Classifying Prostate Cancer

PSA to Prostate MRI

for patients and curious doctors

Samuel Aronson, M.D.    Serge Carrier, M.D.
Franck Bladou, M.D.
Armen Aprikian, M.D. & Marc Emberton, M.D.  Forewords
### Prostate Cancers

**Not-Aggressive**  **In-Between**  **Aggressive**
- Indolent, insignificant, low risk
- High 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 No-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

### 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 mostly BPH caused
- PSA Density, PSA Progression better cancer predictors

**After treatment**
- PSA is a sensitive, reliable biomarker for monitoring

### Criteria and Classifications

**Prostate MRI**

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

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

1. Highly likely **no** cancer
2. Likely **no** cancer
3. Unsure
4. Likely cancer
5. Highly likely 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
**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>&lt; 10 ng/mL</td>
<td>10-20 ng/mL</td>
<td>&gt; 20 ng/mL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TNM stage</th>
<th>T1-T2</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Gleason Score</th>
<th>6</th>
<th>7</th>
<th>8, 9, 10</th>
</tr>
</thead>
</table>
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