Imaging Technologies & Transformation of Prostate Cancer Care

Faina Shtern, MD
President, AdMeTech Foundation

Director of Radiology Research
Boston Children’s Hospital
Harvard Medical School
Imaging Technologies & Transformation of Prostate Cancer Care

- AdMeTech Foundation’s Mission:

To End the Era of Blind Prostate Cancer Care: To Create a Future of Image-Guided, Minimally-Invasive Diagnosis & Treatment
Clinical History: NIH Case Study

- 53 year old asymptomatic man:
  Under observation in a leading academic center, between 2000 and 2005:
  - PSA: Rising
  - Physical exam: Non-specific
  - Biopsies: Consistently Negative
  - Standard, state-of-the art MRI: Negative
Clinical Course:
NIH Case Study

PSA ng/mL over time with antibiotic trials and biopsy events.
Clinical History: NIH Case Study

Clinical Diagnosis: Infection?

Treated with antibiotics for 5 years with partial reduction of PSA
Standard 1.5T MRI
(Leading Academic Institution)
Clinical Course: NIH Case Study

- June 2005:
  - Referral to NIH
Advanced 3.0T MRI (NCI)
Advanced 3T MRI: Dynamic Contrast Enhanced Study
Advanced 3T MRI:  
Guided Biopsy

Large 2 cm Tumor:  
Aggressive, virulent prostate cancer

(Gleason Score: 8 & 9)
Clinical Course: NIH Case Study

- Multiple Metastases
NIH Case Study: Summary

- 53 year old man with history of rising PSA
- Multiple negative biopsies
- 1.5T MRI - negative
- 3.0T MRI demonstrated tumor
  - Image-guided Biopsy showed virulent cancer
  - Metastases to lymph nodes
- Treated with chemo-hormonal therapy & radiation
Imaging Technologies & Transformation of Prostate Cancer Care

• “If prostate cancer is caught at a time when it is confined to the prostate, generally it can be cured by radiotherapy and surgery”

Professor Alan Horwich
Royal Marsden Hospital, UK
Prostate Cancer Epidemic

- Most common major cancer:
  - 1 in 6 men is stricken
- In 2005:
  > 1.5 Million biopsies
  > 230,000 new diagnoses
  > 70,000 men had treatment failures
  > 30,000 men died
Prostate Cancer Epidemic & African American Men

- Greater risk (by 60%)
- Younger Men
- More Virulent & Lethal Disease
- Higher Mortality (>100%)
U.S. Prostate Cancer Epidemic

- 20 million men who had biopsy
- 2 Million men live with prostate cancer
- (18 million men had unnecessary biopsies)
Prostate Cancer Epidemic

• “Much remains to be done and too many men with prostate cancer still get a poor deal”

Sandy Tyndale-Biscoe
Survivor, Prostate Cancer Charter for Action, UK
Prostate Cancer: Current Diagnostic Tools

- Physical Exam
- Blood Test (PSA)
- Biopsy
Prostate Cancer: Current Diagnostic Tools

• Physical:
  Digital Rectal Exam (DRE)
  – Identifies cancer when it is larger
  – May miss smaller lesions
  – Depends on the location of cancer
Prostate Cancer: Current Diagnostic Tools

• **Blood Test (PSA):**
  
  • **Pros:**
    • Cancer is Detected Earlier
  
  • **Cons:**
    • False reassurances when normal:
      - 15% of men have cancer
    • False alarms when abnormal
      - Only 12% of men have cancer
      - Up to 88% of men have unnecessary biopsies

  *Thompson, IM et. al, NEJM 350:2239, 2004*
PSA & Blind Biopsies

- PSA Controversy:
  - Does PSA Improve Survival?
  - Cost vs. Effectiveness?
  - Do we need further assessment of PSA?
  - Do we need other, more accurate blood tests?
Prostate cancer care is blind.
Imaging Technologies & Transformation of Prostate Cancer Care

There is no accurate, affordable, accessible imaging to guide:

Assessment of Risk
Early Detection
Biopsy
Accurate Staging (Location & Extent)
Aggressiveness
Treatment planning and monitoring
Socioeconomic Economic Impact: Blind & Random Prostate Biopsies

- If men had accurate imaging:
  - > 1 Million men and their families would have been spared fears, trauma and costs

- Cost Savings for Healthcare:
  - Over $2 Billion per year
Imaging Technologies & Transformation of Prostate Cancer Care

• “The time will come when only the rich will be able to afford candles…”
  – Thomas Edison
Prostate Biopsies: Blind and Random

> 20% of cancers are missed

> 20-30% of cancers are underestimated in the virulence and extent
Impact:

Blind Prostate Cancer Care

>Treatment Failures:

70,000 men per year

➢ Unnecessary treatment
Prostate Cancer: Current Clinical Care

• Low-Risk Cancer:
  – Active Surveillance ("Watchful Waiting")

• High-Risk Cancer:
  – Radical Prostatectomy
  – Radiation Treatment
Blind Prostate Cancer Treatment: Complications

- 50 – 80% of impotence
- 50-60% of incontinence
Prostate Cancer Care: Blind Treatment Choices

• There is no imaging to determine:
  – Which men have low-risk cancer
  – Which men have high-risk cancer
Overtreatment of Prostate Cancer: Staggering National Problem

- Many men would benefit from active surveillance (watchful waiting)
  - 10% of men have unnecessary surgery
  - 44% of men have unnecessary radiation Rx

Overtreatment of Prostate Cancer: Staggering National Problem

• "Efforts to reduce overtreatment should be a clinical and public health priority."

Mitchell Schnall, MD, PHD
University of Pennsylvania
Pioneer of Prostate-Dedicated MRI

• “What was the most devastating experience for my father... and what kept him embarrassed, ashamed and isolated from our family was his inability to control his bowels”
Barry Bostwick: Leading Man of Prostate Cancer
Barry Bostwick: Leading Man of Prostate Cancer

- Barry’s Diagnosis – at the age of 52
- Barry Selected Radical Surgery
  - Diapers for Quite a While
  - Challenges with Intimacy
  - Shots and Viagra
Barry Bostwick: Leading Man of Prostate Cancer

- Barry’s Father - Diagnosis at the age of 81
- Barry’s Father Selected Active Surveillance
  - No related problems or surgical complications
Barry Bostwick: Leading Man of Prostate Cancer

• “Was surgery really necessary?”
Prostate Cancer Care: Fundamental Dilemma

• To Treat or Not to Treat?
You can’t solve a problem if you can’t see it.
“The most critical pieces of information...are the precise location and extent of cancer within the prostate.

I can’t think of anything more important.

Right now, there is no proven method... we need that desperately.”
Imaging Technologies & Transformation of Prostate Cancer Care
Economic Impact:

Current Treatment vs. Image-Guided, Minimally Invasive Treatment

• Costs of Treatment Now: est. $8 Billion per year

• Image-guided procedure:
  – 1/2 to 1/3 of std treatment in costs

• With improved imaging:
  – If 50% of current treatments were to be replaced
  – Est. cost savings: $2 Billion
Imaging Technologies & Transformation of Prostate Cancer Care

• Potential Impact: Improved Clinical Information
  – Early Detection
  – Staging:
    • Location, Extent & Virulence
    • Determination of low vs. high risk
  – Serial monitoring
  – Elimination of unnecessary procedures
  – Selection of the Most effective & Least Invasive Treatment
  – Quality of Life
AdMeTech Research Program: Scientific Progress (Clinical Studies)

- Improved Early Detection:
  - Drs. Mitchell Schnall & Mark Rosen, University of Pennsylvania:
    - High Precision MRI
  - Dr. Irving Bigio, Boston University
    - Prostate-Dedicated, New Generation Optical Technologies
AdMeTech Research Program: High-Precision MRI
AdMeTech Research Program: High-Precision MRI
AdMeTech Research Program: High-Precision MRI
AdMeTech Research Program: Scientific Progress (Clinical Studies)

• Image-Guided, Minimally-Invasive Treatment

– Gabor Fichtinger, Johns Hopkins
  • Development of the Prostate-Dedicated Medical Robotics for Precision Treatment (Brachytherapy & Focused Ultrasound)
  • Grant Awards from NSF & NIH
AdMeTech Research Program: Scientific Progress (Pre-Clinical Studies)

- **Improved Early Detection & Risk Assessment:**
- **Imaging of Prostate Cancer Genes**

  - **Dr. Angelo DeMarzo, Johns Hopkins:**
    - Visualization of AMACR with Nuclear Medicine & CT
    - First Place Award, National Medical Association

  - **Drs. Kim Kelly & Ralph Weissleder, Mass General, Harvard Medical School:**
    - Optical Imaging of Hepsin with high specificity and sensitivity
AdMeTech Research Program: Scientific Progress (Pre-Clinical Studies)

• Improved Early Detection & Risk Assessment:

• Imaging of Prostate Cancer Genes

– Dr. Martin Pomper, Johns Hopkins:
  • Visualization of PSMA with Positron Emission Tomography (PET)
  • Grant from the Patrick Walsh Foundation for Clinical Studies
AdMeTech Research Program: Scientific Progress (Pre-Clinical Studies)

Early Assessment of Cancer Aggressiveness & Treatment Response

Drs. William Sellers & Andrew Kung, Dana Farber Cancer Institute, Harvard Medical School

- Detected Response to Chemotherapy in 24-48 hours
- Clinical Trials Underway
You're Invited to the Conference:
"Image-Guided, Minimally Invasive Diagnosis & Treatment of Prostate Cancer"
October 27–29, 2005 Washington D.C.

Women Have Life-Saving Mammograms.

Where is Prostate Imaging For Men?
Prostate Imaging

• Where is “Manogram”? 
Public Conference:
*Image-Guided Diagnosis & Treatment of Prostate Cancer*

- Organized in cooperation with:
  - National Cancer Institute
  - Telemedicine & Advanced Technologies Research Center, US Army, DoD
  - AdvaMed
  - National Electrical Manufacturers Association
Public Conference: Image-Guided Diagnosis & Treatment of Prostate Cancer

Philanthropy
Advocacy Organizations
Government
Academic/Educational Institutions
Medical Devices and Drug Industry
Media, Communications & Entertainment
Public Conference: Image-Guided Diagnosis & Treatment of Prostate Cancer

- Leaders of clinical medicine and technologic innovation:
  - Reviewed the “leading edge” technologic innovation
  - Discussed its potential to impact fundamental challenges in prostate cancer care
  - Created vision for the future
Public Conference

- clinical imaging modalities
- molecular imaging
- optical technologies
- robotics, nanotechnologies and biosensors
- treatment tools
- molecular biology
- drug discovery
Public Conference: Outcomes

- Public/private partnerships for:
  - Expansion of the Research Program
  - Brain Trust:
    - Facilitate technologic innovation & implementation
  - Public Awareness Campaign
  - Public Conference – September 16-18, 2007
You Are Invited to
Our Next Public Conference

CALL FOR ABSTRACTS, EXHIBITS & POSTERS

The AdMeTech Foundation Conference:
“Ending the Era of Blind Prostate Cancer Care &
Creating a Future of Image-Guided, Minimally-Invasive Diagnoses & Treatment”
September 16-18, 2007 in Washington D.C.

Breast cancer strikes 1 in 7 women.
Mammograms save lives.

Prostate cancer strikes 1 in 6 men.
Where is our Manogram™?
Breast cancer strikes 1 in 7 women.
Mammograms save lives.

Prostate cancer strikes 1 in 6 men.
Where’s our Manogram?
Follow a Model: 
Women & Breast Cancer

• In response to a demand from women, US Congress increased national investment in breast cancer research, including imaging

• Result:
  – Improved Breast Cancer Imaging and Image-Guided Treatment
Prostate Cancer Crisis

The answer is NEW IMAGING TECHNOLOGY.

“...but you have to demand it to get it.”

Geoff Van Dyke
MEN'S JOURNAL OCTOBER 2006
Men’s Journal – October 2006

• “Until prostate cancer can be tackled by doctors without endangering one’s manhood, men need to ask for better options”
HOUSE RESOLUTION 863

• Leadership:
  – Rep. Elijah Cummings
  – 43 Members of US Congress

• Goal:
  – Improved National Investment in Prostate Imaging and Image-Guided Treatment
Emerging Advocates

• **Thomas Farrington**  
  Founder, PHEN (Prostate Health Education Network)

• **Michael Milken**  
  Prostate Cancer Foundation

• **Richard Atkins**  
  National Prostate Cancer Coalition

• **James Kiefert and Thomas Kirk**  
  Us Too
Stephen Nemeth: Prostate Cancer Warrior

Prostate cancer is an epidemic: 1 in 6 men stricken.

Where’s our Manogram™: life-saving imaging for men?
“Manogram: To take the shame, isolation and silence out of prostate cancer”
Meet “Prosty the Spokesgland®”

“For prostate cancer care, we need a Manogram™: digital imaging to get the whole picture.”
Follow a Model: Women & Breast Cancer

• Public/Private Partnerships to Create
• Accurate, Affordable, Accessible Imaging Technologies
Imaging Technologies & Transformation of Prostate Cancer Care

• To End the Era of Blind Prostate Cancer Care

• To Create a Future of Image-Guided, Less Invasive Diagnosis & Treatment:
  • Minimal Complications, Discomfort & Costs

• To End Prostate Cancer as a Socio-Economic Problem
Framing the Need for Prostate Imaging:
Patrick Walsh, MD, Johns Hopkins
Pioneer of Radical Surgery

• “We don’t want to treat people based on unreliable information.
• …If someone has a good idea, I will go knock on the doors of Congress myself.”