How to perform and interpret an MRI in rectal cancer

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To provide a roadmap for OPTIMAL treatment planning for every INDIVIDUAL patient
How to perform:

- 1.5 or 3T
- Slice thickness \( \leq 3 \) mm
- No FS, T1W (NE or CE) or DCE images
- Optional spasmytics
- Optional enema

\(<15\) min
Normal / low cellularity

High cellularity
DWI
Anatomy

Bladder
Prostate
Seminal vesicles
Mesorectal fascia
How to interpret

- Morphology
- Height and length
- T-stage
- Mesorectal fascia
- N-stage
- EMVI
- T1-2: intact bowel wall
T-stage

<table>
<thead>
<tr>
<th>T3a</th>
<th>&lt; 1 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3b</td>
<td>1-5 mm</td>
</tr>
<tr>
<td>T3c</td>
<td>5-15 mm</td>
</tr>
<tr>
<td>T3d</td>
<td>&gt;15 mm</td>
</tr>
</tbody>
</table>
- T4
Mesorectal fascia

Peritoneum
Per. reflection
MRF

Low rectum
Mid rectum
High rectum

Peritoneal cavity
Peritoneal cavity
Mesorectal fascia
Mesorectal fascia
## N-stage

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>&lt;0.5 mm</th>
<th>&lt;1 mm</th>
<th>&lt;2 mm</th>
<th>&lt;5 mm</th>
<th>&lt;10 mm</th>
<th>≥10 mm</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative LN</td>
<td>165</td>
<td>138</td>
<td>245</td>
<td>270</td>
<td>26</td>
<td>0</td>
<td>844</td>
</tr>
<tr>
<td>Positive LN</td>
<td>4</td>
<td>7</td>
<td>23</td>
<td>57</td>
<td>28</td>
<td>9</td>
<td>128</td>
</tr>
<tr>
<td>Sum</td>
<td>169</td>
<td>145</td>
<td>268</td>
<td>327</td>
<td>54</td>
<td>9</td>
<td>972</td>
</tr>
<tr>
<td>Percent</td>
<td>17.39%</td>
<td>14.92%</td>
<td>27.57%</td>
<td>33.64%</td>
<td>5.56%</td>
<td>0.93%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

![Frequency (%)](image)

- **pN-**
  - 3 mm: 97%
  - 4 mm: 92%
  - 5 mm: 92%
  - 6 mm: 54%
  - 7 mm: 23%
  - 8 mm: 11%
  - 9 mm: 3%
  - 10 mm: 8%

- **pN+**
  - 3 mm: 69%
  - 4 mm: 72%
  - 5 mm: 52%
  - 6 mm: 32%
  - 7 mm: 20%
  - 8 mm: 8%
  - 9 mm: 8%

*Wang et al. Langenbecks Arch Surg 2005*

*Gröne et al., J Gastroint Surg, 2017*
N-stage

**N-stage - suspicious nodes**

**Malignant characteristics**

- Indistinct
- Heterogeneous
- Round

**Short axis**

- < 5mm: needs 3 malignant characteristics
- 5-9mm: needs 2 malignant characteristics
- > 9mm: always suspicious

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**Gröne et al., J Gastroint Surg, 2017**
N-stage
N-stage

Courtesy of D. Lambregts, AVL, Amsterdam
Table 1. MRI characteristics of EMVI (mEMVI)

<table>
<thead>
<tr>
<th>MRI score</th>
<th>Morphology features on MRI</th>
<th>MRI status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pattern of tumour extension through the rectal wall is not nodular; no adjacent vessels</td>
<td>Negative</td>
</tr>
<tr>
<td>1</td>
<td>Minimal extramural stranding; no adjacent vessels</td>
<td>Negative</td>
</tr>
<tr>
<td>2</td>
<td>Stranding in proximity of vessels but no tumour signal in normal calibre lumen</td>
<td>Negative</td>
</tr>
<tr>
<td>3</td>
<td>Intermediate signal in lumen of vessels; slight vessel expansion</td>
<td>Positive</td>
</tr>
<tr>
<td>4</td>
<td>Irregular vessel contour; definite tumour signal</td>
<td>Positive</td>
</tr>
</tbody>
</table>
- Primary/recurrent staging

- Restaging after neoadjuvant treatment

- During follow-up after clinical complete response
Differentiation between:
- T1 and T2
- T2 and T3a
- N- and N+
- Fibrosis and viable tumor

Timing of scan after CRT and during follow-up
OPTIMAL Tx
• Short RT
• RCT
• TNT
• R(C)T followed by CT
• (ta)TME
• Extended TME
• Local excision
• Watch and wait
Thank you