MRI for Rectal Cancer Staging

Daniel R. Karolyi, MD, PhD
Senior Vice-President, Carilion Clinic
Chair of Radiology, VTCSOM
OBJECTIVES

- Describe relevant anatomy including mesorectal fat, mesorectal fascia, internal/external anal sphincter, peritoneal reflection, and pelvic floor musculature.
- Describe role of MRI in preoperative planning.
- Identify the MRI appearance of different T stages of rectal cancer.
- Know the MR appearance of metastatic regional lymph nodes.
- Know the MR appearance of mucinous rectal cancer.
- Know the appearance of extramural venous invasion.
- Describe the role of MR imaging including T2 imaging and diffusion imaging for assessing rectal cancer after neoadjuvant therapy.
- List items to include in reports for staging rectal cancer.
OUTLINE

• Background
• Technique
• Anatomy
• T Staging
• T Staging After Neoadjuvant Therapy
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
BACKGROUND

GERMAN RECTAL CANCER TRIAL

823 patients enrolled.
No survival benefit was demonstrated.
Improved rate of local control.
Improved rate of compliance with therapy.
Increased rate of sphincter preservation.


MERCURY TRIAL

- Prospective study to determine the accuracy of MRI to determine extramural depth of invasion of rectal cancer.
- 408 patients enrolled, multi-center trial
- MRI and histopathology were considered equivalent to within 0.5 mm.

Diagnostic accuracy of preoperative magnetic resonance imaging in predicting curative resection of rectal cancer: prospective observational study. MERCURY Study Group. British Medical Journal 333(7572) 2006. [https://goo.gl/Nua1RC](https://goo.gl/Nua1RC)
OUTLINE

• Background
• Technique
• Anatomy
• T Staging
• T Staging After Neoadjuvant Therapy
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
TECHNIQUE: MRI Field Strength

1.5 Tesla vs 3 Tesla Systems

No difference for distinguishing T1/2 tumors from T3.
N = 13 pts (7 pts with T1/2 and 6 pts with T3)


<table>
<thead>
<tr>
<th>Advantages of 3T</th>
<th>Disadvantages of 3T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faster Image Acquisition</td>
<td>Susceptibility Artifact – Especially Diffusion Imaging</td>
</tr>
<tr>
<td>Higher Spatial Resolution</td>
<td></td>
</tr>
<tr>
<td>Higher Signal-to-Noise Ration</td>
<td></td>
</tr>
</tbody>
</table>
TECHNIQUE: Patient Preparation

- NPO >= 2 hrs – Reduce small bowel peristalsis
- Empty Bladder – Pt comfort, reduce pt motion, reduce phase ghosting, diminish rectal compression.
- Rectal Contrast
  - Not required by any of the professional societies/recommendations.
  - If you use rectal contrast, limit volume to 50-60 mL
  - Microenema +/-
**TECHNIQUE: Patient Preparation**

<table>
<thead>
<tr>
<th>Advantages of Rectal Contrast</th>
<th>Disadvantages of Rectal Contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better outlines the tumor (particularly low [&lt;5 cm from anal verge] tumors)</td>
<td>Can cause rectal peristalsis and motion artifacts</td>
</tr>
<tr>
<td>Can decrease artifact on DWI from bowel gas</td>
<td>High T2 signal in lumen on DWI</td>
</tr>
<tr>
<td></td>
<td>Can artifactually decrease the distance from the tumor to the mesorectal fascia (MRF).</td>
</tr>
</tbody>
</table>

TECHNIQUE: Patient Preparation

Sagittal T2 TSE with Rectal Contrast

Cor T2 TSE

Cor T2 TSE
TECHNIQUE: Patient Preparation

Antiperistaltics:
- Not required
- Buscopan
- Glucagon*
TECHNIQUE: Sequences

Most Important Sequences: Small FOV TSE T2: Sagittal, Oblique Axial, Oblique Coronal. 0.6 x 0.6 x 3 mm
TECHNIQUE: Sequences

Cor T2 TSE
TECHNIQUE: Sequences

Cor T2 TSE

Oblique Axial T2 TSE
<table>
<thead>
<tr>
<th>Sequence</th>
<th>FOV</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronal and Axial T2 TSE HASTE/SSFSE</td>
<td>Large</td>
<td>IMA Through Inguinal Nodes</td>
</tr>
<tr>
<td>Sagittal, Oblique Axial, Oblique Coronal T2 TSE*</td>
<td>Small</td>
<td>FOV 16-20 cm; &lt;1x1mm in-plane; 2-3mm slice; TE 80-110 msec; BW ~ 200 Hz/pixel</td>
</tr>
<tr>
<td>Axial DWI</td>
<td>Large</td>
<td>IMA Through Inguinal Nodes; B = 50, 400, 800 s/mm²</td>
</tr>
<tr>
<td>Oblique Axial DWI</td>
<td>Small</td>
<td>Match Oblique Axial T2 Slice Location; B = 50, 400, 800 s/mm²</td>
</tr>
<tr>
<td>Axial Pre, Art, Ven, Del 3D-T1 GRE</td>
<td>Large</td>
<td>IMA Through Inguinal Lymph Nodes; Fat-Sat AND Dixon With Fat-Only Pre-Contrast Images</td>
</tr>
<tr>
<td>Coronal and Sagittal 3D-T1 GRE</td>
<td>Large</td>
<td>IMA Through Inguinal Lymph Nodes; Fat-Sat</td>
</tr>
</tbody>
</table>

• Background
• Technique
• **Anatomy**
• T Staging
• T Staging After Neoadjuvant Therapy
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
ANATOMY: Mesorectal Fascia

T2 TSE

T2 TSE
ANATOMY: Mesorectal Fascia

T2 TSE
ANATOMY: Mesorectal Fascia

T2 TSE

T2 TSE
ANATOMY: Mesorectal Fascia

T2 TSE

T2 TSE
ANATOMY: Peritoneal Reflection

T2 TSE
ANATOMY: Peritoneal Reflection

T2 TSE
ANATOMY: Peritoneal Reflection
ANATOMY: Peritoneal Reflection

Gull Wing Sign

T2 TSE
ANATOMY: Sphincter Complex

T2 TSE T2 TSE
ANATOMY: Sphincter Complex

T2 TSE

VTC | Virginia Tech Carilion School of Medicine
ANATOMY: Measurements

- Distance from anal verge.
  - Low : < 5 cm
  - Mid 5.1 to 10 cm
  - High 10.1 – 15 cm

- Distance from sphincter complex.

- Craniocaudal dimension.

- Morphology
  - Polypoid = < 90°
  - Partly Annular = >= 90° but < 360°
  - Annular = 360°
OUTLINE

• Background
• Technique
• Anatomy
• **T Staging**
• T Staging After Neoadjuvant Therapy
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
T-STAGING

T<sub>x</sub> = Primary tumor not seen, post transanal excision/polypectomy.

T<sub>1</sub> = Tumor invades submucosa.
T<sub>2</sub> = Tumor invades muscularis propria.

T<sub>3a</sub> = Tumor invades through muscularis propria < 1mm.
T<sub>3b</sub> = Tumor invades through muscularis propria < 5 mm.
T<sub>3c</sub> = Tumor invades through muscularis propria 5 – 15 mm.
T<sub>3d</sub> = Tumor invades through muscularis propria > 15 mm.

T<sub>4a</sub> = Penetrates to surface of visceral peritoneum.
T<sub>4b</sub> = Directly invades or is adherent to other organs or structures.

T<sub>1</sub> vs T<sub>2</sub> best assessed with transrectal ultrasound.
T-STAGING

- T1: Submucosa
- T2: Muscularis Propria
- T3: Vagina, Cervix or Uterus T4b
- T4: Prostate Gland or Seminal Vesicles T4b
- T4a: Urinary Bladder T4b
- T4b: Pelvic Floor Muscles T4b
- T4b: Peritoneal Reflection T4a
OUTLINE

- Background
- Technique
- Anatomy
- **T Staging**
- T Staging After Neoadjuvant Therapy
- N Staging
- N Staging After Neoadjuvant Therapy
- Extramural Venous Invasion (EMVI)
- Synoptic Reporting
T-Staging: T1/2

T2 TSE
T-Staging: T1/2

T2 TSE
Mucinous Tumors

- 5 to 10 percent of all rectal neoplasms
- Subtypes:
  - Mucinous Carcinoma: >50% extracellular mucin
  - Signet Ring: Intracytoplasmic mucin
- Worse Prognosis
  - Present at younger age
  - More aggressive histology
- Associated with microsatellite instability, BRAF and KRAS mutations, and MUC-2 overexpression
- High T2 signal

Categories: No mucin, some mucin, or mostly mucin (>50%)

- T1 sequences provide advantage for mucinous tumors/mucinous lymph nodes
- Beware of the T2 “pseudocapsule” which can mimic intact muscularis propria
T-Staging: T3

T2 TSE
T-Staging: T3

Mesorectal Fascia (MRF) Status (formally circumferential resection margin (CRM))

- T3 Lesions Only
- Measure shortest distance from tumor to the mesorectal fascia.
  - Tumor
  - Extramural Venous Invasion
  - Tumor Deposits
  - Capsule disruptive positive lymph nodes

- More than 2mm = MRF not involved ~ 6% local recurrence rate
- Less than or equal to 2 mm = threatened MRF ~ 16% local recurrence rate
- Less than or equal to 1 mm = involved MRF ~ 36% local recurrence rate

- Do not measure for tumors enveloped by peritoneum (high rectal tumors)
- Do not measure from capsule intact lymph nodes.
T-Staging: T3 – Mesorectal Fascia (MRF) Status

7.1 mm

7.2 mm

T2 TSE
T-Staging: T3 – MRF Invaded
T-Staging: T3 – Sphincter Involvement
T-Staging: T3 – Sphincter Involvement
T-Staging: T3 – Sphincter Involvement

Sphincter Involvement

- Internal sphincter (IS) ONLY
- IS and intersphincteric space (ISS)
- Invades external sphincter

- No clear consensus on if external sphincter involvement indicates T4 staging.
T-Staging: T4a – Peritoneal Reflection

T4a Staging Requirements

- Peritoneum/ peritoneal reflection
  - Altered signal intensity
  - Thickening
  - Nodularity

- Not T4a if there is tumor abutting the peritoneum without the above signal or morphology changes.
OUTLINE

• Background
• Technique
• Anatomy
• T Staging
• **T Staging After Neoadjuvant Therapy**
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
### Rectal Cancer Staging After Neoadjuvant Therapy

- 2013 Meta-Analysis of 33 Studies Involving 1556 Patients

<table>
<thead>
<tr>
<th>Staging Method</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2 Imaging for T Staging</td>
<td>50.4%</td>
<td>91.2%</td>
</tr>
<tr>
<td>T2 + DWI for T Staging</td>
<td>83.8%</td>
<td>84.8%</td>
</tr>
<tr>
<td>Restaging Tumor Free MRF</td>
<td>76.3%</td>
<td>82.9%</td>
</tr>
<tr>
<td>Nodal Staging</td>
<td>76.5%</td>
<td>59.8%</td>
</tr>
</tbody>
</table>

Better at predicting absence of disease rather than presence of disease.

Re-Staging After nCRT - Complete Response

Before

Axial T2 TSE

After

Axial T2 TSE
Re-Staging After nCRT Therapy – Complete Response

Before

After

DWI

DWI

ADC

ADC
Re-Staging After nCRT Therapy – Complete Response

Before

After

T1 Post Contrast

T1 Post Contrast
Re-Staging After nCRT Therapy – Incomplete Response

Before

Axial T2 TSE

After

Axial T2 TSE
Re-Staging After nCRT Therapy – Incomplete Response

Before After

DWI

ADC

ADC
# Rectal Cancer Staging After Neoadjuvant Therapy

## MRI Tumor Regression Grading (mrTRG)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Response</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>mrTRG 1</td>
<td>Complete</td>
<td>Return to normal bowel wall layers Or, thin hypointense scar</td>
</tr>
<tr>
<td>mrTRG 2</td>
<td>Near Complete</td>
<td>Thick dense hypointense fibrotic scar No intermediate T2 signal intensity</td>
</tr>
<tr>
<td>mrTRG 3</td>
<td>Moderate</td>
<td>&gt; 50 % fibrosis or mucin and visible intermediate T2 signal</td>
</tr>
<tr>
<td>mrTRG 4</td>
<td>Slight</td>
<td>Little areas of hypointense fibrosis or mucin, but mostly intermediate T2 signal</td>
</tr>
<tr>
<td>mrTRG 5</td>
<td>No Response</td>
<td>Intermediate T2 signal; same appearance as original tumor</td>
</tr>
</tbody>
</table>
Rectal Cancer Staging After Neoadjuvant Therapy
Potential Pitfalls

**T2 Shine Through:** Rectal wall edema causing increase signal on DWI images
Solution: Look at ADC and consider high b-value DWI

**T2 Dark Through:** Rectal wall fibrosis causing decrease signal on ADC images
Solution: Look at DWI images.

**Signal Abnormalities from Intraluminal Contents:** Microenema
Rectal Cancer Staging After Neoadjuvant Therapy


OUTLINE

• Background
• Technique
• Anatomy
• T Staging
• T Staging After Neoadjuvant Therapy
• **N Staging**
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
Pre-Treatment N-Staging

Nx = Regional lymph nodes* cannot be assessed.
N0 = No regional lymph node* metastases.
N1 = Disease in 1 to 3 regional lymph nodes*.
N1c = Disease in 1 to 3 regions of fat near the lymph nodes.
N2 = Disease in 4 or more regional lymph nodes*.
N2c = Disease in 4 or more regions of fat near the lymph nodes.

* Regional lymph nodes = Mesorectal, obturator, and internal iliac lymph nodes (and inguinal/external iliac for low rectal cancers involving inferior sphincter).

* External iliac, common iliac, inguinal, and mesenteric lymph node (above IMA) involvement is considered metastatic disease (M1)
Pre-Treatment N-Staging – Mesorectal / Superior Rectal Dutch Consensus Criteria

<table>
<thead>
<tr>
<th>Lymph Node Short Axis Size</th>
<th>Number of Required Malignant Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 mm</td>
<td>Need 3 Malignant Characteristics</td>
</tr>
<tr>
<td>5 to 8.9 mm</td>
<td>Need 2 Malignant Characteristics</td>
</tr>
<tr>
<td>9 mm or greater</td>
<td>Suspicious Regardless of Other Characteristics</td>
</tr>
<tr>
<td>Any Size</td>
<td>Mucinous (Bright T2 signal throughout the node)</td>
</tr>
</tbody>
</table>

- **Round**
- **Heterogeneous**
- **Irregular Margins**
Pre-Treatment N-Staging - Heterogeneous T2 Signal
Pre-Treatment N-Staging – Size Criteria
Pre-Treatment N-Staging – Size Criteria
Pre-Treatment N-Staging – Lateral Pelvic Lymph Nodes

- Internal Iliac Nodes
- Obturator Nodes
- Short Axis > 7 mm
- Only applicable for T3/4 tumors located <8cm from the anal verge.
**Pre-Treatment N-Staging – Tumor Deposits**

- Do not contain lymphoid tissue. TNM staged as N1c or N2c.

- Current Imaging Definition: Soft tissue nodule in the mesorectum interrupts a small mesorectal vessel on two (2) orthogonal series.

- Tumor deposits can taper into a vein = comet-tail appearance.

- Tumor deposits are associated with poor prognosis.
OUTLINE

• Background
• Technique
• Anatomy
• T Staging
• T Staging After Neoadjuvant Therapy
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
Post-Treatment N-Staging

• Both benign and malignant lymph nodes decrease in size after neo-adjuvant chemoradiation therapy (nCRT).

<table>
<thead>
<tr>
<th>Lymph Node Location</th>
<th>Suspicious Short Axis Size Criteria AFTER nCRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesorectal</td>
<td>&gt; 5 mm</td>
</tr>
<tr>
<td>Superior Rectal</td>
<td>&gt; 5 mm</td>
</tr>
<tr>
<td>Inferior Mesenteric</td>
<td>&gt; 5 mm</td>
</tr>
<tr>
<td>Internal Iliac* (T3/4 and &lt; 8cm from anal verge)</td>
<td>&gt; 4 mm</td>
</tr>
<tr>
<td>Obturator* (T3/4 and &lt; 8cm from anal verge)</td>
<td>&gt; 6 mm</td>
</tr>
<tr>
<td>Non-Locoregional Nodes</td>
<td>&gt;10 mm</td>
</tr>
</tbody>
</table>

OUTLINE

• Background
• Technique
• Anatomy
• T Staging
• T Staging After Neoadjuvant Therapy
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
Extramural Venous Invasion (EMVI)

EMVI = increased risk of metastatic disease.
Needs abdominal MRI and chest imaging,
Extramural Venous Invasion (EMVI)
OUTLINE

• Background
• Technique
• Anatomy
• T Staging
• T Staging After Neoadjuvant Therapy
• N Staging
• N Staging After Neoadjuvant Therapy
• Extramural Venous Invasion (EMVI)
• Synoptic Reporting
Synoptic Reporting

- Society of Abdominal Radiology: MRI Primary Rectal Cancer Staging Template: https://tinyurl.com/mrys8vc2


Synoptic Reporting – SAR Primary Staging Template

**SAR Primary Rectal Cancer Staging Template - v.2021**
*(To be used only for biopsy-proven adenocarcinoma of the rectum)*

**CLINICAL INFORMATION:** [Free text]

**TECHNIQUE:** [Free text]

**COMPARISON:** []

**PRIMARY TUMOR: MORPHOLOGY, LOCATION, AND CHARACTERISTICS:**
- Distance to the anal verge: [] cm
- Distance to the top of sphincter complex/anorectal junction: [] cm
- Relationship to anterior peritoneal reflection:
  - [ ] Above
  - [ ] Straddles
  - [ ] Below
- Craniocaudal length: [] cm
- Tumor location:
  - [ ] Upper (10-15 cm)
  - [ ] Mid (5-10 cm)
  - [ ] Lower (0-5 cm)
  - [Free text: use descriptors such as “anterior,” “posterior,” “left lateral,” “right lateral,” or clock face depending on institutional preference]
- Morphology:
  - [ ] Polypoid
  - [ ] Annular
  - [ ] Partly annular
- Mucinous composition:
  - [ ] No mucin
  - [ ] Some mucin
  - [ ] Mostly mucin

**MR-T CATEGORY:**
- [ ] T0 (tumor not seen, post transanal excision/polypectomy)
- [ ] T1/2 (tumor confined to rectal wall)
- [ ] T3a (tumor penetrates <1 mm beyond muscularis propria)
- [ ] T3b (tumor penetrates 1-5 mm beyond muscularis propria)
- [ ] T3c (tumor penetrates >5-15 mm beyond muscularis propria)
- [ ] T3d (tumor penetrates >15 mm beyond muscularis propria)
- [ ] T4a (visible tumor signal thickening and/or nodularity of the anterior peritoneal reflection – may also apply to tumor signal extending laterally along peritoneal reflection)
- [ ] T4b* (tumor invades or adherent to adjacent organs or structures)

* For T4b, structures with possible invasion include: [free text]

**FOR LOW RECTAL TUMORS - Invasion of anal sphincter complex:**
- [ ] Absent
- [ ] Invades internal sphincter (IS) only
- [ ] Invades IS and extends into intersphincteric space (ISS)
- [ ] Invades IS + ISS + extends into or through external sphincter (describe involved structures below)

- Area of involvement, if present:
  - [ ] Upper anal canal
  - [ ] Mid anal canal
  - [ ] Distal anal canal

- Description of external sphincter involvement: []

**EMVI:** [ ] No
  - [ ] Yes
  - Location of EMVI (indicate series and image number): []

**MESORECTAL FASCIA (MRF) (FOR T3 TUMORS ONLY)**
- Shortest distance of tumor to MRF: [] mm (location), [image and series number]

  - [ ] N/A: (tumor at peritonealized portion of the rectum)

- Is there a separate tumor deposit, LN or EMVI threatening (≤ 1 mm and ≤ 2 mm) or invading (< 1 mm) the MRF?
  - [ ] No
  - [ ] Yes (if yes, note location)

**TUMOR DEPOSITS:**
- [ ] None identified
- [ ] Yes, series and image number: []

- Free text: [Describe number and location of tumor deposits]
FOR LOW RECTAL TUMORS - Invasion of anal sphincter complex:
- □ Absent
- □ Invades internal sphincter (IS) only
- □ Invades IS and extends into intersphincteric space (ISS)
- □ Invades IS + ISS + extends into or through external sphincter (describe involved structures below)

Area of involvement, if present:
- □ Upper anal canal
- □ Mid anal canal
- □ Distal anal canal

Description of external sphincter involvement: [ ]

EMVI: □ No □ Yes
Location of EMVI (indicate series and image number): [ ]

MESORECTAL FASCIA (MRF) (FOR T3 TUMORS ONLY)
Shortest distance of tumor to MRF: [ ] mm (location), [ ] image and series number
- □N/A: (tumor at peritonealized portion of the rectum)

Is there a separate tumor deposit, LN or EMVI threatening (≤ 1 mm and ≤ 2 mm) or invading (< 1 mm) the MRF?
□ No □ Yes (if yes, note location)

TUMOR DEPOSITS:
- □ None identified
- □ Yes, series and image number: [ ]

Free text: [Describe number and location of tumor deposits]

IMPRESSON:
1. Primary Tumor Location: [ ]
2. MRI Status: T [ ] N [ ] (if node positive, provide location)
3. EMVI involvement: □ No □ Yes (if yes, provide location/laterality)
4. MRF Status:
   - □ Clear (tumor margin >2 mm from MRF)
   - □ Threatened (tumor margin within 1-2 mm of MRF)
   - □ Involved (tumor margin <1 mm from the MRF)
5. EMVI: □ No □ Yes
### MRI pelvis Rectal Cancer RESTAGING (12/2020)

**CLINICAL INFORMATION:** Rectal Cancer RESTAGING
- Pretreatment Tumor staging: [pretreatment TN stage]
- Prior treatment: [induction chemotherapy/CRT/TNT/transanal excision/surveillance etc]

**TECHNIQUE:** Multiparameter, multisequence imaging of the pelvis.
- Magnet strength: [ ]
- IV gadolinium contrast: [ ]

**COMPARISON:** [ ]

**TREATED PRIMARY TUMOR CHARACTERISTICS (compare to pre-treatment):**

- DWI (with associated low ADC) – restricted diffusion and low ADC in tumor or tumor bed
  - Present ([if yes, is it regressed from prior?])
  - Absent
  - Artifact/equivocal or N/A

**MRI-T2W:**
- Intermediate signal intensity, no dark T2/scar
- Mixed dark T2/scar and intermediate signal
- Entirely dark T2 signal/scar
- Nearly normalized appearance of rectal wall
- T2 bright mucin (cannot distinguish between cellular and acellular mucin)
  [free text to describe above findings]

Distance of the inferior margin of treated tumor to the anal verge: [ ] cm
Distance of inferior margin to the top of the sphincter complex/anorectal junction: [ ] cm
Relationship of treated tumor to the anterior peritoneal reflection:
- [ ] Above [ ]/below
- Craniocaudal length: [ ] cm
- Pretreatment craniocaudal length: [ ] cm
- Maximal wall thickness: [ ] cm
- Previous wall thickness: [ ] cm

**[** FOR LOW RECTAL TUMORS - Invasion of anal sphincter complex:**
- Absent
- Involves internal sphincter (IS) only
- Involves IS and extends into intersphincteric space (ISS)
- Involves IS + ISS + extends into or through external sphincter (describe)
[IF present: [ ] upper anal canal [ ] mild anal canal [ ] distal anal canal]

**Extramural Vascular Invasion (EMVI):**
- No (none evident pre-treatment)
- No, complete regression
- Yes, partial regression
- Yes, present and unchanged from baseline

[Mesorectal Fascia (MRF), for T3 disease only:
- Shortest distance of tumor/fibrosis to the Mesorectal Fascia: [ ] mm (location)
- N/A if tumor above the peritoneal reflection
- Tumor deposit, LN or EMVI threatening (≥1 mm and ≤2 mm) or invading (< 1 mm) the MRF?
- No
- Yes (if yes, note location)

[For T4 disease, comment on interval change]

**LYMPH NODES:**

Mesorectal/superior rectal lymph nodes and/or tumor deposits:
- N0 (no visible lymph nodes/deposits or only < 5 mm short axis)
- N+ (any lymph nodes ≥ 5 mm short axis)

Extra-mesorectal lymph nodes: any suspicious?
- No
- Yes (if yes, location and change from prior)

Other: [free text: bones, peritoneal mets, other incidental findings]

**IMPRESSION:**

Since [date of prior], post treatment primary tumor assessment:
- Complete/near complete response
- Incomplete response (likely residual tumor)
- No response (tumor stable or increased from baseline)

[free text summary of relevant findings/interval change]

Suspicous Mesorectal lymph nodes: [ ]No [ ]Yes
Suspicous Extramesorectal lymph nodes: [ ]No [ ]Yes (provide location)
OUTLINE

- Background
- Technique
- Anatomy
- T Staging
- T Staging After Neoadjuvant Therapy
- N Staging
- N Staging After Neoadjuvant Therapy
- Extramural Venous Invasion (EMVI)
- Synoptic Reporting
- What’s next?
Shifting Approach for Rectal Cancer Treatment Decisions?

- **Current Practice (NCCN Guidelines):**
  - T2 vs T3
  - N0 vs N1/2
  - MRI over stages T-score 27%
  - MRI over stages N-score 44%

- **Evolving Practice**
  - Surgery vs nCRT based on likelihood of a negative surgical margin:
    - T3b vs T3c
    - MRF clear vs MRF threatened/involved
    - Lateral pelvic lymph node involvement (not based on mesorectal / superior rectal lymph nodes)
    - Extramural venous invasion