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CRC Educational Pathology Slide Deck

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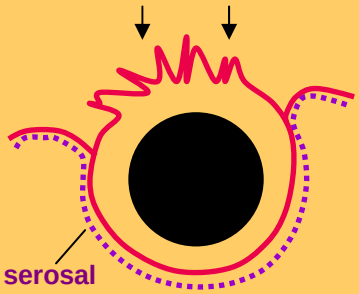
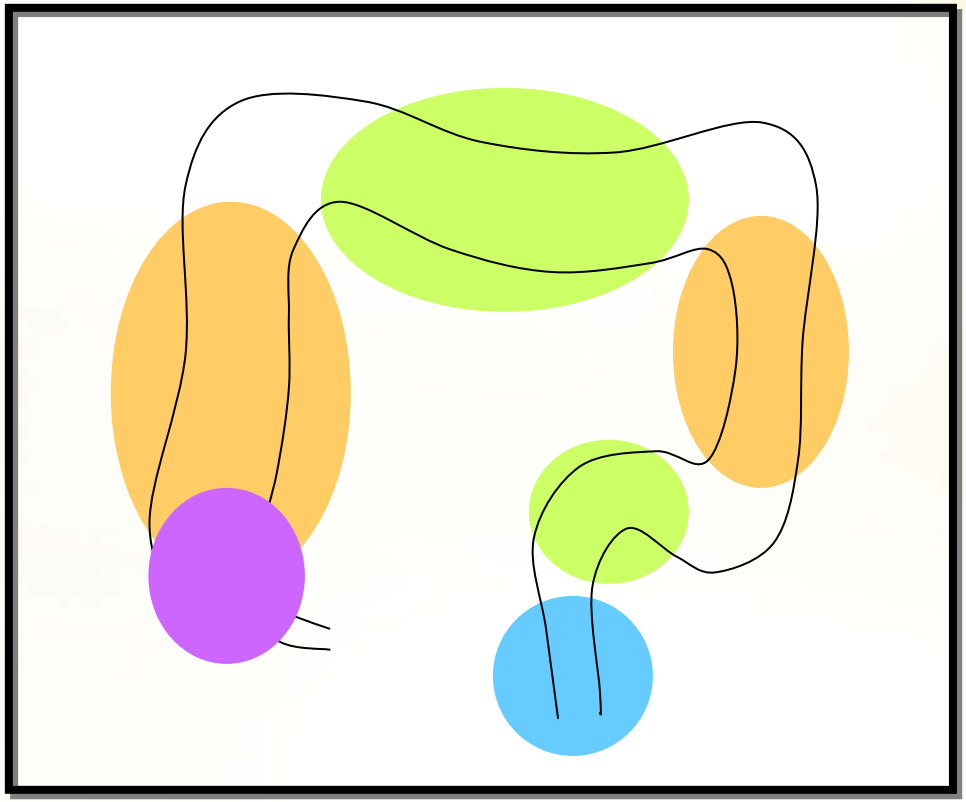
Colon Cancer – Serosa and Radial Margins

- the extent to which the colon and rectum is covered by peritoneum ***varies with the anatomical site***
- areas of colon not invested by peritoneum have a **radial surgical margin**

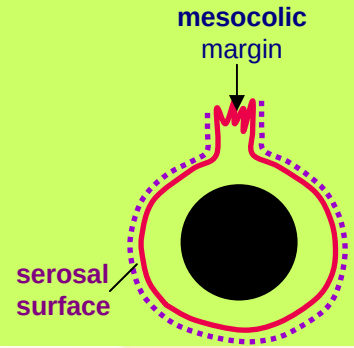
Ascending & descending



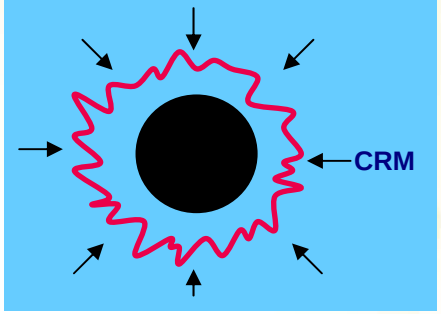
Cecum
may be covered by peritoneum or have a posterior retroperitoneal surface



Transverse & sigmoid



Rectum



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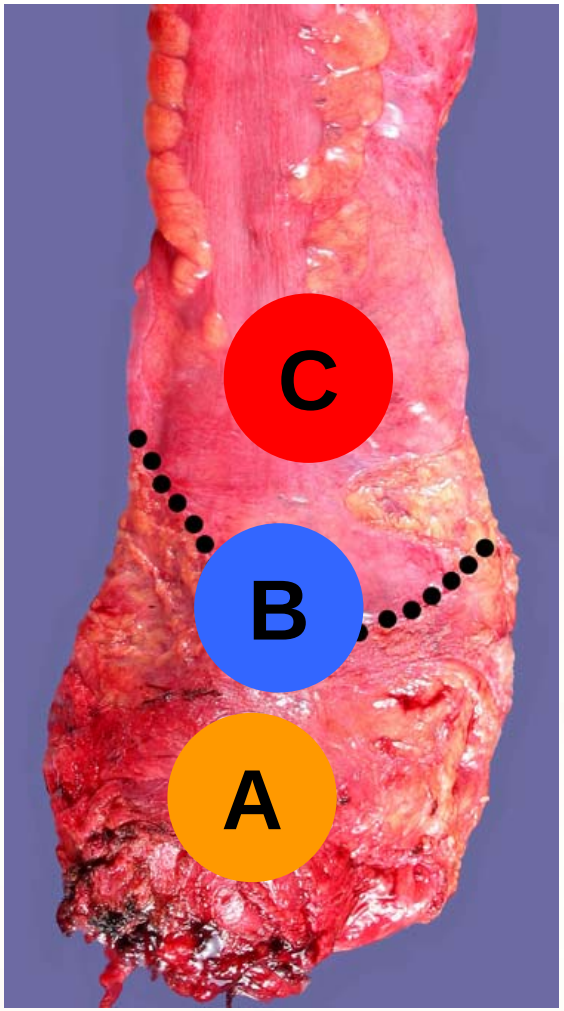
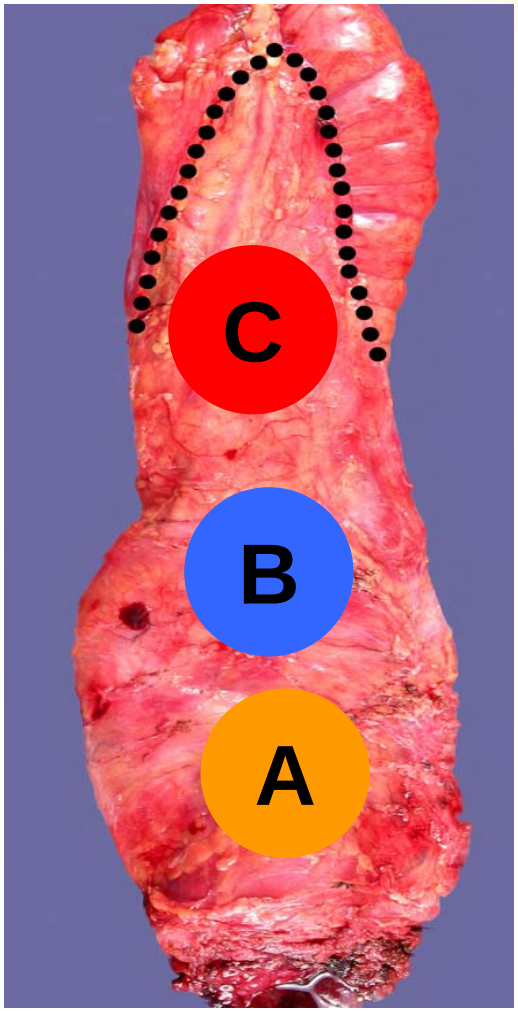
Modified from: Burroughs SH, Williams GT. J Clin Pathol 00;53:344

Rectal Cancers – Serosa and Margins



Anterior



Posterior

A circumferential radial margin

B CRM + serosal surface

C non-circumferential radial margin + serosal surface

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Importance of Assessing Radial Margins in Rectal Cancer Specimens

- **CRM status = the single most important factor for predicting the risk of local recurrence in patients with rectal cancer**
- positive radial margin = tumor located 1 mm or less from the margin
- involvement of CRM associated with higher rates of local recurrence, distal metastases and poorer survival (in 5-36% of cases)
- the closer the tumor to the CRM, the worse the prognosis
- radial margins <1 mm vs >1 mm:
  - increased risk of distant metastases (37% vs 15%)
  - shorter survival (70% vs 90%)

Quirke P et al. Histopathol 07;50:103
Nagtegaal ID et al. Eur J Cancer 02;38:964
Birbeck KF et al. Ann Surg 02;235:449
Dexter SP et al. Gut 01;48:667

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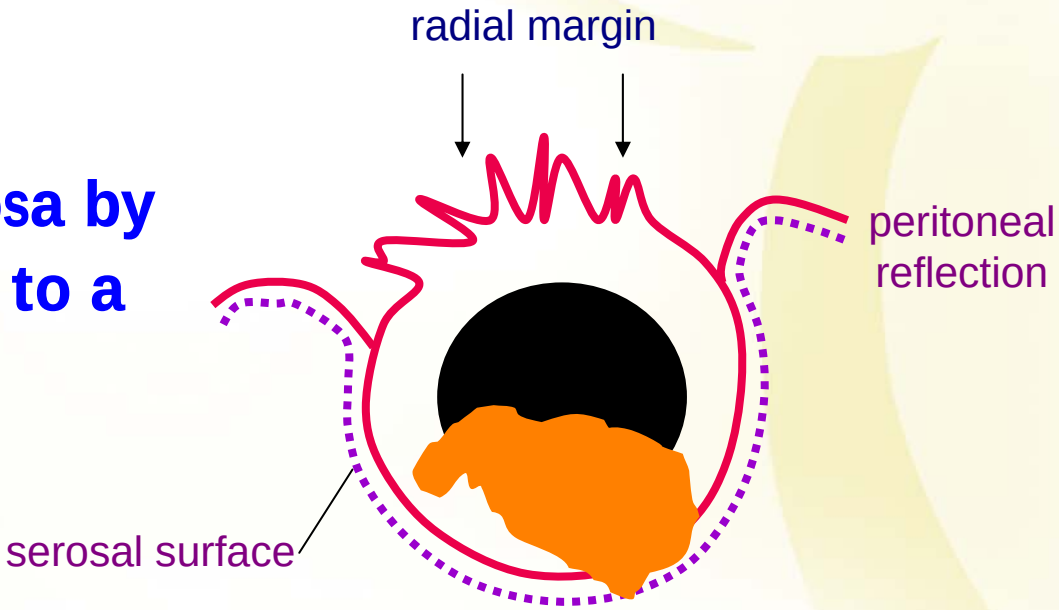
Serosa ≠ Margin

Serosa = the continuation of the peritoneal investment of the colon (or other organ)

Involvement of the serosa by tumor is <u>not</u> equivalent to a positive radial margin



- there are circumstances in which an advanced tumor has penetrated the serosa and is adherent to adjacent soft tissue
- in such cases, there would be a margin on the peritonealized aspect of the colon
- determination of this requires surgical correlation (communication between surgeon and pathologist)

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Importance of Documenting Serosal Involvement (pT4b)

- common in colon cancer (30-50% in literature)
- likely under-reported in Ontario (7-12% CCO data)
- highly predictive of subsequent intraperitoneal recurrence
- one of the strongest and most important independent prognostic parameters in patients with colon cancer
- a more powerful prognostic indicator than extent of nodal spread

Shepherd NA et al. J Pathol 93;129:128A
Shepherd NA et al. Gastroenterology 97;112:1096
Petersen VC et al. Gut 02;51:65
Ludeman L et al. Histopathol 05;47:123

Identification of Serosal Involvement

The assessment of serosal involvement by colon cancer requires meticulous GROSS assessment & sampling

- assess the relationship of the tumor to the serosal surface
- take 2 blocks from the area where the tumor is **closest to the serosa** or from areas that are **suspicious for serosal involvement**
  - retraction/puckering, prominent blood vessels, granularity, exudate, loss of shiny surface

To ink vs not to ink:

It is preferable not to ink the serosal surface, as inking the serosa may obscure microscopic evaluation of the serosal surface

Ludeman L et al. Curr Diagn Pathol 06;12:220

Mesorectum and Mesorectal Excision

- **Mesorectum**
  fatty connective tissue layer, measuring 2-3 cm in thickness, with associated vessels, lymphatics and lymph nodes, which surrounds the rectum and is enveloped by fascia

- **Mesorectal excision**
  surgical removal of the soft tissue mesorectal envelope using sharp instruments under direct vision, dissecting the potential space ("holy plane") between the visceral and parietal pelvic fascia

Importance of Complete Mesorectal Excision

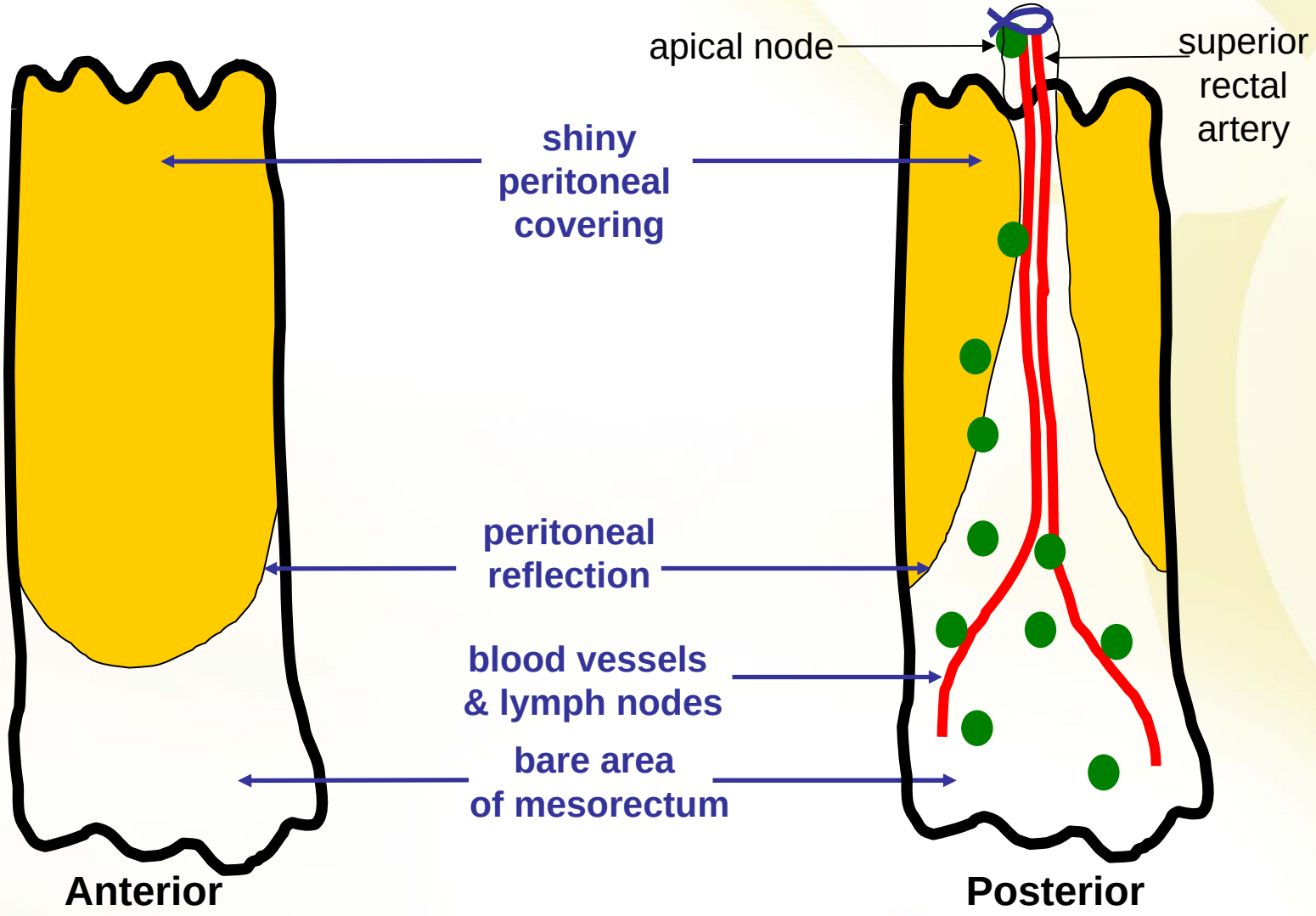
- randomized trials: operative plane of surgery predicts margin positivity, local recurrence and survival
  - surgery in mesorectal plane: best outcome
  - violation of mesorectal fascia: intermediate outcome
  - surgery impinges on muscularis propria: worst outcome

- completeness of mesorectum related to:
  - overall recurrence rates
    28.6% vs 14.9%, p=0.03 (incomplete vs. complete) with negative CRM
  - incidence of CRM positivity
    44% vs 24%, p<0.05 (incomplete vs. complete)

- **it is the responsibility of the pathologist to document the completeness of the mesorectal excision for rectal cancer**
  - MRC-CR07 trial: continual feedback led to improved surgical quality and decreased rates of margin positivity

Quirke P et al. Histopathol 07;50:103
Quirke P et al. J Clin Oncol 06;24:A3512
Nagtegaal ID et al. J Clin Oncol 02;20:1729
Wibe A et al. Br J Surg 02;89:327

Rectum – Anatomical Landmarks



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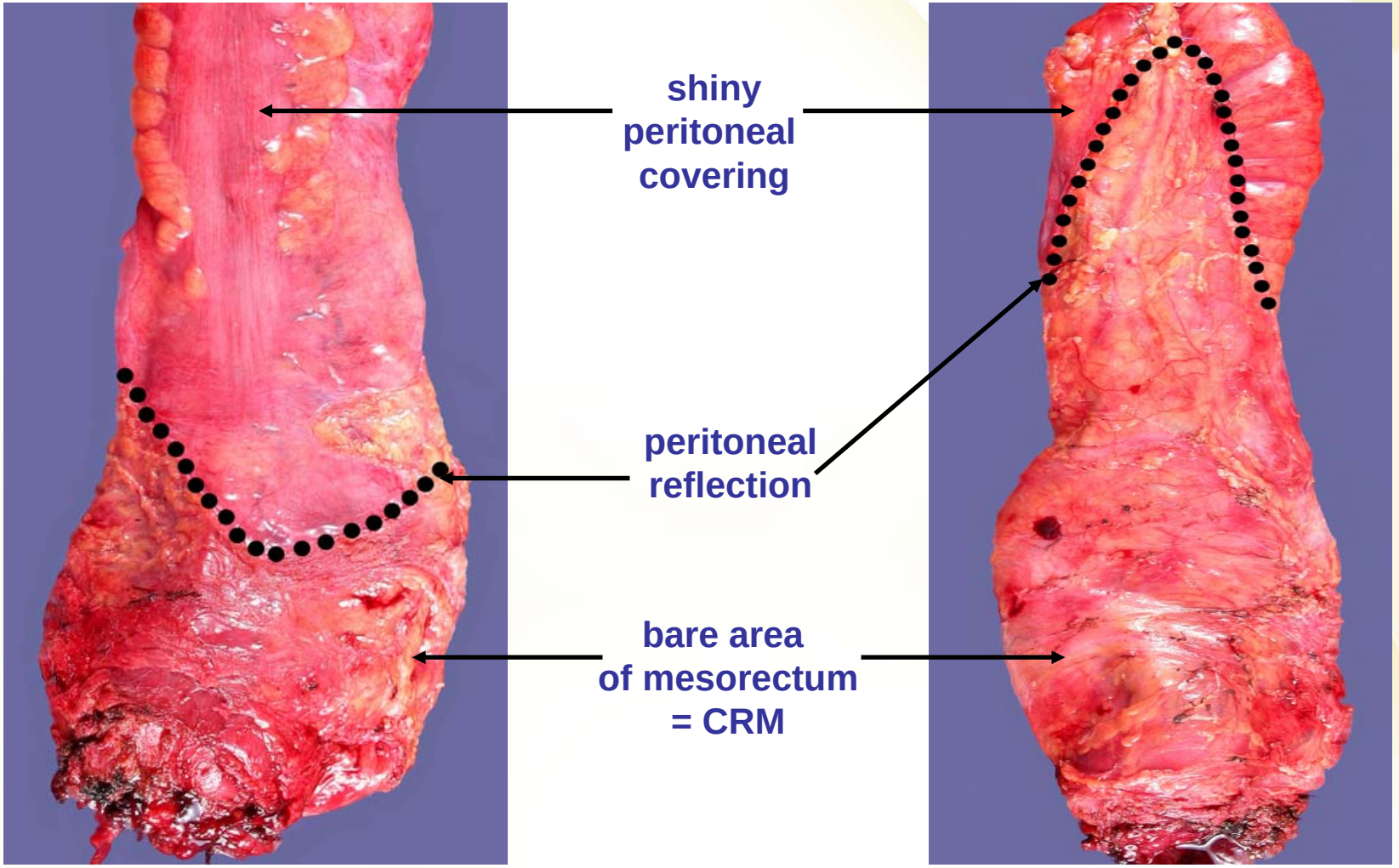
Mod from http://www.rcpath.org/index.asp?PageID=254

TME Specimen – Anatomical Landmarks



Rectal Cancer Grossing
Step 1 – Assess Quality of TME Specimen

	Mesorectum	Defects	Coning
Complete	good bulk, intact, smooth surface	no deeper than 5 mm	none
Nearly complete	moderate bulk, irregular surface	no visible muscularis propria (except where levator muscles insert)	moderate
Incomplete	little bulk	down to muscularis propria	moderate-marked

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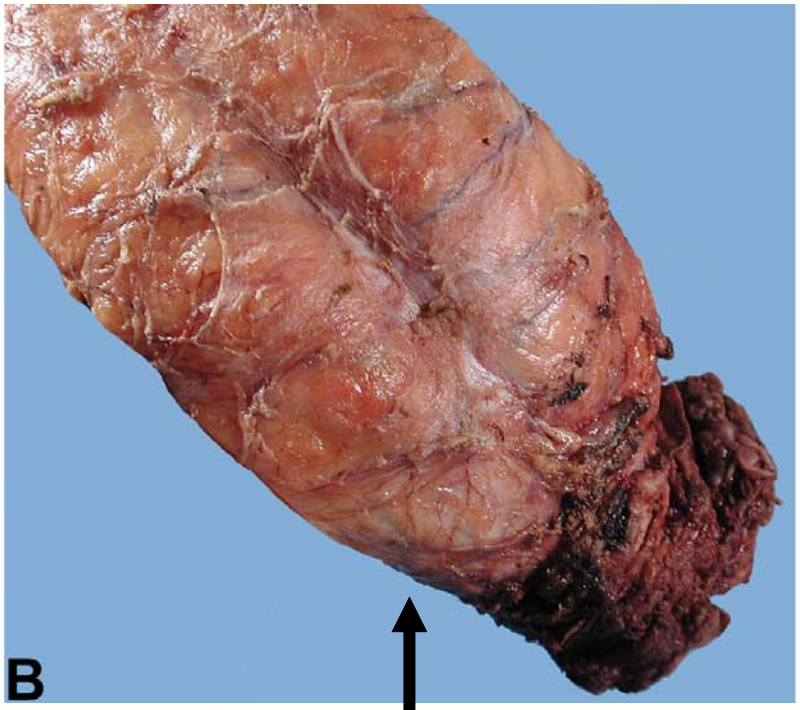
Examples of Mesorectal Resection Specimens

- intact, bulky mesorectum
- no defects deeper then 5 mm
- no coning of the specimen
- wisps of fascia on surface



some good MREs show the normal “rectal buttocks” as seen here

- little bulk to mesorectum
- irregular, ragged mesorectum with defects down to visible muscularis propria (arrow)

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Images courtesy Dr. R. McLean, Royal Alexandra Hospital, Edmonton, Alberta

Rectal Cancer Grossing
Step 2 – Ink Prior to Fixation

Paint the bare areas with ink as shown below:

Anterior

Posterior

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Rectal Cancer Grossing
Step 3 – Open Specimen

- Open the specimen along the anterior aspect from the top and the bottom, leaving the bowel intact at a level just above and just below the tumor, as shown here →
- Place loose gauze wicks – soaked in formalin – into the unopened ends of the bowel.
- Fix the specimen for 48 hours.

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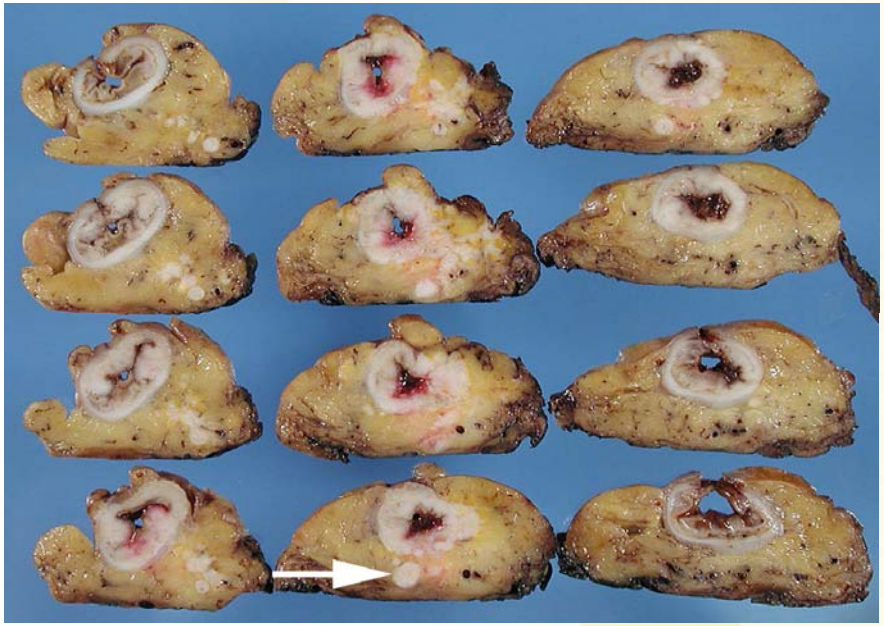
Image courtesy Dr. R. McLean, Royal Alexandra Hospital, Edmonton, Alberta

Rectal Cancer Grossing
Step 4 – Sections

- Slice through the unopened bowel at 3-5 mm intervals
- Lay slices down on the work surface



- Inspect slices to note:
  - CRM: smooth, regular vs moderately irregular vs very irregular
  - extent of tumor and the closest distance of tumor to the CRM
  - the distance of margin from tumor includes tumor within a lymph node, vein, nerve or direct tumour extension (whichever is closest)
  - record whether the closest tumor to CRM is anterior, posterior or lateral
  - examine fat away from tumor for lymph nodes
- Inspect bowel away from tumor for polyps, other lesions

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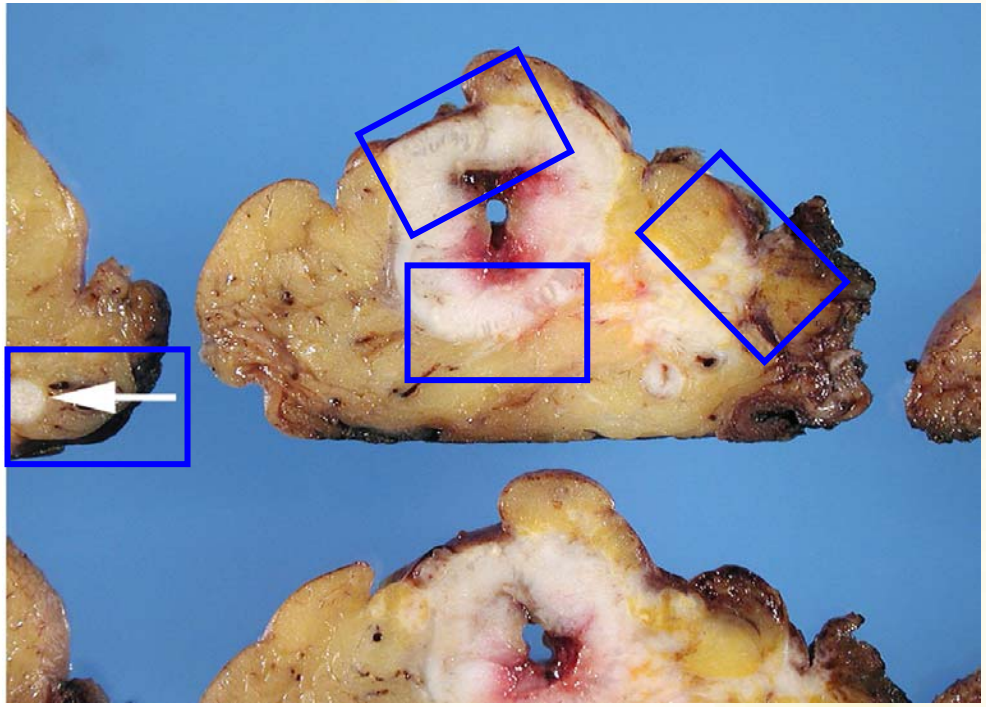
Image courtesy Dr. R. McLean, Royal Alexandra Hospital, Edmonton, Alberta

Rectal Cancer Grossing
Step 5 – Blocking

- block selection
  - tumor
    - 3 blocks - closest CRM
    - 2 blocks - luminal aspect
  - all lymph nodes
    - be careful not to double-count nodes present in more than one slice
    - fat away from the tumor must also be examined to detect lymph nodes
  - any polyps
  - proximal and distal resection margins (NB: pay attention to mesorectal soft tissue when assessing the distal margin)
  - if tumor is present above the peritoneal reflection, the serosa overlying the tumor must be sampled



• example of blocks taken
• note tumor extension close to anterior CRM and positive lymph node (arrow)

Image courtesy Dr. R. McLean, Royal Alexandra Hospital, Edmonton, Alberta