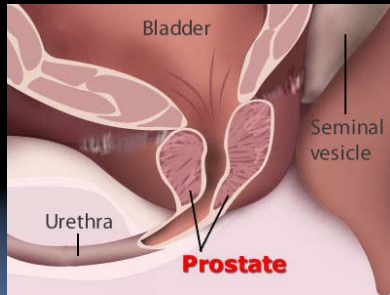


## PROSTATE CANCER



Andrew T. Figura, MD

## Overview

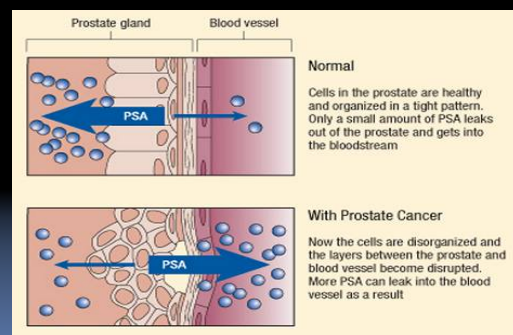
- Anatomy
- Natural History
- Staging
- Risk classification
  - Local
  - Adjuvant vs. Salvage
  - Metastatic



## Anatomy



## PSA

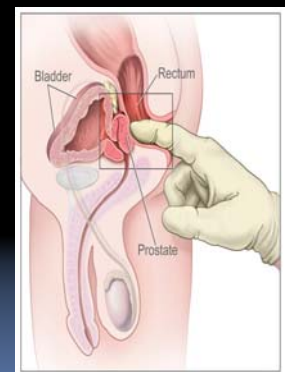


## Natural History

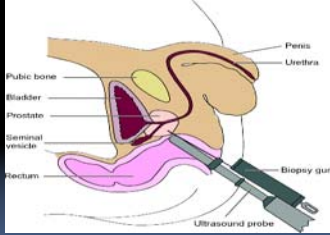
- Prior to 1980's, DRE, Biopsy or bone pain
- 200,000 cases, 30,000 deaths/yr
- Elevated PSA most common finding
- Palpable Nodules
  - 10 to 20%
  - 50% malignant
- Pelvic and peri aortic LN
  - Related to Stage, size, PSA & Gleason
- Number of biopsies positive / PSA velocity

## Screening

- < 10 yrs OS do not need PSA
- Low Risk:
  - Age 50
  - DRE and PSA
- High risk:
  - Start at age 40-45
  - First degree relative at young age or AA

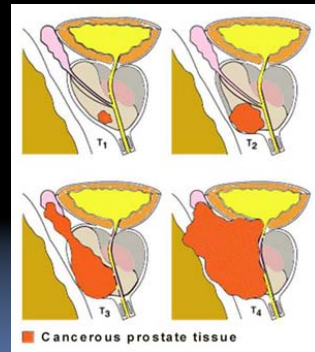


# Prostate Biopsy



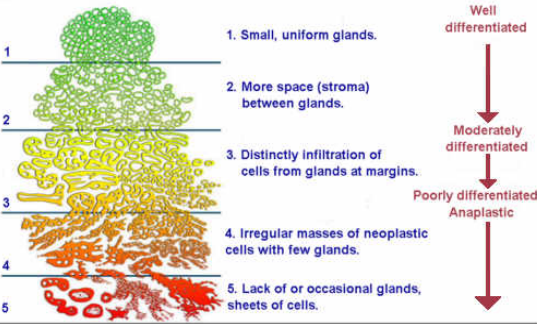
# Staging

- Lymph nodes
  - No vs N1
- Metastasis
  - Mo vs M1
- PSA
- Gleason Score
- CT/bone scan



# Gleason Score

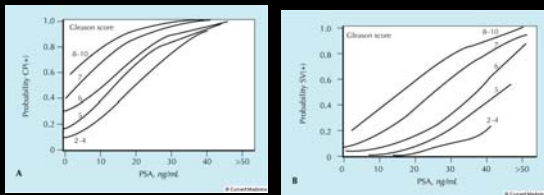
## Gleason's Pattern Scale



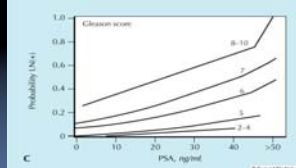
# Risk Group Classification

Table 2. CET Risk Group Classification.

Risk Group	T-Stage	PSA	Gleason Grade	Rules $\geq$
Low	T1-T2a	$\leq 10$	$\leq 6$	All required
Intermediate	T2bc	$>10 \leq 20$	7	One or more
High	T3	$>20$	8-10	One or more



$ECE+ = 3/2 PSA + (GS-3) * 10$        $SV+ = PSA + (GS-6) * 10$



$LN+ = 2/3 PSA + (GS-6) * 10$

TABLE 58.12. STANDARD TREATMENT OPTIONS ACCORDING PROGNOSTIC RISK GROUP CLASSIFICATION

Prognostic Risk Group	Treatment Option	Comments
Favorable risk <i>5yr OS 85-95%</i> <i>bRFS 90%</i>	Radical prostatectomy	Should be considered for patients $\leq 70$ y of age without significant medical comorbidities. Dose escalation not established as routine in this group. Hormone therapy should be considered for volume reduction in selected cases only. Ideal patients include those with prostate gland sizes of $\leq 50$ g and minimal obstructive urinary symptoms. Hormone therapy should be considered for volume reduction in selected cases.
	External-beam radiation therapy	
	Brachytherapy	
Intermediate risk <i>5yr OS 80%</i> <i>bRFS 80%</i>	Radical prostatectomy High-dose external-beam radiation therapy Brachytherapy alone	For selected patients with low-volume disease.
Unfavorable risk <i>5yr OS 70%</i> <i>bRFS 60%</i>	External-beam radiation therapy + brachytherapy <sup>a</sup> High-dose external-beam radiation therapy + hormone therapy External-beam radiation therapy + brachytherapy <sup>a</sup> $\pm$ hormone therapy	

<sup>a</sup>Brachytherapy—can be in the form of low-dose-rate permanent interstitial implantation or high-dose-rate brachytherapy boost.

## Management Localized Prostate Cancer

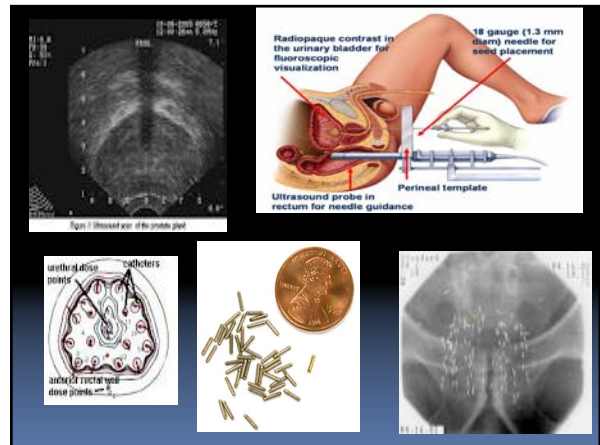
- Observation
- Prostatectomy
- EB Radiation
  - Traditional
  - Conformal
  - IMRT
- Brachytherapy



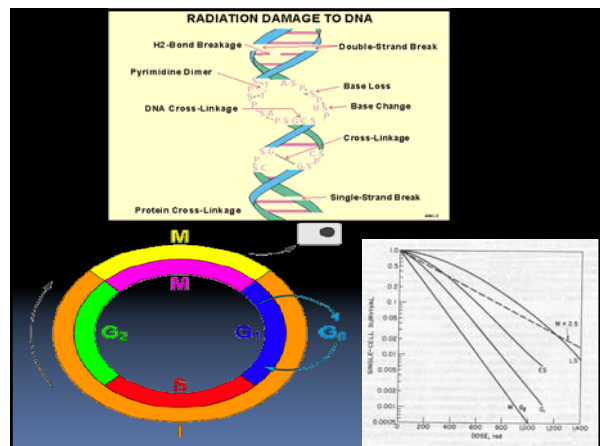
Da Vinci

## Prostatectomy Complications

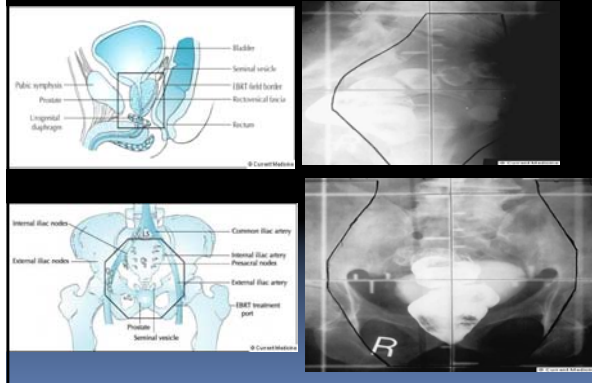
- Operative mortality 2%
- Occasional incontinence 50 %
- Thromboembolic event 2%
- Urinary incontinence 3-13%
- Impotency bL vs UL: 30% vs 52%



## External Beam Radiation



## Traditional Simulation



## Conventional RT

- High Failure after XRT (65% LC)
  - Max dose 70Gy
  - Uncertainties in patient positioning
  - Marginal miss
- Bladder and rectum tolerance limited dose

## Conventional RT Toxicity

- Rectal toxicity
  - 60% develop grade 2 or higher
  - 3.3% chronic diarrhea, proctitis, rectal/anal stricture, or ulcer
- Urinary
  - 7.3% incidence of urinary complications requiring hospital admission (cystitis, hematuria, urethral stricture or bladder contracture)

## 3D-Conformal/IMRT

- Decrease acute morbidity
- Improved 12-month PSA nadir
- Fewer late sequelae
- Increase LC
- Exceed 75Gy

## CT Planning



Note lack of boundaries at apex vs. GUD

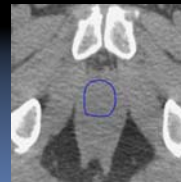
Axial CT without Contour



Axial MRI without Contour

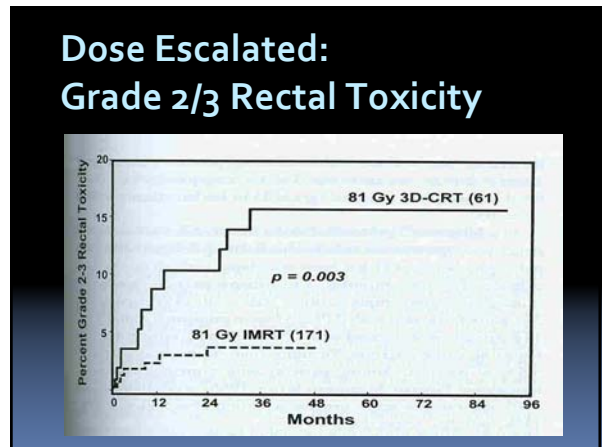
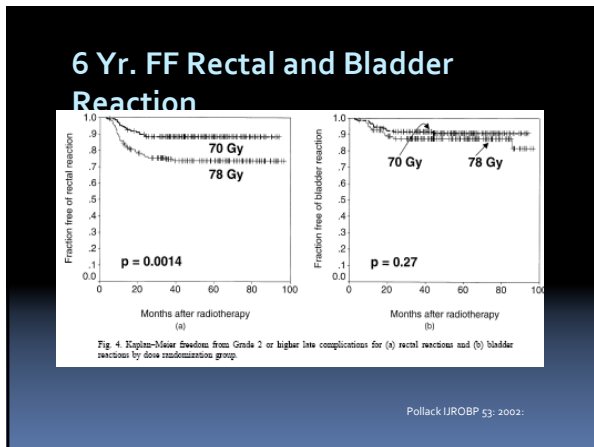
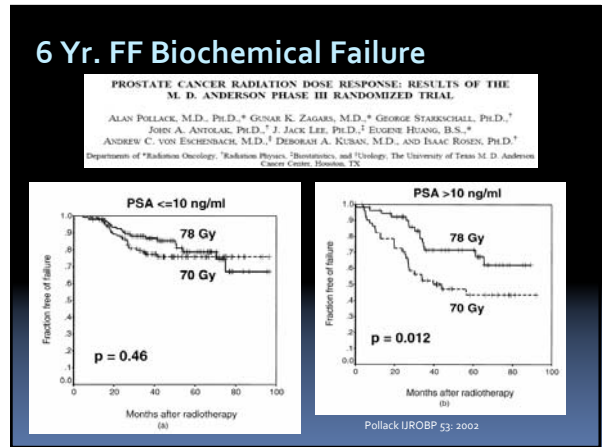
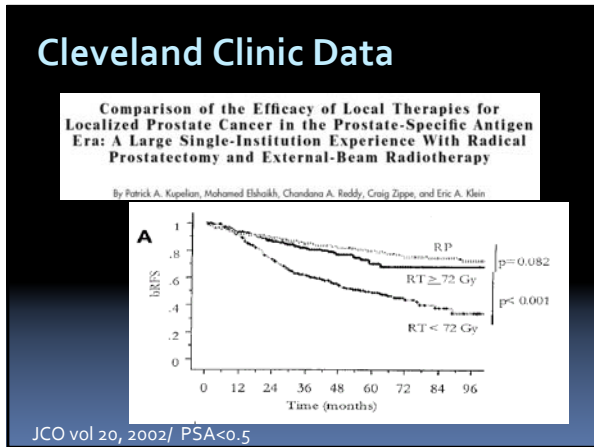
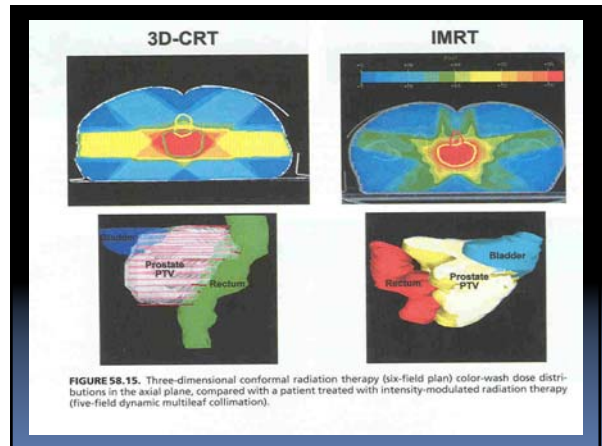
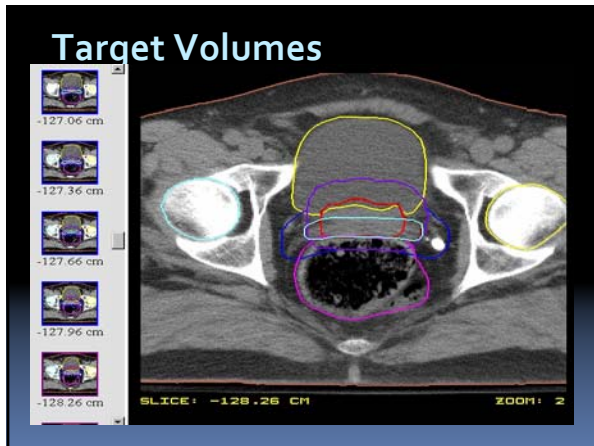


Axial CT with Contour



Axial MRI with Contour





## Dose Escalated: Urinary Toxicity

- 5-yr 10% risk grade II
- No differences between conformal/IMRT
- TURP increased incontinence rate:
  - 2% vs 0.2% without

## Tissue Tolerances

Normal Organ Limit	No more than 15% volume receives dose that exceeds	No more than 25% volume receives dose that exceeds	No more than 35% volume receives dose that exceeds	No more than 50% volume receives dose that exceeds
Bladder Constraint	80 Gy	75 Gy	70 Gy	65 Gy
Rectal Constraint	75 Gy	70 Gy	65 Gy	60 Gy
Penile bulb	Mean dose less than 52.5 Gy			

- Femurs max <68Gy
- Large bowel <60Gy
- Small bowel <50Gy

## Does Escalated: Impotence

- ED: 6 to 84%
- Potency after RT: 1, 20, 40, & 60 months
  - 96, 75, 59, and 53%
- Multifactorial: Diabetes, CAD, AB
  - 63% arterial
  - 31% cavernosal dysfunction
  - 3% neurologic
- Viagra :
  - 74% response after 3-DCRT
  - 22% had no response

## Prostate Motion

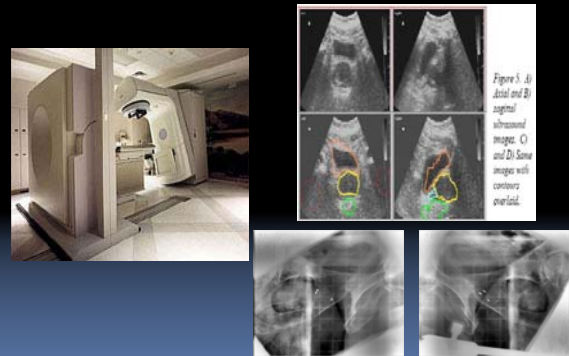


TABLE 2  
Multivariate Cox Proportional Hazards Regression Analysis of Factors that Affected Biochemical Recurrence-Free Survival

Factor	P value
Age (continuous variable)	0.31
Race (African American vs. Caucasian)	0.10
Clinical T classification (T1-2a vs. T2b-c vs. T3)	<0.001
PSA level (continuous variable)	<0.001
Biopsy Gleason score (continuous variable)	0.001
Use of androgen deprivation (no vs. yes)	0.34
Radiation technique (standard vs. conformal/IMRT)	0.10
Radiation dose (continuous variable)	<0.001
Year of therapy (continuous variable)	<0.001

PSA: prostate-specific antigen; IMRT: intensity-modulated radiotherapy.

Deepak Khuntia et al. Cancer 2004

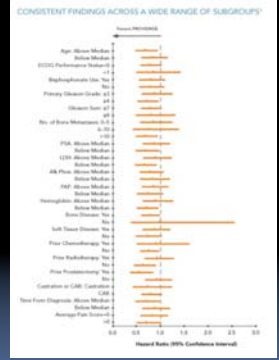
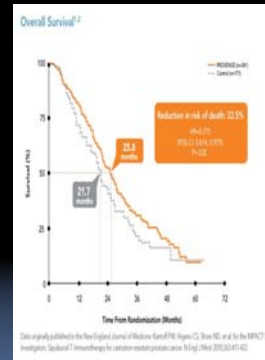
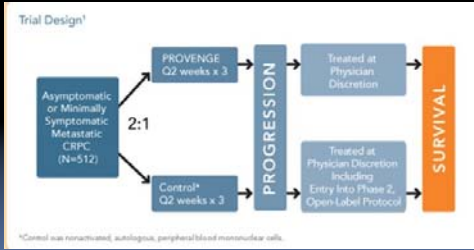
## Hormones

- Before Radiation
  - Tumor/prostate shrinkage (30 to 40%)
  - Reduced dose to bladder/rectum
- Concurrent
  - Potentiate effects
- After radiation
  - 6-12 months for Intermediate/2yrs for high risk



# Provenge

- Castrate Resistant with bone mets



COST \$93,000

**Mechanism of Action**  
**Immunotherapy Antigen Presenting Cells Provenge**

