

# Ovarian Mucinous Tumours

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# Epithelial tumours

- 65-70% serous
- 3% MUCINOUS
- 9-11% endometrioid
- 12-13% clear cell
- 1% transitional
- 6% mixed ??

- Mucinous carcinoma – 3% of all epithelial tumours
- Older literature – 12-%
- Reason for decline-
  - Better awareness and recognition of secondaries
  - Better defined criteria for BMT

# What's new

- Until 2014 classification – two types intestinal type and endocervical type/Mullerian-type
- Now only one type – gastrointestinal-type
- Endocervical type – renamed seromucinous-type

# General issues

Benign  Borderline  Carcinoma

- Benign vs borderline
- Borderline vs malignant
- Other tumours with mucinous differentiation
- Primary vs secondary
- Appendiceal pathology

# Presentation

- wide age range but may occur in young females)
- large and unilateral
- usually confined to ovary
- multiloculated with or without solid areas
- Ca 125 normal or just mildly elevated
- serum CA19.9 and CEA

# Mucinous tumours

- Benign mucinous cystadenoma
- Borderline mucinous tumour (BMT)
- BMT with microinvasion
- Microinvasive carcinoma
- Adenocarcinoma

# Molecular framework

- **KRAS** mutations common (occur early in pathway)
- *Tp53* mutation occurs in minority of ovarian mucinous carcinomas
- minority arise in teratomas (may exhibit upper or lower intestinal differentiation)

# Macroscopic

- Thorough examination of every locule
- 1 block/cm
- More from solid areas but also cystic areas
- Look for capsular breach and secondary signs of leakage
- Look for adhesions (may upstage)

## Stage I (FIGO 2014)

Stage I		Growth limited to ovaries
IA	T1a N0 M0	Growth limited to one ovary; no tumour on the external surface, capsule intact, no ascites
IB	T1b N0 M0	Growth limited to both ovaries; no tumour on the external surface, capsule intact, no ascites
IC	T1c N0 M0	Tumor limited to one or both ovaries
	IC1	Surgical spill
	IC2	Capsule rupture before surgery or tumor on ovarian surface
	IC3	Malignant cells in the ascites or peritoneal washings



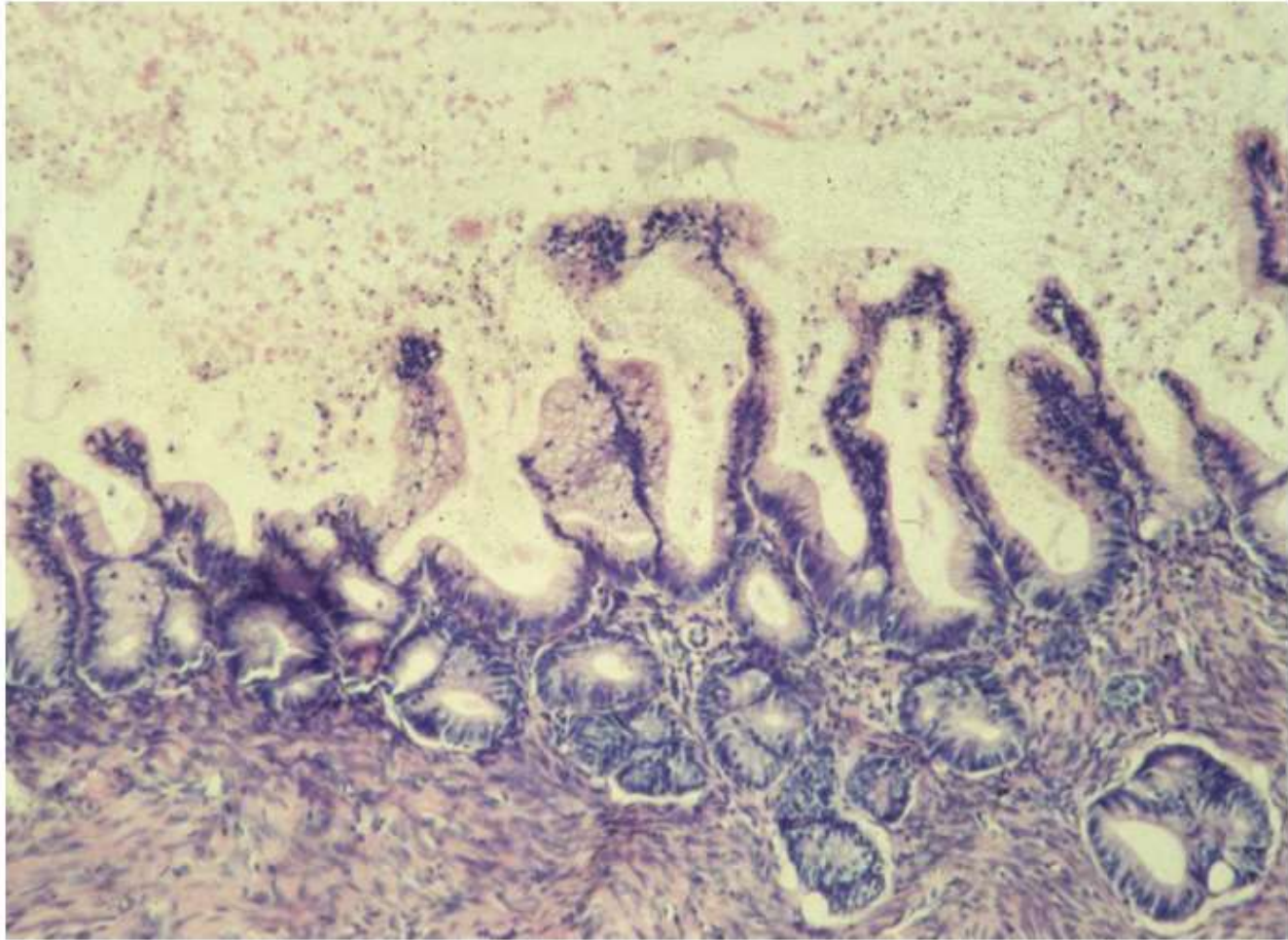


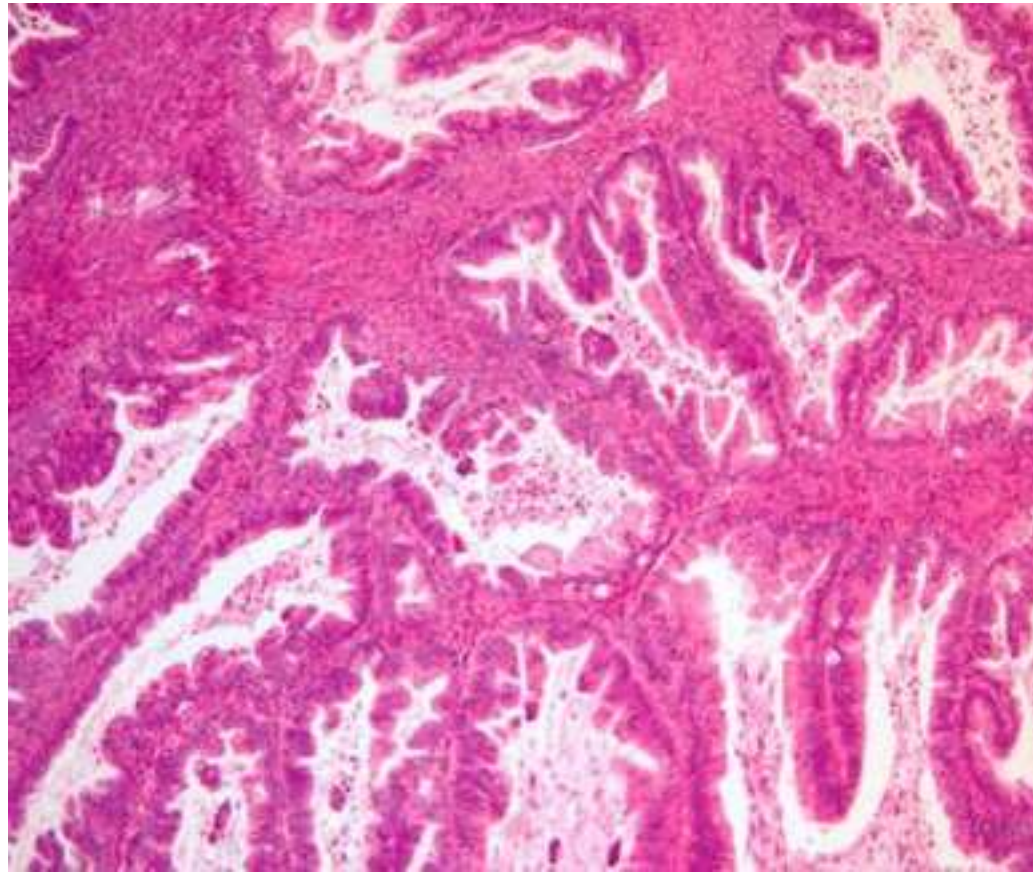
# Cystadenoma/adenofibroma

- Gastric-type or intestinal type or both type of epithelia
- <10% epithelial proliferation
- Association with Brenner tumour is well known

# Borderline

- Proliferation in >10%
- Nuclear stratification, mild to mod nuclear atypia, occasional mitoses
- Villous architecture, papillation





# Microinvasion vs microinvasive

- Microinvasion- occasional scattered cells
  - no stromal reaction
  - <5mm
  - no clinical implication

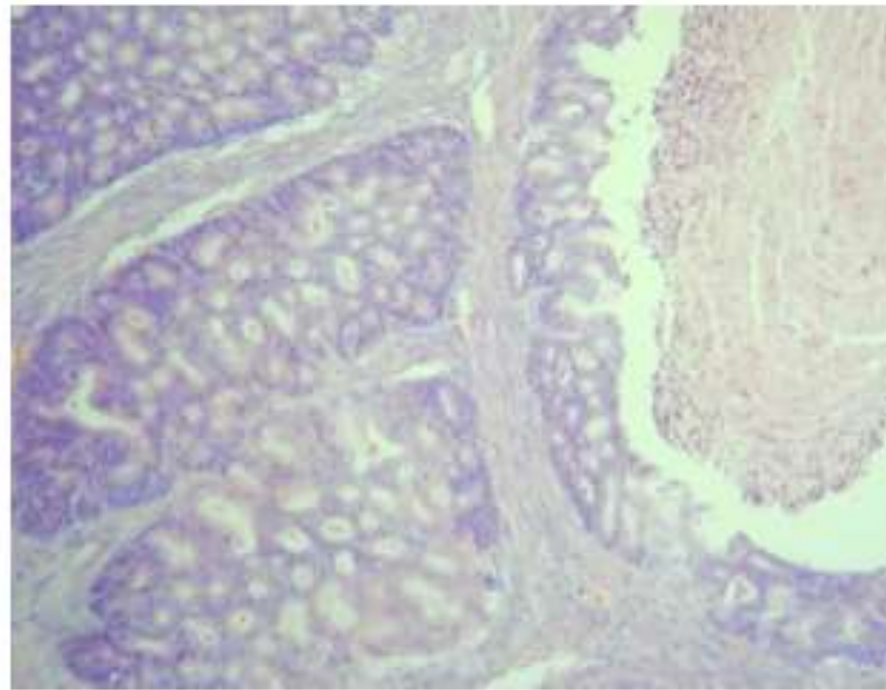
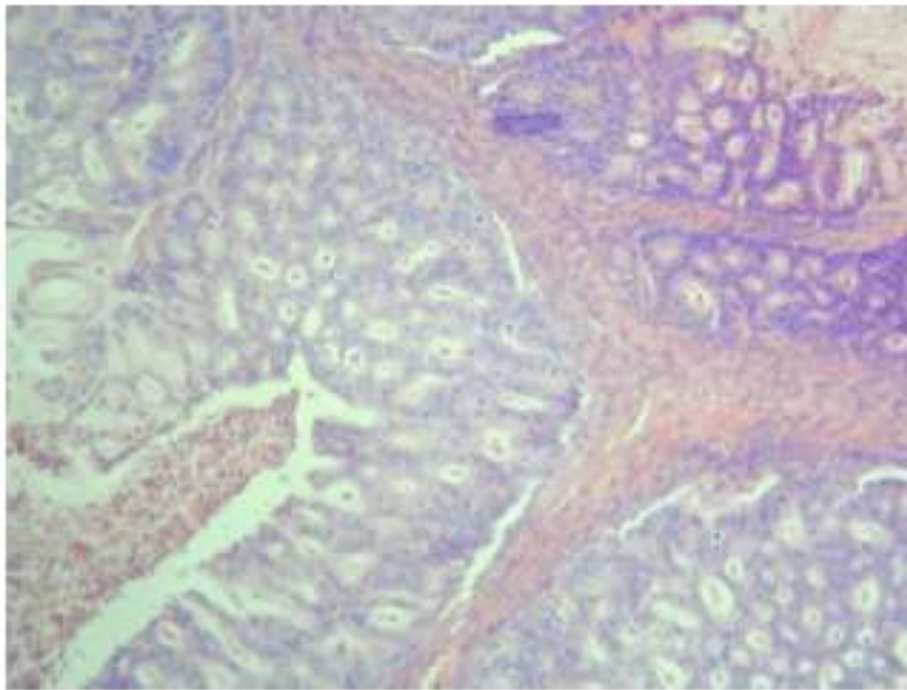
Microinvasive – small focus of high grade carcinoma

- poor prognosis

# Invasion

- Expansile vs infiltrative
- DD of muc ca with expansile invasion from BMT
- Pathologist should state what type of invasion
- Grading is like in endometrioid carcinoma

# CRIBRIFORM



# Expansile invasion (slide)

- back to back small to medium sized glands with stromal exclusion
- cribriform growth pattern
- nuclear atypia, although may be low grade
- at least 5mm area
- marked inter-observer variability
- LOW POWER DIAGNOSIS

# Destructive invasion

- obvious invasion- easy to diagnose but not very common
- always think of secondary

# PROBLEMS WITH OVARIAN MUCINOUS NEOPLASMS

- BL vs carcinoma
  - significant inter-observer variation
- Primary vs secondary
  - variable threshold to suggest further investigations to rule out metastasis
  - cause of unrest/debate/arguments in MDM

# Prognosis

- Borderline -TUMOUR OF NO MALIGNANT POTENTIAL- may recur following cystectomy and possibly spillage
- borderline with intraepithelial carcinoma (extremely good prognosis )
- borderline with microinvasion (extremely good prognosis provided adequate sampling)
- stage I carcinoma with expansile invasion (good prognosis)
- stage I carcinoma with destructive invasion (guarded prognosis)
- advanced stage mucinous carcinoma (poor prognosis; exclude secondary)

# Immunohistochemistry

CK 7, CK20, CDX 2, CEA, p16

Ovary – CK7 > CK20 (unless..), PAX8,  
(CDX2,ca19.9)

Colon – CK20 > CK7, CDX2

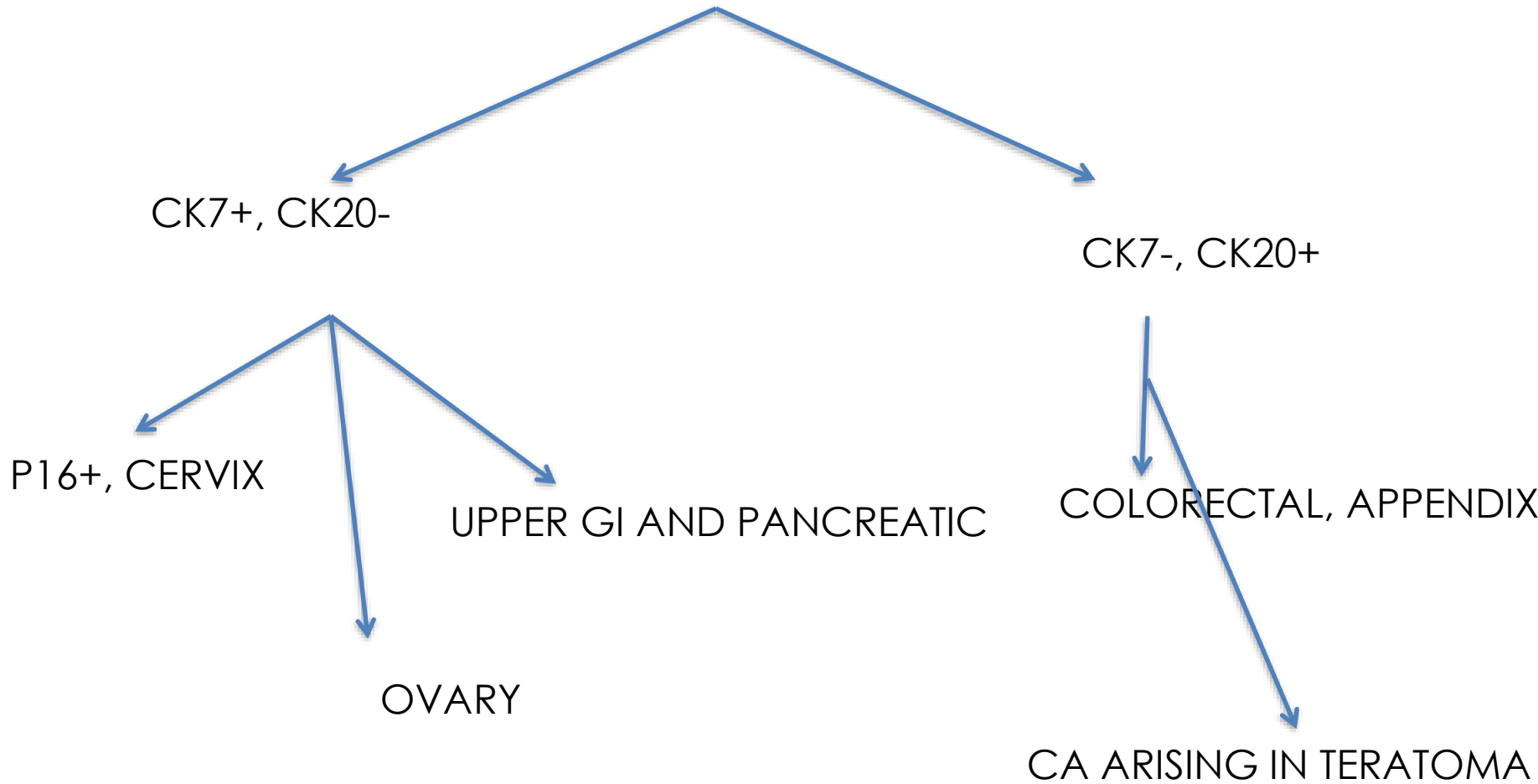
Appendix CK20 +, CK7 –

Pancreatobiliary – CK7 >CK20

Stomach – CK7 >CK20

Cervix – CK7 > CK20, p16 +

# CK7, CK20



# Seromucinous tumours

- New category in WHO 2014 classification
- Previously classified as endocervical type mucinous tumours
- Benign, borderline and low grade carcinoma spectrum
- Arise in background of endometriosis
- Can be predominantly serous or mucinous type posing diagnostic challenge

# Seromucinous tumours- morphology

Mixed epithelia

Associated with endometriosis

Inflammatory infiltrate is a constant feature

# Differential diagnosis

- If predominantly mucinous – ER and vimentin positive, CDX2 negative
- If predominantly serous papillary architecture – WT1 negative
- Mixed mucinous, serous, clear cell, endometrioid areas
- Association with endometriosis
- Presence of polymorphs

# How do we grade?

- Mucinous carcinoma is graded like endometrioid carcinoma

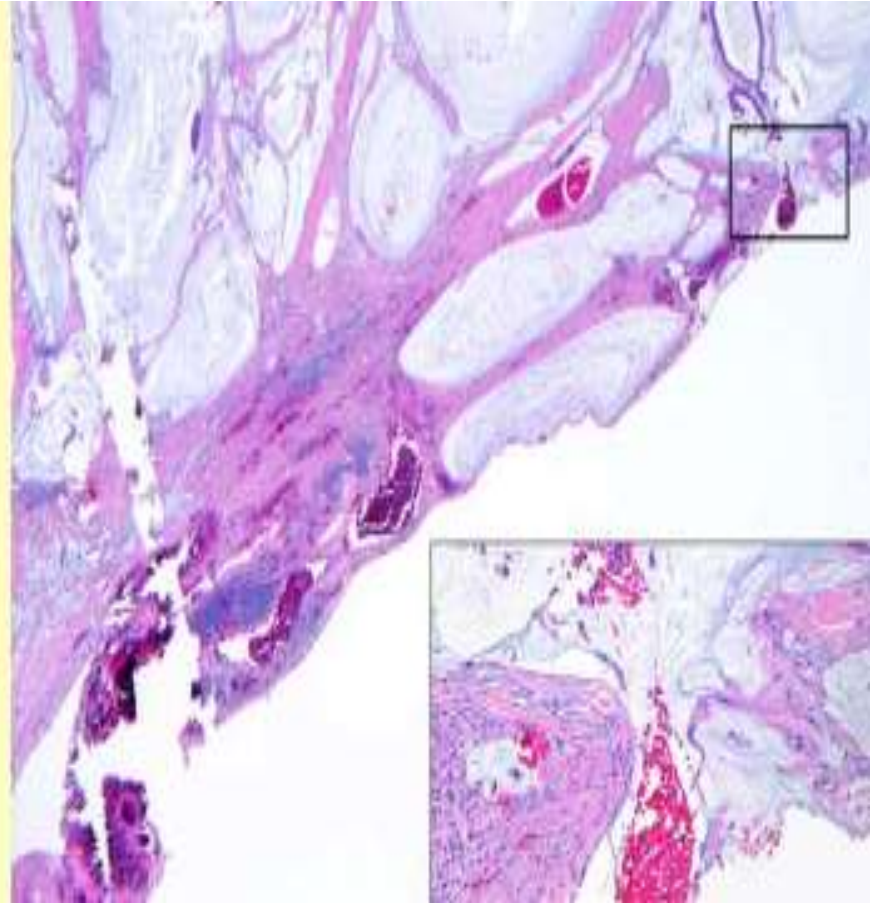
# Appendix

- Hyperplastic polyp
- SSP
- [LAMN](#)
- AC
- GCC

- Biopsy of the omental nodule

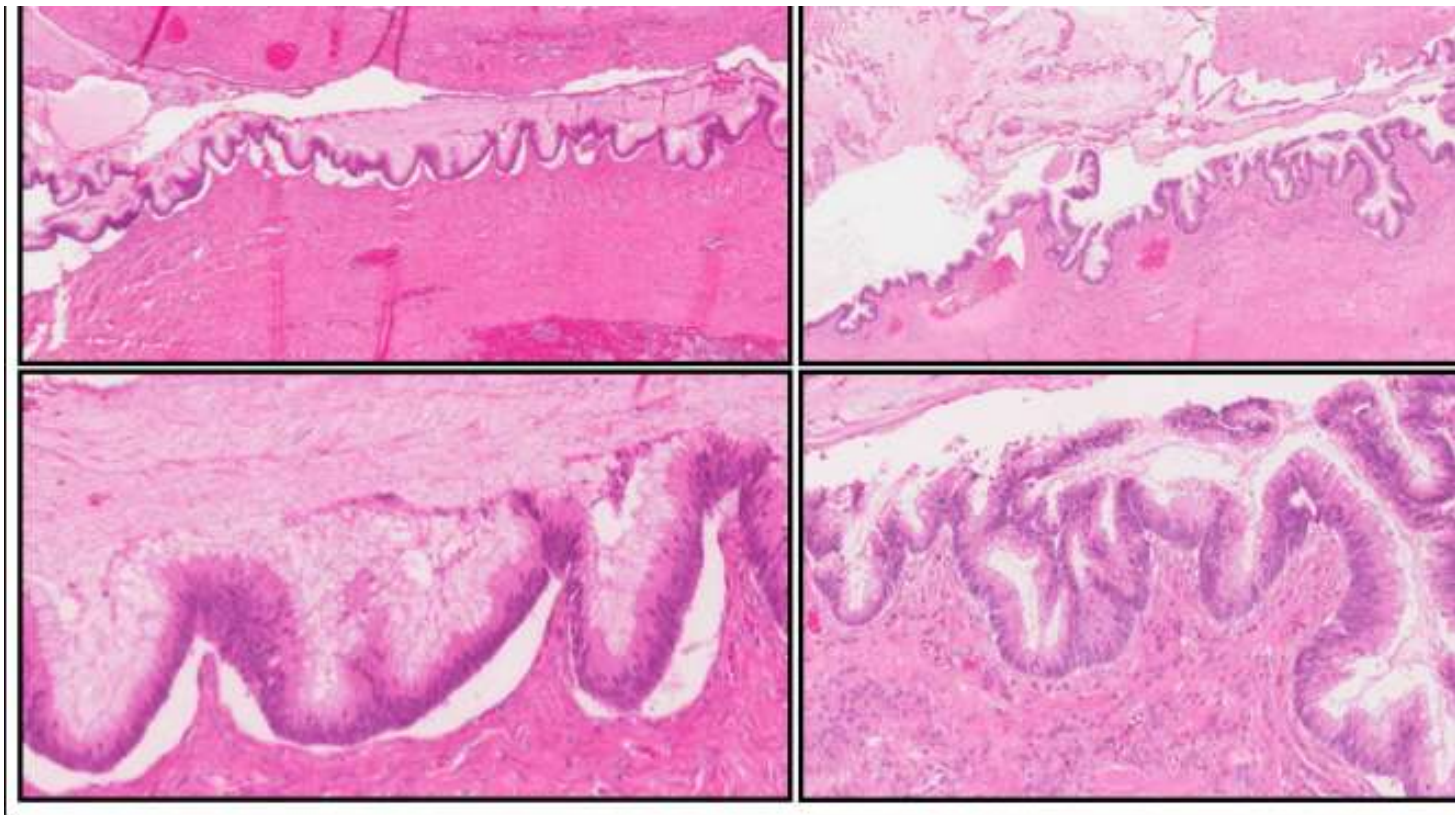
- Debulking surgery

# PMP



# Case of the month (BAGP)

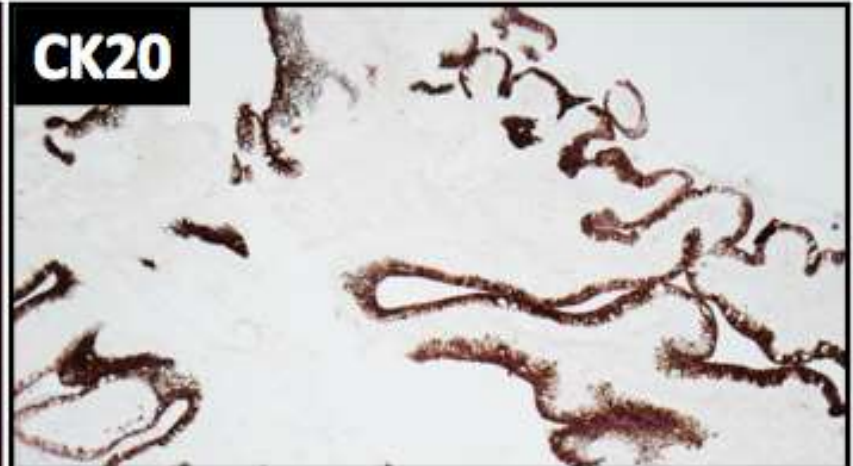
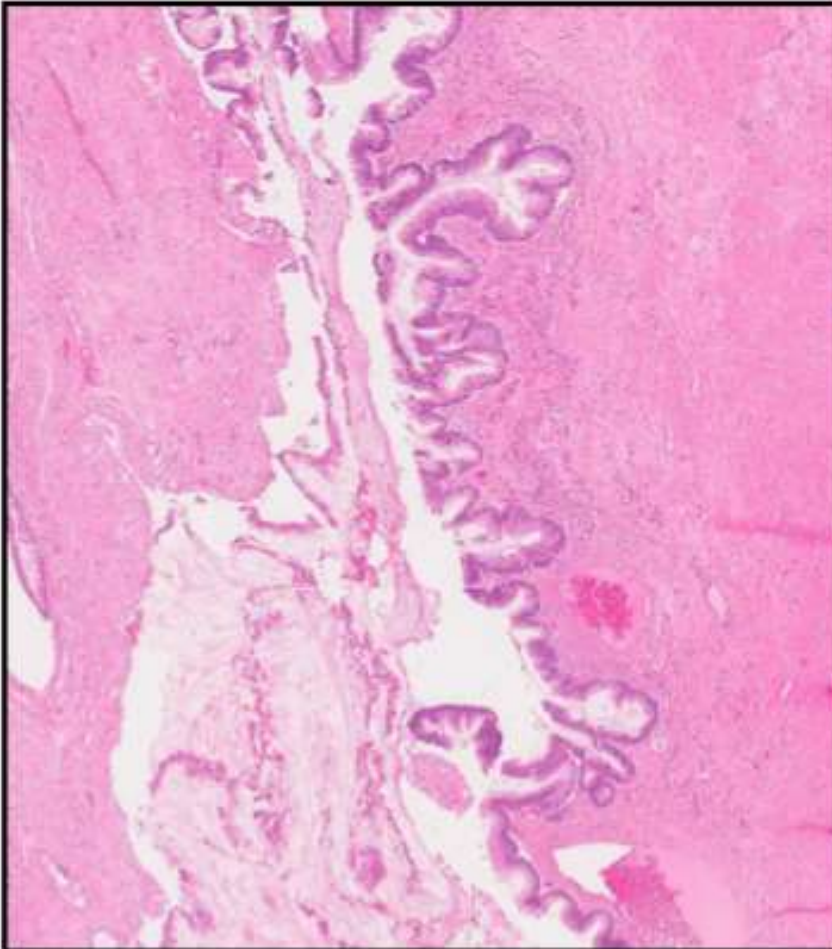
- Case of the month (BAGP)



# Ovarian tumour + mucinous ascites

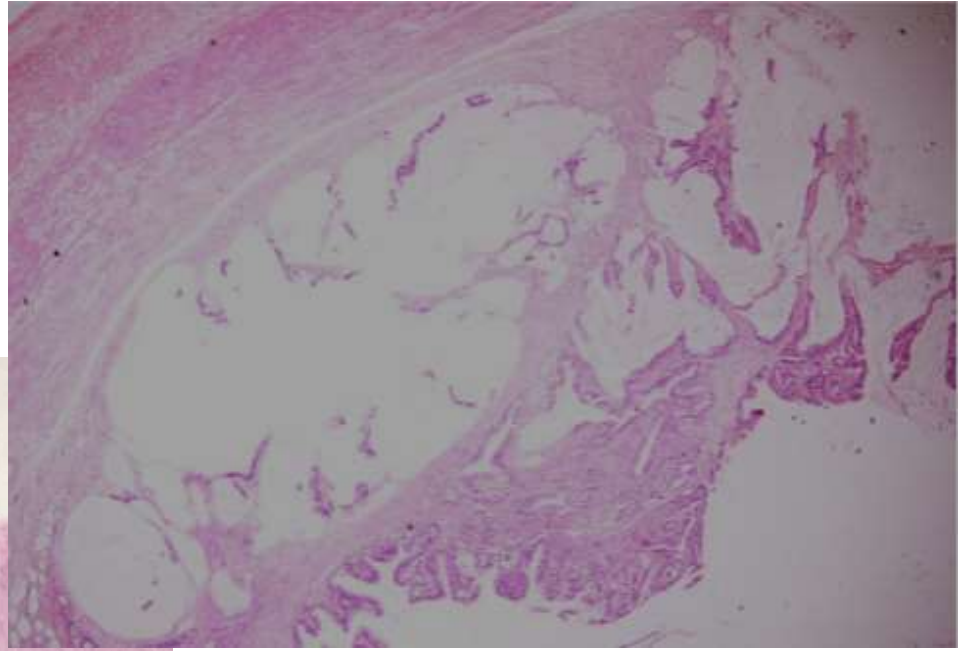
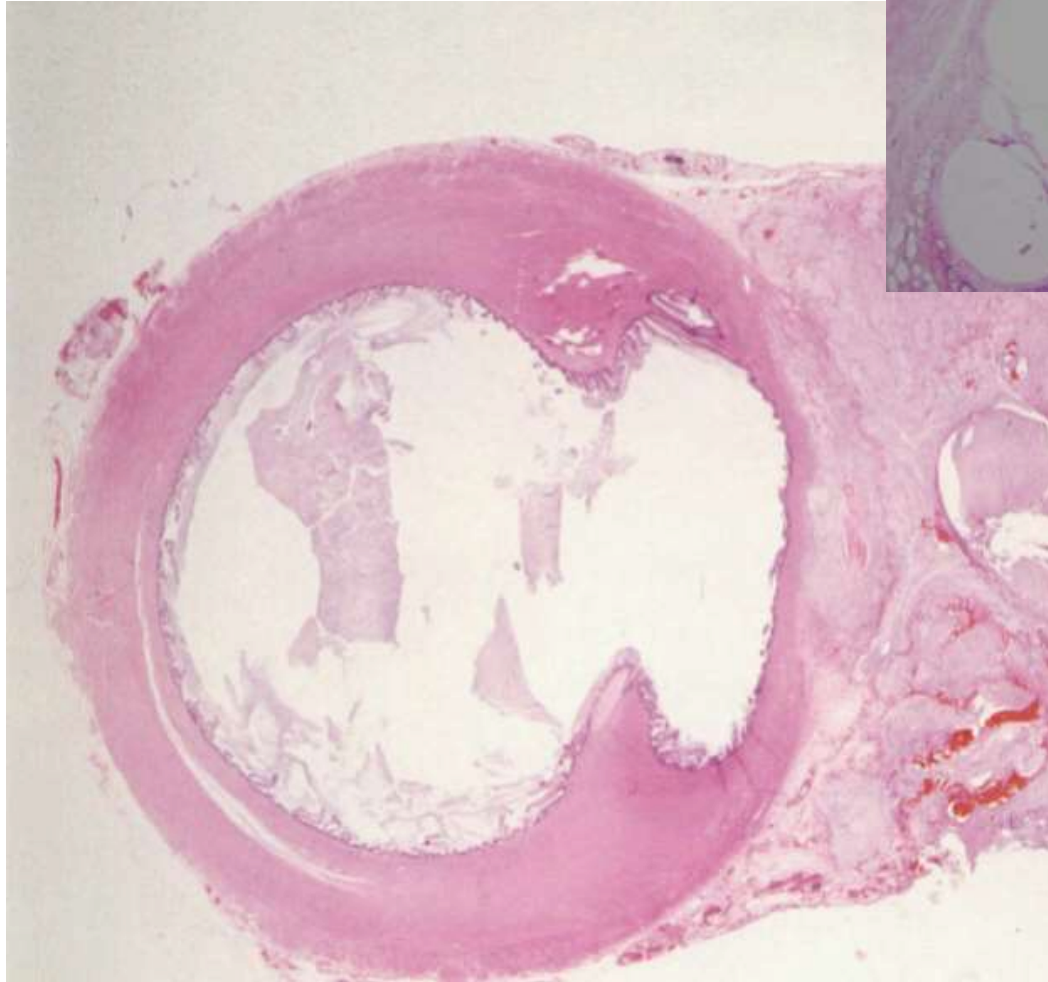
## Pseudomyxoma peritonei

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# Mucocele





# **LAMN**(Low grade Appendiceal Mucinous Neoplasm)

- Villous or cystic epithelial neoplasm
- Low grade dysplasia
- May be associated with ovarian involvement
- Risk of PMP

# Reporting

- Examination of entire appendix (esp if macroscopically normal)
- Degree of dysplasia
- Perforation present/absent
- Mucin on the serosal surface present /absent
- Acellular vs epithelium outside appendix
- Comment on risk of PMP

# Management

- Simple appendicectomy even when ruptured
- Close follow up required because of the possibility of pelvic recurrence
- Presence of any epithelium worsens prognosis
- Must examine multiple sections if no epithelium found in mucin

# PMP

- Clinical diagnosis
- Right ovary more commonly affected
- Usually due to spread from appendix
- Appendix may be embedded in mucinous or fibrous mass

# Pseudomyxoma peritonei

- Low grade
- High grade

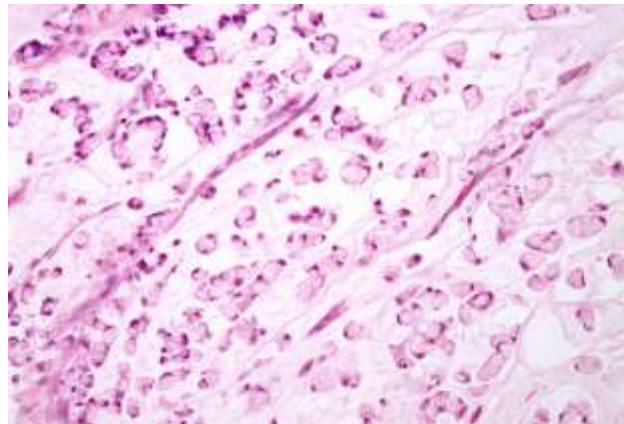
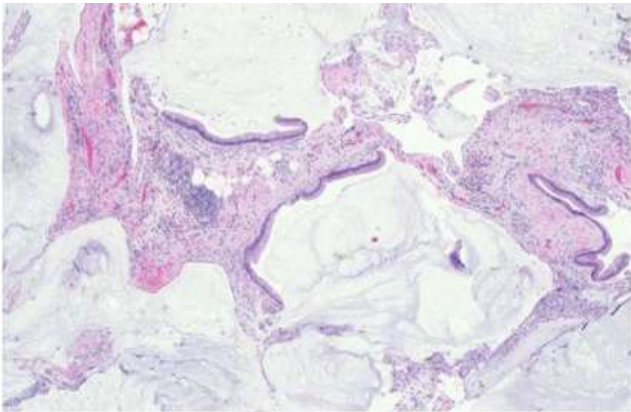
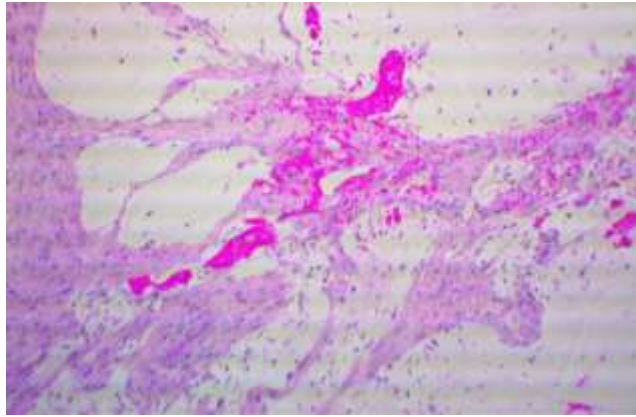
Takes into account

Mucin pools

Cytological atypia

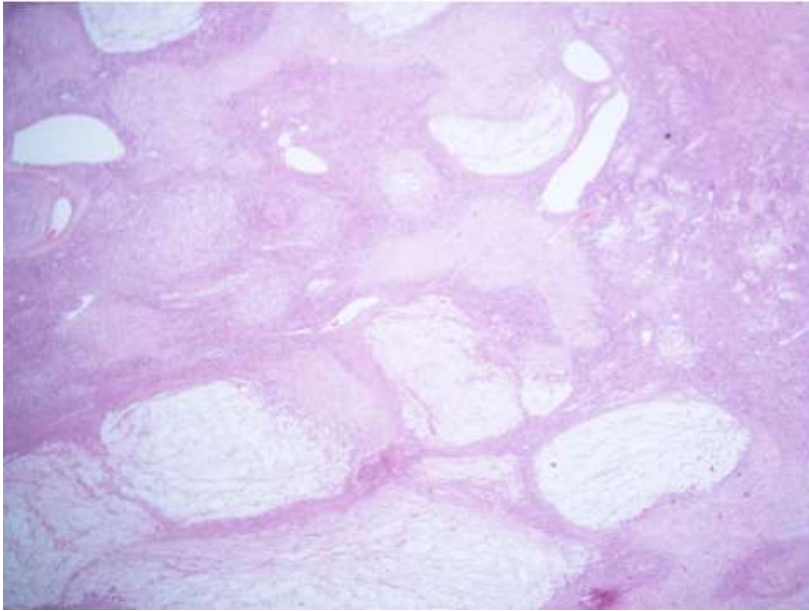
Architectural complexity

LG =<10% of epithelium, nonstratified columnar epithelium, bland cytology

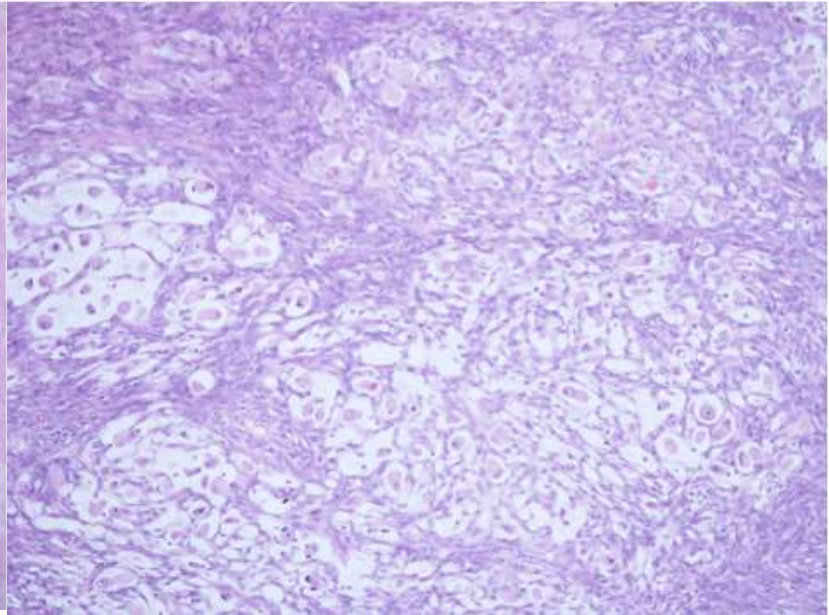


# Case discussion

# Metastatic carcinoma (CK7 +, CK20-, ER-, ,PAX8 -, P16-, CDX2 -) upper GI and breast likely primary sites.



Extracellular mucin

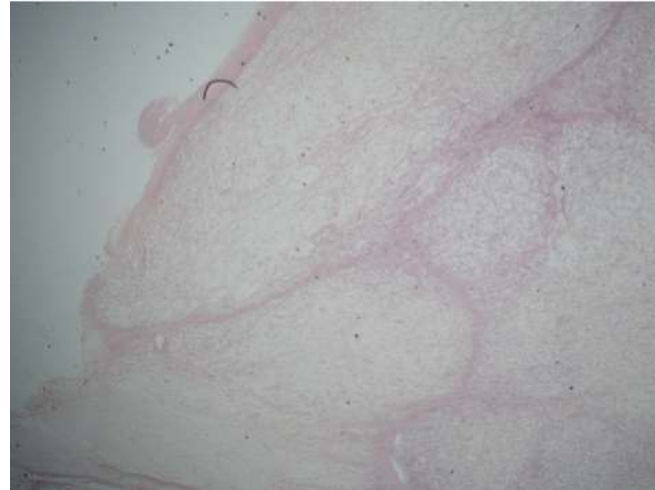
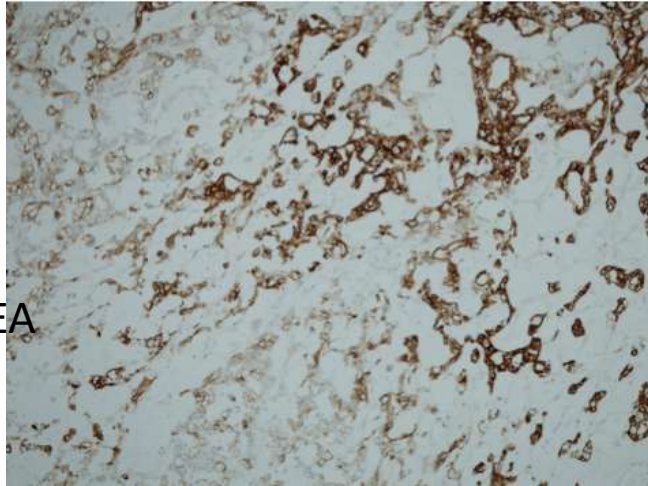


Infiltrative invasion  
Signet ring cells

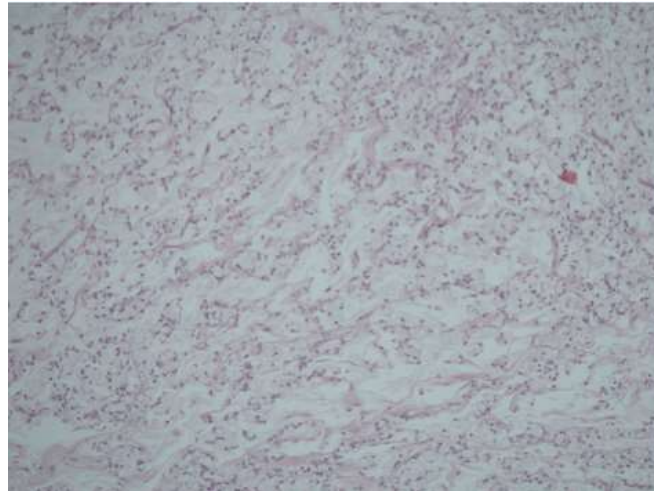
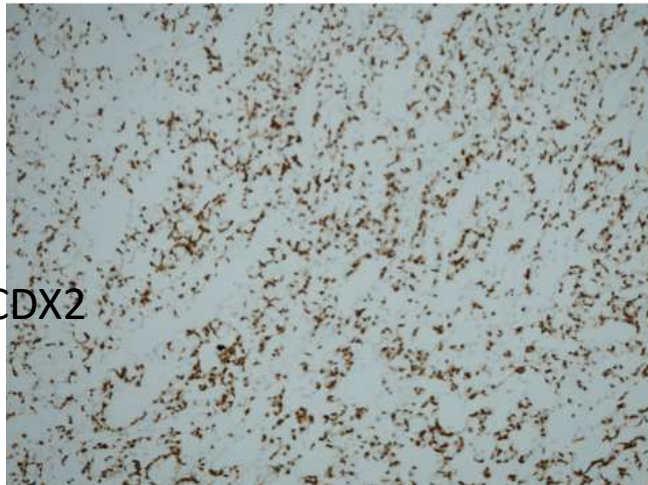
# Case discussion 2

## Metastatic mucinous carcinoma

CEA



CDX2



Ck20 + CK7-, CDX2+ (colonic primary)



# Secondaries

- Not uncommon
- History of primary may or may not be there
- Unilateral or bilateral
- Solid or cystic
- Often exhibit maturation phenomenon ( also consider D/D in BMT)

# Features favouring metastasis

- Bilaterality
- <10cm size (small tumours)
- Surface involvement
- Advanced stage

# Features favouring metastasis

- Signet ring cells
- Extracellular mucin
- LVI
- Hilar infiltration
- Surface involvement
- Nodular growth pattern

# Take home....

- Mucinous tumours tend to be large , multilocular and usually unilateral
- Gross examination and adequate sampling is a key to correct diagnosis
- All ovarian mucinous tumours are now called gastrointestinal type
- Previous endocervical-type is now reclassified as seromucinous tumour

# Take home....

- BL vs carcinoma – cribriforming, villiformity, severe atypia, necrosis are clue to carcinoma
- In carcinoma – grading is like endometrioid carcinoma
- In carcinoma- mention pushing or infiltrative type invasion
- Infiltrative type invasion- think of metastasis
- Clues to metastatic nature – bilaterality, <10cm size, multilobulated surface, infiltrative pattern of invasion, LVI

- IHC-
- Metastatic lower GI – CK20 +, CK7- ( teratoma premise to be excluded)
- Metastatic upper GI – CK7+, CK20 -, infiltrative pattern , signet ring morphology
- Seromucinous – ER+ PGR+ Pax8 +, CK7+,WT1- associated with endometriosis

# PMP

- Causes – colonic, appendiceal, ovarian
- Appendix – examine whole appendix,
- Presence of rupture, acellular/cellular mucin at the surface in the mesoappendix most important prognostic features

That's it.....!

Thank you.