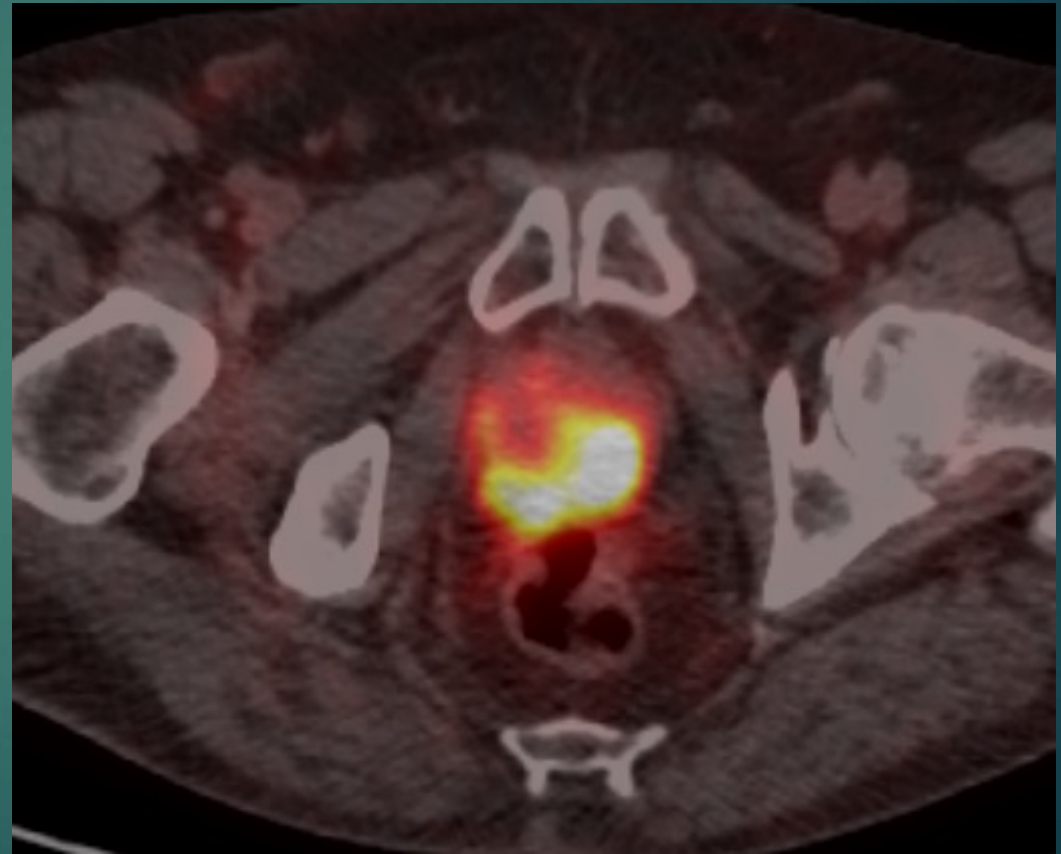
Hypofractionation: *reduces* the number of fractions by *increasing* the daily dose

- ▶ CONVENTIONAL FRACTIONATION:
 - ▶ 40-44 fractions
- ▶ MODERATE HYPOFRACTIONATION:
 - ▶ 20-30 fractions
- ▶ EXTREME HYPOFRACTIONATION:
SBRT
 - ▶ 5 fractions



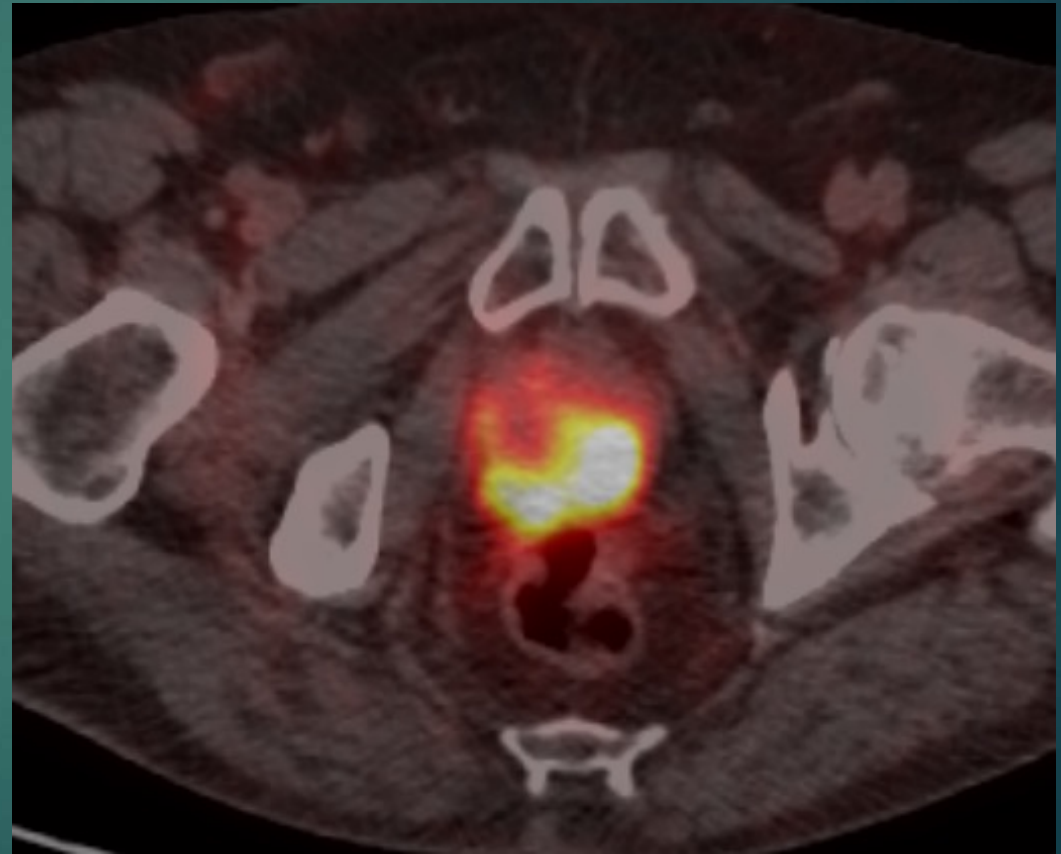
SBRT for Prostate Cancer

- ▶ Well established as definitive treatment
- ▶ Now being used for salvage of local failures
- ▶ Controversial: toxicity concerns
- ▶ Recent studies show acceptable control rates and low toxicity

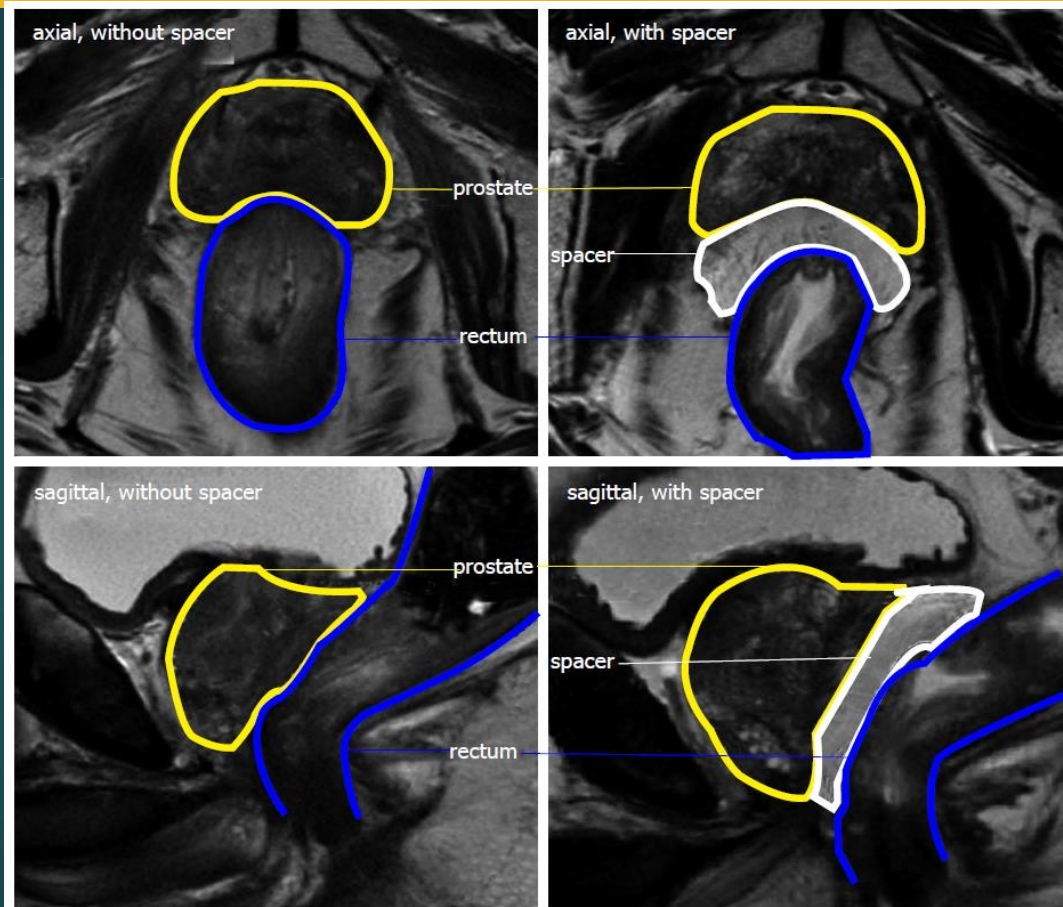


SBRT for Prostate Cancer: Toxicity

- ▶ Bowel: fistula, bleeding, blockage
- ▶ Bladder: fistula, bleeding
- ▶ Urethra: fistula



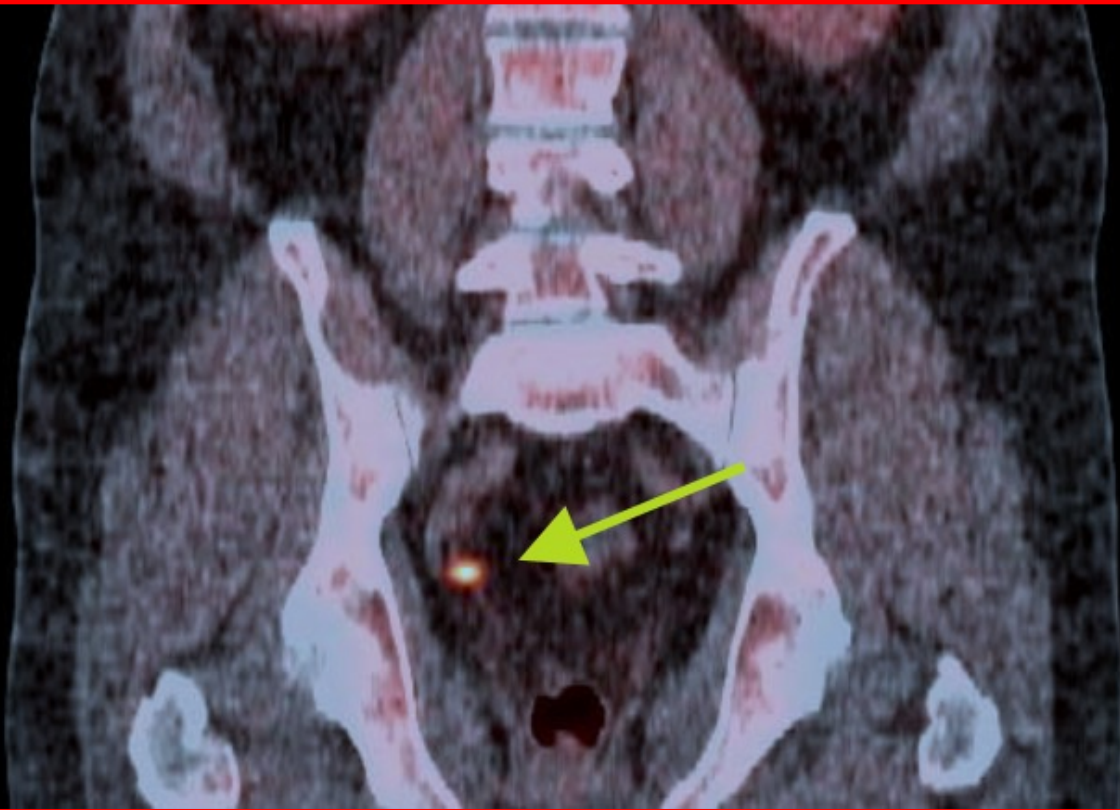
Decrease RT toxicity: Rectal Spacers



- ▶ Rectal spacers now being used
- ▶ Decrease rectal dose
- ▶ Less bowel issues in clinical trials

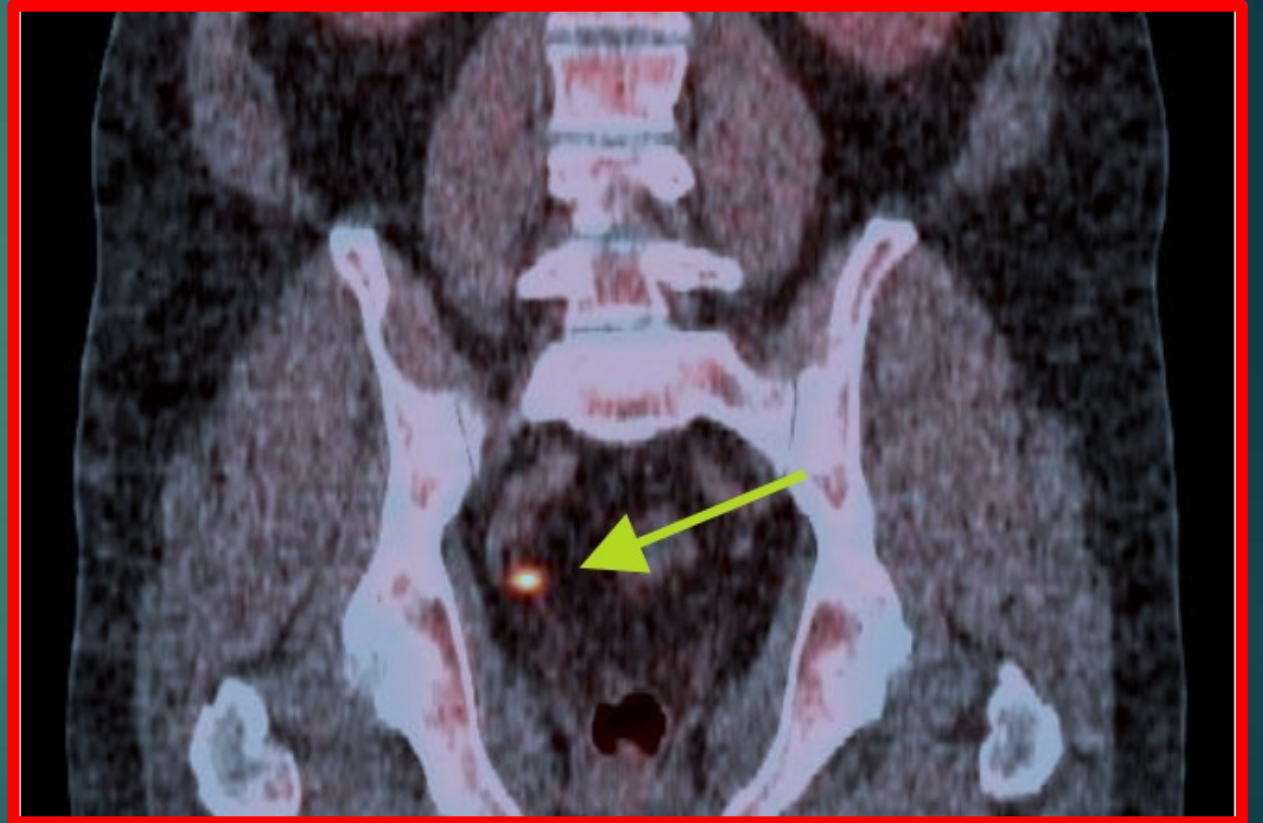
EXTENT of DISEASE: PSMA PET SCAN

Nodal Recurrence



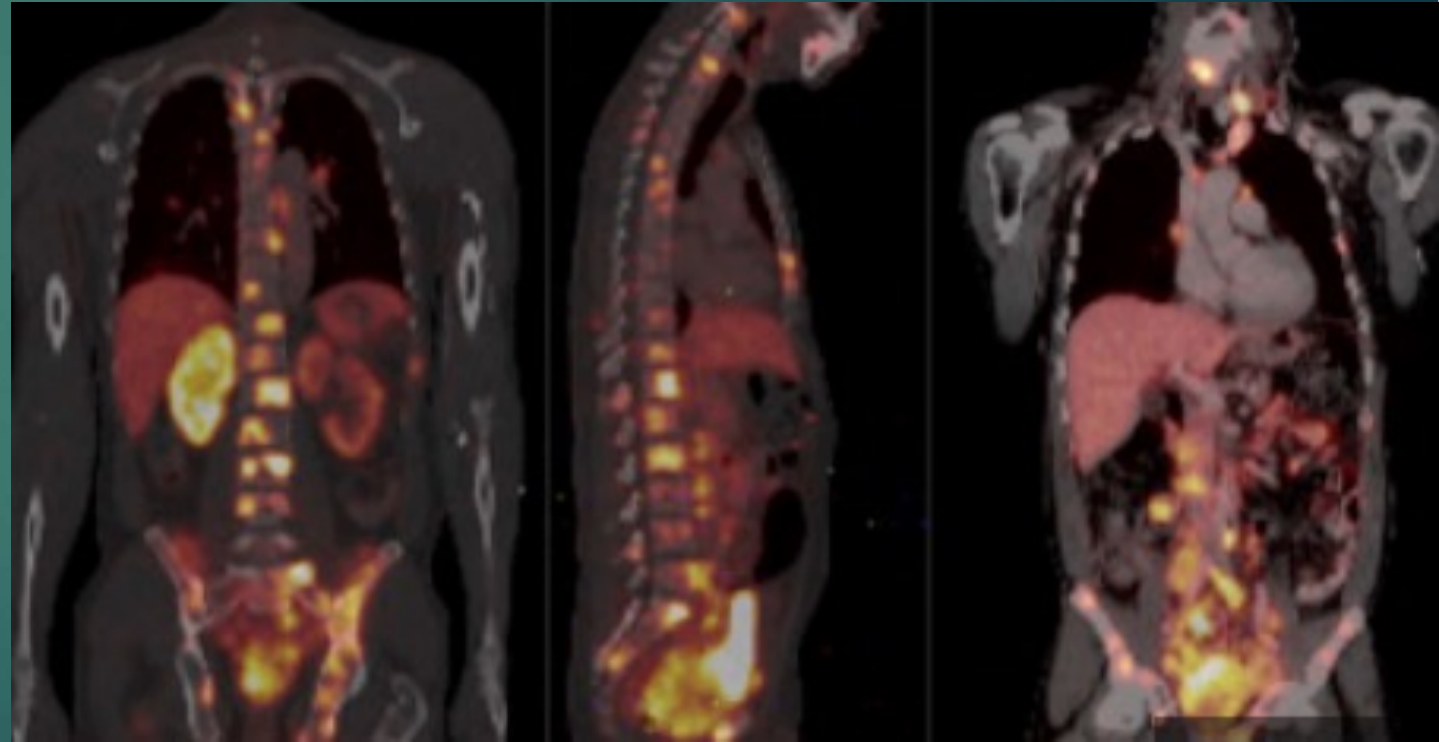
Prostate Cancer: Nodal Recurrence

- ▶ Effectively treated with ADT and RT
- ▶ Extended field with boost to node



Prostate Cancer: Distant Recurrence

- ▶ Stage IV or metastatic
- ▶ Mainstay: Systemic therapy
 - ▶ Hormonal therapy (ADT)
 - ▶ Chemotherapy

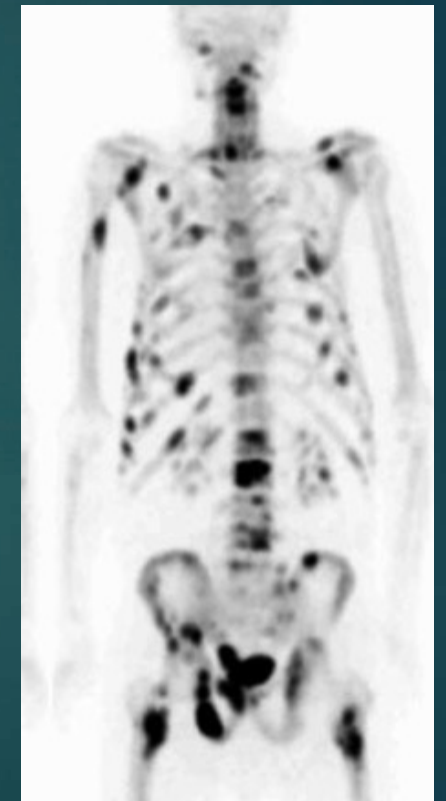


Prostate Cancer: Distant Recurrence

What is the extent of disease?

2 scenarios:

- ▶ Widely metastatic
- ▶ Oligometastatic



Radiation Therapy: Oligometastatic Prostate Cancer (OPC)

- ▶ Definition: Limited # of metastatic tumors
 - ▶ at diagnosis or recurrence
 - ▶ ? 5 or fewer sites
 - ▶ Boney sites
- ▶ Systemic therapy + local ablative techniques (SBRT)
- ▶ SBRT: 3-5 fractions
- ▶ Role for prostate RT at diagnosis



Prostate Cancer

288,300 new cases/year in US

▶ 80-85% localized

▶ 12% regional

▶ 4% metastatic

} Stage
IV

Oligometastatic Prostate Cancer: *Treatment of prostate*

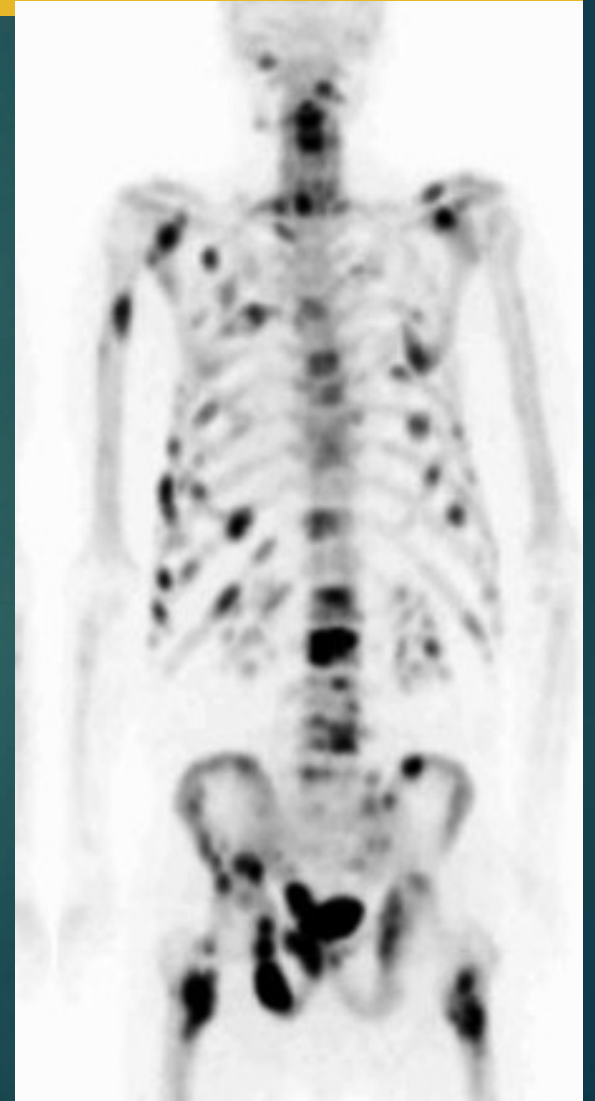
- ▶ Stampede and Peace-1 trials showed improved survival with RT in addition to systemic therapy

Oligometastatic Prostate Cancer: *Treatment of metastasis*

- ▶ Oriole and SABR-COMET trial showed decreased progression of cancer with metastasis directed therapy

Radiation Therapy: Widely Metastatic Prostate Cancer

- ▶ Palliation: External radiation
- ▶ Systemic radiation
 - ▶ Xofigo
 - ▶ Pluvicto



Radiopharmaceuticals



XOFIGO (Radium-223)

- Castration-resistant prostate cancer
- 6 dose IV Q 6 weeks
- Bone Metastases
- No visceral metastatic disease
- ALSYMPCA Trial: Shown to improve overall survival and improved quality of life

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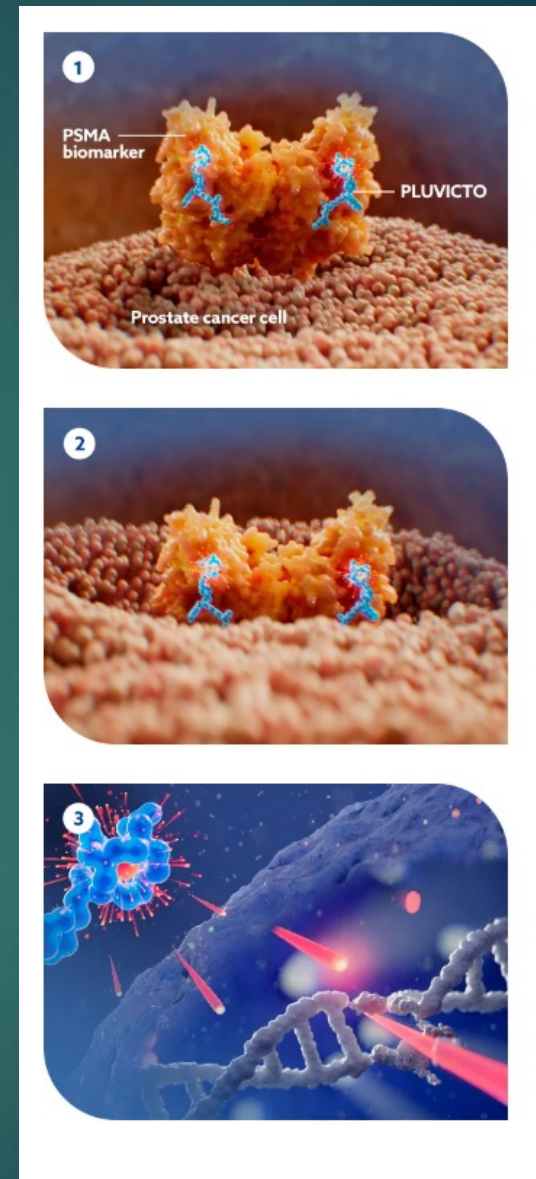
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**Alpha Emitter Radium-223 and Survival
in Metastatic Prostate Cancer**

C. Parker, S. Nilsson, D. Heinrich, S.I. Helle, J.M. O'Sullivan, S.D. Fosså, A. Chodacki, P. Wiechno, J. Logue, M. Seke, A. Widmark, D.C. Johannessen, P. Hoskin, D. Bottomley, N.D. James, A. Solberg, I. Syndikus, J. Kliment, S. Wedel, S. Boehmer, M. Dall'Oglio, L. Franzén, R. Coleman, N.J. Vogelzang, C.G. O'Bryan-Tear, K. Staudacher, J. Garcia-Vargas, M. Shan, Ø.S. Bruland, and O. Sartor, for the ALSYMPCA Investigators*

Pluvicto (Lutetium-177)

- ▶ Targets PSMA PET avid areas
- ▶ IV Q 6 weeks
- ▶ Indication: castrate resistant post chemotherapy



Conclusions

- ▶ Prostate cancer is common
- ▶ Recurrence in about 20-30%
- ▶ PSAM PET scan helps determine extent of recurrence
- ▶ Many options including surveillance
- ▶ Radiation options: SBRT, radiopharmaceuticals
- ▶ Oligometastatic