


What's New in Prostate Cancer Treatment

Dario Pasalic, MD
Rocky Mountain Cancer Centers, 303-416-6960

Patrick Richard, MD, MPH
Rocky Mountain Cancer Centers, 303-647-5726

Stephen Siegel, MD
Boulder Medical Center, 303-747-4951



Boulder
Community
Health 



Boulder
Medical Center



2022 Prostate Cancer Summit

New Technologies for Diagnosing & Treating Prostate Cancer

Dario Pasalic, MD
Patrick Richard, MD, MPH

Radiation Oncology
Rocky Mountain Cancer Centers
Boulder, CO

Carolyn Fronczak, MD, MS
Stephen Siegel, MD

Urology
Boulder Medical Center
Boulder, CO

June 28, 2022



Patrick Richard, MD, MPH



- Tulane University School of Medicine
- Tulane University Public Health Masters
- University of Washington Residency

Dario Pasalic, MD



- Mayo Clinic School of Medicine
- Memorial Sloan-Kettering Cancer Center Transitional Year
- MD Anderson Cancer Center Residency

Stephen Siegel, MD



- Vanderbilt University School of Medicine
- Yale University Residency

Carolyn Fronczak, MD, MS



- University of Colorado School of Medicine
- University of Colorado Public Health Masters
- University of Nebraska Residency

Screening



- Prostate specific antigen (PSA)
- Physical exam

Diagnosing



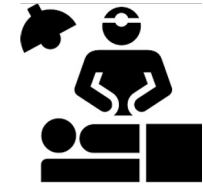
- Biopsy
- Genomic testing

Grouping



- Staging
- Risk stratification
- Imaging
 - Positron emission tomography (PET) using prostate-specific membrane antigen (PSMA)

Treating



- Watchful waiting
- Active surveillance
- Focal therapy
- Prostatectomy
- Hormone therapy
- Chemotherapy
- Radiation therapy



+



=

Multidisciplinary Approach

- **Formalized discussions** between specialized physicians/providers to provide **evidence-based best care recommendations** to patients
- Endorsed by American Society of Clinical Oncology as Best Cancer Practice
 - “Patient Centered, Specialized, and Integrated Multidisciplinary Care”
- Some evidence in breast cancer **that MDTs can improve health outcomes**
- Main benefits:
 - Patients have more confidence in providers and recommendations
 - MDTs provide multiple provider opinions and recommendations and patients like a second, third, and fourth opinion on their case without having to visit multiple providers.



- **RMCC/BMC** meets on a regular basis to **review mutual patients**
- **UNBIASED** recommendations
 - Our groups are **distinct** and **not financially connected**
 - Provide **recommendations** that are the **patient's BEST interest** based on **clinical, evidence-based medicine**
 - Combined urology-radiation practices connected financially often recommend therapy to patients that focus on the financial gain and not patient care (Mitchell et al. *NEJM* 2013)
 - Urologists use of radiation treatments they own more than doubled compared to urologist that are in a separate practice from radiation oncologist.

BMC/RMCC: A truly unbiased, multi-disciplinary prostate team in
Boulder county

Screening



- Prostate specific antigen (PSA)
- Physical exam

Diagnosing



- Biopsy
- Genomic testing

Grouping



- Staging
- Risk stratification
- Imaging
 - Positron emission tomography (PET) using prostate-specific membrane antigen (PSMA)

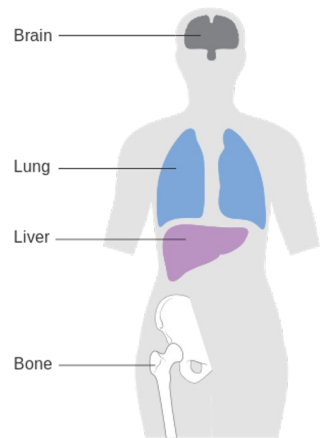
Treating



- Watchful waiting
- Active surveillance
- Focal therapy
- Prostatectomy
- Hormone therapy
- Chemotherapy
- Radiation therapy

- Three main risks with prostate cancer


Distant metastasis



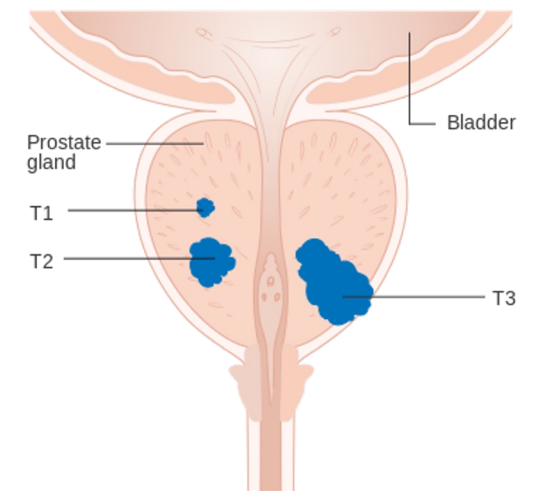
Prostate cancer mortality

Lung & bronchus	72,500	23%
Prostate	33,330	10%
Colon & rectum	28,630	9%
Pancreas	24,640	8%
Liver & intrahepatic bile duct	20,020	6%
Leukemia	13,420	4%
Esophagus	13,100	4%
Urinary bladder	13,050	4%
Non-Hodgkin lymphoma	11,460	4%
Brain & other nervous system	10,190	3%
All sites	321,160	

Estimated Deaths



Local recurrence/persistence



- Risk stratification
 - **Clinical** information (NCCN clinical risk grouping uses PSA, prostate digital rectal exam, Gleason score)
 - **Genetic tumor** information (Decipher testing)

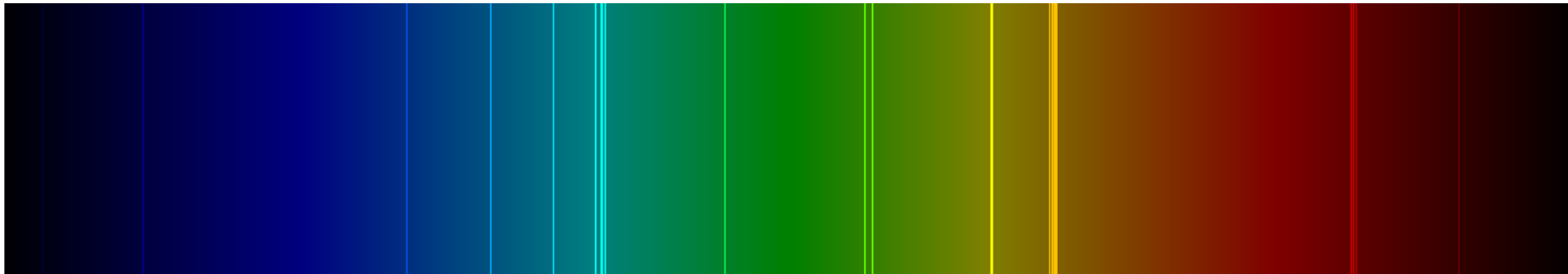
**Very
low risk**

**Low
risk**

Intermediate risk
Favorable Unfavorable

**High
risk**

**Very high
risk**



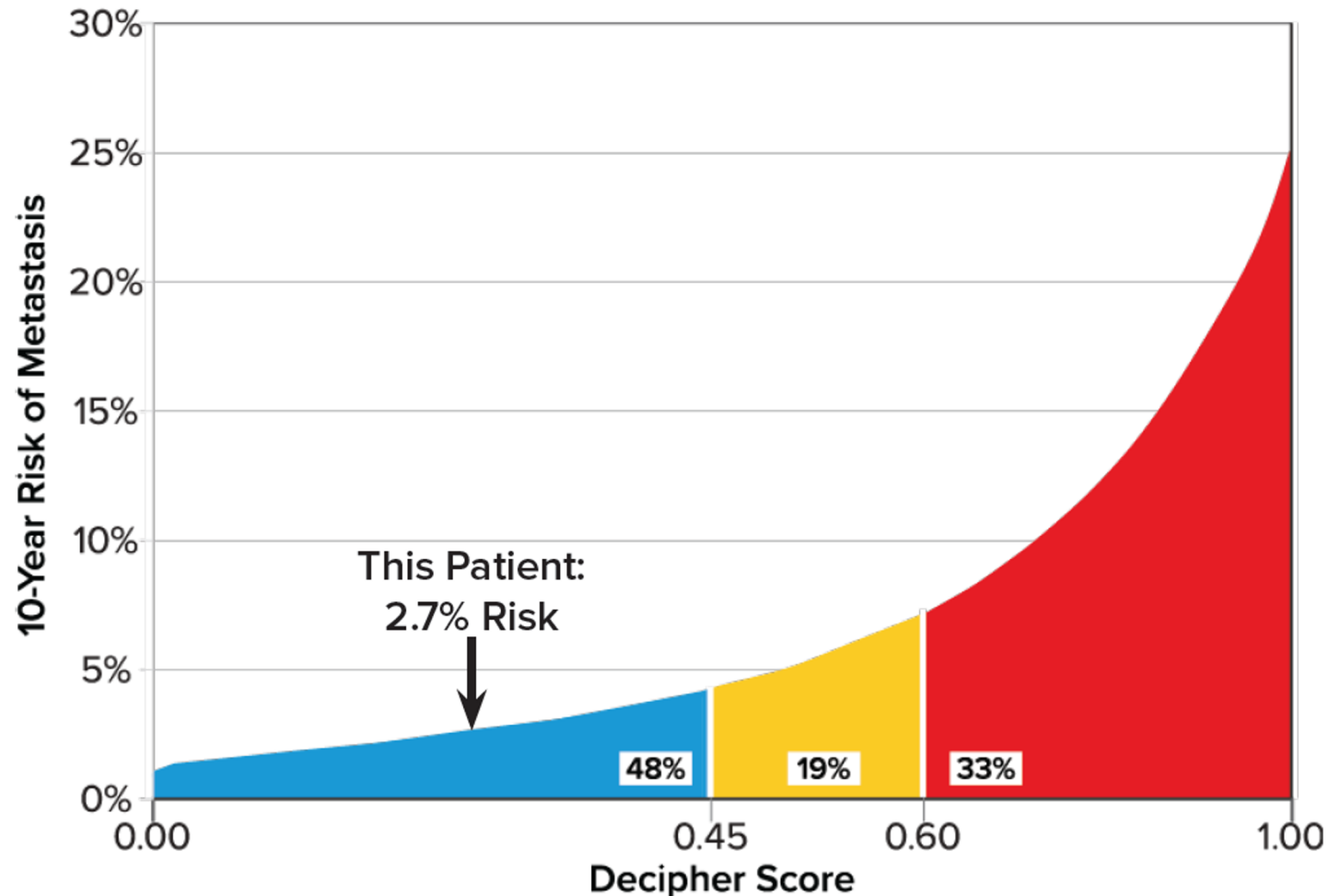
Aggressiveness of prostate cancer

- Important to understand your risk group and the implications of it
 - Very low risk prostate cancer is best treated with initial active surveillance
 - Very high risk prostate cancers typically require aggressive treatment with both systemic and local regional therapy
- Challenge of intermediate risk group
 - Favorable vs. Unfavorable

- NCCN risk groups historically used for determining risk of local recurrence or PSA-recurrence
- **More valuable endpoints are distant metastases and prostate cancer specific mortality.**
- **Decipher Test: 22 gene genomic classifier** originally intended to determine **risk of distant metastases** after prostatectomy
- Genetic testing of cancer cell RNA expression of certain biomarkers
 - Over the past 5-10 years, expanded use in certain risk groups of prostate cancer
 - Use of hormone therapy and higher dose radiation (RTOG 0126 analysis)
 - Need for adjuvant (immediate) vs. salvage radiation after prostatectomy (Den et al *JCO* 2015)
 - Use of hormone therapy in men getting salvage radiation (RTOG 9601 analysis)
 - De-escalate or escalate hormone therapy for intermediate risk or high risk (more to come)

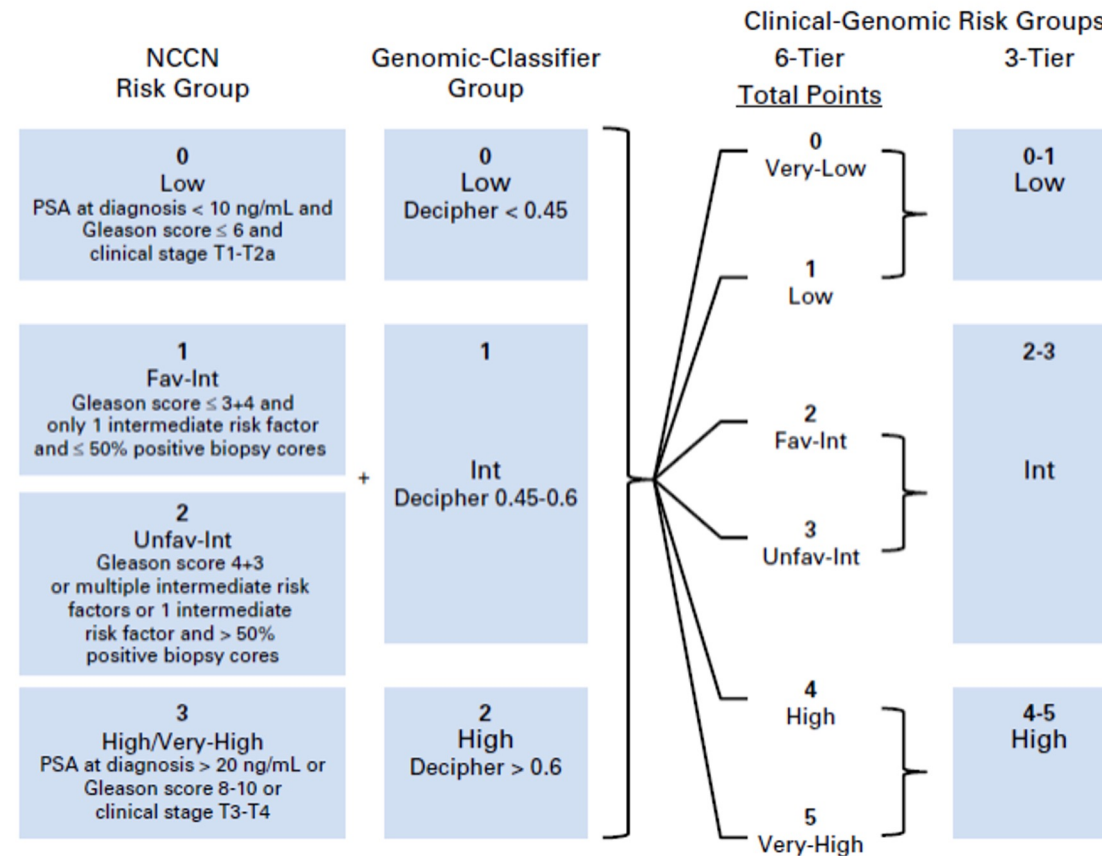
Decipher Report Example

RISK COMPARED TO PATIENTS WITH SIMILAR CLINICAL AND PATHOLOGIC FEATURES



Patients (n=6,708) with Unfavorable Intermediate Risk Disease[†]

- **Combining** results of **genomic testing** (Decipher) with **clinical factors** (PSA, physical exam, Gleason score)
- Uses genomic testing to either **upstage** the risk or **downstage** the risk



- **BCH and RMCC partners with Western States Cancer Research** program (WSCR)
 - NCI funded program granting access to **national clinical trials**
- **Diverse prostate cancer clinical trial portfolio** to offer patients
- **NRG GU009: PREDICT-RT** trial
 - High risk prostate cancer using genomic testing to potentially de-escalate hormone injections (if genomic low risk) or escalate (if genomic high risk)
- **NRG GU010: GUIDANCE** trial
 - Intermediate risk prostate cancer using genomic testing to potentially de-escalate hormone therapy (if genomic low risk) or escalate (if genomic high risk)

- **Staging** studies determine whether cancer is **localized** to the **prostate** gland or **outside** the prostate gland.
 - Extending through capsule
 - Involving regional pelvic lymph nodes or non-regional nodes
 - Involving distant organ (bone, liver, lungs)
- Depending on risk group, staging studies are more or less necessary.
 - NCCN: unfavorable intermediate risk and above should get staged
 - Symptomatic patient regardless of risk group
- **Staging** studies usually consists of cross-sectional **imaging** to evaluate anatomy in the pelvis and other organs.

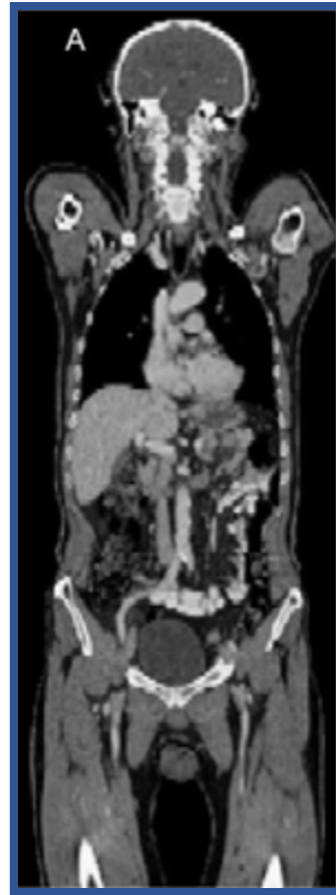
Prostate Cancer Diagnostic Imaging Options



Bone scintigraphy
(bone scan)



Tc99m single photon
emission CT (SPECT)



Computed
tomography (CT)

- **Bone scan** is a nuclear medicine scan to specifically evaluate the bone, specifically at sites of **bone turnover**.
 - Technetium-99 bone scan either in a single plane or 3D reconstruction (SPECT)
 - Lacks sensitivity and specificity
 - Detection rates low especially for lower PSA
- **CT** typically given with IV contrast and evaluates abdomen and pelvis; purely assessment of **anatomy**
 - Pelvic/regional lymph nodes
 - Liver
 - Non-regional nodes in the abdominal area
- **Combining CT** results and **bone scan** results may have higher accuracy in detecting metastases.

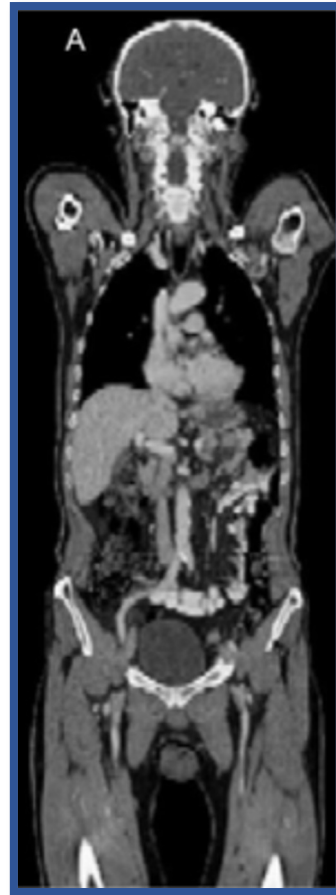
Prostate Cancer Diagnostic Imaging Options



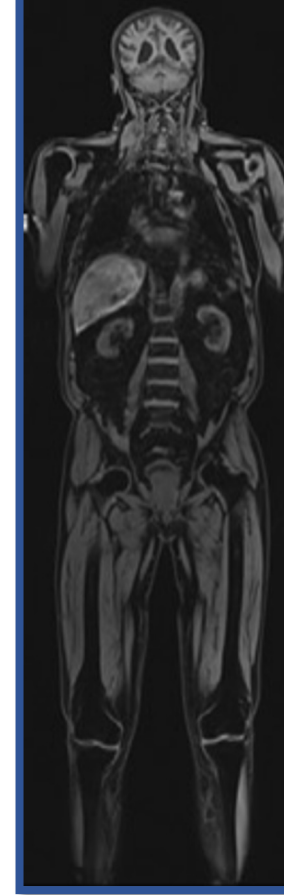
Bone scintigraphy
(bone scan)



Tc99m single photon
emission CT (SPECT)



Computed
tomography (CT)



Magnetic resonance
imaging (MRI)

- **Multiple MRI sequences/parameters** are used to radiographically determine whether high grade lesions are present
- **Prostate Imaging Reporting and Data System (PI-RADS)**

PI-RADS 1 = Very low (clinically significant cancer highly unlikely)

PI-RADS 2 = Low (clinically significant cancer unlikely)

PI-RADS 3 = Intermediate (clinically significant cancer equivocal)

PI-RADS 4 = High (clinically significant cancer likely)

PI-RADS 5 = Very high (clinically significant cancer highly likely)

- Important consideration to assess for all risk groups
 - BCH radiology offers mpMRI

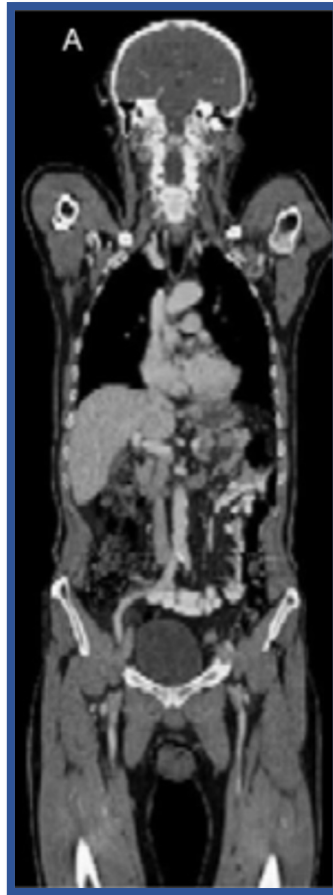
Prostate Cancer Diagnostic Imaging Options



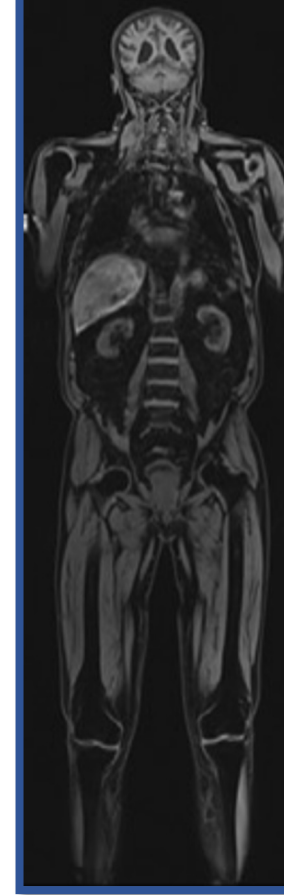
Bone scintigraphy
(bone scan)



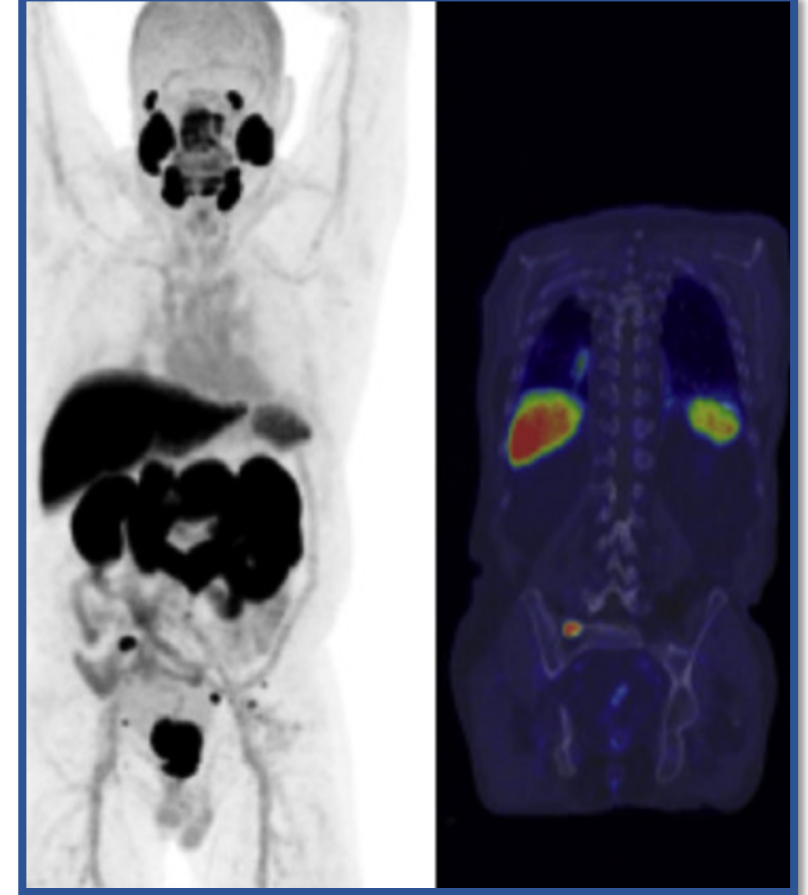
Tc99m single photon
emission CT (SPECT)



Computed
tomography (CT)



Magnetic resonance
imaging (MRI)



Positron emission tomography with prostate-
specific membrane antigen (PET-PSMA)

Sensitivity & Specificity in Diagnosing

- **Sensitivity:** Proportion of patients **with prostate cancer** who **test positive**
- **Specificity:** Proportion of patients **without prostate cancer** who **test negative**

Imaging Modality	Sensitivity	Specificity
CT	33-43%	79-98%
SPECT	33-52%	97-98%
MRI	43-67%	96%
PET-18-F-PSMA-1007	86-95%	81-90%

- Single-institution trial; 80 patients; high-risk prostate cancer; initial staging

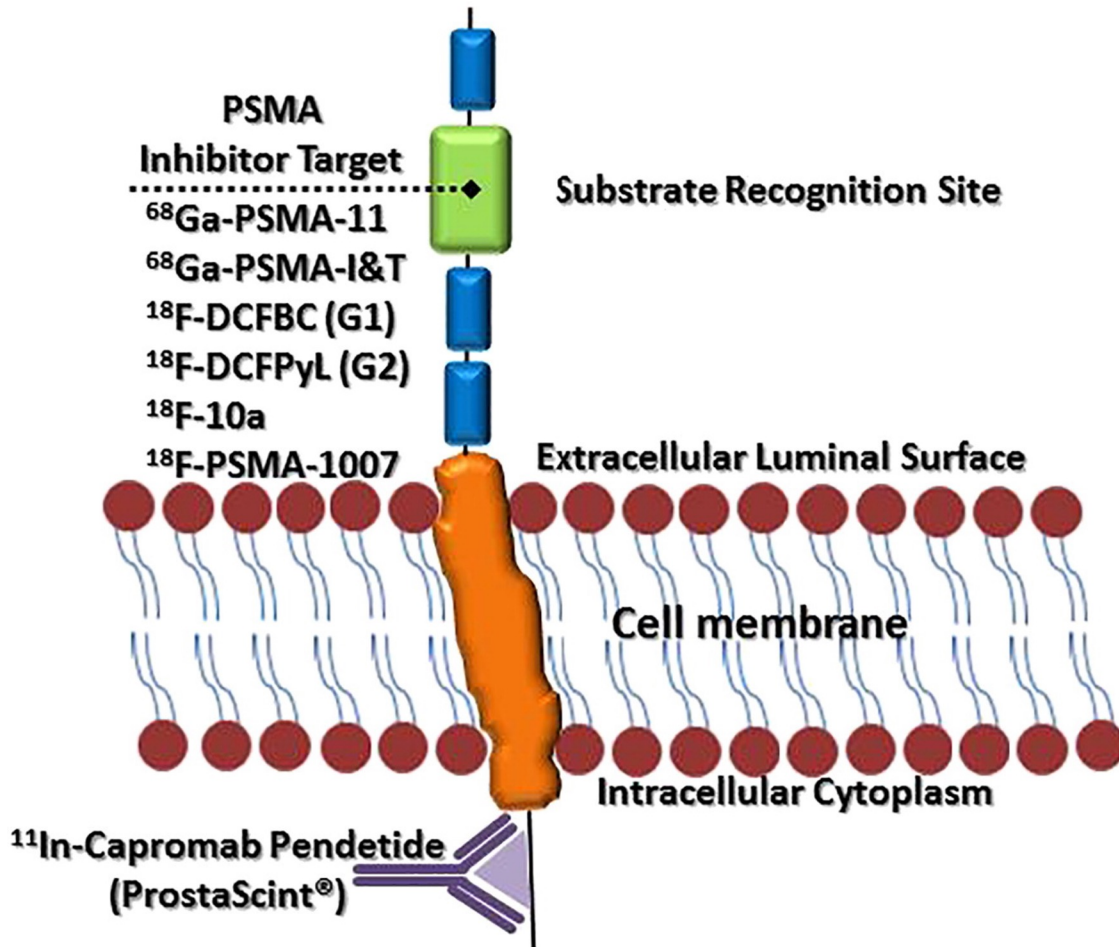
Sensitivity & Specificity in Diagnosing

- **Sensitivity:** Proportion of patients **with prostate cancer** who **test positive**
- **Specificity:** Proportion of patients **without prostate cancer** who **test negative**

Imaging Modality	Sensitivity	Specificity
CT + SPECT	38%	91%
PET-68-Ga-PSMA-11	85%	98%

- Multi-institutional trial; 302 patients; high-risk prostate cancer; initial staging
- **PSMA** much more accurate in terms of **nodal** metastasis (32% greater than CT/bone scan) and **distant** metastases (22% better than CT/bone scan)

PSMA Structure



- **Extracellular** catalytic domain binding site target for **PSMA ligands** including **^{68}Ga -PSMA-11** and **^{18}F -DCFPyL** → Leads to internalization and intracellular accumulation of bound radioligand.
- PSMA is overexpressed in prostate cancer cells.
- ProstaScint is an intracellular binding tracer and proven to have more limitations compared to extracellular tracers.

- Initially PSMA was only approved for staging in the RECURRENT prostate cancer setting after local therapy or AFTER conventional imaging (CT and bone scan)
- NCCN: **“the Panel does not feel that conventional imaging is a necessary prerequisite to PSMA-PET and that PSMA-PET/CT or PSMA PET/MRI can serve as an equally effective, if not more effective frontline imaging tool for these patients”**
- Society of Nuclear Medicine and Molecular Imaging (SNMMI) just released Appropriate Use Criteria for PSMA PET tracers



PSMA Appropriate Use Criteria

Clinical Scenarios for PSMA PET

Scenario no.	Description	Appropriateness	Score
1	Patients with suspected prostate cancer (e.g., high/rising PSA levels, abnormal digital rectal examination results) evaluated for targeted biopsy and detection of intraprostatic tumor	Rarely appropriate	3
2	Patients with very-low, low-, and favorable intermediate-risk prostate cancer	Rarely appropriate	2
3	Newly diagnosed unfavorable intermediate-, high-risk, or very-high-risk prostate cancer	Appropriate	8
4	Newly diagnosed unfavorable intermediate-, high-risk, or very-high-risk prostate cancer with negative/equivocal or oligometastatic disease on conventional imaging	Appropriate	8
5	Newly diagnosed prostate cancer with widespread metastatic disease on conventional imaging	May be appropriate	4
6	PSA persistence or PSA rise from undetectable level after radical prostatectomy	Appropriate	9
7	PSA rise above nadir after definitive radiotherapy	Appropriate	9
8	PSA rise after focal therapy of the primary tumor	May be appropriate	5
9	nmCRPC (M0) on conventional imaging	Appropriate	7
10	Posttreatment PSA rise in the mCRPC setting	May be appropriate	6
11	Evaluation of response to therapy	May be appropriate	5

- **68-Ga-PSMA PET** and **18-F-PSMA PET** now offered in **Boulder**
 - Medicare only for now until coding and reimbursement are determined by private payers.
- **RMCC-Boulder / BCH** with newly installed **General Electric MI DR PET-CT** scanner
 - Installed 1/2022
 - High spatial resolution (2mm); higher PET sensitivity; reduced radiation dose for CT



RMCC PET-CT Imaging Locations

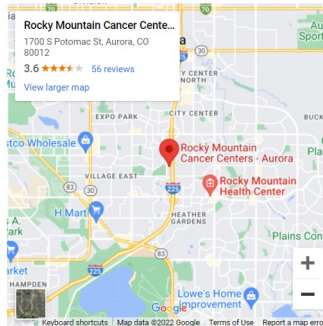


Aurora

1700 S. Potomac St.
Aurora, Colorado 80012

[REQUEST AN APPOINTMENT](#)

Phone: 303-418-7600
Fax: 303-750-3137
Radiation Dept Phone: 303-418-7659
Radiation Dept Fax: 303-750-3096



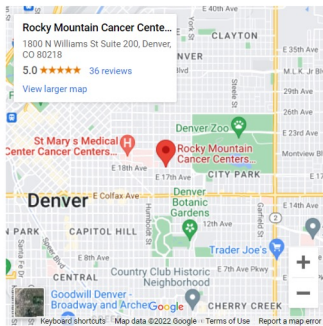
Denver - Midtown

1800 N. Williams St., Ste. 200
Denver, Colorado 80218

[REQUEST AN APPOINTMENT](#)

Phone: 303-388-4876
Fax: 303-285-5097

[NEW PATIENT FORMS](#)

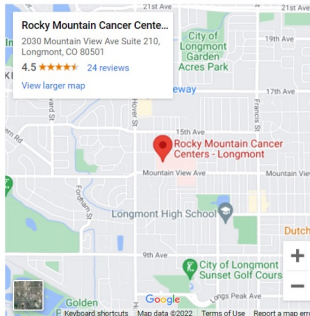


Longmont

2030 Mountain View Ave., Ste. 210
Longmont, Colorado 80501

[REQUEST AN APPOINTMENT](#)

Phone: 303-684-1900
Fax: 303-267-4470

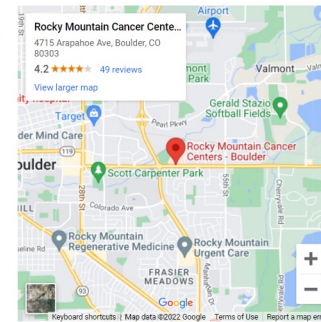


Boulder

4715 Arapahoe Ave.
Boulder, Colorado 80303

[REQUEST AN APPOINTMENT](#)

Phone: 303-385-2000
Fax: 303-267-4419
Radiation Dept Phone: 303-385-2068
Radiation Dept Fax: 303-385-2090

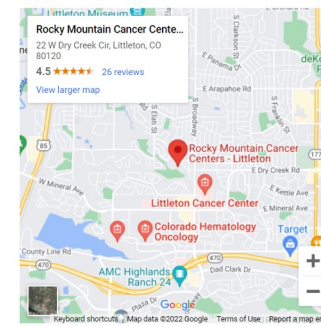


Littleton

22 W. Dry Creek Cir.
Littleton, Colorado 80120

[REQUEST AN APPOINTMENT](#)

Phone: 303-730-4700
Fax: 303-730-4790
Radiation Dept Phone: 303-730-4700
Radiation Dept Fax: 303-930-8053



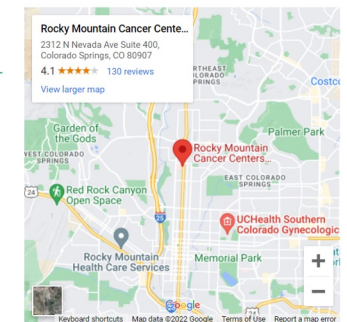
Colorado Springs - Penrose Pavilion

2312 N. Nevada Ave., Ste. 400
Colorado Springs, Colorado 80907

[REQUEST AN APPOINTMENT](#)

Phone: 719-577-2555
Fax: 719-577-2553

[NEW PATIENT FORMS](#)

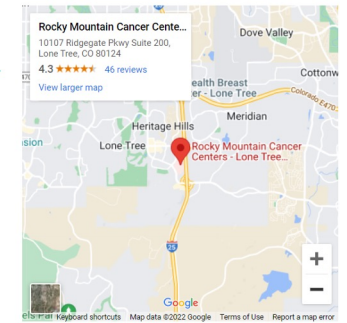


Lone Tree - Sky Ridge Medical Center

10107 Ridgeway Pkwy, Ste. 200
Lone Tree, Colorado 80124

[REQUEST AN APPOINTMENT](#)

Phone: 303-925-0700
Fax: 303-329-2599
Radiation Dept Phone: 720-225-4200
Radiation Dept Fax: 720-225-4208

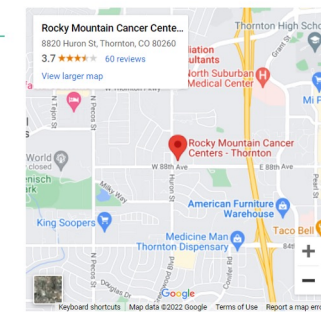


Thornton

8820 Huron St.
Thornton, Colorado 80260

[REQUEST AN APPOINTMENT](#)

Phone: 303-386-7622
Fax: 303-427-6800
Radiation Dept Phone: 303-386-7622
Radiation Dept Fax: 303-487-9350



Screening



- Prostate specific antigen (PSA)
- Physical exam

Diagnosing



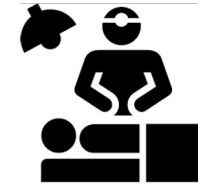
- Biopsy
- Imaging
 - Positron emission tomography (PET) using prostate-specific membrane antigen (PSMA)

Grouping



- Staging
- Risk stratification

Treating



- Watchful waiting
- Active surveillance
- Focal therapy
- Prostatectomy
- Hormone therapy
- Chemotherapy
- Radiation therapy

How Do I Decide What is Right for Me?

- Guided by risk stratification
- Patient life expectancy
- Quality of life outcomes
- Patient preference

Shared decision making is the key.

- **Watchful Waiting**
- Active Surveillance
- Focal Therapy
- Radical Prostatectomy
- Hormonal Therapy
- Chemotherapy
- Radiation Therapy

- Offered to patients who are **asymptomatic** with **limited life expectancy**
- Implies **no further cancer evaluations** or **treatments** unless and until the patient becomes symptomatic

- Watchful Waiting
- **Active Surveillance**
- Focal Therapy
- Radical Prostatectomy
- Hormonal Therapy
- Chemotherapy
- Radiation Therapy

- **Low risk** cancer
- **Serially monitored** for disease progression
- Intent is to pursue **treatment** in the setting of disease **progression** or if the **patient requests** treatment
- Goal is to **avoid or delay** the risk of **treatment** related **morbidity**

- **Safe** and **effective** for appropriate patients
- Very low risk and low risk patients
 - Grade Group 1 (Gleason 6)
 - Clinical Stage \leq T2a
 - PSA density <0.15
 - ≤ 3 positive biopsy cores
 - $\leq 50\%$ cancer in each core

- **Updated guidelines** show Active Surveillance as an option for:
 - PSA < 10
 - Stage \leq T2a
 - Grade Group 2 (Gleason 3+4=7)
 - Greater than a 10-year life expectancy

- **Grade Group 2** - Study of 219 patients at Memorial Sloan-Kettering Cancer Center
- **29%** eventually elected **treatment** at **3.1 years** of follow up

- **PSA and DRE** every 3-6 months
 - Can go out longer for older men with stable disease
- **Repeat biopsies** every 1-3 years
 - Should have biopsy with MRI guidance at follow up
- Role of **PSA kinetics** unclear
- **Genetic biomarkers** may improve risk stratification, management decisions and influence biopsy intervals

- Common **triggers** for physicians to **recommend treatment** after repeat biopsy
 - Increase in **Gleason score** (Grade Group)
 - **Number of positive cores**
 - **Percent of core positive**
 - **Increasing PSA** - needs to be rechecked first
 - Change in **DRE**
 - Patient **anxiety**

- Watchful Waiting
- Active Surveillance
- **Focal Therapy**
- Radical Prostatectomy
- Hormonal Therapy
- Chemotherapy
- Radiation Therapy

- Includes approaches such as **cryotherapy, high-intensity focused ultrasound, laser ablation, photodynamic therapy, electroporation, radiofrequency ablation**
- Should only be considered in **Intermediate Risk** patients
 - Low risk patients should have active surveillance
 - High risk patients should have surgery or radiation
- **Only randomized trial** reported on prostate ablation was on **low risk cancer** was **Focal Photodynamic Therapy**
- **Lowered** the likelihood of **progression** and rates of surgery or radiation compared to active surveillance
- **Not approved** in the **United States**



- Variety of other ablative therapies have reported outcomes, but without randomized trials and without sufficient follow up - the current guidelines of the **American Urological Association** is

“the role of ablative therapy in the management of clinically localized prostate cancer remains to be defined.”

- Watchful Waiting
- Active Surveillance
- Focal Therapy
- **Radical Prostatectomy**
- Hormonal Therapy
- Chemotherapy
- Radiation Therapy

- **Curative** treatment option for men with clinically localized prostate cancer
- Allows for accurate **pathologic grading** and **staging**
- Makes treatment failure easy to identify
- **Genetic Biomarkers (Decipher)** can predict future risk of metastasis in high risk patients with positive margins, pT3 disease and/or rising PSA

Abdominal Trocars



Davinci Robot

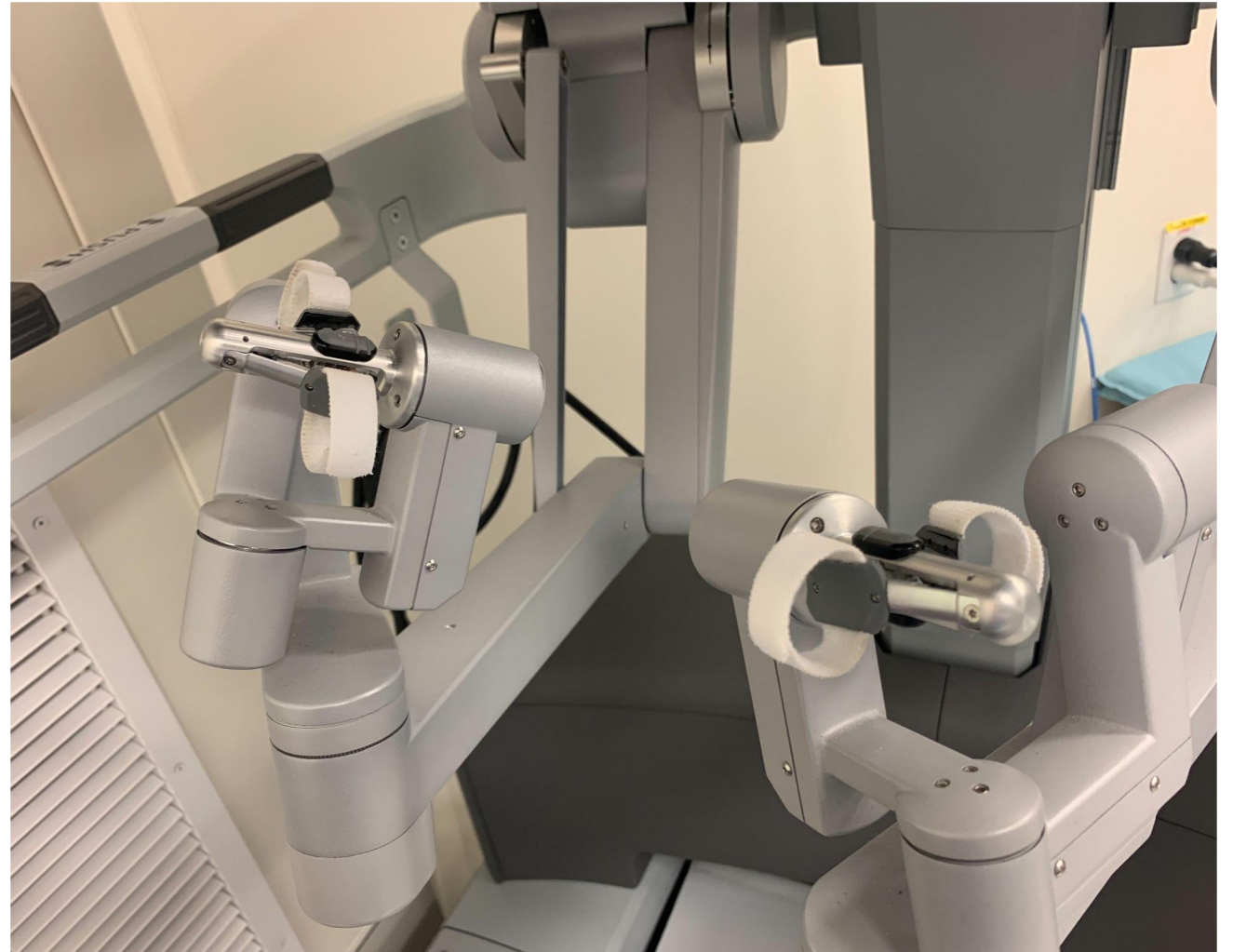


Surgeon's Console





Robotic Finger controls



3D View



Technique of Radical Prostatectomy

- Separation of Bladder from Prostate
- Removal of Prostate and Seminal Vesicles
- Cutting of Urethra
- Reconstruction of Urethra
- Sampling of Pelvic Lymph Nodes

- Lower likelihood of post op Erectile Dysfunction
- Needs to be balance between nerve preservation and optimizing cancer control
- Decision should be made based on PSA, grade, tumor volume and location

- Study comparing Radical Prostatectomy to watchful waiting (Scandinavian Prostate Cancer Group Study)
- Overall Survivor Benefit 12%
- Median 2.9 years of life gained at 23 years of follow up

- PIVOT (Prostate Cancer Intervention versus Observation trial) did not show improved survival at 12.7 years
- Did show that surgery reduced the risk of progression of disease 40.9% to 68.4%
- Showed the need for treatment due to progression was also improved. 33.5% to 59.7%

- ProtecT trial - 1,643 patients randomized to surgery, radiation or active surveillance - 77% Grade Group 1
- NO significant difference in mortality between surgery, radiation, or active surveillance
- Increased risk of clinical progression without treatment
- Increased risk of metastatic disease without treatment

- Improvements in open surgery/ better understanding of anatomy in 1980s and 1990s led to decreased complications and better functional outcomes
- Short history of laparoscopic prostatectomies
- Introduction of robotic surgery
- By 2010, 67-85% of all prostatectomies in the US were done robotically

- Similar to open surgery
- Similar quality of life outcomes
- Similar oncologic control
- Fewer complications
- Less blood loss
- Shorter length of stay in the hospital

- Rectal/ Bowel injury
- Bladder/Urethral injury
- Injury to Nerves
- Venous Thromboembolic event
- Incontinence
- Erectile Dysfunction

- Serial PSA measurements
 - Every 3-6 months for the first two years
 - Every 6 months between years 2 and 5
 - Every 12 months after year 5
- Symptom assessment
- Treatment of lifestyle affecting side effects

- Watchful Waiting
- Active Surveillance
- Focal Therapy
- Radical Prostatectomy
- **Hormonal Therapy**
- **Chemotherapy**
- Radiation Therapy

- Watchful Waiting
- Active Surveillance
- Focal Therapy
- Radical Prostatectomy
- Hormonal Therapy
- Chemotherapy
- **Radiation Therapy**

Prostate Cancer Treatment Options

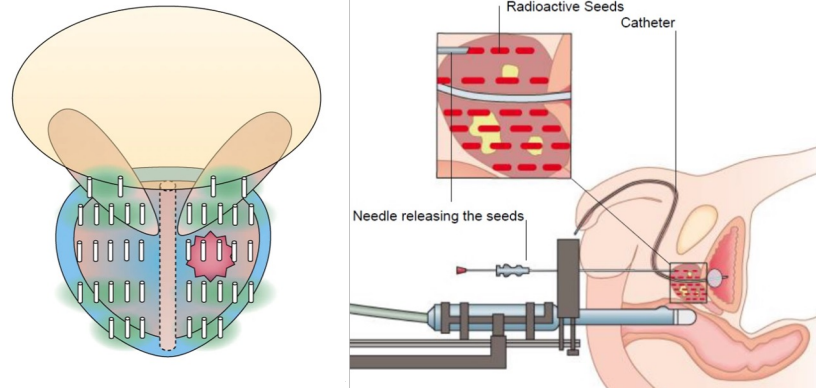
Level I: Evidence obtained from at least one properly designed **randomized controlled trial**

Surgery (Prostatectomy)



- 1 day
- Anesthesia
- Invasive

Internal Radiation (Brachytherapy)

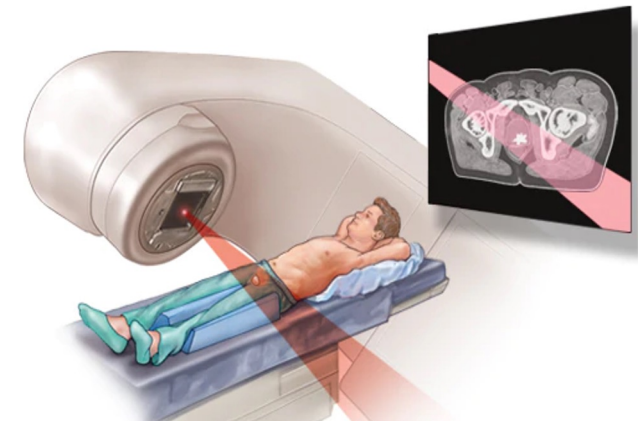


- 1 day
- Anesthesia
- Invasive

External Radiation

IMRT

SBRT



- ~4-9 weeks
- No anesthesia
- Non-invasive
- 1-2 weeks
- No anesthesia
- Non-invasive

Prostate Cancer Treatment: Surgery vs. Radiation



The NEW ENGLAND
JOURNAL of MEDICINE

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

Freddie C. Hamdy, F.R.C.S.(Urol.), F.Med.Sci., Jenny L. Donovan, Ph.D., F.Med.Sci., J. Athene Lane, Ph.D., Malcolm Mason, M.D., F.R.C.R., Chris Metcalfe, Ph.D., Peter Holding, R.G.N., M.Sc., Michael Davis, M.Sc., Tim J. Peters, Ph.D., F.Med.Sci., Emma L. Turner, Ph.D., Richard M. Martin, Ph.D., Jon Oxley, M.D., F.R.C.Path., Mary Robinson, M.B., B.S., F.R.C.Path., et al., for the ProtecT Study Group*

Patient-Reported Outcomes after Monitoring, Surgery, or Radiotherapy for Prostate Cancer

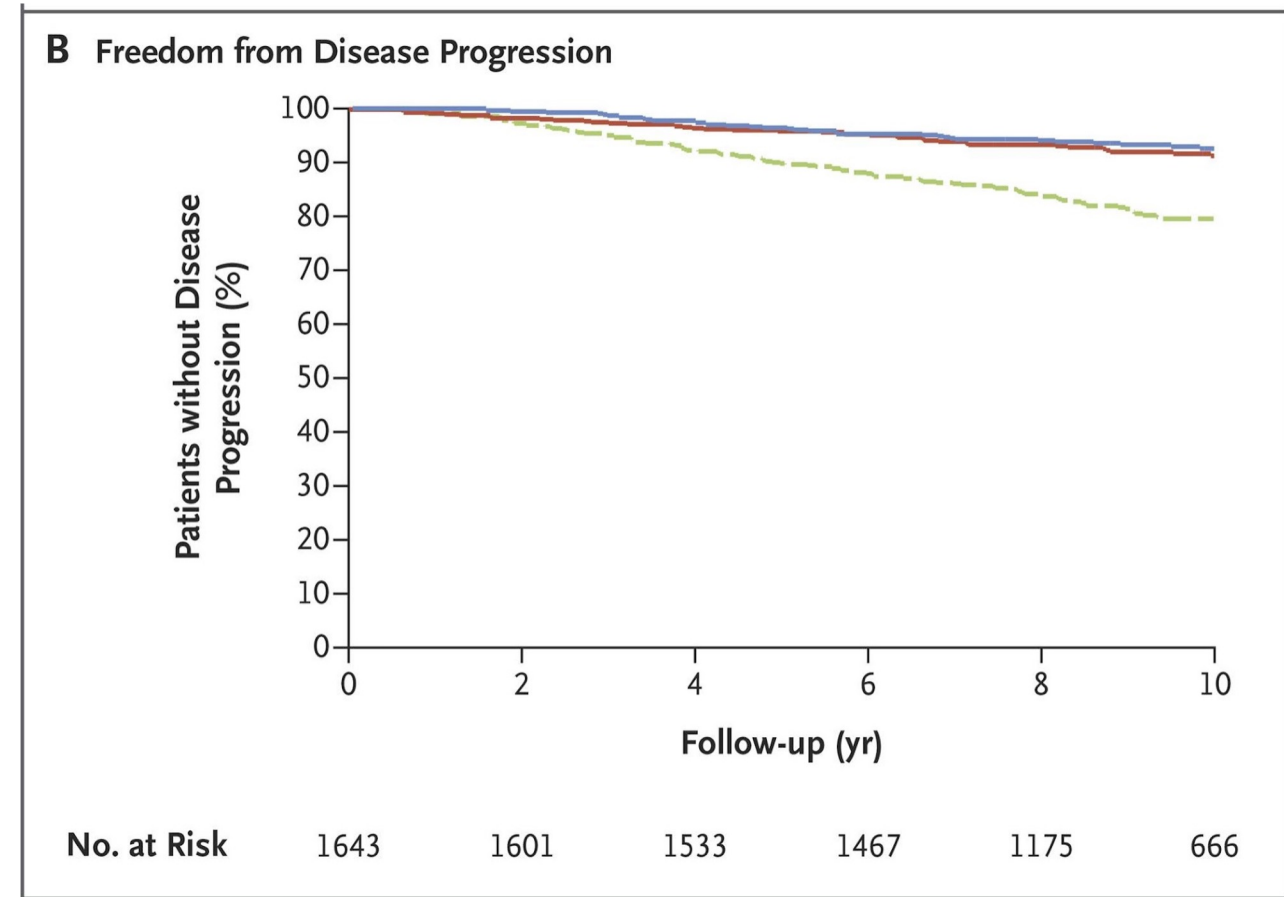
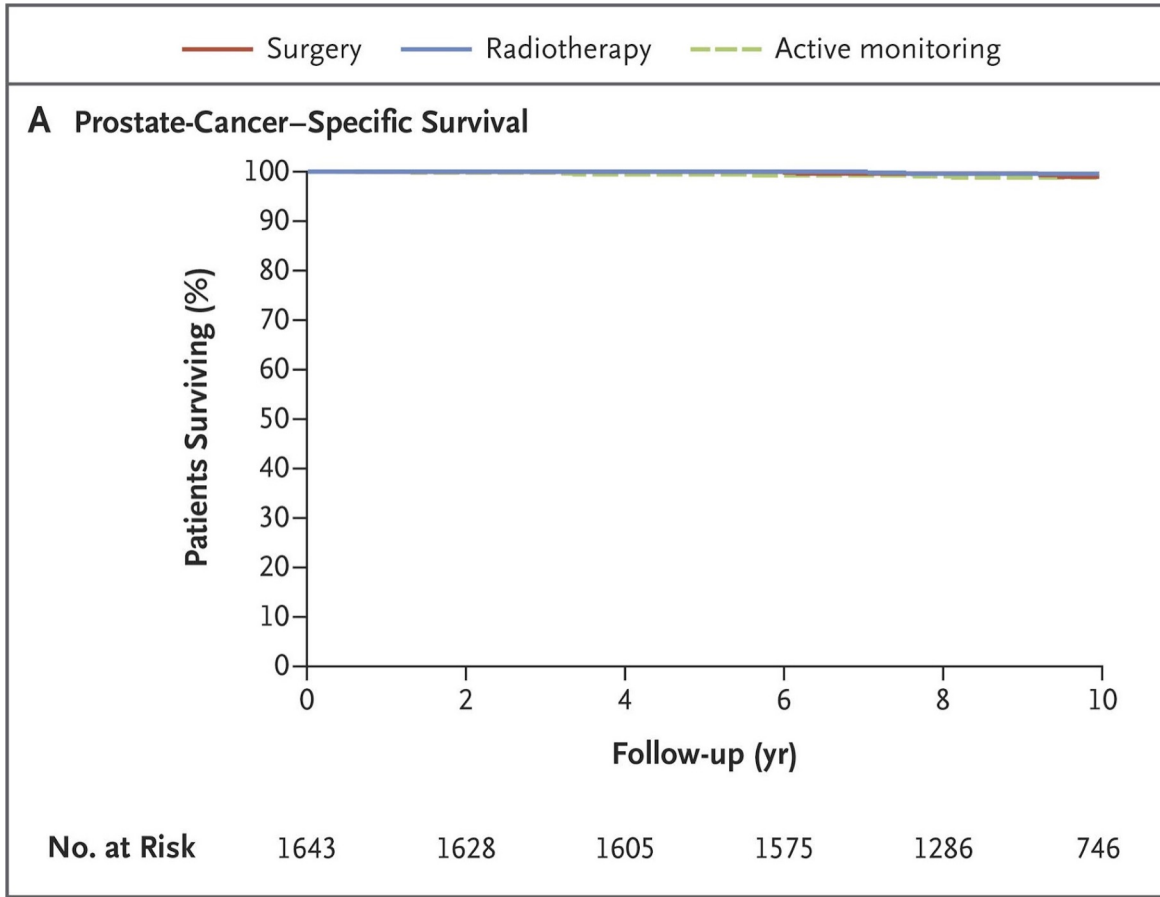
Jenny L. Donovan, Ph.D., F.Med.Sci., Freddie C. Hamdy, F.R.C.S.(Urol.), F.Med.Sci., J. Athene Lane, Ph.D., Malcolm Mason, M.D., Chris Metcalfe, Ph.D., Eleanor Walsh, M.Sc., Jane M. Blazeby, Ph.D., F.R.C.S., Tim J. Peters, Ph.D., F.Med.Sci., Peter Holding, R.G.N., Susan Bonnington, R.G.N., Teresa Lennon, R.G.N., Lynne Bradshaw, R.G.N., et al., for the ProtecT Study Group*



Boulder Medical Center



Prostate Cancer Treatment: Surgery vs. Radiation



Prostate Cancer Treatment Options

Surgery (Prostatectomy)



- 1 day
- Anesthesia
- Invasive

Internal Radiation (Brachytherapy)

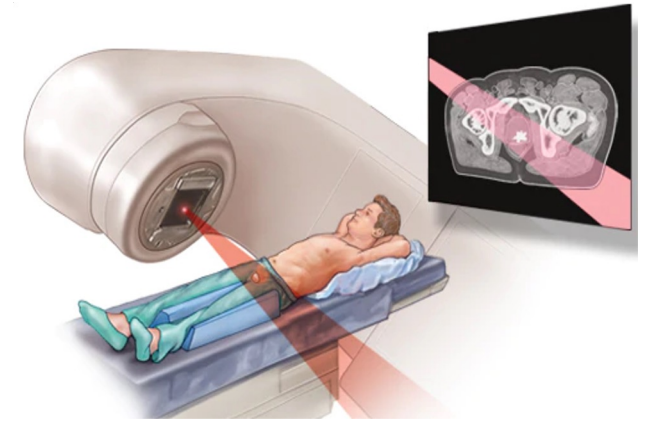


- 1 day
- Anesthesia
- Invasive

External Radiation

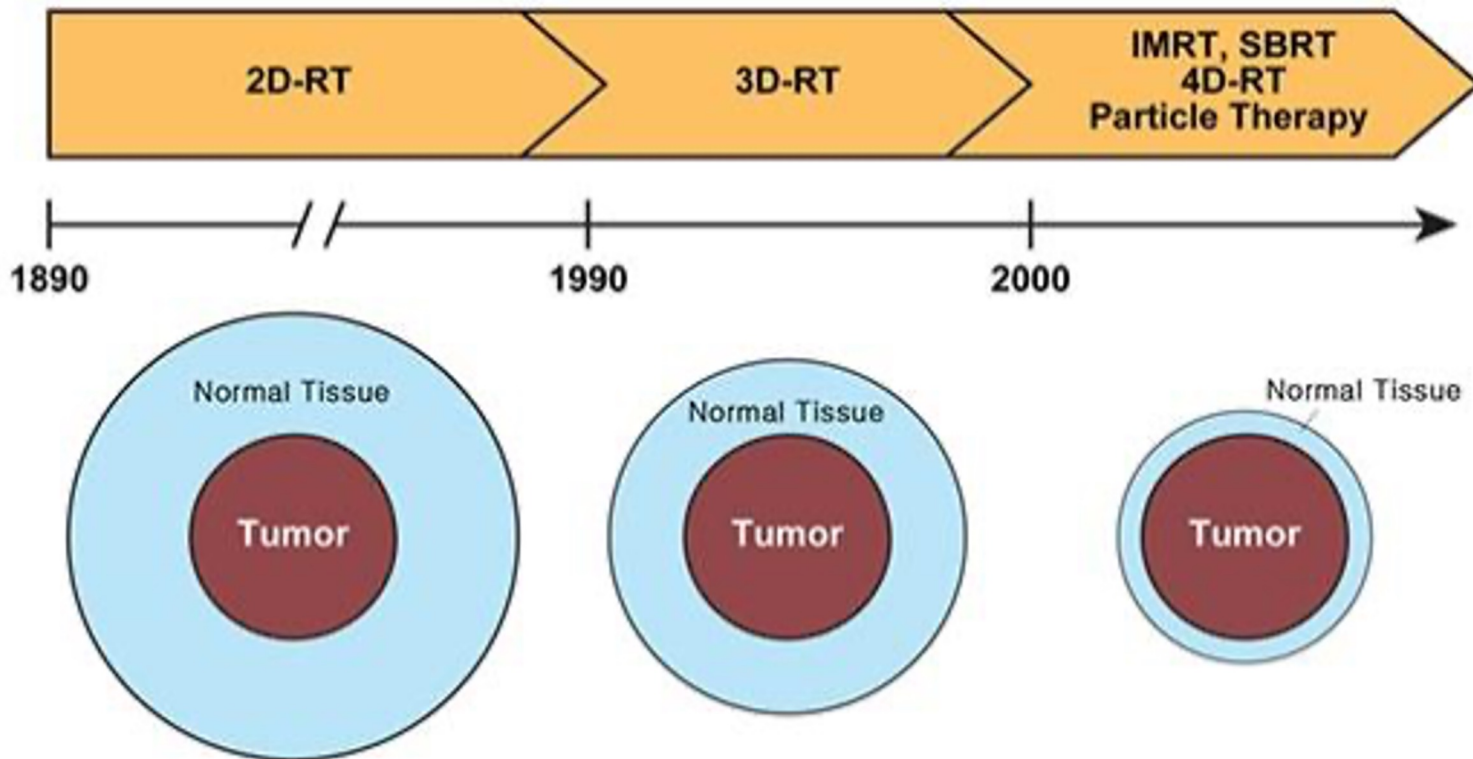
IMRT

SBRT



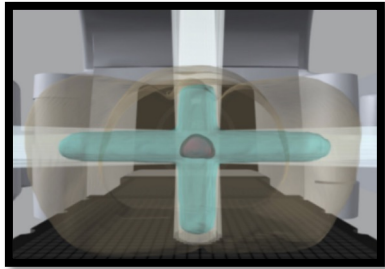
- ~4-9 weeks
- No anesthesia
- Non-invasive
- 2 weeks
- No anesthesia
- Non-invasive

Evolution & Goals of Modern Radiation Therapy

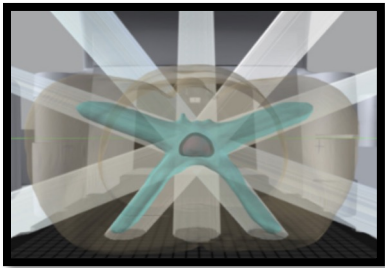


- **Design** radiation plan
 - Matches **individual** patient prostate gland **anatomy**
 - **Minimize radiation** exposure to surrounding **normal tissue** such as rectum, bladder, and bone
- **Delivery** radiation plan
 - **Timely**
 - Ensure **consistent daily setup** through rigorous **image guidance**

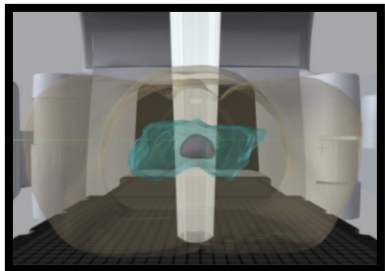
External Beam Radiation Therapy (EBRT)



3D-conformal
(**3D-CRT**)



Intensity
modulated
(**IMRT**)



Volumetric
modulated
arc therapy
(**VMAT**)

Conventional EBRT

- Small dose daily (Mon-Fri)
- 8-9 week course

Hypo-fractionated EBRT

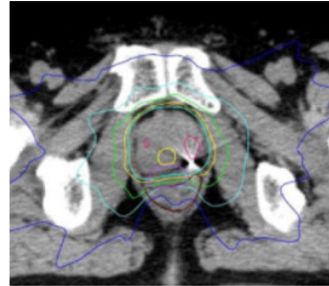
- Larger dose daily
- 4-6 week course

Ultra hypo-fractionated EBRT

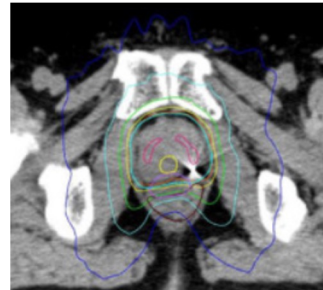
- Stereotactic body radiation therapy **SBRT**
- Larger dose per treatment
- 5 total treatments given every other day (~2 week course)

Technology to Deliver EBRT/SBRT

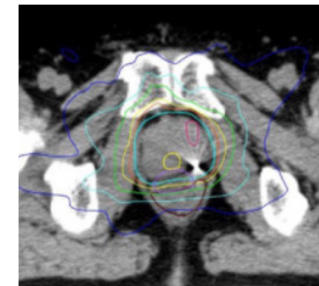
TrueBeam



Tomotherapy



CyberKnife



High energy photon radiation

Linear accelerator (accelerate electrons → high energy photons)

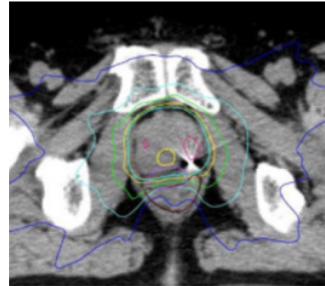
Conventional or Stereotactic

Stereotactic

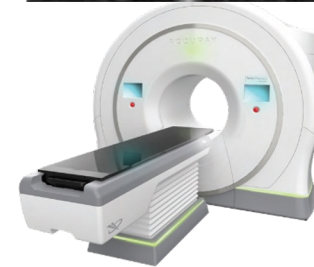
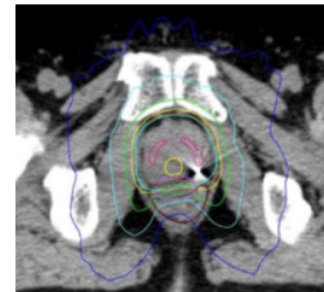
Any tumor location

Technology to Deliver EBRT/SBRT

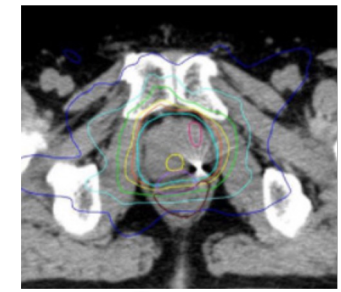
TrueBeam



Tomotherapy



CyberKnife



Treatment **time** for 1 fraction

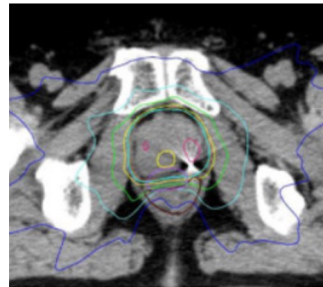
2.6 minutes

6.9 minutes

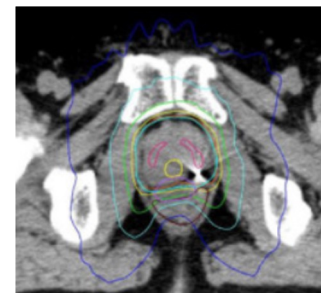
17.4 minutes

Technology to Deliver EBRT/SBRT

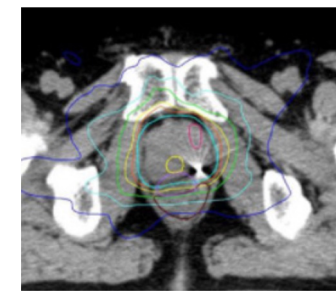
TrueBeam



Tomotherapy



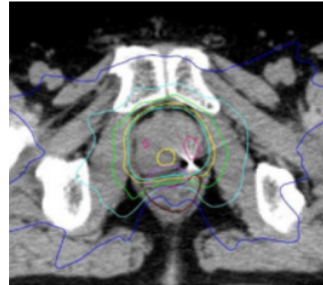
CyberKnife



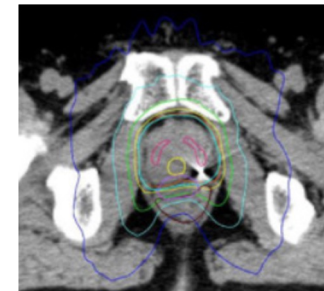
Treatment time for 1 fraction	2.6 minutes	6.9 minutes	17.4 minutes
Percent rectum receiving significant radiation dose	5.6%	20.2%	11.2%

Technology to Deliver EBRT/SBRT

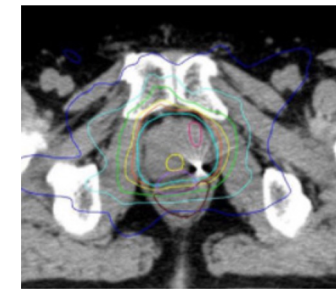
TrueBeam



Tomotherapy



CyberKnife



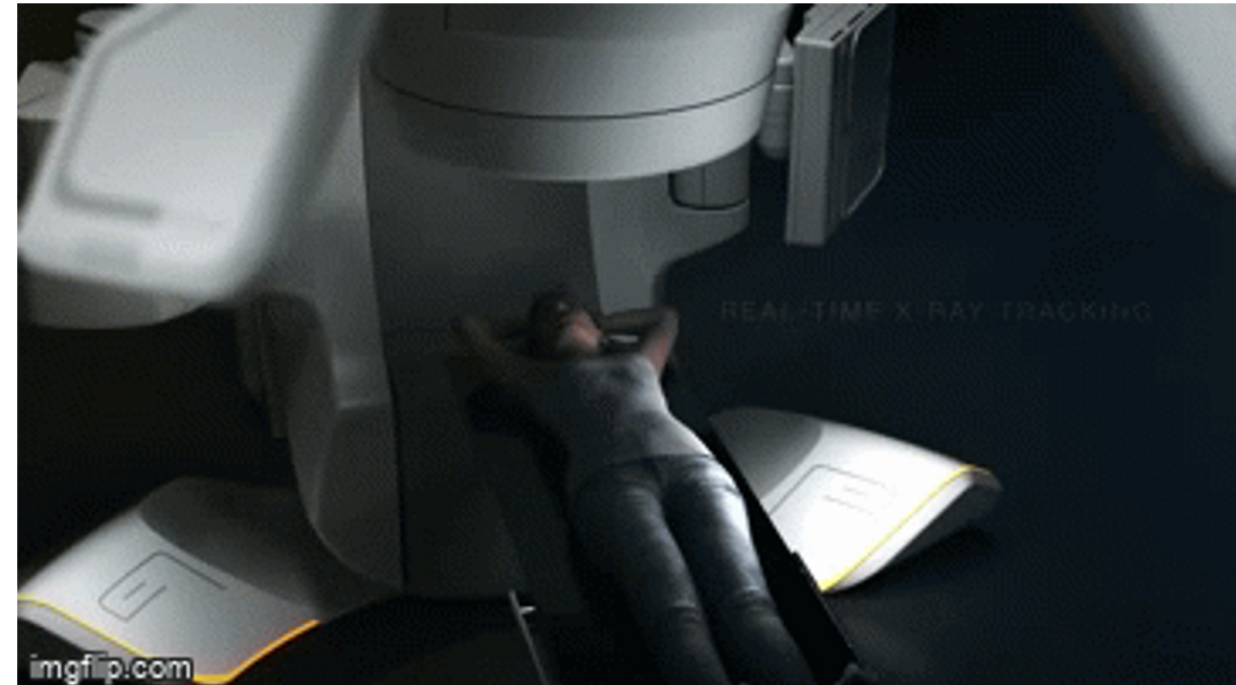
Treatment time for 1 fraction	2.6 minutes	6.9 minutes	17.4 minutes
Percent rectum receiving significant radiation dose	5.6%	20.2%	11.2%
Percent bladder receiving significant radiation dose	16.5%	33.2%	15.8%

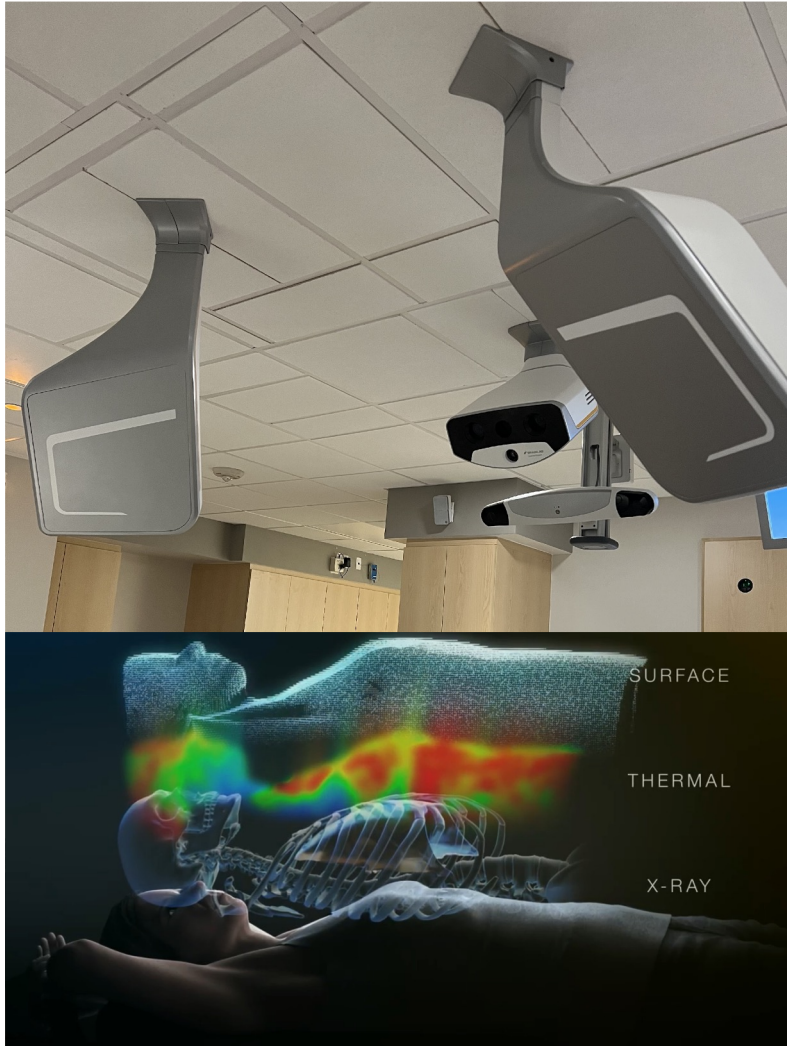


Varian TrueBeam (Edge)

- 6-degree-of-freedom couch
 - Adjust patient position in any direction
- High definition multileaf collimators (2.5 mm)
 - Shape radiation dose with much tighter margins and dose fall-off

Brainlab ExacTrac Dynamic



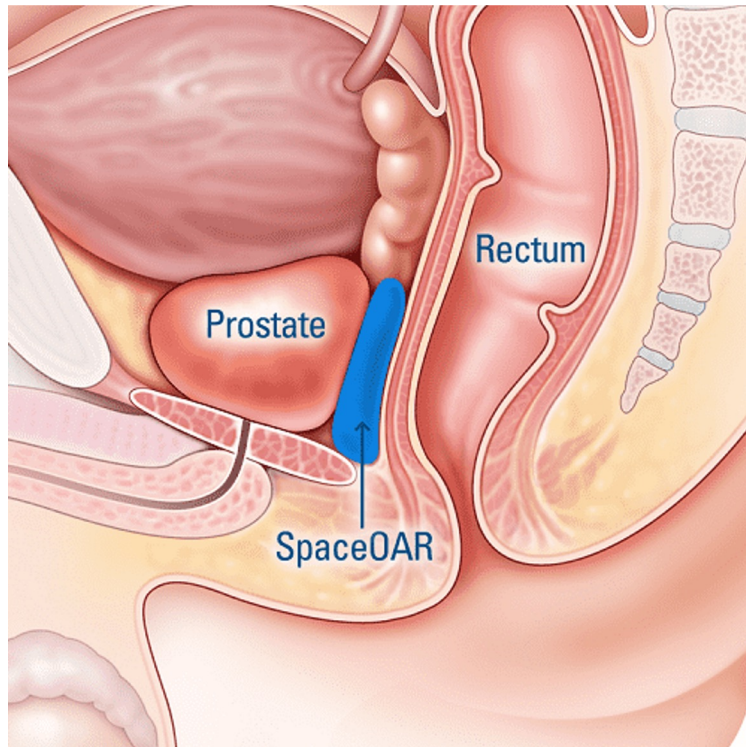


Brainlab ExacTrac Dynamic

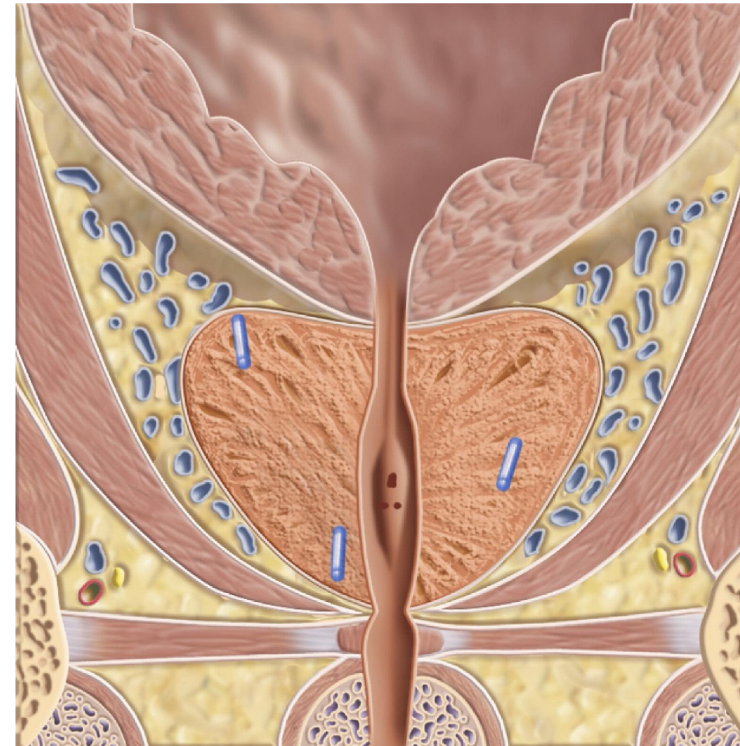
- Patient motion and position monitoring on four levels
 - Surface guidance
 - Thermal guidance
 - X-ray guidance
 - Real-time tracking/monitoring during treatment
- Allows for sub-millimeter precision and accuracy of setup, and a much tighter dose delivery

RMCC Technology for Accurate & Reproducible Targeting

Hydrogel spacer
(decrease dose to rectum;
visualize on daily imaging)



Metal prostate markers
(visualize on daily imaging)



Not mandatory for every type of prostate cancer treatment plan; requires additional procedure

RMCC Technology for Accurate & Reproducible Targeting

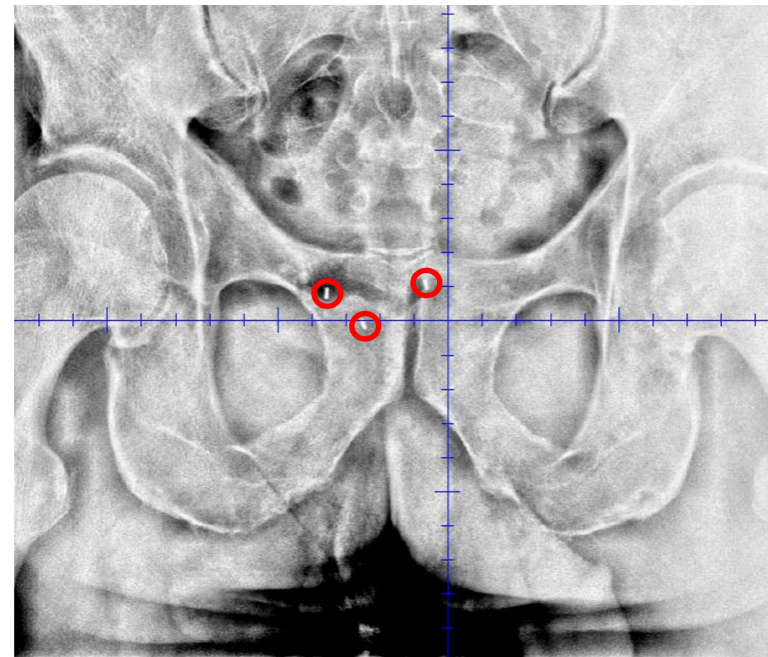
Hydrogel spacer

(decrease dose to rectum;
visualize on daily imaging)



Metal prostate markers

(visualize on daily imaging)



Not mandatory for **every** type of prostate cancer treatment plan; requires **additional procedure**

Why Choose RMCC/BMC/BCH?



- **Collaboration**

- **Multidisciplinary** care between urology, radiation oncology, medical oncology, and radiology
- Diverse portfolio of prostate cancer **clinical trials**

- **Technology**

- Latest prostate biopsy techniques (**US-** and **MRI-based prostate biopsy**)
- Advanced staging and risk stratification technology (**PSMA-PET; Decipher** testing)
- Leading treatment options (minimally invasive **DaVinci robotic prostatectomy; TrueBeam + ExacTrac** radiation hardware for **5 fraction prostate SBRT**)

- **Experience**

- **Board certified** physicians with years of **clinical, research, and publication experience** on the topic of prostate cancer



What's New in Prostate Cancer Treatment

Dario Pasalic, MD
Rocky Mountain Cancer Centers, 303-416-6960

Patrick Richard, MD, MPH
Rocky Mountain Cancer Centers, 303-647-5726

Stephen Siegel, MD
Boulder Medical Center, 303-747-4951



Boulder
Community
Health 



Boulder
Medical Center

