Classifying Prostate Cancer

PSA to Prostate MRI

for patients and curious doctors

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Prostate Cancers

Not-Aggressive  In-Between  Aggressive
indolent, insignificant, low risk  low grade, non invasive  biologically active, significant, high risk  high grade, invasive

Most Prostate Cancers are Not-Aggressive
- Common, very slow growing, causes no illness or symptoms
- PSA slow progression, PSA density less than 0.10
- Men with Not-Aggressive cancers die from other illnesses
- Most are biopsy Gleason grade 6
- Not visualized on MRI

In-Between
- Rate of cancer growth varies
- PSA rates of progression varies
- PSA density 0.10-0.15
- Biopsy Gleason 7 (3+4) small volumes
- Sometimes visible on MRI (cancer nodule less than 0.2 cc)

Some Prostate Cancers are Aggressive
- Less frequent, grow faster, can cause serious illness and death
- PSA rapid progression, PSA density greater than 0.15
- Cancer nodule(s) visualized on MRI
- Biopsy Gleason grades 7 (4+3), 8, 9, 10

Criteria and Classifications

Prostate MRI

**Identifies:** Cancer nodule(s), location and volume

**Predicts:** Likelihood of Cancer, 3 parameters Score (T2w, DWI/ADC, DCE)

2. Likely no cancer

Local cancer staging:
1. Cancer nodule confined inside the prostate
2. Cancer nodule involves prostate capsule
3. Limited local cancer spread - adjacent, seminal vesicles
4. Cancer spread involves bladder, rectum, nodes, bones

PSA

**For Diagnosis:**
- no assigned normal limits
- 4 ng/ml upper limit of normal incorrect
- The higher the PSA value the greater likelihood of cancer
- Less than 4 ng/ml Aggressive cancers can be present
- Over 4 ng/ml mostly BPH caused
- PSA Density, PSA Progression better cancer predictors

**After treatment**
PSA is a sensitive, reliable biomarker for monitoring
**Gleason grade** (potential for causing illness)

The grade defines the biologic potential of prostate cancer cells to grow, spread and cause illness. Determined from pathologist microscopic examination of prostate tissue.

**Grade**

- 6 Not-Aggressive (no potential)
- 7 Moderately Aggressive (low to moderate potential)
- 8, 9, 10 Aggressive (high potential)

**TNM Staging**

Developed before prostate MRI

Describes the size of the prostate cancer, where it has spread

- **T** Digital Rectal Exam (DRE) finger exam of prostate
  - T1 cancer cannot be felt
  - T2 cancer nodule confined to the prostate gland
  - T3, T4 cancer nodule has grown outside the prostate

- **N** Cancer spread to lymph nodes
  - N1 a small cancer in a lymph node
  - N2 a medium cancer in one node
    - or several small cancers in several lymph nodes
  - N3 a large cancer in one or more lymph nodes

- **M** Cancer spread beyond lymph nodes
  - M1a adjacent to the nodes
  - M1b into the bones
  - M1c to other parts of the body

**D’Amico Risk Classification**

Developed before prostate MRI

<table>
<thead>
<tr>
<th>PSA</th>
<th>Low risk (favourable)</th>
<th>Intermediate risk</th>
<th>High risk (unfavourable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 10 ng/mL</td>
<td>10-20 ng/mL</td>
<td>&gt; 20 ng/mL</td>
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<tr>
<td>TNM stage</td>
<td>T1-T2</td>
<td>T2</td>
<td>T3</td>
</tr>
<tr>
<td>Gleason Score</td>
<td>6</td>
<td>7</td>
<td>8, 9, 10</td>
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Epstein’s Criteria for Not-Aggressive (Insignificant) Cancers
Developed before prostate MRI

- PSA ≤ 10  PSA density ≤ 0.15
- Biopsy Cores – Fewer than 3 positives cores
  Each core less than 50 % cancer per core
- Gleason Grade 6
- No Gleason grade 4 or 5
- Cancer confined inside prostate
- Cancer nodule volume < 0.2 cc

Risk Of Prostate Cancer Causing Illness

**Low risk**
Not-Aggressive, MRI score 1-2, Gleason 6, nodule volume ≤ 0.2 cc, confined inside prostate

**Moderate risk**
In-Between, MRI score 3, biopsy tissue Gleason 7 (3+4), volume ≤ 0.5 cc, confined inside prostate

**High risk**
Aggressive, MRI score 4-5, Gleason 7(4+3) 8,9,10 volume ≥ 0.5 cc, may involve capsule, neurovascular bundle, spread locally, adjacent, seminal vesicles, nodes or bones

References

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