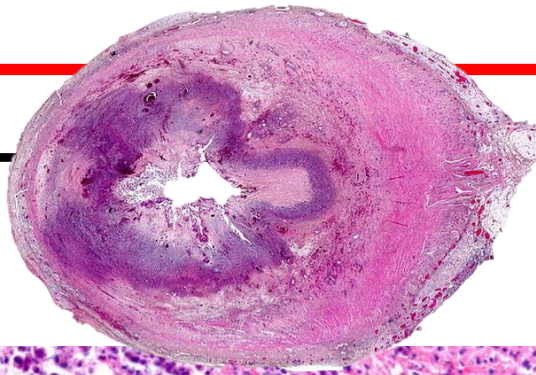
Appendix

Prepared by Dr. Kurt Schaberg

Inflammatory/Non-neoplastic



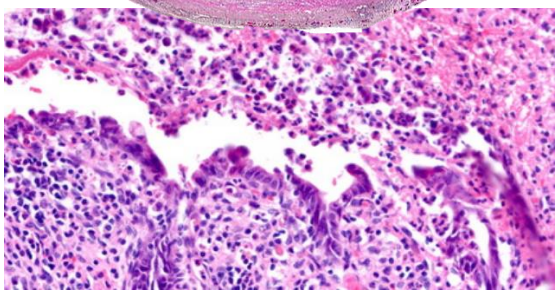
Acute appendicitis

Extremely common: Most common abdominal surgical emergency.

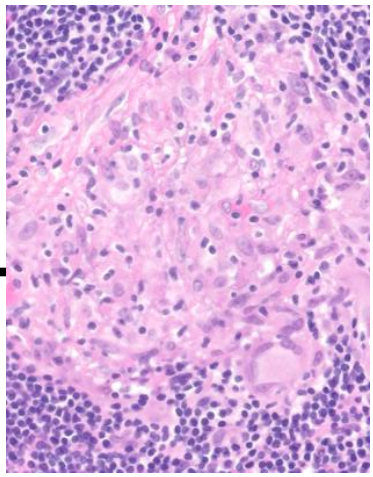
Often diagnosed clinically: colicky, periumbilical pain→ localizes to lower right quadrant. Treat with appendectomy.

Acute (neutrophilic) inflammation
No strict criteria/cutoff, but generally goes into wall
If goes to serosa and mesoappendix→ "periappendicitis"
(If solely periappendiceal→ suggests extra-appendicular cause)

Don't forget to <u>look for tumors</u> too (especially in the tip)!



"Interval" appendicitis



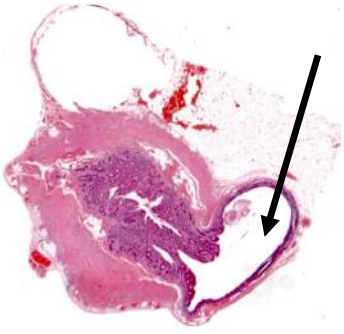
Some (often ruptured) cases are treated with antibiotics in the acute setting and may be treated with appendectomy after some "interval" of time.

Minimal acute inflammation. **Granulomas**/Xanthogranulomas. Chronic inflammation with lymphoid follicles. Fibrosis.

Granulomatous appendicitis

Granulomatous inflammation, which can be infectious (Yersinia, Mycobacteria, fungal, parasitic) or non-infectious (Crohn's Disease, sarcoidosis, interval appendicitis, foreign material reaction). **Do Bug stains!**
Relatively low risk of developing Crohn's disease if isolated to appenedix.

Diverticulum



Usually acquired pseudodiverticula. Herniation of mucosa through the muscularis propria due to increased luminal pressures.

Can become inflamed→ acute appendicitis

Lined by normal-appearing epithelium with lamina propria. Can rupture and extrude some mucin (so don't confuse it with a LAMN!)

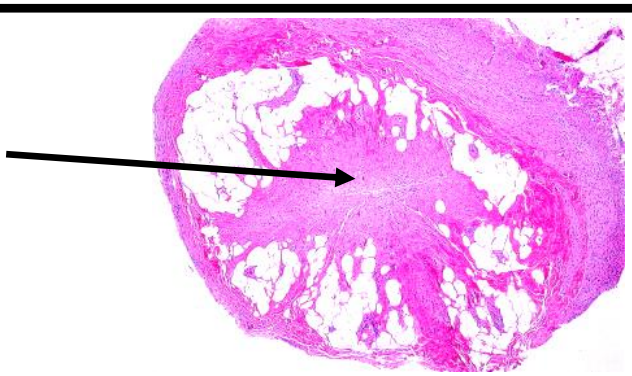
Retention Mucocele

Luminal obstruction→ retention and accumulation of inspissated mucus → dilation of appendix *(think blowing up a balloon).*
Unilocular, thin-walled. Lined by flattened, atrophic (smushed!) epithelium.

<u>Myxoglobulosis</u>—variant of mucocele with mucinous, occasionally calcified, pearl- or caviar-like globules.

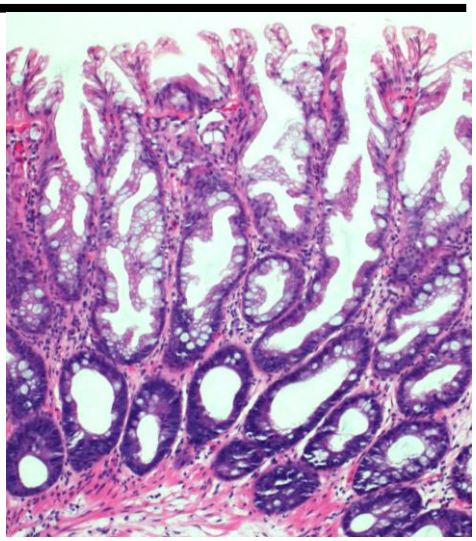
Fibrous Obliteration

Common, usually incidental.
Replacement of lumen by fibrous tissue with varying neural proliferation and adipocytes (so may stain with S100).



Tumors

Serrated Lesions and Polyps



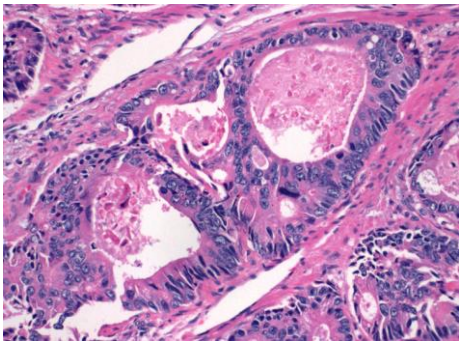
Identical to those in the colon. May be incidental or cause acute appendicitis. Associated with KRAS mutations.

Hyperplastic polyp: Polyp with serrations of superficial crypts only.

Sessile Serrated Lesion (formerly Sessile serrated adenoma/polyp): Serrated polyp with distortion extending to crypt **bases**, often circumferential.
→ Can develop (adenoma-like) dysplasia (high-grade or low-grade)
→ villous growth → eventual possible adenocarcinoma

Notably, both of these lesions have intact lamina propria (in contrast to LAMN where it is compressed and disappears)

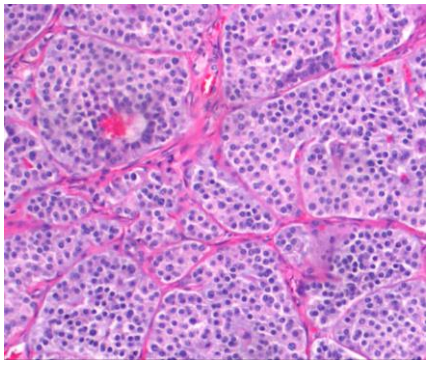
Adenocarcinoma



Looks just like adenocarcinoma of the colon.
Can be NOS, mucinous, signet-ring, etc…
Frequent KRAS and GNAS mutations.
Staging very similar to colonic adenocarcinoma.

Irregular malignant glands **infiltrating** the stroma (often with a desmoplastic response).

Neuroendocrine tumors



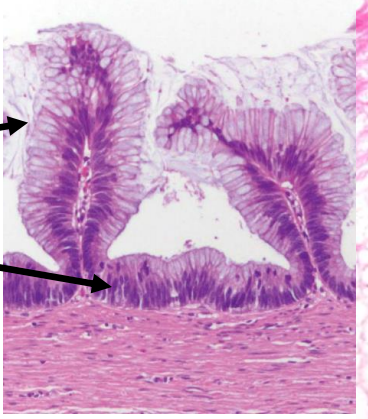
Most common appendiceal tumor by far.
Incidence of ~1% of all appendectomies.
Majority in appendiceal tip (so be sure to sample this!)
Occur at younger age than NETs elsewhere in GI tract.
May present incidentally or with acute appendicitis.
Good prognosis (>95% survival) if confined to appendix.

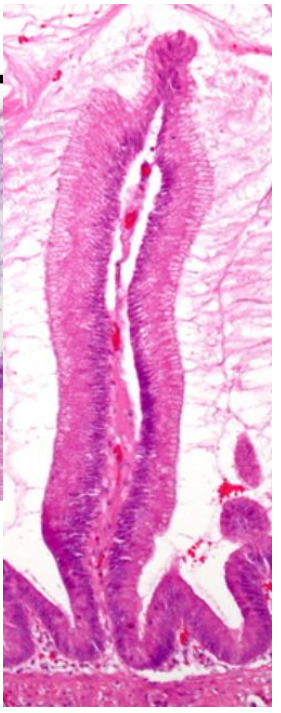
Looks and is graded like other GI NETs (see separate guide)

Nests and cords of cells with monotonous nuclei with “salt and pepper” chromatin

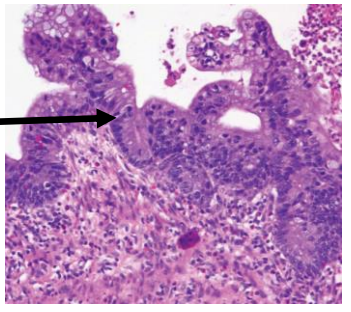
Unique appendiceal tumors

Appendiceal Mucinous Neoplasms





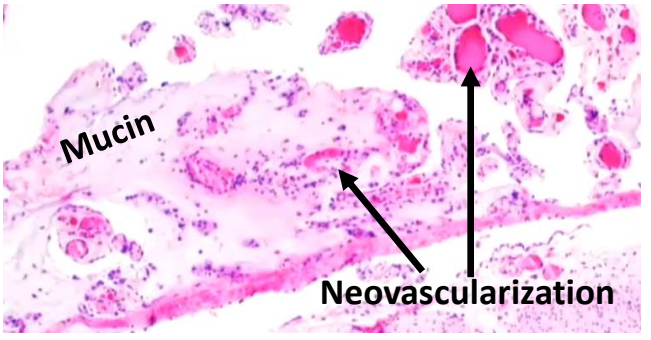
Low-grade Appendiceal Mucinous Neoplasm (LAMN):
Villous mucinous epithelium with tall cytoplasmic mucin
Low-grade cytology (nuclei compressed to pseudostratified)
Broad, **pushing** border with compression of lamina propria, obliteration of the muscularis mucosae and fibrosis
Mucin may dissect through wall (with or without epithelium)
→ Can cause pseudomyxoma peritonei (see next page)
Prognosis is very stage-dependent (earlier is much better)
If there is intact lamina propria→ some call "Appendiceal adenoma"



High-grade Appendiceal Mucinous Neoplasm (HAMN):
Similar to LAMN, with additional complex architecture (micropapillary or cribriform) and/or cytologic atypia
Stage as an adenocarcinoma (CIS), but behave like LAMN

Infiltrative growth?! → Adenocarcinoma!

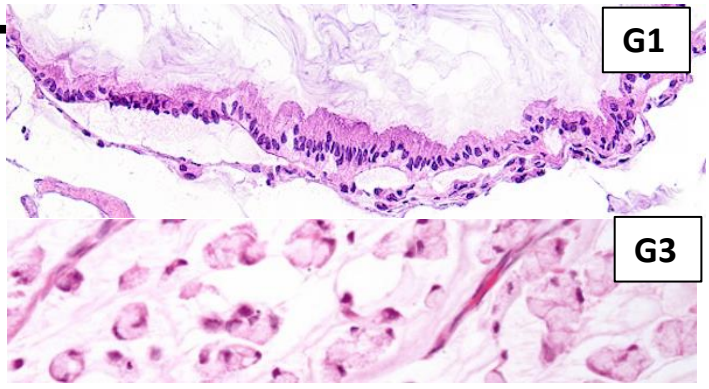
Both have frequent KRAS mutations.
Both are considered in situ ["pTis(LAMN)"], if confined by the muscularis propria→ can recur if perforated though
If through muscle into subserosa → pT3.
If serosa involved → pT4a
Acellular peritoneal deposits (lower risk) → pM1a
Cellular peritoneal deposits (higher risk) → pM1b
(Must sample mucin well!)



To consider something *true* extraluminal neoplastic mucin (and not just artifactual grossing contamination), you'd ideally like to see "dissecting" (infiltrating) mucin with neovascularization and tissue response.

LAMN/HAMN	Mucinous adenocarcinoma
Low-grade (G1) or High-grade (G2)	High-grade (G2)
Simpler growth (at least for LAMN)	Complex growth
No signet ring cells	Signet ring cells may be present
Pushing invasion	Infiltrative invasion
No desmoplasia	Desmoplasia
No/rare small clusters of tumor cells floating in mucin	Tumor cells floating in mucin
Peritoneal disease, but no lymph node or hematogenous metastases	Risk of lymph node, systemic, and peritoneal metastases
Follow with imaging; possible cecectomy	Consider chemotherapy and possible hemicolectomy for lymph nodes

Pseudomyxoma peritonei



Deposits of tumor with **abundant mucin** within the peritoneal cavity secondary to a mucin-producing epithelial neoplasm, usually of appendiceal origin.
Grossly, gelatinous watery globules→ "Jelly belly"

Grade as G1-3 (see below)
If >10% signet ring cells or sheet-like growth→ G3

	Low-grade (G1)	High-grade (G2)
Term if known appendix primary	LAMN	HAMN, Mucinous adenocarcinoma
Unknown primary	Mucinous carcinoma peritonei, low grade, or (old term) Disseminated peritoneal adenomucinosis (DPAM)	Mucinous carcinoma peritonei, high grade, or (old term) Peritoneal mucinous adenocarcinoma (PMAC)
Cytology	Low-grade atypia	High-grade atypia (in >10%)
Architecture	Strips of epithelium	Clusters, complex growth
Destructive invasion	Absent	Present,
Cellularity	Hypocellular (<20%)	Hypercellular (>20%)
Treatment	Cytoreductive therapy (CRS), HIPEC	CRS, HIPEC, Systemic chemotherapy

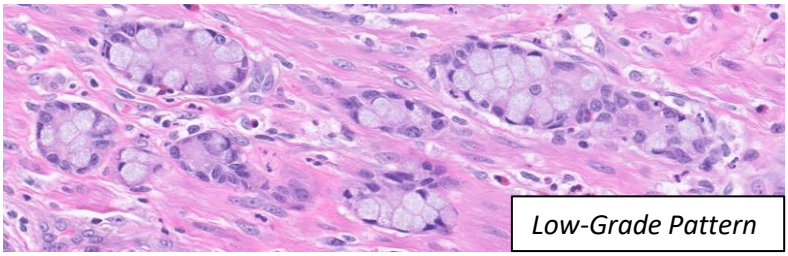
Goblet Cell Adenocarcinoma

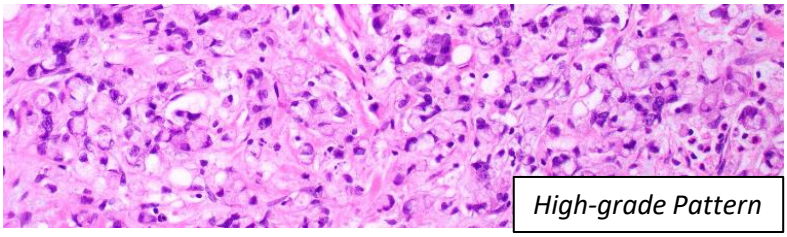
Previously known as "Goblet cell carcinoid" or "Adenocarcinoma ex Goblet cell carcinoid"

Amphicrine (having both endocrine and exocrine features) tumor with **goblet-like mucinous cells**, **endocrine cells**, and Paneth-like cells.

Must have at least some low-grade pattern for Dx (otherwise, just call it an adenocarcinoma)

Usually located at appendiceal tip.
Stage as an Adenocarcinoma.





Low-grade pattern: Tubules and clusters of goblet-like mucinous cells; endocrine and Paneth-like cells with granular eosinophilic cytoplasm, mild nuclear atypia, and no stromal reaction.

High-grade pattern: Tumor cells infiltrating as single cells, complex anastomosing tubules, cribriform masses, or sheets. Signet-ring cells. High-grade cytologic features. Desmoplastic response.

Grade	Tubular/Clustered (Low-grade Pattern)	Loss of tubular/clustered growth (High-grade pattern)
1	>75%	<25%
2	50-75%	25-50%
3	<50%	>50%