# Prostate Cancer
# Screening and Diagnosis

# Why screen for any Disease ?

- ☐ Significant % of the population affected
- ☐ Safe and affordable curative therapy needs to exist
- ☐ Early detection improves outcomes dramatically
- ☐ Burden on healthcare is relieved

## Why do we screen for Prostate Cancer ?

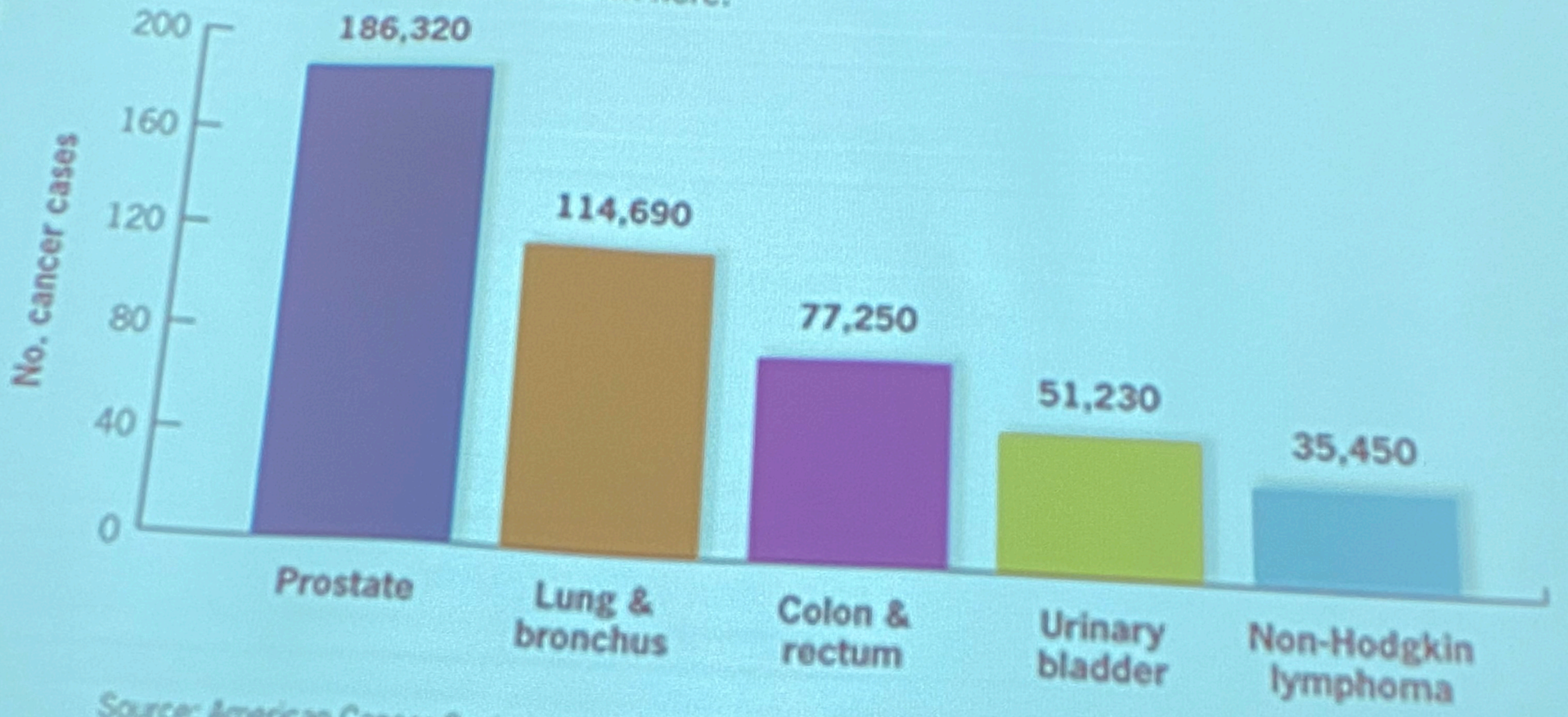
- ☐ 1 Out of 6 males affected
- ☐ Curative therapy with early detection
- ☐ Curative therapy less invasive than ever before
- ☐ Treatment of metastatic disease major financial burden

# Costs involved in Prostate Cancer Care

- Da Vinci - ±R260 000
- Open Radical Prostatectomy - ±R150 000
- Brachitherapy - ±R180 000
- EBRT (6 weeks) - ±R200 000
- MRI Prostate
  - Contrasted - ±R18 000
- PET (PSMA) Scan - ±R36 000
- Zoladex
  - 3-month depot (10,8mg) - ±R7500
- Caloxa 50mg - ±R600/month
- Enzalutamide - ±R31 000/month
- Abiraterone - ±R13 000/month

# Prostate Cancer Still No. 1

Prostate cancer remains the most commonly diagnosed malignancy among men in the United States. It accounted for one quarter of the 745,180 estimated new cancers diagnosed in men in 2008, according to the American Cancer Society. The top five cancers in American men are shown here.




Source: American Cancer Society. Cancer Facts & Figures 2008.

# Has prostate screening improved outcomes?

**70's/80's**

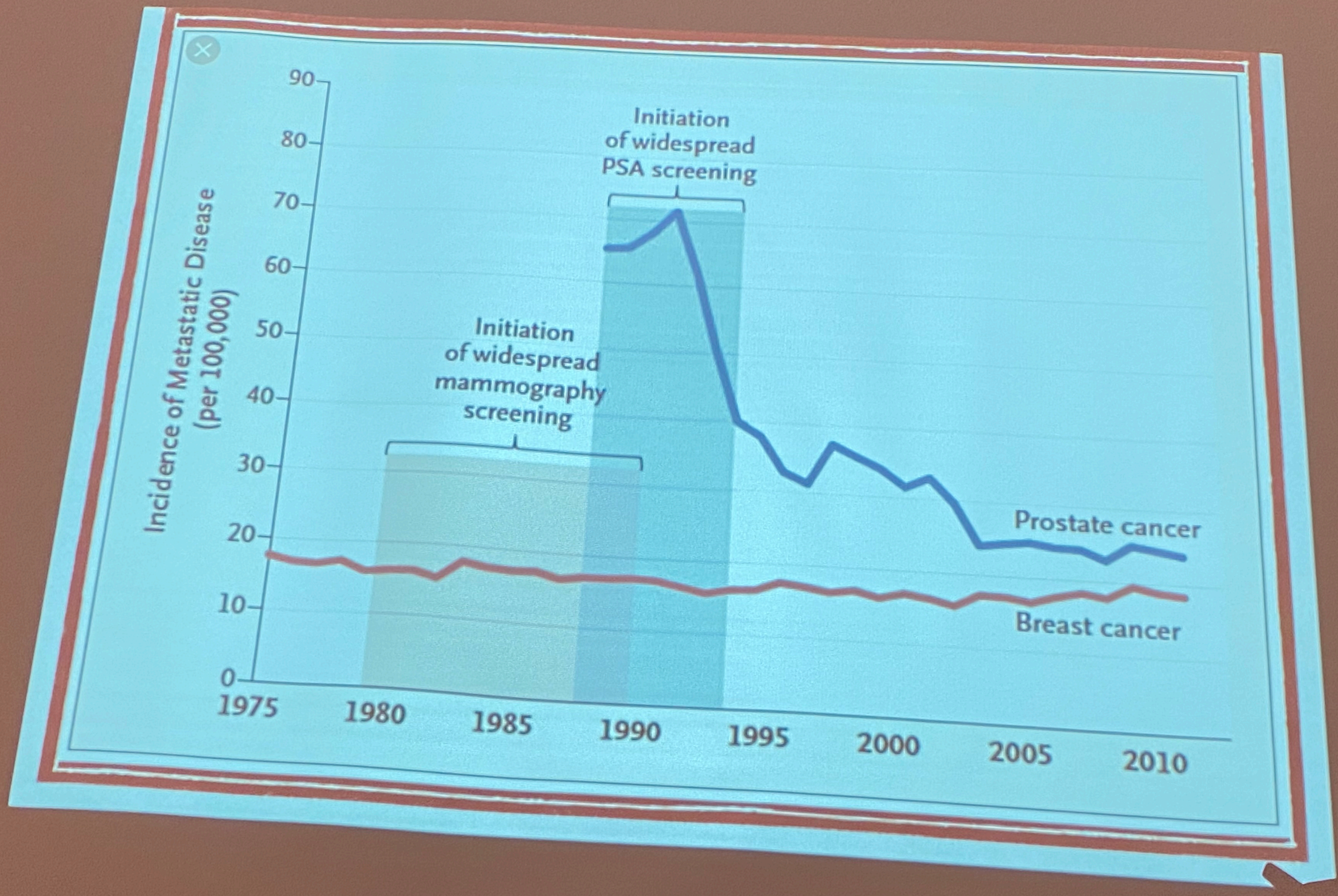
Late diagnosis = Incurable disease

Higher Prostate CA specific mortality

**From the 90's**

Screening = Early detection and cure

Lower prostate CA specific mortality


Incidence of Metastatic Disease (per 100,000)
90
80
70
60
50
40
30
20
10
0
1975
1980
1985
1990
1995
2000
2005
2010
Initiation of widespread mammography screening
Initiation of widespread PSA screening
Prostate cancer
Breast cancer

# USA POLICIES

- screening 90's - 2008 ⬇ PCa mortality
- No screening 2008 - 2016 ⬆ advanced disease
- Reintroduced Informed screening from 2017 *(risks and benefits)*

# Back to being sensible

## USPSTF
### Prostate Cancer Screening Recommendation

**2008 - 2016**

**D/I**

Discourage the use of this service

**2017**

**C**

Offer or provide this service for selected patients (55 - 69), depending on individual circumstances

**Join ZERO in the fight for every man to have access to early detection!**

ZERO
THE END OF PROSTATE CANCER

ZEROCANCER.ORG

# Who do we screen?

- ☐ Annually from 40 if : +Family history and African
- ☐ Annually from 50
- ☐ Stop screening at 75 if Px has been screened
- ☐ NB Family history of prostate CA related deaths

## What are the dangers of screening?

Over treatment of insignificant disease with potential harmful modalities.

# Harmful complications of treatment

- ☐ Blood loss
- ☐ Incontinence
- ☐ Erectile dysfunction
- ☐ Radiation damage to surrounding tissue
- ☐ Biopsy complications (Bleeding and septicemia)

# THE POSITIVES

- ☐ Cure if detected early ⬇ Pca deaths ⬇ Pca metasteses
- ☐ The aging male
- ☐ Debilitating death of metastatic prostate cancer
- ☐ Financial implication of metastatic disease
- ☐ Unpredictability of TRUS Bx distinguishing between significant and insignificant disease
- ☐ Less invasive curative modalities - Da Vinci Radical Prostatectomy / Brachy Therapy

## WHAT IS AN ABNORMAL SCREEN TEST?

| AGE | PSA |
|---|---|
| 40-59 | > 2,5 |
| 60-75 | > 4 |
| >75 | > 6,5 |

- Free PSA ratio < 20%
- Velocity > 0,75 ng/ml per year
- Antibiotic then redo PSA after 2 months
- NB palpable nodule

# POSITIVE SCREEN - WHAT NOW?

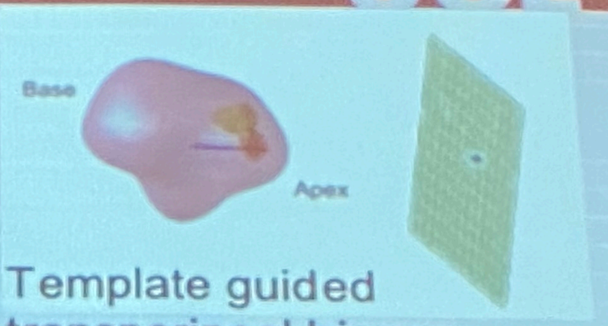
- TRUS Bx
- 18 cores systematically taken - sonar guided
- Antibiotic prophylaxes

# Biopsy strategies

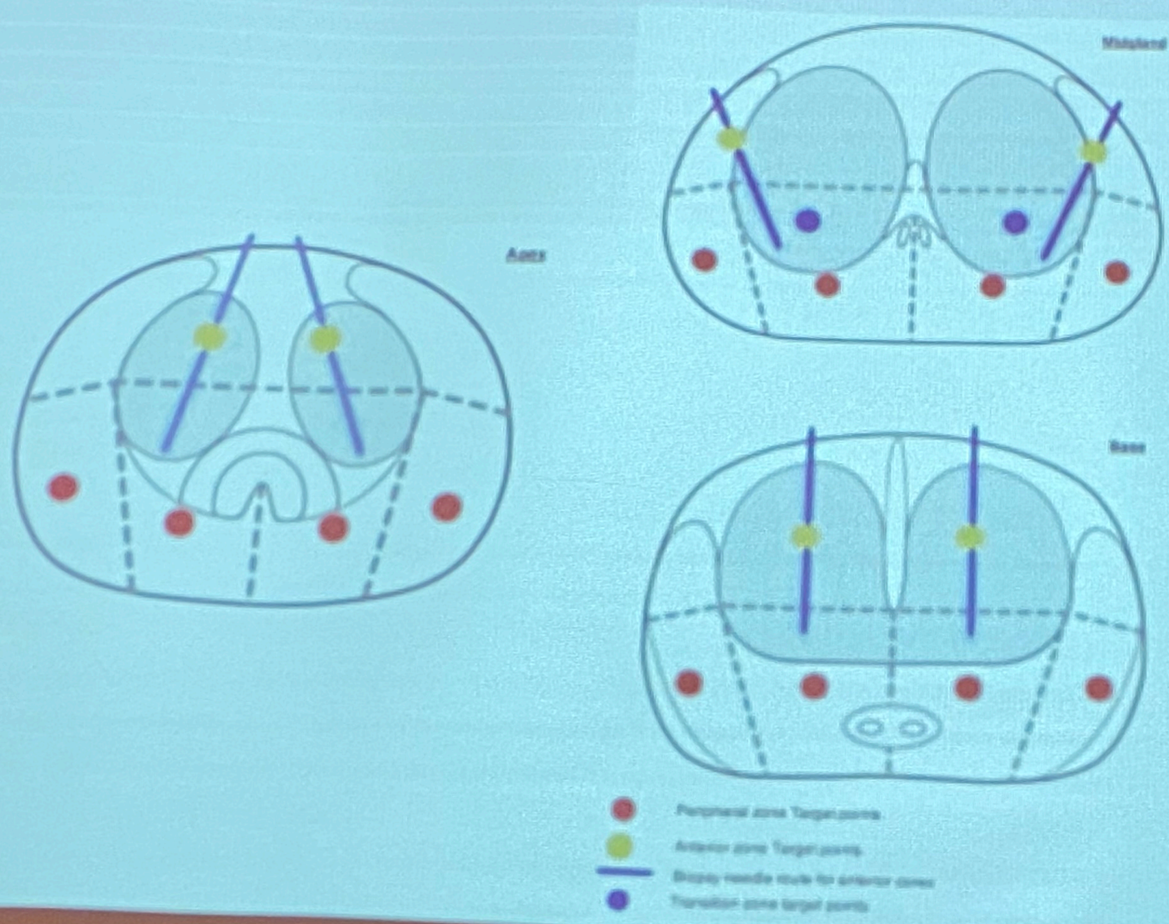
UCL

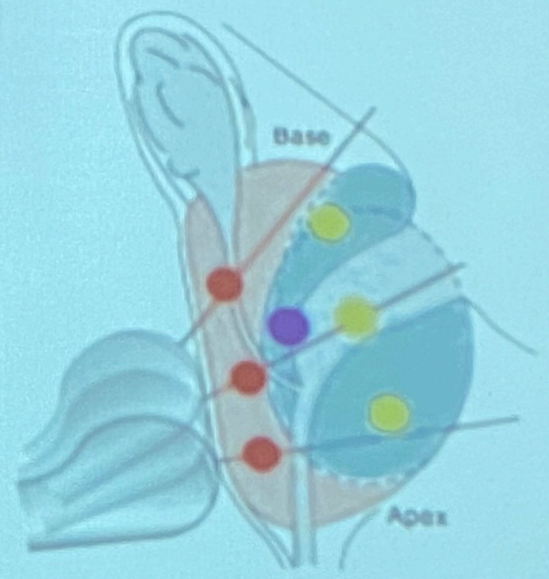
Transrectal biopsies

1. Standard TRUS (a) : 12 cores 10mm RLE
2. Standard TRUS (b) 12 cores 15mm RLE
3. 14 (12 PZ + 2TZ) cores 5mm RLE
4. 18 (12 PZ + 6 Ant) cores 10mmRLE




Template guided transperineal biopsy




Peripheral zone target points

Anterior zone target points

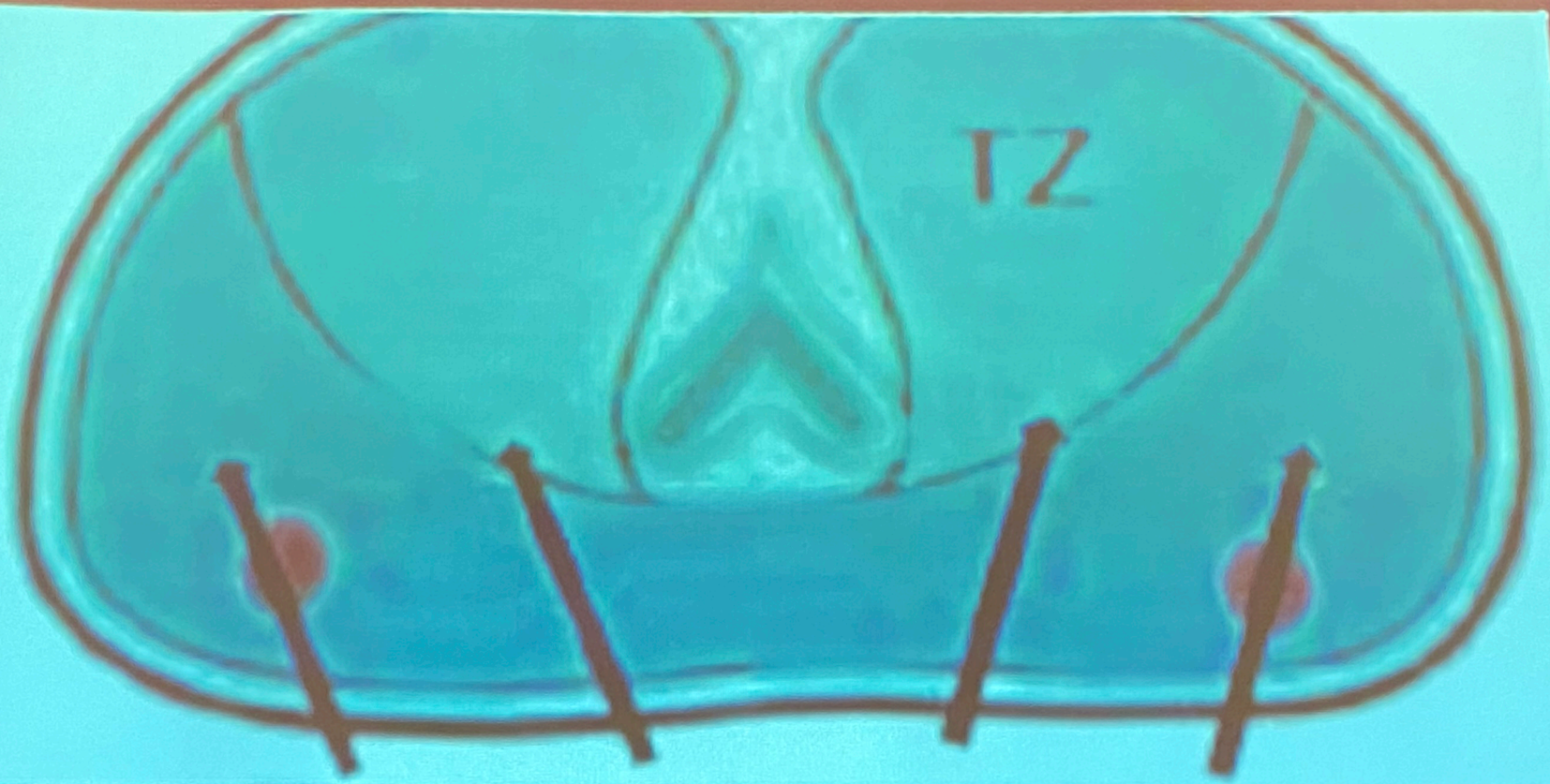
Biopsy needle route

Transition zone target points

## Significant disease under sampled




Random deployment of the needle leads to a clinically significant tum being under-sampled ar categorised as low risk




# Hitting small volume disease

# Missing significant disease

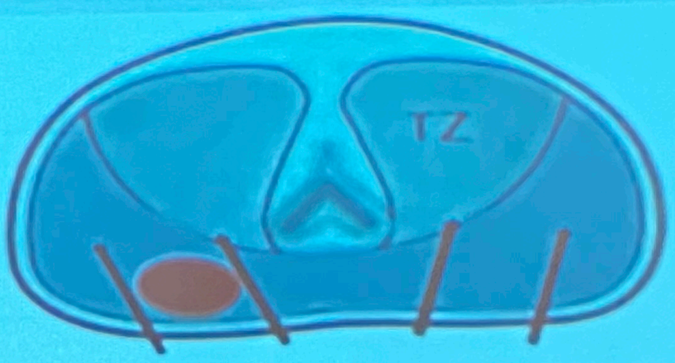



Figure 3a: Random deployment of the needle leads to a clinically significant tumour being missed in the PZ.

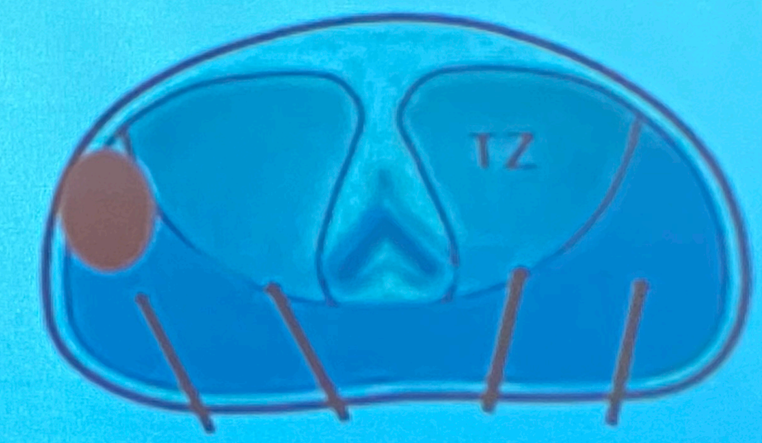
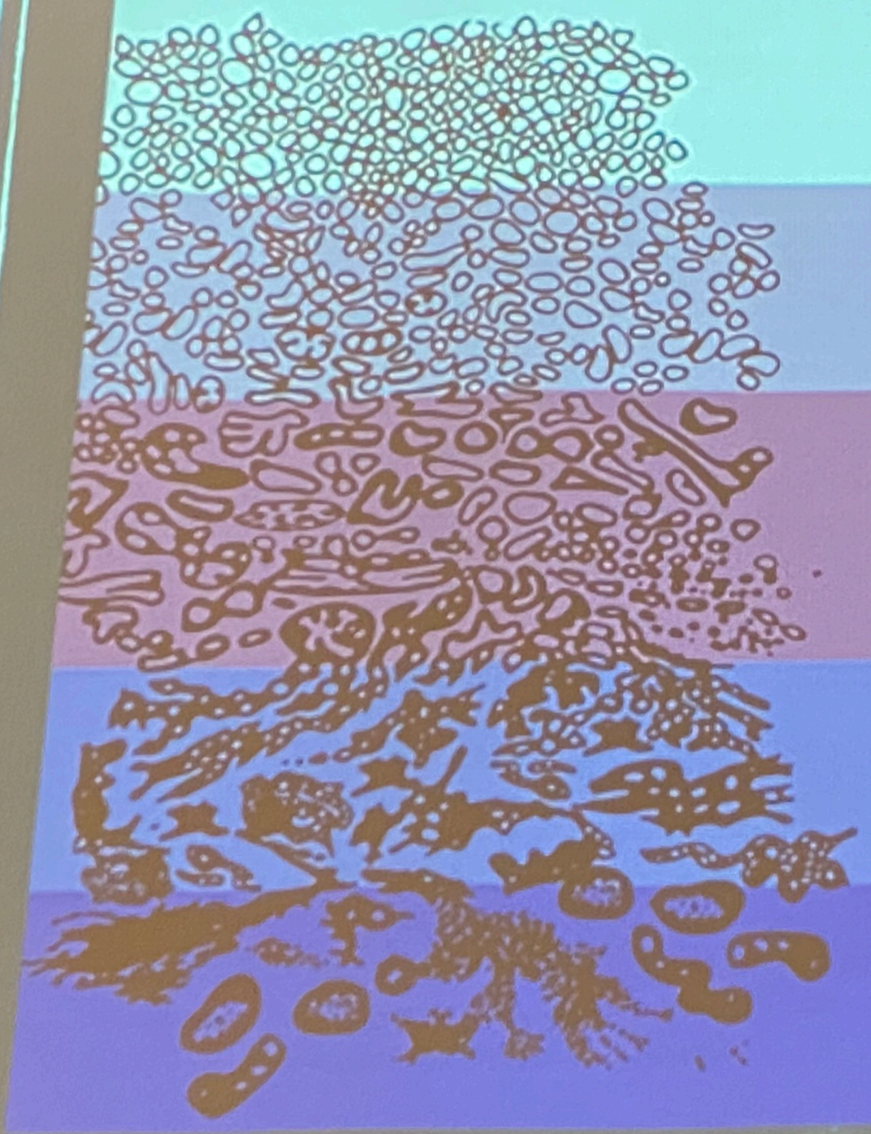



Figure 3b: Random deployment of the needle leads to a clinically significant tumour being missed in the anterior PZ horn

# Gleason's Pattern



1. Small, uniform glands

2. More stroma between glands

3. Distinctly infiltrative margins

4. Irregular masses of neoplastic glands

5. Only occasional gland formation

Well differentiated

Moderately differentiated

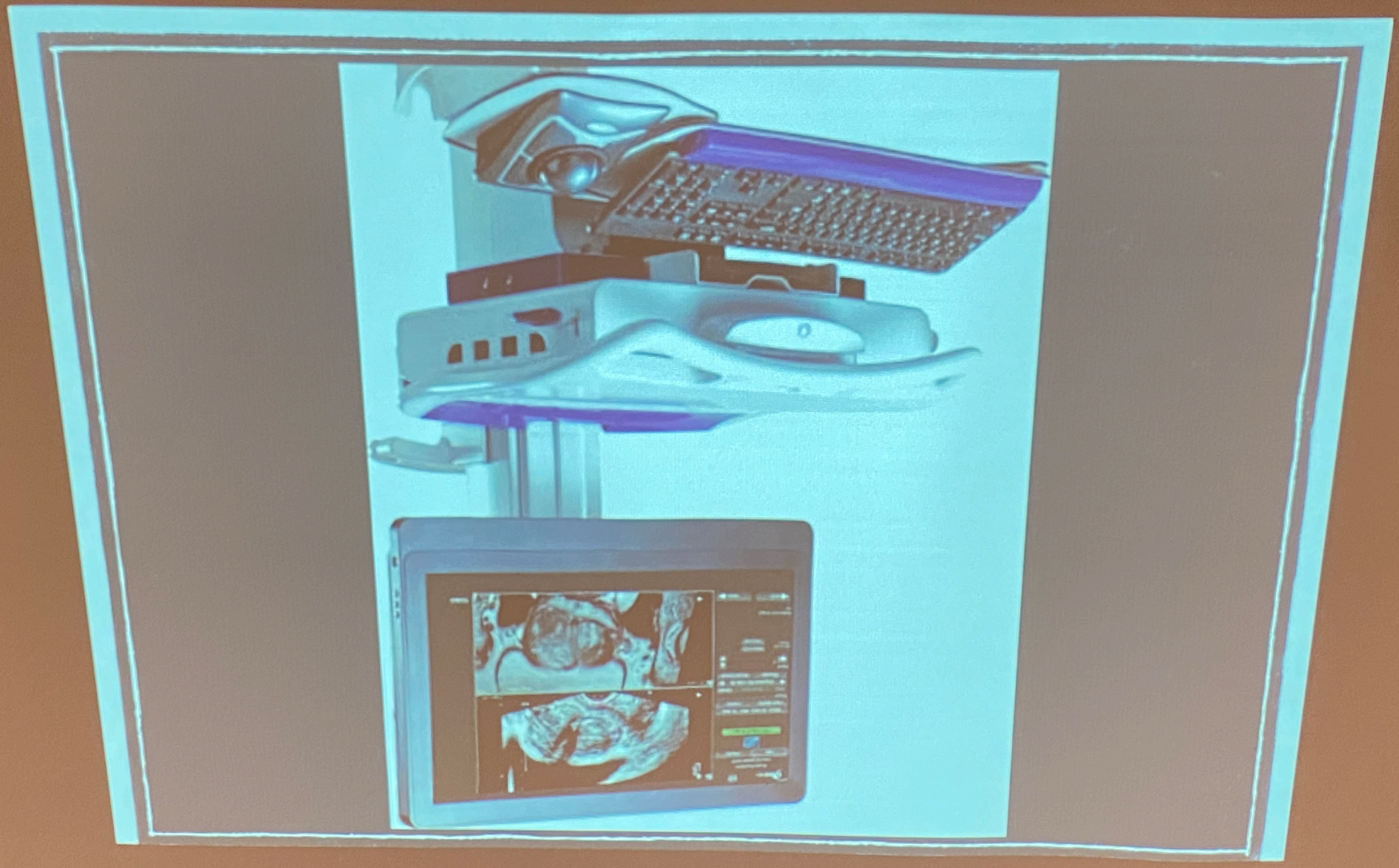
Poorly differentiated/ Anaplastic

# Bx negative - PSA keeps rising

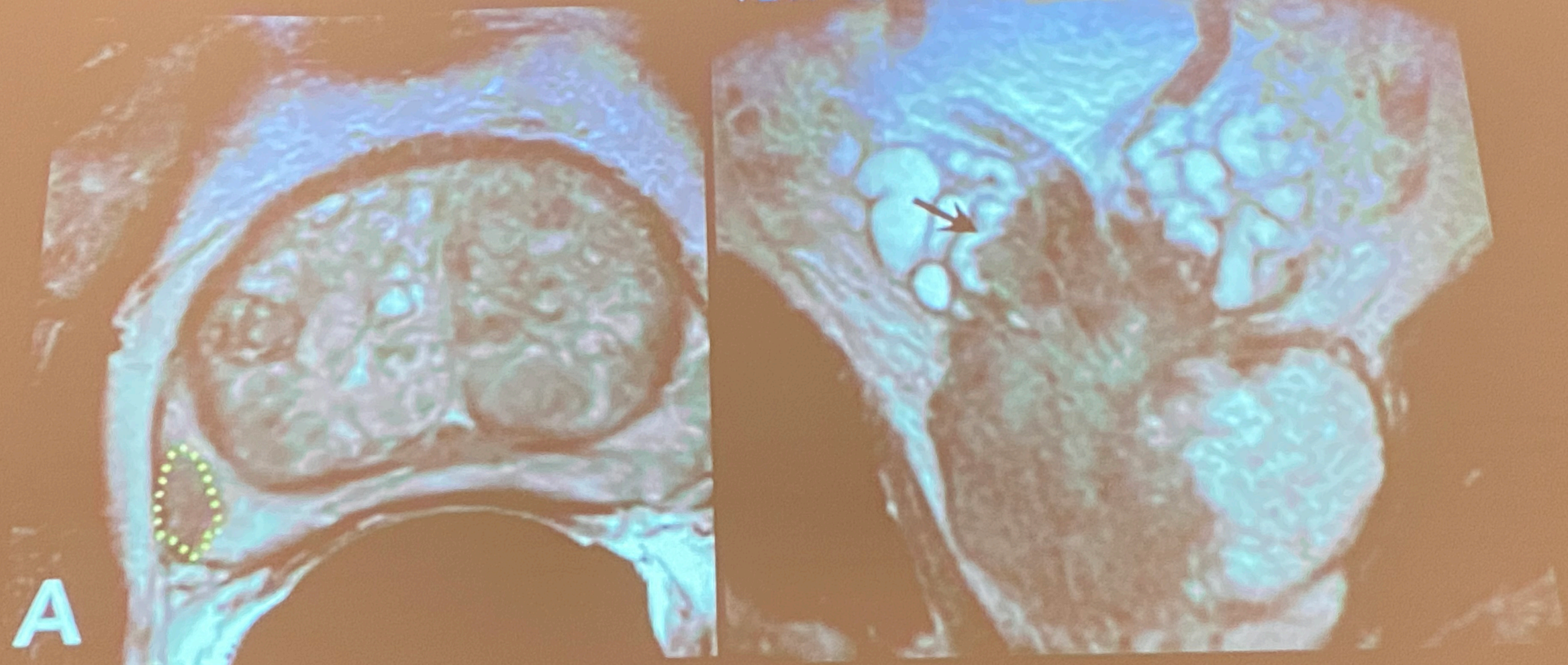
- ☐ MRI - fusion Bx
- ☐ TURP + TRUS Px Bx

# THE ROLE OF MRI

- To confirm insignificant disease in older Px on active surveillance / watchful waiting
- To help pinpoint possible cancer in Px with previous negative TRUS biopsies and rising PSA
- To detect extra prostatic extension and lymph nodes involved in Px with high risk disease



T2W-coronal



A

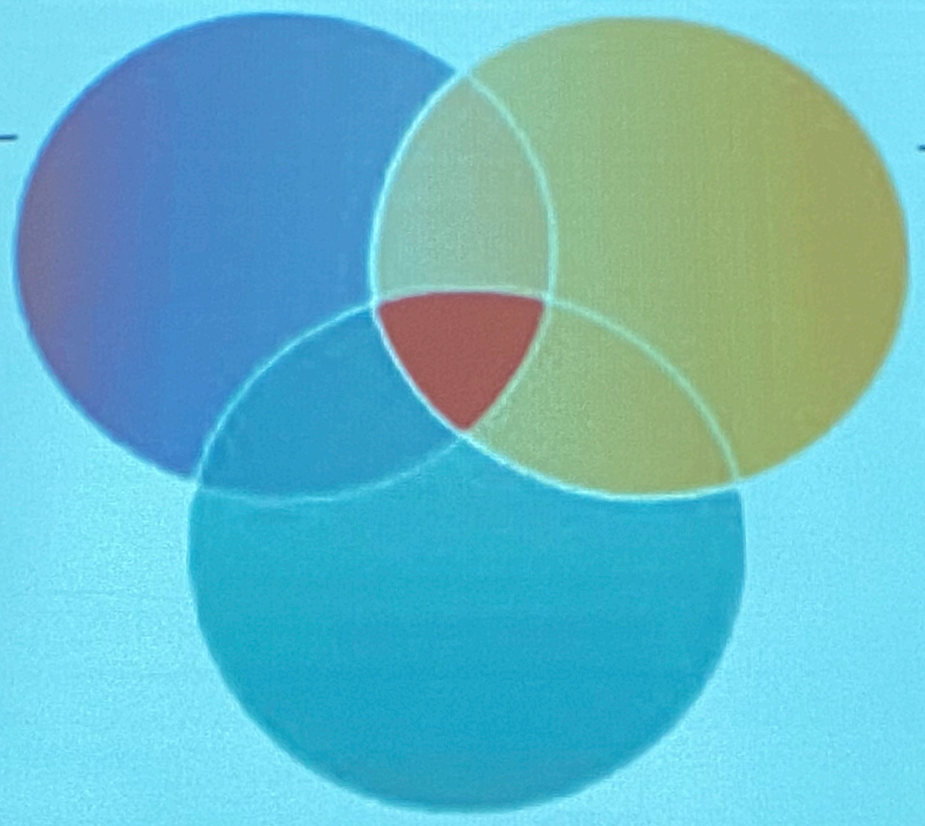
# 2 MODALITIES THAT MAKE SCREENING MORE RELEVANT TODAY THAN EVER BEFORE

- MRI - to detect significant disease in Px's with + screening
- Da Vinci Robot - if the morbidity and complications of active treatment becomes insignificant , screening becomes mandatory

# WHAT IF POSITIVE BIOPSY?

- Categorize Cancer - Low/ Medium/ High risk
- Determine Px, life expectancy and comorbidities
- Choose treatment
  - active surveillance / watchful waiting
  - da Vinci robotic radical prostatectomy
  - Brachy therapy
  - Open retropubic radical prostatectomy

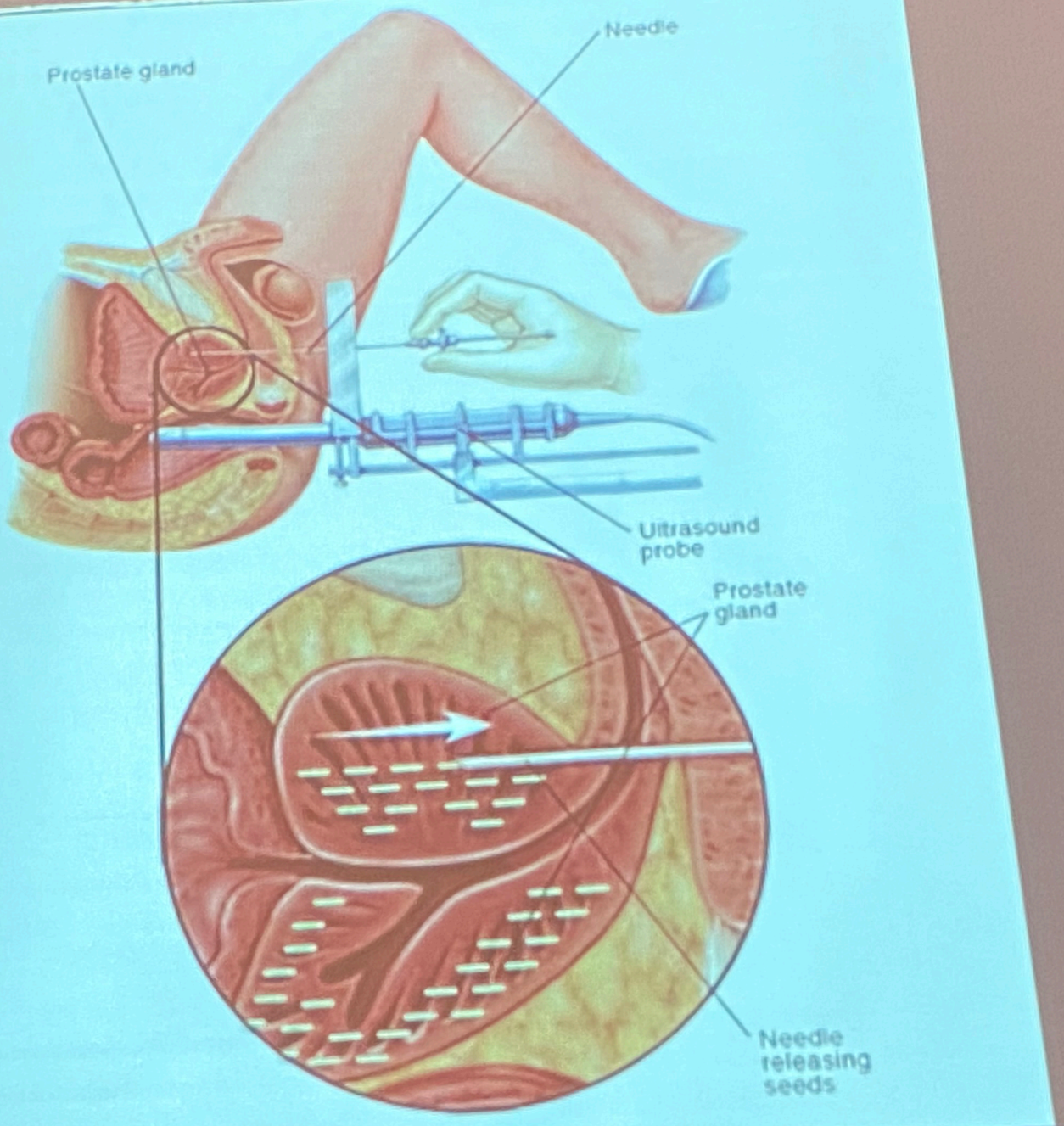
# Prostate Cancer Treatment Philosophy

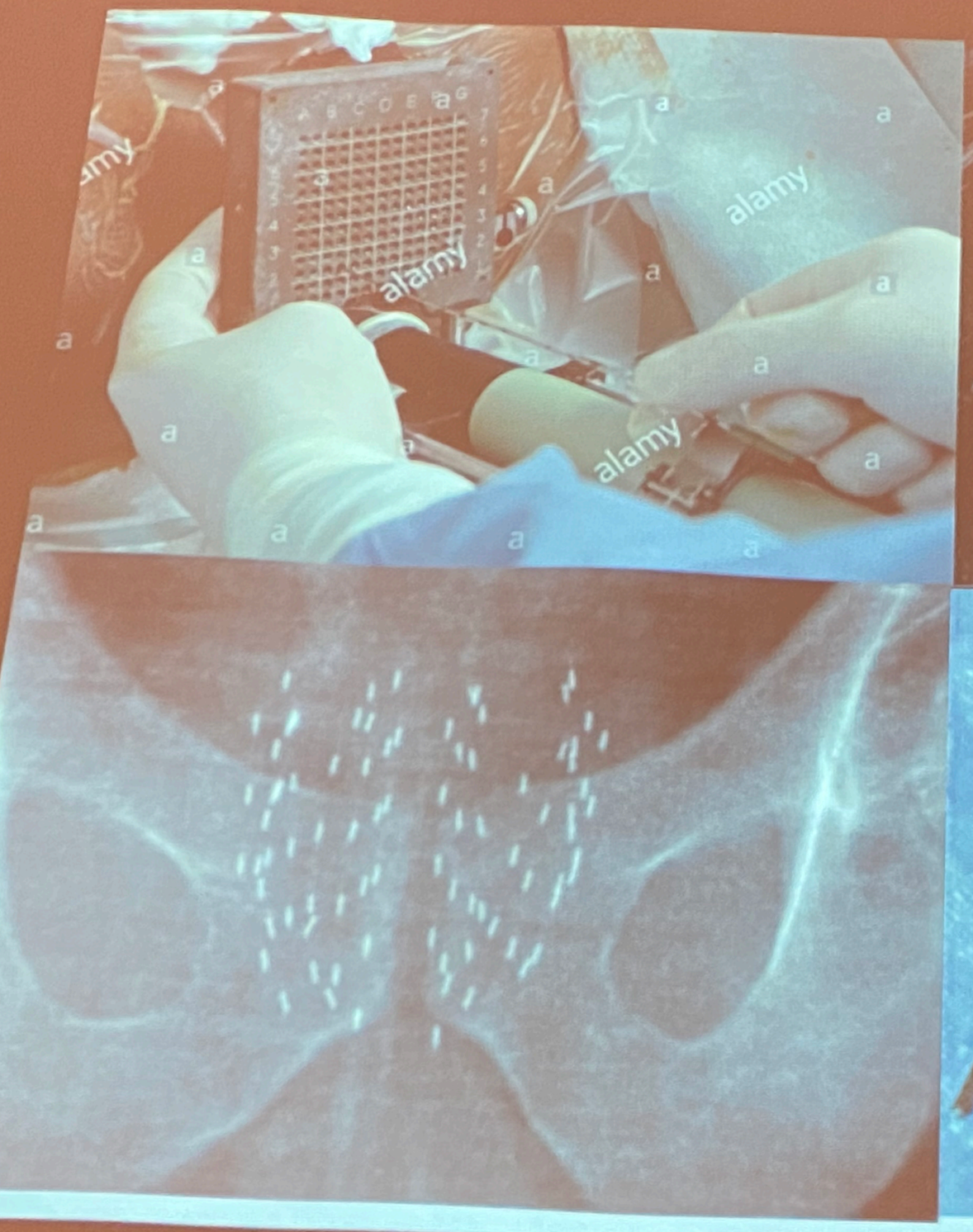


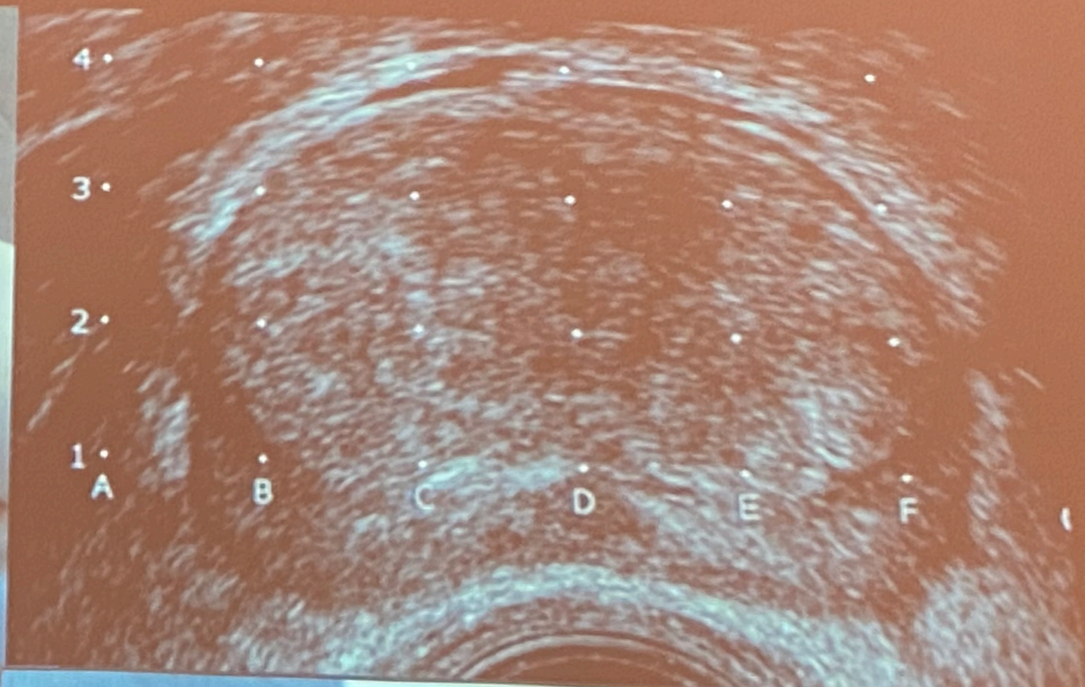
Cancer Cure

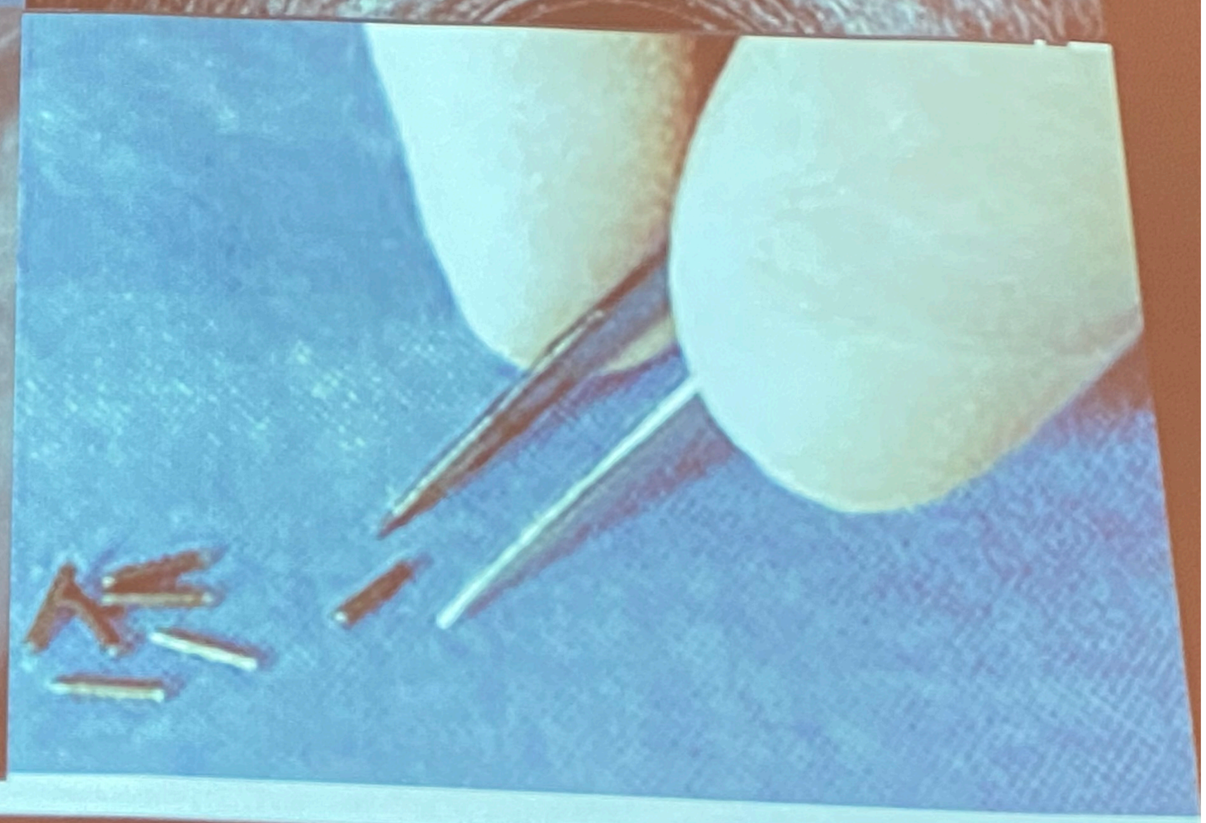
Contenence

Potency


Prostate gland
Needle
Ultrasound probe
Prostate gland
Needle releasing seeds




4
3
2
1
A
B
C
D
E
F



The journey from

the KNOWN and TRUSTED to

STATE of THE ART

# DA VINCI ROBOT IS THE FUTURE

- Screening for prostate cancer makes absolute sense if one detects cancer early and cure is likely with a fairly non-invasive method.
- We have learnt that prostate biopsies are unreliable in predicting severity of disease and rarely leads to overtreatment !!!!!
- Healthy patients below the age of 70 that are diagnosed with prostate cancer should be treated curatively.
- Surgical removal of the prostate has been proven as the gold standard for long term cure.
- Da Vinci Robotic radical prostatectomy is the least invasive surgical method to establish the chance of cure.

# WHERE ARE WE NOW?

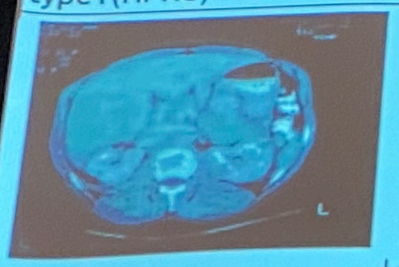
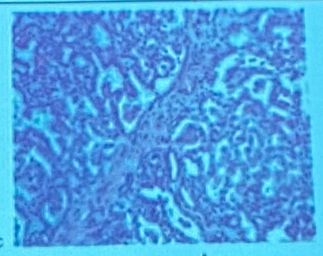
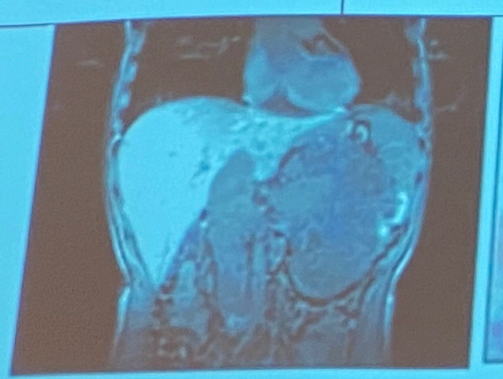
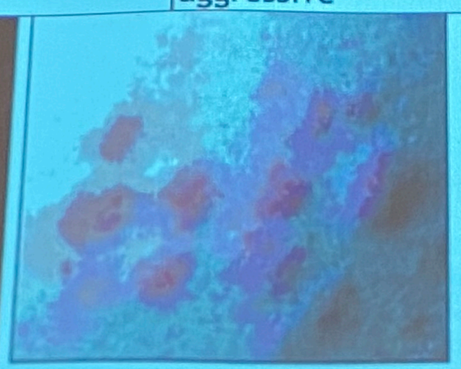
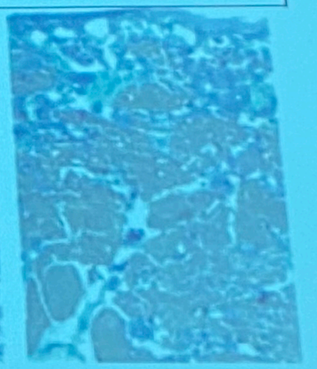
- Since 2017: 973 cases have been done

  **±200 minutes then - now ±100 minutes per case**

- We have developed into a high volume centre in South Africa and for 2024 we were ranked 5th by volume of cases
- Ranked 1st in the Netcare Group with regards to efficiency, proficiency and cost effectiveness - used as a benchmark for the Netcare Group
- Only facility in the Eastern Cape accredited to do robotic kidney surgery

# THE SECRET OF A PREDICTABLE OUTCOME

- ☐ Dedicated team with commitment of all role players
- ☐ Consistency in staff and surgical assistants
- ☐ Patient selection
- ☐ Attention to detail

| | Location (Gene) | | |
|---|---|---|---|
| *Hereditary papillary renal carcinoma type1(HPRC)* | 7q31<br>MET | Papillary renal carcinoma type 1: solid, multiple and bilateral | None |
|  |  |  | |
| *Hereditary leiomyomatosis and renal cell carcinoma (HLRCC)* | 1q42-43<br>FH | Papillary renal carcinoma type 2, collecting duct carcinoma: solitary, aggressive | Uterine leiomyomas and leiomyosarcomas; cutaneous leiomyomas |
|  |  |  |  |


TAKE CARE OF
WHAT'S IMPORTANT
RENAL CELL CARCINOMA
NOVEMBER 2024

# Epidemiology

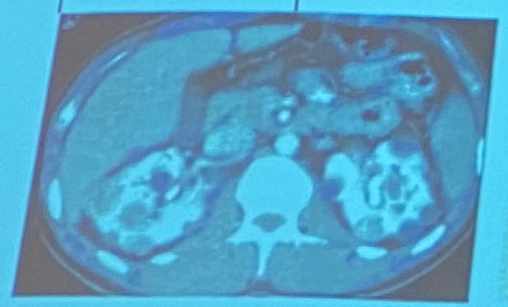
- Male predominance (1.6:1.0 M:F)
- Highest incidence between age 50-70
  - -Median age of diagnosis is 66 years
  - -Median age of death 70 years
- Majority of RCC occurs sporadically
- Highest incidence in Scandinavia and North America, lowest in Africa

# Risk Factors

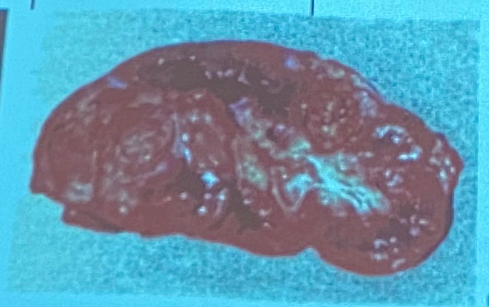
- Tobacco smoking contributes to 24-30% of RCC cases
  - Tobacco results in a 2-fold increased risk
- **Environmental:**
  Cadmium, thorium-di-oxide, petroleum and phenacetin analgesics.
- **Occupational:**
  leather tanners, shoe workers, asbestos workers.
- **Hormonal:**
  diethylistillbestrol,
- Obesity, HTN
- 35% - 47% pt on long term dialysis develop Acquired polycystic kidney disease, out of which 5.8% develops Renal cancer.

# Hereditary Renal Cancer Syndromes

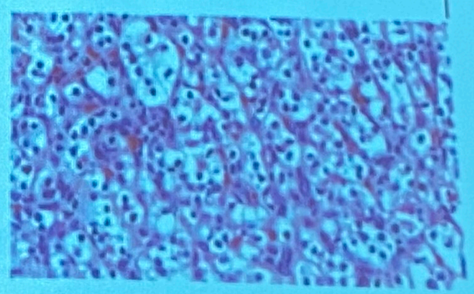
| Syndrome | Chromosome Location (Gene) | Renal Manifestations | Other Manifestations |
|---|---|---|---|
| *Von Hippel-Lindau (VHL)* | 3p25<br>VHL | Clear cell renal carcinoma: solid and/or cystic, multiple and bilateral<br>28%-45% | Retinal and central nervous system hemangioblastomas; pheochromocytomas; pancreatic cysts and neuroendocrine tumors; endolymphatic sac tumors; epididymal and broad ligament cystadenomas |



A



B



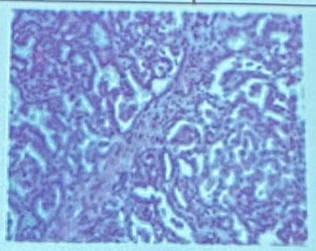
C

| | Location (Gene) | | |
|---|---|---|---|
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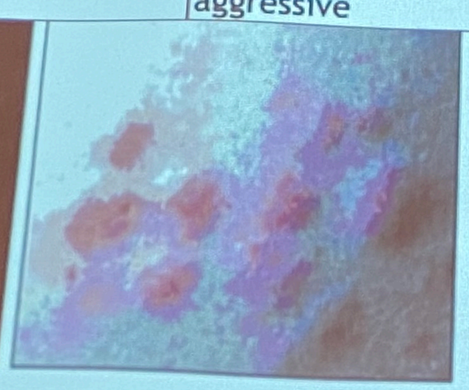


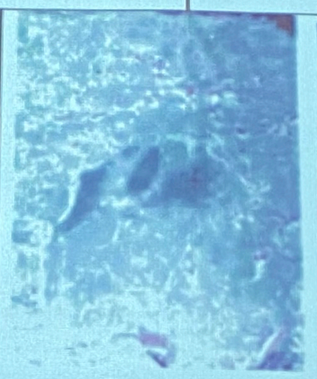


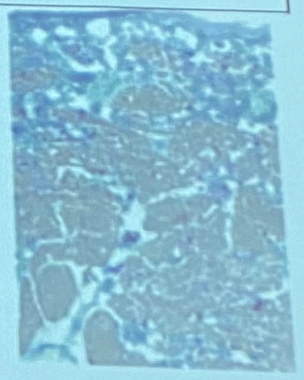












## Natural History

- 7% diagnosed incidentally
- 45% present with localized disease, 25% with locally advanced disease, 30% with metastatic disease
- Lymph node metastases- 9% to 27% (renal hilar, para-aortic and paracaval)
- Renal vein – 21% & IVC 4%
- Distant metastases- lung (75%), soft tissue (36%), bone (20%), liver (18%), skin (8%) and CNS (8%)

# Clinical Presentation

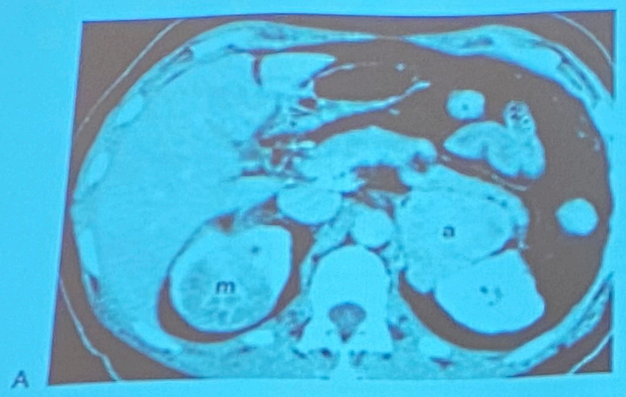
- Clinically occult for most of its course.
- Classic triad (occur in 5%-10% of patients)
  - flank pain,
  - hematuria,
  - palpable abdominal mass
- Hematuria present 40% of patients
- Systemic symptoms
  - Anaemia, Fatigue, Cachexia, Wt. Loss, Hypercalcemia, Hepatic Dysfunction
- Paraneoplastic Syndrome
  - Parathyroid like hormones, erythropoietin, renin, gonadotropins, placental lactogen, prolactin, enteroglucagon, insulin like hormones, adrenocorticotropic hormone and prostaglandins identified in RCC pt.

# Diagnostic Work-Up

- **General-**History, Physical examination
- **Laboratory studies**
  - CBC, LFT's, alkaline phosphotase, BUN, creatinine, urinalysis
- **Radiographic studies-** Increased use of imaging has increased the detection of renal lesions most of which are simple cysts.
  - X-Ray KUB region
  - *Ultrasonography*- Excellent in distinguishing cystic from solid masses
  - *Intravenous Urography* - Starting point for hematuria evaluations and function of contralateral kidney
  - *Computed tomography*- Provides an excellent assessment of the parenchyma and nodal status.
  - *Magnetic Resonance Imaging* - excellent demonstration of solid renal masses and is image test of choice to demonstrate extent of vena caval involvement with tumor. Useful in patients with renal insufficiency

# Metastatic Work-Up

- Chest X-ray or Chest CT
- CT/MRI scan of abdomen or pelvis
- Bone scan with plan films (for elevated alkaline phosphatase or bone pain).




A

**Figure :** Computed tomography demonstrates a right renal carcinoma (m) with a large contralateral adrenal metastasis (a).




A

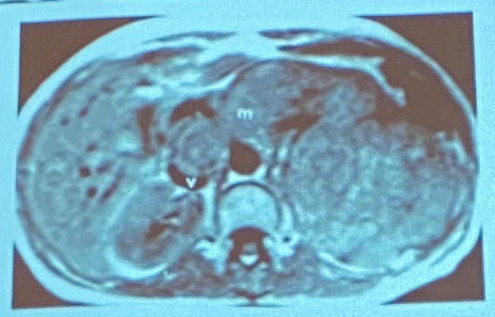
**Figure:** CT scan shows large left renal mass with calcification (m) invading the left renal vein (arrow).




**Figure:** T1-weighted magnetic resonance image demonstrates tumor (m) and vascular invasion (arrow). Flowing blood (v) in the left renal vein is black on this scan.




B




A

**Figure A:** Axial T1-weighted image demonstrates a large left renal carcinoma with extension into the left renal vein (m) with protrusion into the IVC (v). **B:** Sagittal T1-weighted image shows the relation of the tumor thrombus (m) to the IVC (v) in the lateral projection.

## Continue...



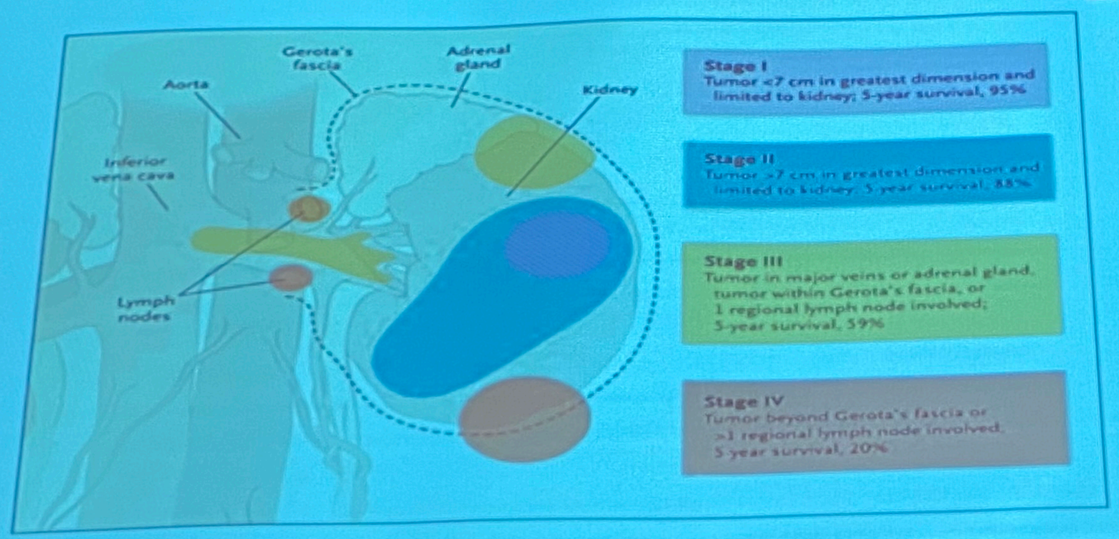
# Robson Modification Of the Flocks & Kadesky Staging of RCC

| Tumor Stage | Description |
|---|---|
| I | Renal cell carcinoma is confined to the kidneys |
| II | Renal cell carcinoma extends through the renal capsule but is confined to Gerota's fascia |
| III | Renal cell carcinoma involves the renal vein or inferior vena cava (IIIA) or the renal hilar lymph nodes (IIIB) |
| IV | Renal cell carcinoma has spread to local adjacent organs (other than adrenal gland) or to distant sites |

# Staging

- Stage I-III: Localized disease
- Stage IV: Advanced, metastatic disease

| | | | |
|---|---|---|---|
| I | T1 | N0 | M0 |
| II | T2 | N0 | M0 |
| III | T3 | N0 | M0 |
| | T1 | N1 | M0 |
| | T2 | N1 | M0 |
| IV | T4 | N0 | M0 |
| | T4 | N1 | M0 |
| | Any T | N2 | M0 |
| | Any T | Any N | M1 |



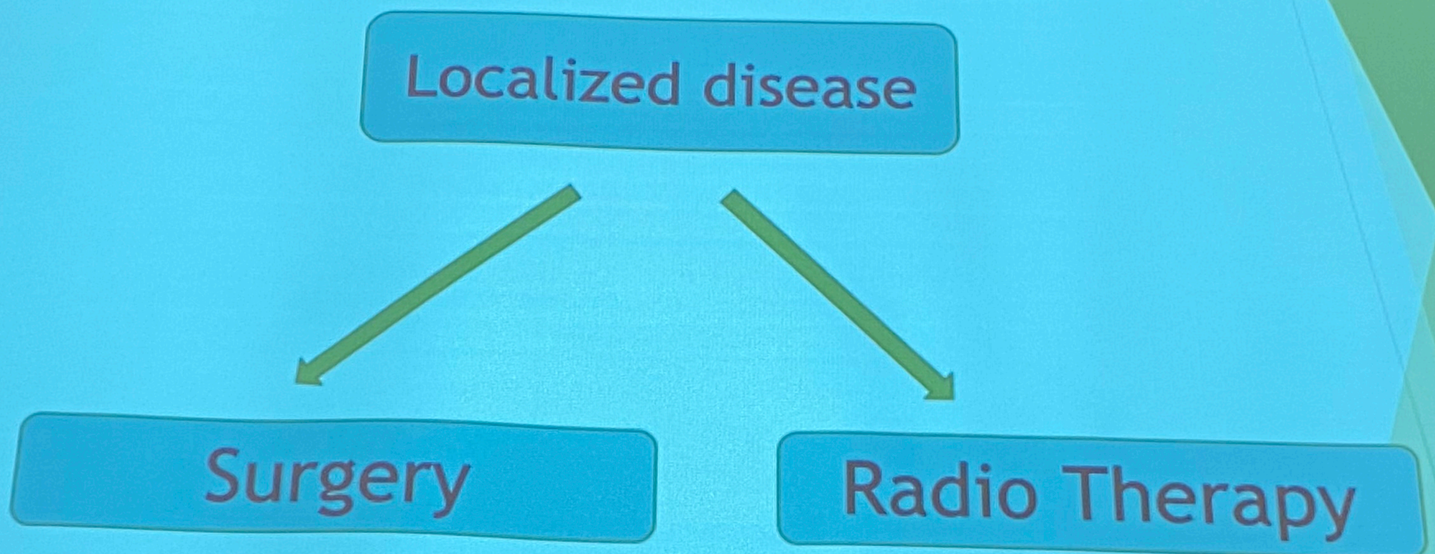
# Prognostic factors for RCC

| | 5 yr survival |
|---|---|
| **Pathologic stage** | |
| T1 - 2 organ confined | 70-90% |
| T3 | 50-70% |
| N+, M1 | 5-30% |
| **Tumour size** | |
| < 4 cm | > 90% |
| 4 - 10 cm | 50% |
| > 10 cm | 0% |
| **Histological type** | |
| Clear cell | 70% |
| Papillary, Chromophobe | 85% |
| Multilocular cystic | 100% |
| Medullary, Collecting duct | 0% |

# Management

- Localized disease
- Metastatic disease

# Management of Localized disease



## Surgery- Radical nephrectomy

Gold standard treatment for localized RCC with contralateral normal kidney, adequate surgical margin.

**Principles of Surgery-** Early ligation of renal artery and vein , removal of kidney including Gerota's fascia, removal of ipsilateral adrenal gland, regional lymphadenectomy from crus of diaphragm to aortic bifurcation.

# Nephron Sparing Surgery

## Indications

1. Bilateral RCC
2. RCC in a solitary functioning kidney
3. Unilateral RCC with contralateral kidney under threat of its future function
(Renal artery stenosis, Chronic pyelonephritis , Hydronephrosis, Ureteral reflux, Calculus disease, Systemic disease such as diabetes )
4. Tumor less than 4cms with normal opposite kidney.
5. Five year survival rate 75% to 85%
6. Local tumor recurrence of 10% is reported.

## Other Approaches

1. Radio frequency ablations
2. Cryo ablation



Scars of open versus robotic surgery

- Smaller incisions with less pain and scarring
- Shorter hospital stay and quick return to normal activities
- Reduced bleeding and blood transfusion rates
- Lower risk for wound infection
- Shorter ischemia time than laparoscopy and equal to open surgery which results in less kidney damage
- Excellent magnified view allowing precise closure of blood vessels and collecting system in the tumor bed and closure of the remaining kidney
- Much more ergonomic than laparoscopy

## ROBOTIC-ASSISTED PARTIAL NEPHRECTOMY

https://www.youtube.com/watch?v=31uGJLwUbDo&list=PPSV&t=18s

Robot-Assisted Partial Nephrectomy (RAPN)