Prostate Cancer

One Man’s Journey
Introduction

- Lori Kasuske, CMD, RT (R)(T)
- Radiography 1997
- Radiation Therapy 1998
- CMD 2008
- AAMD Volunteer 2009
  - Annual Conference Committee: 2009-2015
  - Board of Directors: 2014-present
Watertown, South Dakota
Watertown, South Dakota
Twin Brooks vs Buffalo
South Dakota Buffalo
Heading Home
Staff – Radiation Oncology

- 1 Radiation Oncologist
- 1 Medical Physicist
- 1 Medical Dosimetrist
- 2 Full Time Radiation Therapists
- 1 PRN Radiation Therapist
- 1 Radiation Oncology Nurse
Staff – Medical Oncology

- 2 Medical Oncologists
- 1 Nurse Practitioner
- 6 Nurses (clinic/infusion)
- 2 PRN nurses
- 1 Research Specialist (Clinical Study Coordinator)
- 1 Scheduler/Receptionist
Staff – Shared

- 1 Cancer Center Director
- 1 Receptionist
- 1 Social Worker
- Dietitian, Pastoral Care, Wound Care Specialist, Lymphedema Specialist, PT, OT, RT available
Other than skin cancer, prostate cancer is the most common cancer in American men. The American Cancer Society’s estimates for prostate cancer in the United States for 2017 are:

- About 161,360 new cases of prostate cancer
- About 26,730 deaths from prostate cancer

About 1 man in 7 will be diagnosed with prostate cancer during his lifetime.

- About 6 cases in 10 are aged 65 or older (average age at diagnosis is 66 years)
- Rare before age 40

3rd leading cause of cancer death in American men, behind lung cancer and colorectal cancer.

- About 1 man in 39 will die of prostate cancer
- More than 2.9 million men in the US are living with a prostate cancer diagnosis
## Prostate Cancer

### NCCN Prostate Cancer Risk Classification: Risk Groups

<table>
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<th>Very low</th>
<th>Low</th>
<th>Intermediate</th>
<th>High</th>
<th>Very high</th>
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<tr>
<td>T1c</td>
<td>T1-T2a</td>
<td>T2b-T2c or</td>
<td>T3a or</td>
<td>T3b-T4 or</td>
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<td>Gleason score ≤6/</td>
<td>Gleason score</td>
<td>Primary Gleason pattern 5/</td>
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<td>Gleason grade 3+4=7/</td>
<td>Gleason grade</td>
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<td>group 2 or</td>
<td>Gleason score 8/</td>
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<td>cores positive,</td>
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<td>PSA 10–20 ng/mL</td>
<td>Gleason grade group 4 or</td>
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<td>≤50% cancer in</td>
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<td>PSA &gt;20 ng/mL</td>
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<tr>
<td>each core</td>
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<td>Gleason score 9–10/</td>
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<td>PSA &lt;10 ng/mL</td>
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<td>Gleason grade group 5</td>
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<td>PSA density ≤0.15 ng/mL/g</td>
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<td>&gt;4 cores with Gleason score 8–10/</td>
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<td></td>
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<td></td>
<td>Gleason grade group 4 or 5</td>
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</tbody>
</table>
One Man’s Journey – Overview

- 2002 - Diagnosis/surgery – age 50
- 2004 - Radiation to Prostate Bed and SV
- 2008 - ProstaScint Scan due to rising PSA
- 2009 - Hormone therapy 1 year
- 2010 - Rising PSA – restart hormone therapy
- 2011 - Rising PSA – while on hormone therapy
- 2012 - Immunotherapy
- 2013 - Radiation to spine
- 2014 - Zytiga, Xgeva, Lupron
- 2015 - Radiation to spine, Xofigo
- 2016 - Xofigo
- 2017 - Radiation to hip
One Man’s Journey

- Family History
  - 4 paternal uncles with prostate cancer
  - 1 maternal aunt with breast cancer
- Social History
  - 1 pack a day until 2008
  - Alcohol on occasion
  - Married with three grown children
  - Owns/manages grain elevator
One Man’s Journey: 2002

- **June**
  - Elevated PSA ~5.0 ng/mL
  - Biopsy – no cancer
- **September**
  - Elevated PSA 8.7 ng/mL
- **October**
  - Repeat bx: moderately differentiated prostate adenocarcinoma
  - Gleason 4 + 3
- **November**
  - Radical retropubic prostatectomy
  - Gleason 4 + 4
- Follow up PSAs <0.1 ng/mL
- Followed with observation
One Man’s Journey: 2003

- **January-November**
  - Stable PSA <0.1 ng/mL

- **December**
  - PSA rise 0.29 ng/mL
  - ProstaScint Scan 12/18 & 12/23
    - Residual activity in prostate bed
ProstaScint® Scan

- **ProstaScint - Radiolabeled monoclonal antibody**
  - Murine monoclonal antibody
  - Indium (In-111) Chloride
    - Radiolabel – to incorporate a radioactive or heavy isotope into (a molecule) in order to make traceable (thefreedictionary.com)
  - Targets Prostate Specific Membrane Antigen (PSMA)

- **Procedure**
  - ProstaScint injection followed by scan with gamma camera, then return 4-5 days later for additional imaging
  - OR
  - ProstaScint injection then return 4-5 days later for imaging
My Exciting 40 Mile Commute
One Man’s Journey: 2004

- January
  - Started hormone therapy – Lupron
- July
  - Radiation to prostate bed + SV
- October
  - PSA <0.1 ng/mL
  - Follow up with Urologist and Radiation Oncologist
One Man’s Journey: 2004

- January
  - Started hormone therapy – Lupron
  - Injections January and April
Androgen deprivation therapy or androgen suppression therapy

Goal: reduce levels of male hormones (androgens) in the body

- Why? Androgens stimulate prostate cancer cells to grow

Main androgens in men – testosterone and dihydrotestosterone (DHT)

- Mainly made by testicles, but small amount made by adrenal glands
Hormone Therapy

- When to use
  - Cancer spread too far to be cured by surgery or radiation
  - Recurrent prostate cancer
  - Use with radiation if high risk of recurrence
  - Use before radiation to try to shrink the cancer
Hormone Therapy
Luteinizing Hormone-Releasing Hormone (LHRH)

**LHRH AGONISTS**
- Drugs that lower the amount of testosterone made by the testicles
- Chemical/medical castration
  - Testosterone level <50 ng/dL
- Initially increases testosterone levels – flare
- Examples
  - Leuprolide (Lupron, Eligard)
  - Goserelin (Zoladex)
  - Triptorelin (Trelstar)

**LHRH ANTAGONISTS**
- Acts like LHRH agonists
- Chemical/medical castration
  - Testosterone level <50 ng/dL
- No flare response
- Example
  - Degarelix (Firmagon)
Hormone Therapy
Luteinizing Hormone-Releasing Hormone (LHRH)

- **Luteinizing Hormone**: A gonadotropin (a hormone that affects the function of the sex organs) that is released by the pituitary gland in response to LHRH. In men LH stimulates the testes to produce androgens. (MedicineNet.com)
- **Agonist**: A chemical substance capable of combining with a specific receptor on a cell and initiating the same reaction or activity typically produced by the binding endogenous substance. (Merriam-Webster’s medical definition)
- **Antagonist**: A chemical that acts within the body to reduce the physiological activity of another chemical substance; especially: one that opposes the action of the nervous system of a drug or a substance occurring naturally in the body by combining with and blocking its nervous receptor. (Merriam-Webster’s medical definition)
POSSIBLE SIDE EFFECTS

- Hot flashes
- Decreased sex drive
- Erectile dysfunction
- Shrinkage of testicles and penis
- Breast tenderness and growth of breast tissue
- Osteoporosis
- Loss of muscle mass
- Weight gain
- Fatigue
- Depression

"What do you mean you know how I feel? Like you've had a hell of a day with your hormones!"
One Man’s Journey: 2004 Continued

- July
  - Radiation to prostate bed + SV
Radiation Therapy

- Simulation: Siemens Simview
- Contouring: XIO
- TPS: Corvus
  - Target: Prostate Bed + SV
  - 66 Gy in 33 fractions
- Linac: Siemens Primus
- Nomos Mimic
- BAT Ultrasound
Ultrasound Image

Patient: Prostate Bed + SV
Study ID: 11411-0138
Alignment #24 completed: Wednesday, August 18, 2004 08:59 AM

Patient Name: Prostate Bed + SV
Patient ID: 11411-0138
Study Date: Plan approval number — 72028. Treat with head involved geometry.

User: John
Treatment Unit: M0AC
Start time: 8/18/2004 8:42:15 AM Finish time: 8/18/2004 8:50:45 AM
Total Alignment time (in min): 120

Structures:
- Bladder
- Prostate Bed
- Rectum

Contrast Visible During Alignment:
- Structures
- Rectum

Couch Movements:
- Couch Left 0.000cm
- Couch Up 0.023cm
- Couch In 0.172cm
- Couch Left 0.000cm
- Couch Up 0.000cm
- Couch In 0.172cm

Total Couch Movement:
- Couch Left 0.000cm
- Couch Up 0.023cm
- Couch In 0.172cm
Corvus Treatment Plan

Axial Image 126. Central Image Through Prostate Bed

Sagittal Image 247. Central Image Through Prostate Bed
DVH – Prostate Bed + SV
One Man’s Journey: 2004 Continued

- October
  - PSA < 0.1 ng/mL

- Follow up with Urologist and Radiation Oncologist
Peaceful at the Lake
One Man’s Journey: 2005-2006

- Alternating appointments between Radiation Oncologist and Urologist
- Stable PSA <0.1 ng/mL
One Man’s Journey: 2007-2009

- Rising PSA
- Stopped smoking 3/2008
- ProstaScint® Scan – 8/2008
  - Probable recurrence near the right side of prostate bed near seminal vesicle
- XRT vs continuous hormone therapy vs intermittent hormone therapy
- Lupron – 11/08, 2/09, 6/09
  - PSA <0.1 ng/mL
  - Testosterone 15 ng/dL (240-950 ng/dL)
One Man’s Journey: 2010

- **February**
  - 8 months since last Lupron injection (6/9/2009)
  - 4 month injection
  - Rising PSA 1.0 ng/mL
- **July**
  - PSA 4.6 ng/mL
  - Switch to continuous hormone therapy
  - Lupron Injection
- **September**
  - PSA 0.47 ng/mL
One Man’s Journey: 2011

- Lupron Injections
  - February, June, September, December
- PSA rising while on hormone therapy
- Referred to Medical Oncology
The Beauty of My Commute
National Cancer Institute (NCI) defines CRPC as prostate cancer that keeps growing even when the amount of testosterone in the body is reduced to very low levels. Many early-stage prostate cancers need normal levels of testosterone to grow, but CRPC cancers do not.
One Man’s Journey: 2012

- **January/February**
  - Medical Oncology Consultation
  - Bone Scan 1/10/2012
  - Casodex and Xgeva started
    - January PSA 1.3 ng/mL
    - February PSA 0.3 ng/mL
  - Continue Lupron

![PSA chart](image)
REPORT

- Increased activity in the anterior right third rib.
- Increased activity on the posterior views in the region of the left sacrum.
- Degenerative changes noted about the shoulders, knees, ankles and feet bilaterally. Also of the thoracic spine.
Casodex (bicalutamide)

- Anti-androgen
  - Binds to the androgen receptors so the androgens can’t
- Oral pill taken daily
- Side Effects
  - Hot flashes
  - Breast pain or swelling
  - Weakness, dizziness
  - Back pain, pelvis pain, joint or muscle pain
  - Weight changes
  - Impotence, loss of interest in sex, or trouble having an orgasm
  - Increased nighttime urination
**Xgeva® (denosumab)**

- Rx medicine used to prevent fracture, spinal cord compression, or the need for radiation or surgery to bone in patients with bone metastases from solid tumors
- Can be used to treat osteoporosis and hypercalcemia
- Subcutaneous injection
- Given every 4 weeks
One Man’s Journey: 2012 Continued

- March/April
  - Provenge – Immunotherapy
  - Withhold Casodex during Provenge Treatments
  - Continue monthly Xgeva
  - Continue Lupron
  - PSA 0.2 ng/mL
**Immunotherapy**

- **Provenge (sipuleucel-T)**
  - First and only FDA-approved immunotherapy for advanced prostate cancer
  - Approved by the FDA in April 2010
  - Asymptomatic or minimally symptomatic mCRPC
Provenge® (sipuleucel-T)

- Goal is not to lower PSA, but to extend life
Provenge® (sipuleucel-T)

- More men in Provenge group alive 3 years after start of study
  - Provenge group vs control group
    - 1 year: 81.1% vs 72.4%
    - 2 years: 52.1% vs 41.2%
    - 3 years: 31.7% vs 23.0%
- Only 1.5% discontinued treatment due to side effects
  - Most side effects are mild to moderate

![Overall survival benefit with Provenge](chart.png)
### Provenge® (sipuleucel-T)

#### Most Common Adverse Events

<table>
<thead>
<tr>
<th></th>
<th>Chills</th>
<th>Fatigue</th>
<th>Fevers</th>
<th>Back Pain</th>
<th>Nausea</th>
<th>Joint Ache</th>
<th>Headache</th>
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<td><strong>Provenge</strong></td>
<td><strong>53.1</strong></td>
<td>41.1</td>
<td>31.3</td>
<td>29.6</td>
<td>21.5</td>
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<td>18.1</td>
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<tr>
<td><strong>Control</strong></td>
<td>10.9</td>
<td>34.7</td>
<td>9.6</td>
<td>28.7</td>
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**Provenge® Treatment Process**

- **Cell Collection**
  - Blood Center/Bank
  - Immune cells, platelets, red blood cells
  - 3-4 hours
  - Cells sent to FDA approved manufacturing facility to be made into a dose of Provenge specific to patient

- **Treatment**
  - 3-4 days after cell collection
  - Approximately 2 hours
## Sample Schedule

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<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<td></td>
<td>1</td>
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<tr>
<td>3</td>
<td>4</td>
<td>5 CYCLE 1 Cell Collection</td>
<td>6</td>
<td>7</td>
<td>8 CYCLE 1 PROVENGE Infusion</td>
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<td>10</td>
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<td>19 CYCLE 2 Cell Collection</td>
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<td>22 CYCLE 2 PROVENGE Infusion</td>
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<tr>
<td>1</td>
<td>2</td>
<td>3 CYCLE 2 Cell Collection</td>
<td>4</td>
<td>5</td>
<td>6 CYCLE 3 PROVENGE Infusion</td>
<td>7</td>
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</tbody>
</table>
May - December
- Clinically stable
- Restaging scans
  - Radiographically stable
- Continue monthly Xgeva
- Continue Lupron
- Restart Casodex
- Main side effect
  - Hot flashes
The Pheasant
One Man’s Journey: 2013

- March - restage
  - CT – new nodules in right lung too small to consider PET/CT
  - Bone scan stable
  - Clinically – mild backache
- August – restage
  - Back pain
    - chiropractor
    - injection with primary care doctor
  - Bone Scan, MRI, CT
  - Back pain 9/10
  - Radiation to T11-L1: 8Gy/1 fx
  - Discontinue Casodex
- Findings suspicious for mild progression of bony metastasis in right aspect of T12 thoracic vertebra
- Focal uptake in right 3rd anterior rib suspicious for stable bony metastasis versus a healing rib fracture
- No convincing evidence of other areas of metastatic disease
Heterogeneous enhancing lesion in the right hemisphere T12 is compatible with a metastatic deposit.

Superior endplate lesion at L1 is inapparent on the bone scan. This finding likely represents an enhancing Schmorl’s node.

- Schmorl’s Node: An upward and downward protrusion of a spinal disk’s soft tissue into the bony tissue of the adjacent vertebrae. (MedicineNet.com)
Persistent sclerotic focus in the right aspect of T12. Measures 15 mm in diameter, and is slightly increased in size and not as well defined.
Radiation Therapy

- Simulation: Siemens Simview
- CT in radiology department
- Contouring: MIM
- TPS: TomoTherapy
  - Target: Spine T11-L1
  - Dose: 8Gy/1 fraction
- Linac: TomoTherapy
  - Tx: 8/27/2013
XRT Spine: T11-L1 (8Gy/1 fx)
XRT Spine: T11-L1 (8Gy/1 fx)
Follow Up After XRT

- First 1-2 days following XRT said his abdomen had the feeling of fire in that area
- Improved dramatically after
- Overall pain control is excellent – no pain
One Man’s Journey: 2013 Continued

- **September**
  - Started Zytiga with Prednisone
  - Continue Lupron
  - Continue Xgeva
- **October-December**
  - Continue as above and manage side effects
Zytiga (Abiraterone)

- Blocks androgen production at the testes, adrenal glands, and the tumor itself
- Interrupts the androgen-making process and reduces the amount of androgen being made
- Need to continue LHRH agonist or antagonist because Zytiga does not stop the testicles from making testosterone
- Taken as a pill – daily
- Needs to be taken with prednisone due to lowering other hormones in the body

How ZYTIGA® works

ZYTIGA® blocks androgen production at 3 sources—the testes, adrenal glands, and the tumor itself.

ZYTIGA® works by interrupting the androgen-making process at an important step, thereby reducing the amount of androgen being made.
Zytiga – Clinical Study Results

- 1088 men with mCRPC, whose disease had progressed while on androgen deprivation therapy and had not received prior chemotherapy
  - Median Overall Survival
    - 34.7 months - Zytiga + prednisone
    - 30.3 months - placebo + prednisone
  - Disease Progression – measured by imaging studies
    - 65% men had progression - Zytiga + prednisone
    - 71% men had progression - placebo + prednisone
  - Time To Chemotherapy
    - 25.2 months with Zytiga + prednisone
    - 16.8 months placebo + prednisone
Zytiga (Abiraterone)

- Side Effects
  - Weakness
  - Joint swelling or pain
  - Hot flashes
  - Diarrhea
  - Vomiting
  - Cough
  - High blood pressure
  - Shortness of breath
  - Anemia
One Man’s Journey: 2014

- **January-August**
  - Continue Zytiga/prednisone daily
  - Continue Xgeva – monthly
  - Continue Lupron – every 3 months
  - Doing very well with a few side effects
    - Leg cramps
      - Quinine Sulfate
      - Elavil (Amitriptyline)
    - Hand cramps
    - Hot flashes

![PSA Graph]
September
- Deep pain left upper thigh
  - Constant discomfort
  - Sharp pain with activity: 8/10
  - Dull pain resting: 2-3/10
- Bone Scan – 9/5/2014
  - Stable bone mets
- MRI – 9/2014
  - Avascular necrosis of left hip (possibly secondary to chronic low-dose steroid)
    - Referred to orthopedic surgeon
- Continue Zytia, Lupron, and Xgeva (but change to every 3 months)
Bone Scan 9/5/2014

- Again noted uptake in 3rd anterior rib and in the T12 vertebra, unchanged from prior study. May represent stable bony metastases.
- New probably benign healing fractures of left 4th and 5th anterior ribs.
- Subtle uptake projecting over the left 7th posterior rib is nonspecific.
- No convincing evidence of other areas of bony metastasis.
One Man’s Journey: 2014 Continued

- October-December
  - Continue Zytiga – daily
  - Continue Lupron – every 3 months
  - Continue Xgeva – every 3 months
  - Hip replacement surgery 12/2014
The Challenges of Commuting
One Man’s Journey: 2015

- January- February
  - No more hip pain
  - Continue as planned

- March - September
  - Right shoulder pain
  - Bone scan – normal shoulder
  - MRI – right rotator cuff tear with swelling
  - Referred to orthopedic doctor
    - 5/2015: cortisone injection to right shoulder – relieved pain
  - Continue same medications
  - 9/2015: PSA doubling time ~4 months
- Uptake in the T12 thoracic vertebra is nonspecific however stable bony metastasis is not excluded. Consider further evaluation.
- Uptake in several bilateral ribs is nonspecific however rib fractures are favored.
- Benign-appearing arthritic changes in multiple locations.
October
- Mild-moderate back pain radiating to right side
- Bone scan 10/6/2015
- Reevaluate due to rising PSA, increased back pain, and radiologic changes
- Refer to radiation oncology for XRT and Xofigo
  - Retreat spine T11-L1
Bone Scan 10/6/2015

- Mild progression of bony metastasis involving right aspect of T12 thoracic vertebra and right sacrum
- Arthritic changes multiple locations
Radiation Therapy

- Simulation: Siemens Simview
- CT in radiology department
- Contouring: MIM
- TPS: TomoTherapy
  - Target: Spine T11-L1
  - Dose: 8Gy/1 fraction
- Linac: TomoTherapy
  - 10/15/2015
Retreat Spine T11-L1
One Man’s Journey: 2015 Continued

- November-December
  - No pain in back
  - Continue Zytiga, Lupron, Xgeva
  - Initiate Xofigo
    - 11/17/2015
    - 12/15/2015
**What IS it?**

- Radium Ra 223 dichloride injection
  - Half life 11.4 days
  - Radium 226 – half life ~1600 years
- An alpha emitter
  - 95.3% energy emitted as alpha particles
  - 3.6% energy emitted as beta particles
  - 1.1% energy emitted as gamma radiation
- **Indications**
  - Metastatic Castrate Resistant Prostate Cancer (mCRPC)
  - Symptomatic bone metastases
  - No known visceral metastases
    - Liver, lungs, etc.
- **Contraindications**
  - Women who are or may become pregnant
Xofigo

**DOSAGE**

- 1.35 microcurie per kilogram body weight
- Every 4 weeks
- 6 total treatments

**ADMINISTRATION**

- Slow intravenous injection over 1 minute
- Flush IV with saline before and after injection of Xofigo
- At PLHS we have this done in the Nuclear Medicine Department
Xofigo

- Patient Instructions
  - After injection – no restrictions regarding contact with others
  - Bathroom hygiene – throughout treatments + 1 week after
    - Wash hands very well every time you use the bathroom
    - Flush the toilet several times after each use
    - If bodily waste is spilled – remove completely and quickly
    - If bodily waste gets on clothing – wash right away by itself
    - Wear one-use gloves or gowns any time you clean up bodily waste
    - Keep bathroom area clean
  - Sexual relations
    - Use a condom
    - Female partners should use a very effective form of birth control during treatment and for 6 months after treatment is over
Xofigo

- **Mechanism of Action**
  - Mimics calcium and forms complexes with the bone mineral hydroxyapatite at areas of increased bone turnover, such as bone metastases
  - Works at the site of bone metastases, emitting radiation that exerts an antitumor effect
    - The short range of radiation limits damage to surrounding normal tissue
    - Xofigo can be absorbed by organs other than bone, primarily the bone marrow and GI system, which can result in side effects in those healthy tissues
**Xofigo**

**DISTRIBUTION**
- Rapidly cleared from the blood and distributed into bone or excreted into intestine
  - Blood – post injection
    - 15 minutes
      - ~20% radioactivity remained
    - 4 hours
      - ~4% radioactivity remained
    - 24 hours
      - <1% radioactivity remained
  - Bone and Intestine – post injection
    - 10 minutes
      - ~61% radioactivity remained
    - 4 hours
      - ~49% radioactivity remained
  - No significant uptake seen in other organs

**ELIMINATION**
- Whole body measurements show ~63% radioactivity excreted within 7 days
- Fecal excretion is main route of elimination
- Rate of excretion is variable due to different rates of intestinal transit among population
Blood Counts

- Baseline
  - Absolute neutrophil count (ANC)
    - $\geq 1.5 \times 10^9$/L
  - Platelet count
    - $\geq 100 \times 10^9$/L
  - Hemoglobin
    - $\geq 10$ g/dL

- Prior to each dose
  - Absolute neutrophil count (ANC)
    - $\geq 1 \times 10^9$/L
  - Platelet count
    - $\geq 50 \times 10^9$/L
  - Hemoglobin
    - $\geq 10$ g/dL
Xofigo

6 DOSES XOFIGO

- Injection #1: 11/17/2015
- Injection #2: 12/15/2015
- Injection #3: 1/12/2016
- Injection #4: 2/9/2016
- Injection #5: 3/8/2016
- Injection #6: 4/6/2016

FOLLOW UP WITH LAB

- 11/5/2015 (Pre Xofigo)
  - Hgb 13.6 / Plt 220 / ANC 3.12
- 12/8/2015
  - Hgb 13.7 / Plt 255
- 1/5/2016
  - Hgb 14.0 / Plt 245 / ANC 3.64
- 2/2/2016
  - Hgb 13.2 / Plt 245 / ANC 3.09
- 3/1/2016
  - Hgb 13.8 / Plt 231 / ANC 4.02
- 3/29/2016
  - Hgb 12.8 / Plt 215 / ANC 2.94
Xofigo

- **Side Effects**
  - Nausea
  - Diarrhea
  - Vomiting
  - Swelling of the arms or legs
  - Low blood cell counts

![Median OS in an Exploratory Analysis](image-url)
More Challenges
One Man’s Journey: 2016

- January
  - Tolerating Xofigo very well
  - Complains of severe low neck pain radiating down left shoulder
  - MRI 1/13/2016
    - Significant canal stenosis
    - No sign of metastasis to cervical spine
  - Refer to neurosurgeon
February
- Tolerating Xofigo very well
- Neck pain improving with PT
- Cataract Surgery
- Continue Zytiga, Xgeva, Lupron

March
- Tolerating Xofigo very well
- Noticing some loss of muscle strength – possibly from long term effect of hormone therapy
- Continue Zytiga, Xgeva, Lupron
One Man’s Journey: 2016 Continued

- **April**
  - Mild fatigue day after treatment, but recovers by day 2
  - Quality of life has shown nice steady improvement
  - Patient is happy with results so far
  - Continue Zytiga, Xgeva, Lupron

- **May**
  - Feels quite well except osteoarthritic pain in left shoulder
    - Received cortisone shot
  - Continue Zytiga, Xgeva, Lupron

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![PSA Graph](chart.png)
June
- No shoulder pain
- Noticed increased strength and stamina and less shortness of breath the further out he gets from Xofigo
- Discomfort in left hip after injury from falling off tractor. Saw orthopedic doctor and is slowly getting better
- Continue Zytiga, Xgeva, Lupron
One Man’s Journey: 2016 Continued

- July
  - Bone Scan 7/11/2016
  - Pelvic CT 7/13/2016
  - Continue Zytiga, Xgeva, Lupron

- August – December
  - Discomfort in body mainly from arthritis
    - Left shoulder – cortisone shot
    - Low back – seeing chiropractor
    - Right Hip – cortisone shot/PT
    - PSA 3.54 ng/mL – 5 month doubling time
    - Bone Scan – 12/28/2016
  - Continue Zytiga, Xgeva, Lupron
Bone Scan 7/11/2016

- Good uptake of activity by the skeleton
  - Right side T12 - decreased in conspicuity
  - Tiny focus in right sacrum – decreased in conspicuity
  - Posterior superior aspect of left iliac bone – question artifact – correlate with plain film
  - Small foci within ribs – likely related to old healed fractures

- CT Pelvis 7/13/2016
  - Probable unusual stress or insufficiency fracture of the left ilium.
Multiple focal areas of abnormally increased uptake, consistent with skeletal metastases. Areas of involvement include and are compared to bone scan from 7/11/2016:

- Left 2\textsuperscript{nd} posterior rib - new
- Right aspect of T12 thoracic vertebra - unchanged
- Mid and right sacrum – increased uptake
- Posterior left iliac bone - increased uptake
- Proximal right femur – new

Overall, mild progression of disease
The Beauty of My Commute
January - March

- Bone scan 12/28/2016 – mild progression of disease with new uptake in right proximal femur
- 3/21/2017: referred to radiation oncology
  - X-rays pelvis and right femur
  - Microfractures and increased pain in acetabulum on right side and proximal femur
New sclerotic foci within the right supra-acetabular region and upper right iliac bone adjacent to the lateral margin of right SI joint

Within the left iliac bone there is a ill-defined area of sclerosis extending obliquely and a more defined sclerotic focus within the upper margin of the iliac crest. There is no evidence of a pathologic fracture.

IMPRESSION: Developing sclerotic changes within the bony pelvis consistent with progression of bone metastases.
1.9 CM area mixed sclerotic and lucent change within proximal femur lateral to lesser trochanter likely a site of bone metastasis.
No evidence of pathologic fracture.
Simulation: Siemens Simview
CT in radiology department
Contouring: MIM
TPS: TomoTherapy
- Target: Right proximal femur and acetabulum
- Dose: 8Gy/1 fraction
Linac: TomoTherapy
- 3/23/2017
XRT Right Proximal Femur and Acetabulum
XRT Right Proximal Femur and Acetabulum
April

- Med Onc
  - Hip pain completely resolved
  - Continue Zytiga, Xgeva, Lupron
  - PSA 3.88 ng/mL

- Rad Onc
  - Patient noted fatigue 3-4 days post XRT then had significant and now almost complete pain relief
May – August
- No major complaints
- Feels very well
- Admits to hot flashes and fatigue
One Man’s Journey: Future

- Future Options
  - Xtandi – newer type of anti-androgen
  - Chemotherapy
  - ???
Thank You!
References

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