



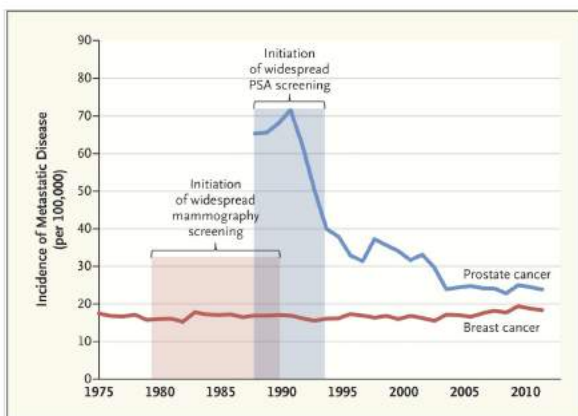
Prostate cancer: PSA screening, biopsy, new technologies

“The treatment/cure should never be worse than the disease.”

“If you have aggressive cancer, you would want treatment in time for a cure.”

What is PSA?

- PSA is a protein measured by a simple blood draw
 - We recommend annual PSA screening between 50 and 70 years of age
- PSA was introduced in the 1990s and the rate of death and metastasis from prostate cancer has reduced dramatically (see figure):



Welch HG et al. N Engl J Med 2015;373:1685-1687.

- PSA became controversial because it can lead to overtreatment of slow growing tumors
- Our goal is to avoid overtreatment and use PSA to find aggressive cancer in time for a cure
- Prostate cancer is still a leading cause of death

Prostate cancer & PSA

1. **PSA** finds cancer 10 years prior to symptoms (bone pain, etc.)
 - PSA screening is not recommended if life expectancy <10years
 - If doing PSA screening, you should be working on **diet and exercise** and other activities associated with long-term health
2. PSA finds cancers that need treated, but many that do not need treatment
 - We will commit to avoid over treating (e.g. treating grade 1)
 - Over half of men will have grade 1 and never know it
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• One **PSA** value can be misleading, a repeat is needed in 2 weeks

- PSA elevation could be from infection, biking, intercourse, etc.

• Does prostate cancer make my prostate large?

- **No**, cancer does not enlarge the prostate. Growth of the prostate is genetic and called benign prostatic hypertrophy (BPH). BPH can falsely elevate the PSA.

• Does prostate cancer typically cause symptoms?

- **No**, prostate cancer does not cause symptoms until very late in the disease when it has grown through the whole prostate (urinary obstruction) or metastasized to bone (bone pain). PSA detects cancer 10 years prior to this.

Cross-section of the prostate (MRI)

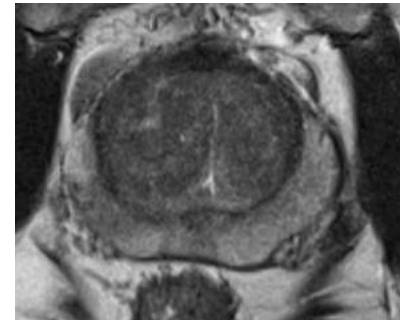
Central zone: this is the benign part of the prostate that wraps around the urethra and causes obstruction and symptoms (BPH).

Urethra: sits within the central (benign) zone.

Peripheral zone: most common location for cancer. It does not wrap around the urethra and typically does not cause urinary obstruction.

Nerve bundle: sends the signal for penile erection and is spared during a “nerve sparing” procedure.

Rectum: runs underneath prostate and is used for the digital rectal exam and for prostate biopsy.

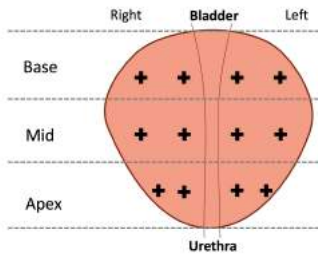


Avoiding overtreatment

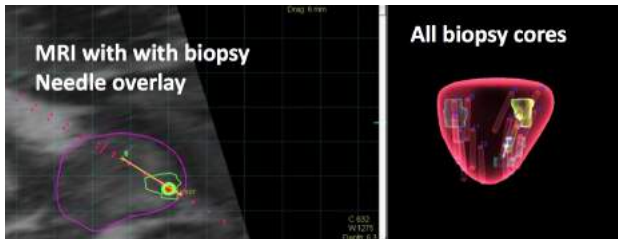
- Can we find the aggressive cancer without over-treating the slow growing tumors?
- **YES, many new technologies became available in the last 5 years:**
 - 4Kscore: blood draw giving percent risk of prostate cancer, based on 4 proteins in the blood
 - SelectMDx: Urine specimen giving percent risk of prostate cancer, based on RNA expression
 - MRI guided fusion biopsy: This enables us to better see cancer, we do hundreds of these at I.U.
 - Genomic testing: tissue from biopsy or prostatectomy, helps predict if a tumor will become more aggressive
 - PSMA-PET imaging: Exciting new tracer that makes prostate cancer “glow”

The biopsy procedure

Ultrasound guided biopsy (top view):



MRI guided biopsy (fusion):



Prostate biopsy:

- Clinic procedure
- Minimal discomfort:
 - Numbing injection given
- Short duration:
 - 10minutes with Ultrasound
 - 20minutes with MRI
- Risks:
 - 1/200 have infection
 - Blood in urine for 2-3 days

Prostate Cancer Grading

Old system -
Gleason:

New system -
Grade group:

3+3 = 6



1

3+4 = 7



2

4+3 = 7



3

4+4 = 8



4

4+5 = 9



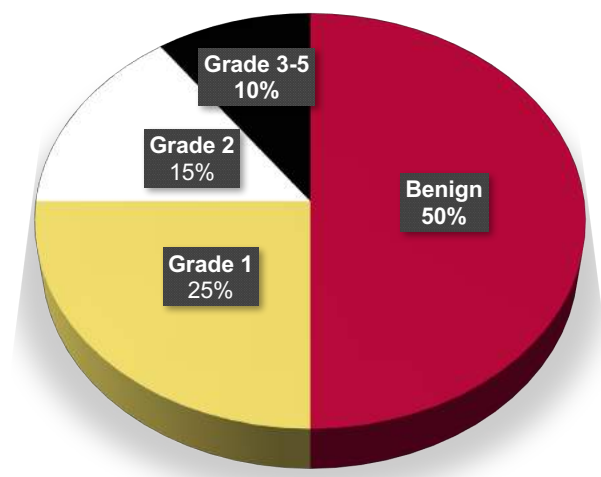
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The pathology report: Typical Biopsy results for a first biopsy on PSA screening

Grades 3-5. Often requires multiple treatments for cure: - Surgery, radiation, hormone therapy, chemo.

Grade 2. Cure with a single Treatment:
-HIFU (focal therapy), robotic surgery, radiation

Grade 1. Do not treat:
- Active surveillance with repeat biopsy and PSA checks



High intensity focused ultrasound (HIFU):

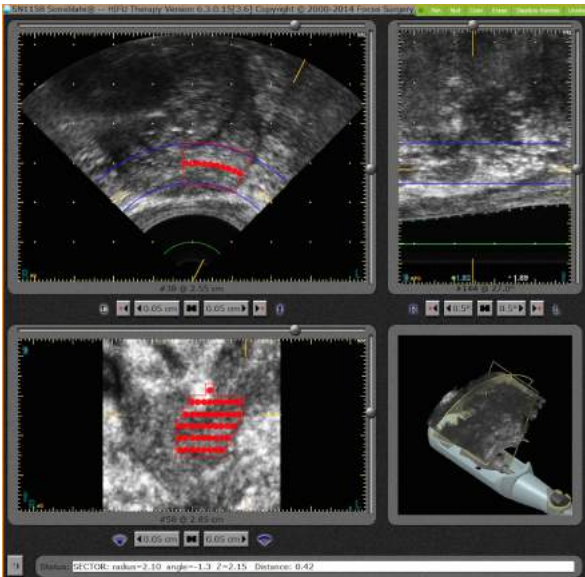


HIFU focuses sound waves

More HIFU information on our website:

<https://medicine.iu.edu/departments/urology/clinical-care/high-intensity-focused-ultrasound/>

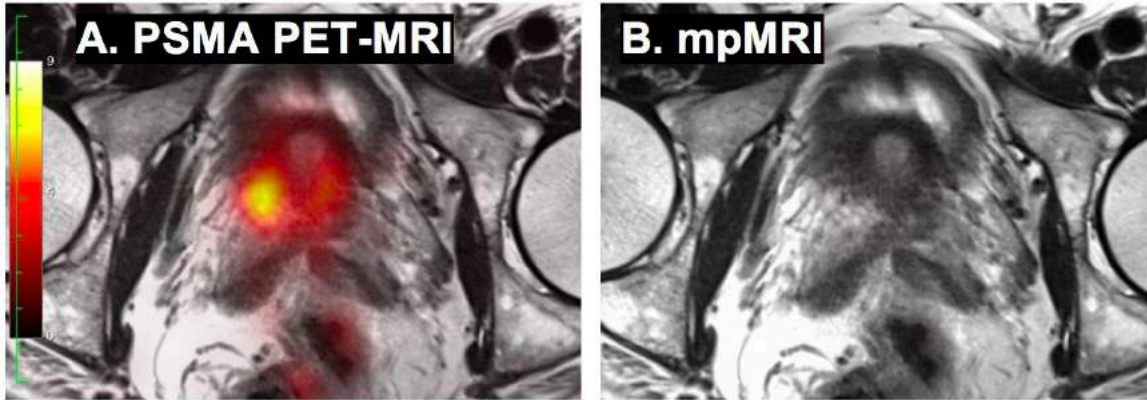
- Invented at Indiana University!
- Uses a rectal probe:
 - Focuses sound waves for heat
 - No incision or radiation
- Guided by MRI
 - Can treat part of prostate (focal)
- Outpatient procedure with anesthesia
- Few side effects:
 - Low risk erectile dysfunction
 - Low risk of Incontinence
- Covered by Medicare



HIFU treatment planning with ultrasound

- Grade 2 prostate cancer:
 - Is prostatectomy or radiation overtreatment?
- HIFU can:
 - Treat small early cancers
 - Ensure the “cure is not worse than the disease”
- Best for focal cancers that are not on both sides of prostate

PSMA-PET: A tracer for prostate cancer



- The PSMA-PET demonstrates a “yellow” prostate cancer lesion (A) that was not seen on MRI alone (B)
- We have a clinical trial investigating PSMA-PET to better “see” cancer
- The patient had a biopsy confirming Gleason 4+3 (Grade 3)