

Thoracic Frozen Sections FRCPath course Sept 2019

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Indications for FS

- Diagnosis of lung mass
 - Benign vs malignant
 - Subtype lung cancer
 - Subtyping/staging adenocarcinoma
 - Margins
- LN staging
- Mediastinal lesions
- Pleural lesions
- Ensure surgeon sampled lesional tissue: definitive diagnosis not needed at FS

Approach

- History
- Gross examination and orientation
 - E.g. suture by surgeon of site/margin of interest
- Careful selection tissue
 - Not too big
 - Consider touch imprint
- Start off at low power

Ask yourself

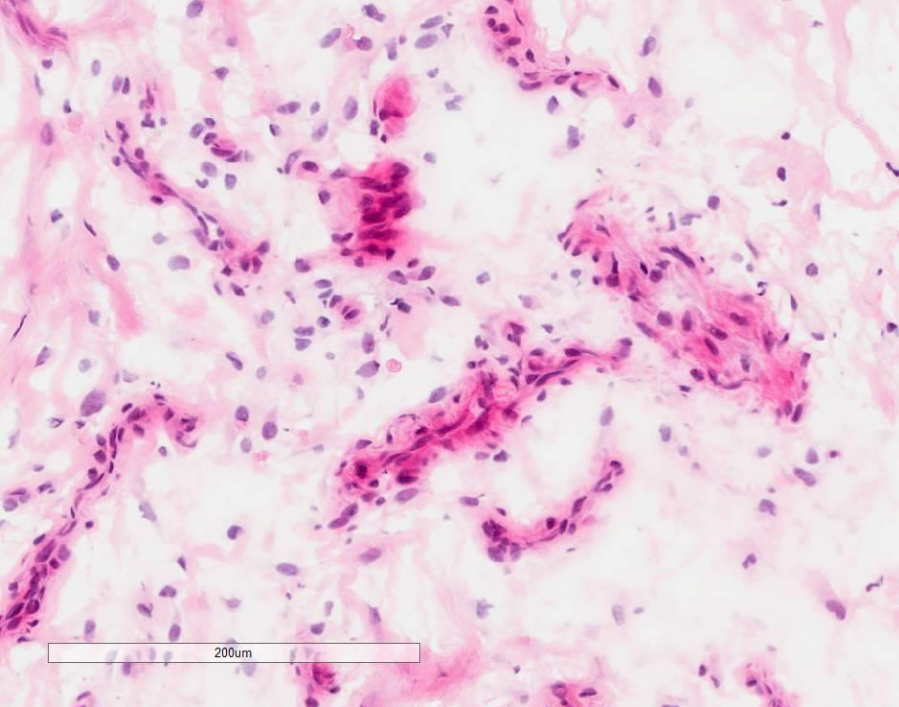
- Lesional or not?
- Benign, malignant, indeterminate?
 - Could the atypia be reactive?
- non-small cell, small cell, other
 - Other small cell lesions
 - Lymphoid, carcinoid, soft tissue
 - Primary or secondary
- Only go as far as confident
 - E.g. “low grade epithelial neoplasm”, “poorly differentiated malignant neoplasm” etc
- Err on the negative

Difficult cases

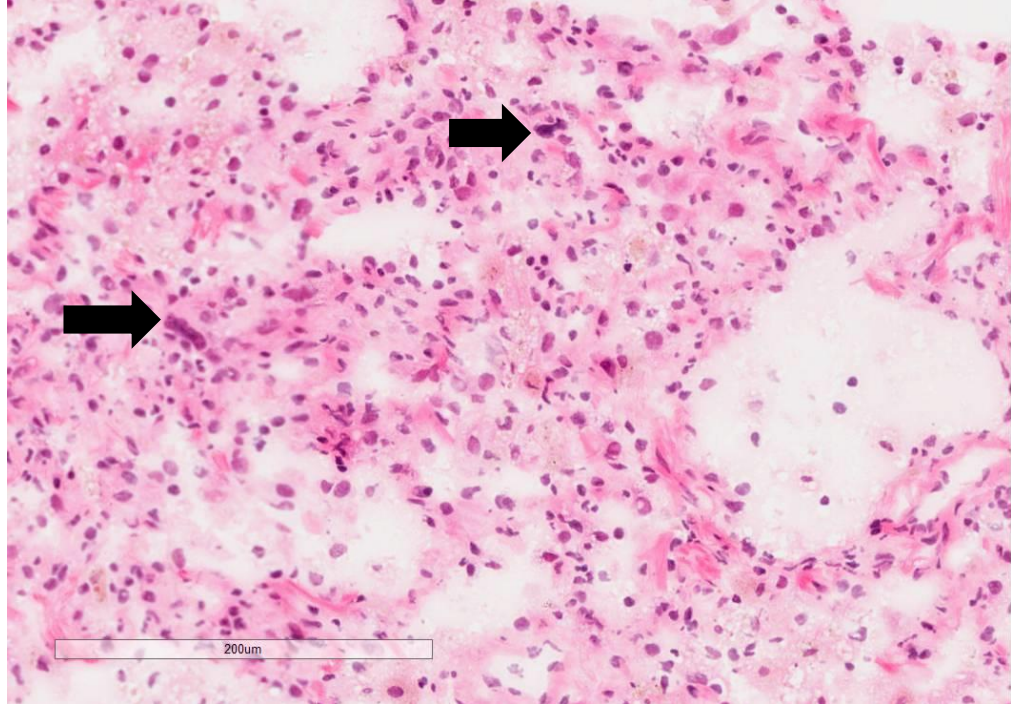
- Get more history
- Look at multiple sections/levels
- Show a colleague
- Sample more or ask surgeon for more tissue
- Defer to paraffin section

Causes of False positives

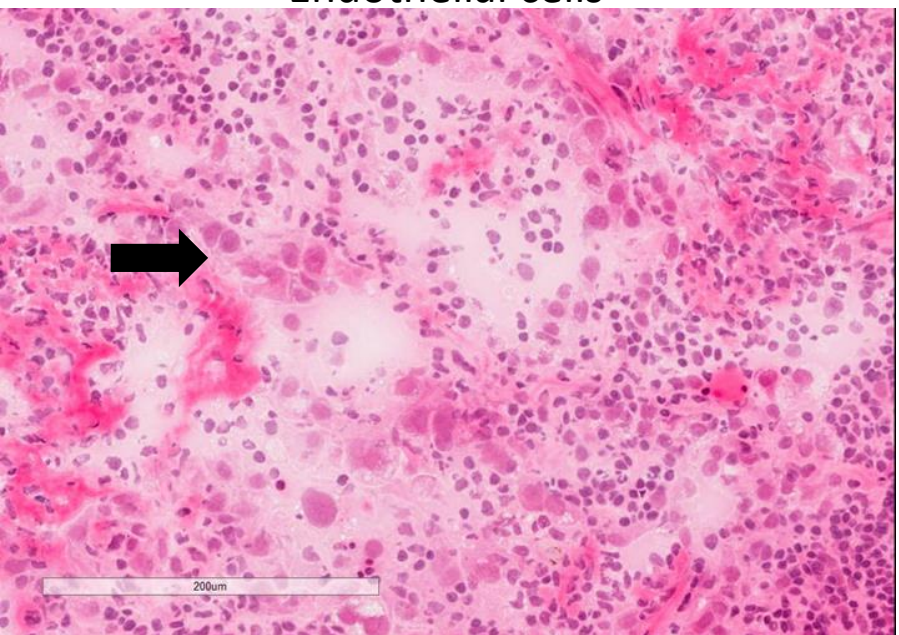
- **Reactive atypia**
 - Endothelial cells
 - Fibroblasts
 - Alveolar epithelial cells
 - Bronchial/bronchiolar epithelium
- **Metaplasias**
 - Squamous, mucinous, peribronchial
- **Odd cells**
 - Megakaryocytes
- Often in **context** of:
 - Inflammation
 - DAD/OP
 - Fibrosis and honeycomb change
 - Epithelia overlying a tumour
 - Crushed tissue



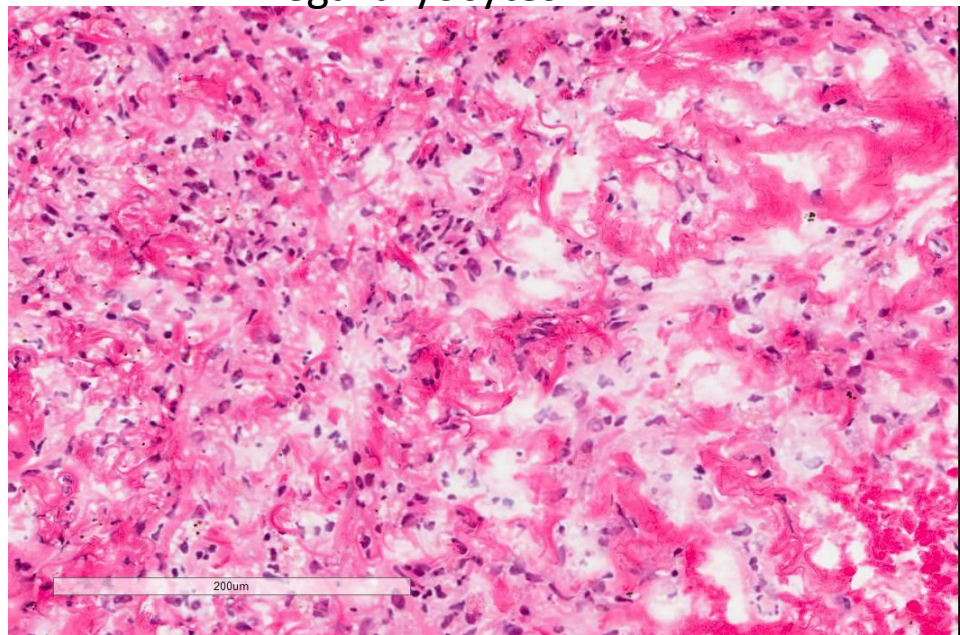
Endothelial cells



Megakaryocytes



Reactive epithelial cells



Fibroblasts

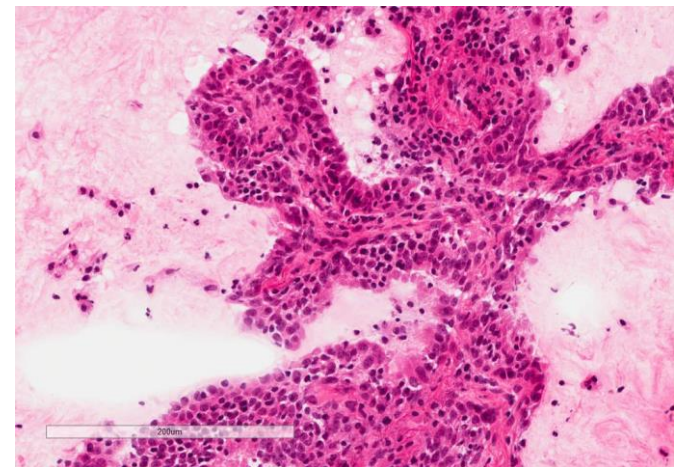
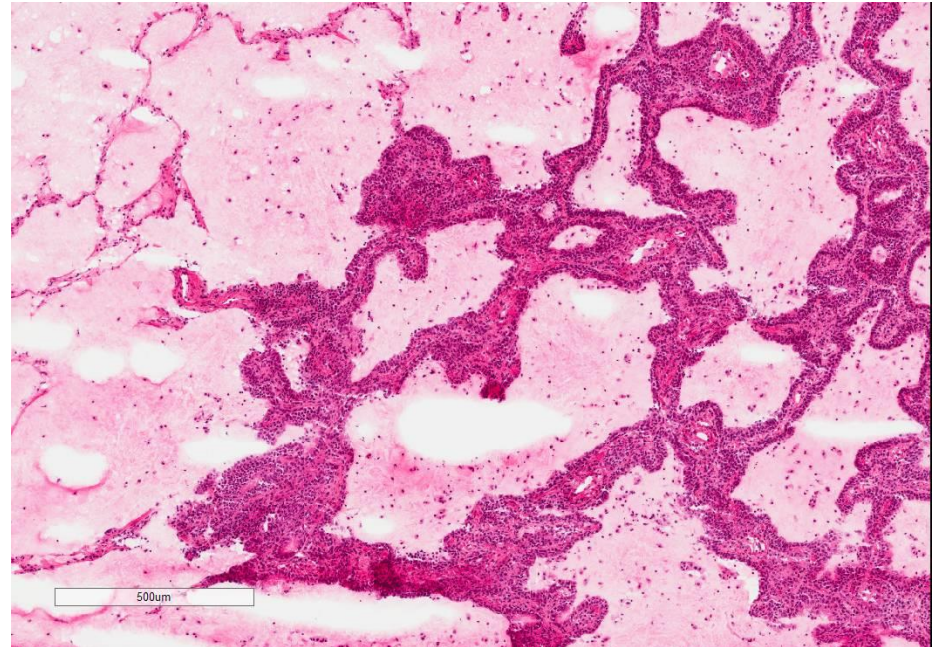
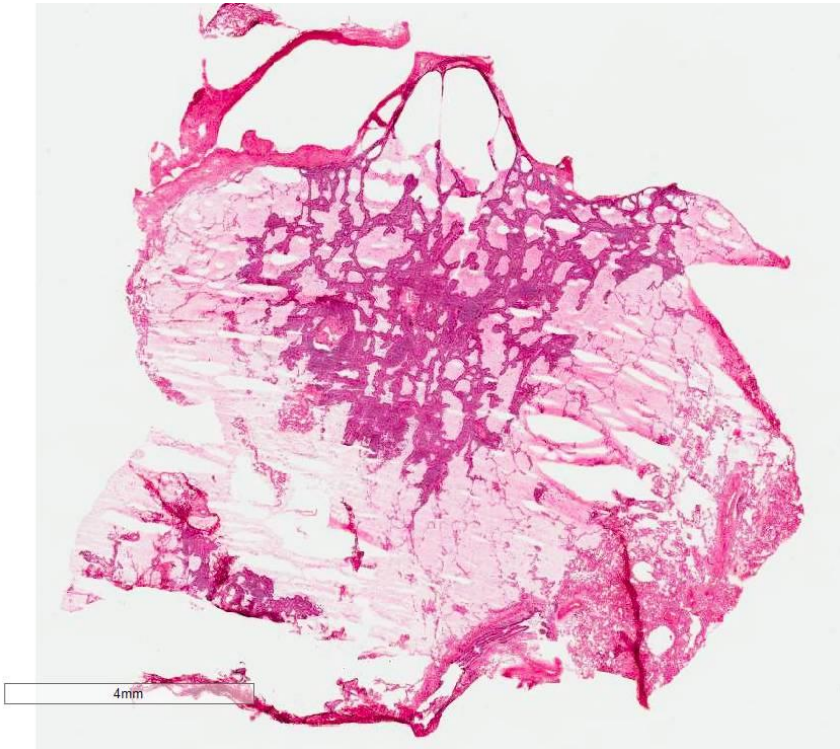
Reactive conditions can show:

- Hyperchromasia
 - Increased cell size
 - Nucleoli
 - Mitoses
 - Necrosis
-
- Beware overcalling reactive epithelial atypia when there is a lot of **inflammation** (esp acute)
 - Be mindful that tumours can be very inflamed : often poorly differentiated and non-lepidic.

Benign vs Malignant proliferations

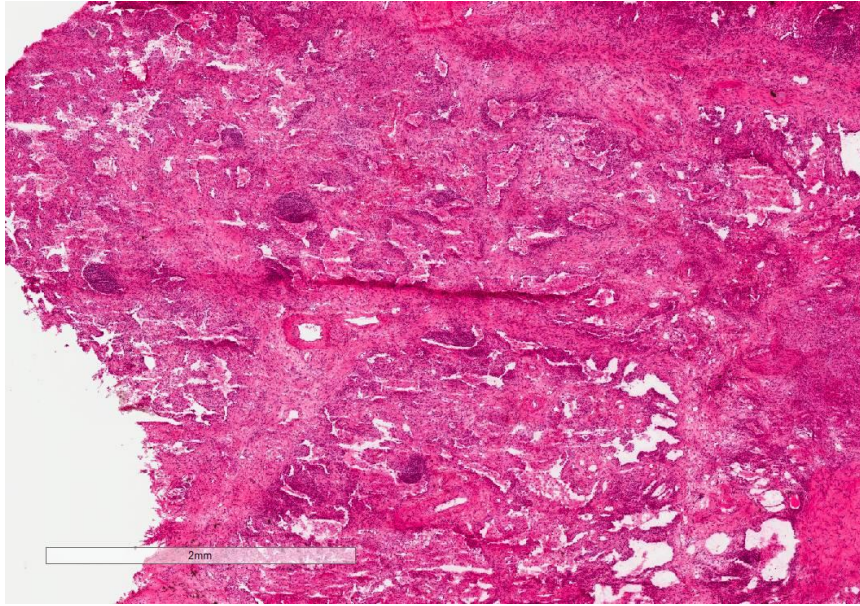
BENIGN	MALIGNANT
Mild atypia : generally (but can see some very atypical cells e.g following chemo/rad)	Extreme atypia : generally
Random atypia : some normal looking cells, spectrum atypia	Monomorphic atypia : all cells uniformly atypical
N:C ratio preserved	Increased N:C ratio
Normal mitotic figures	Abnormal mitotic figures
Architecture normal	Abnormal architecture
Epithelia: cilia, merges with normal epithelium	Epithelia: tufted and micropapillary architecture, abrupt edge

Mucinous adenocarcinoma

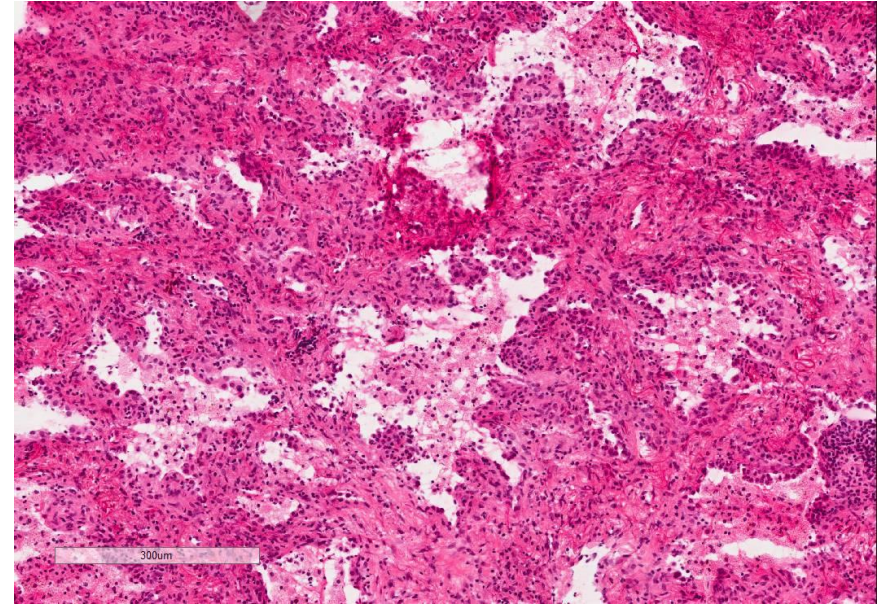


Sharp demarcation
Monomorphic atypia
Mild inflammation
“hard” appearing cytoplasm

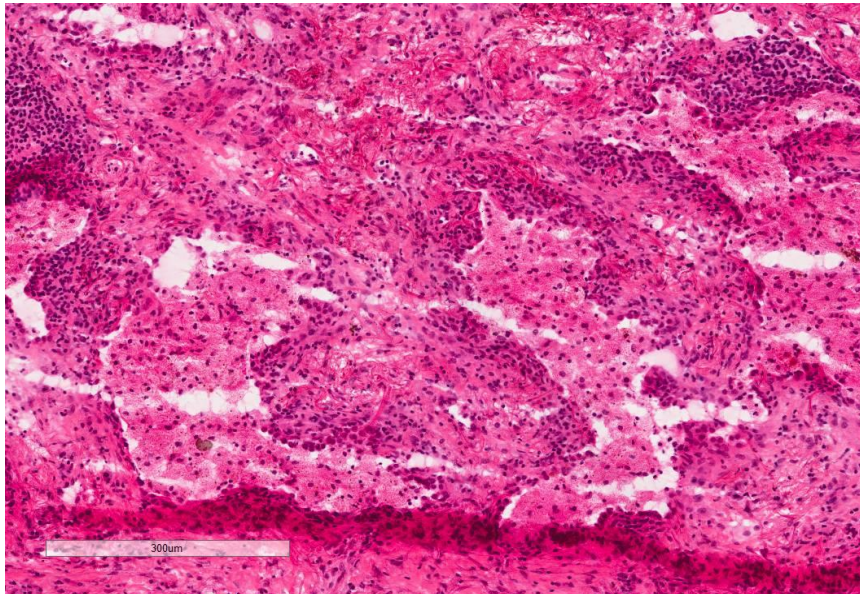
Reactive lung



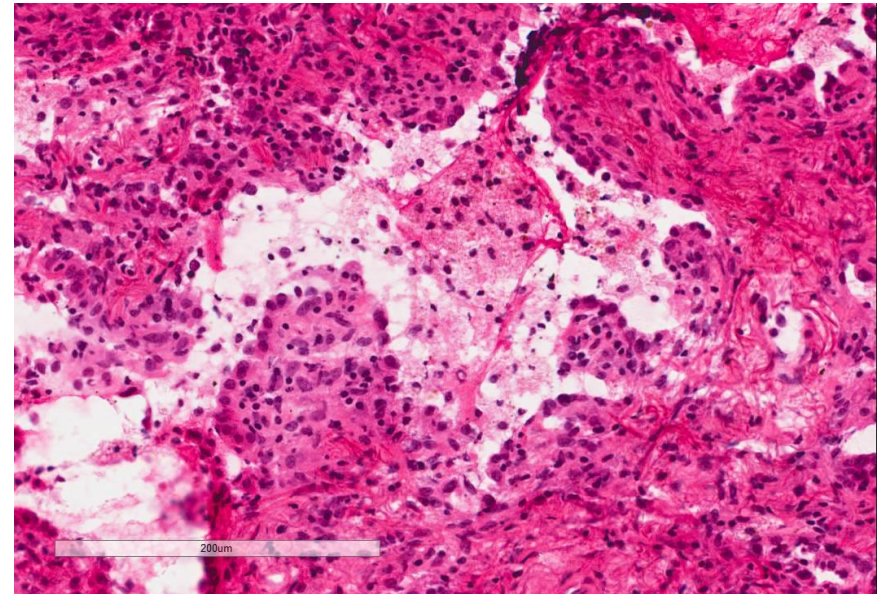
Diffuse process



Septal inflammation and fibrosis +++

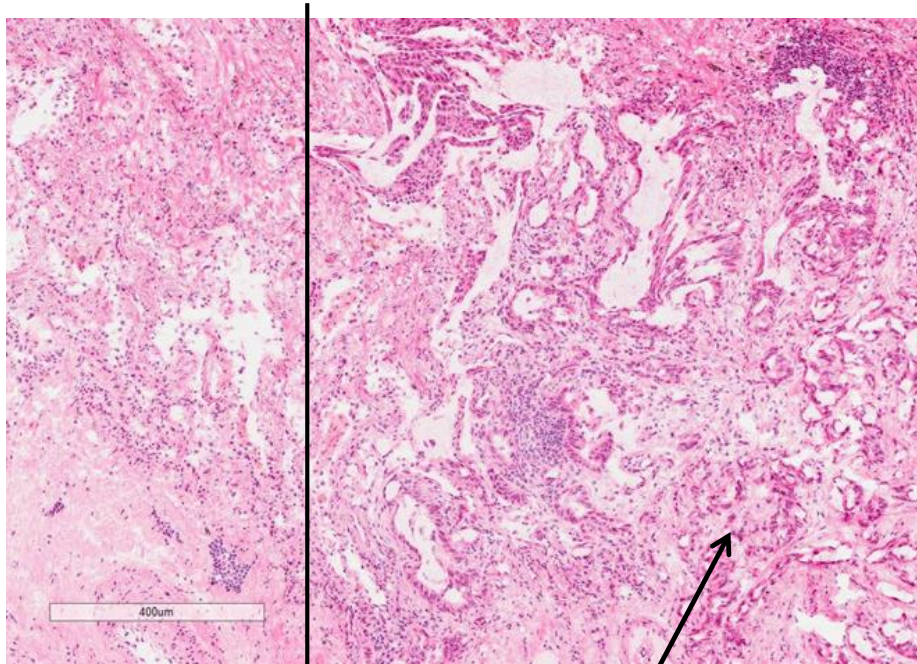


Organising pneumonia



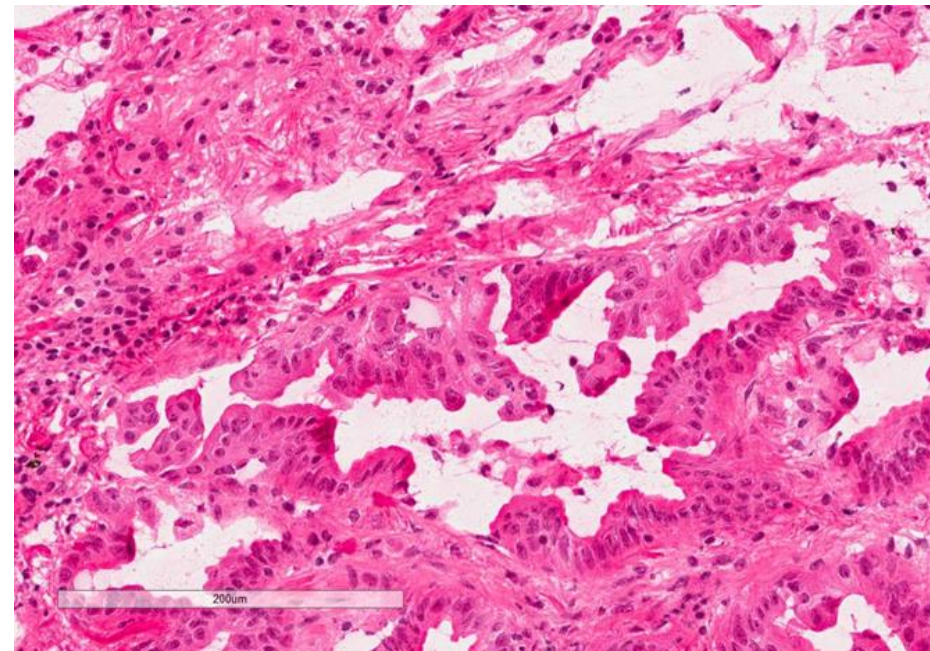
Type 2 pneumocyte hyperplasia – mild atypia

Adenocarcinoma



Sharp Demarcation

Loss of normal architecture



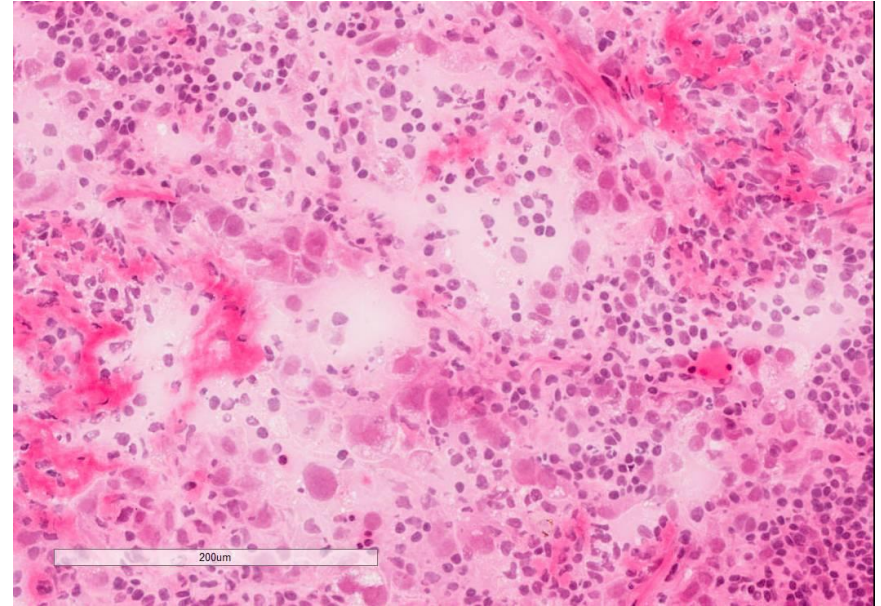
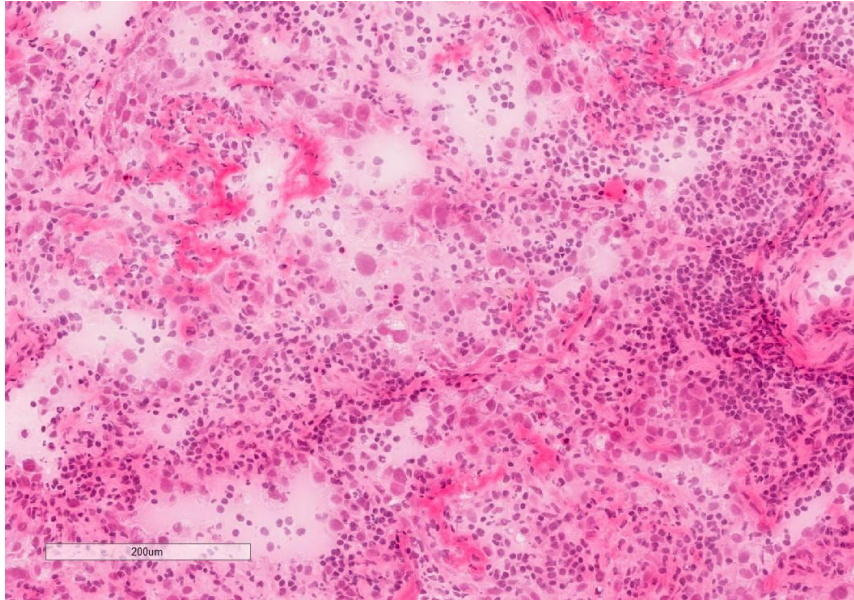
Tufting and multilayering

Uniform atypia

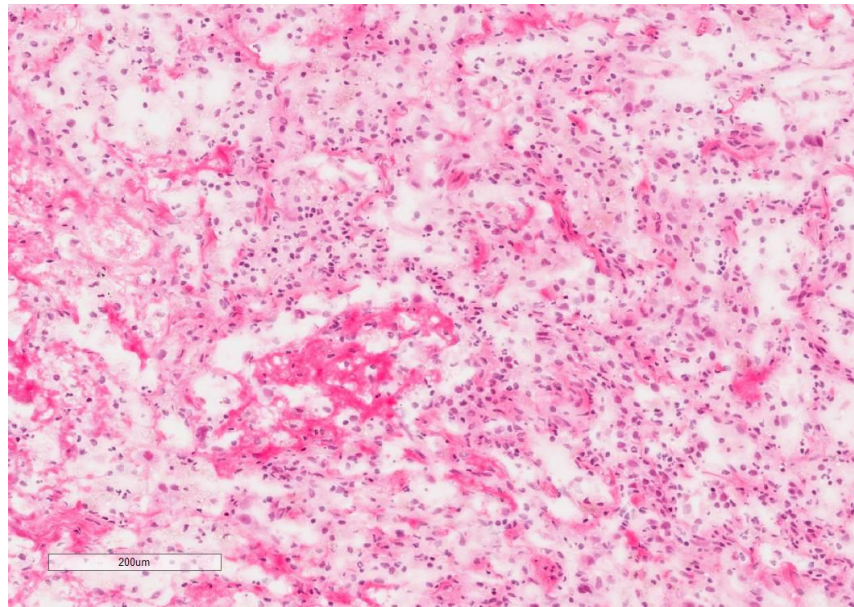
“hard” appearance to
cytoplasm

No associated inflammation

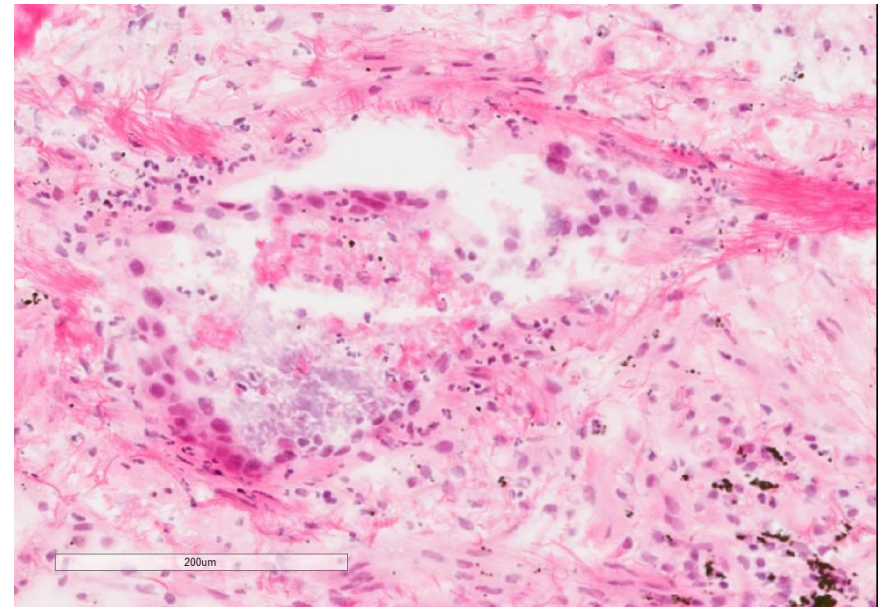
Reactive lung



Random epithelial atypia with inflammation

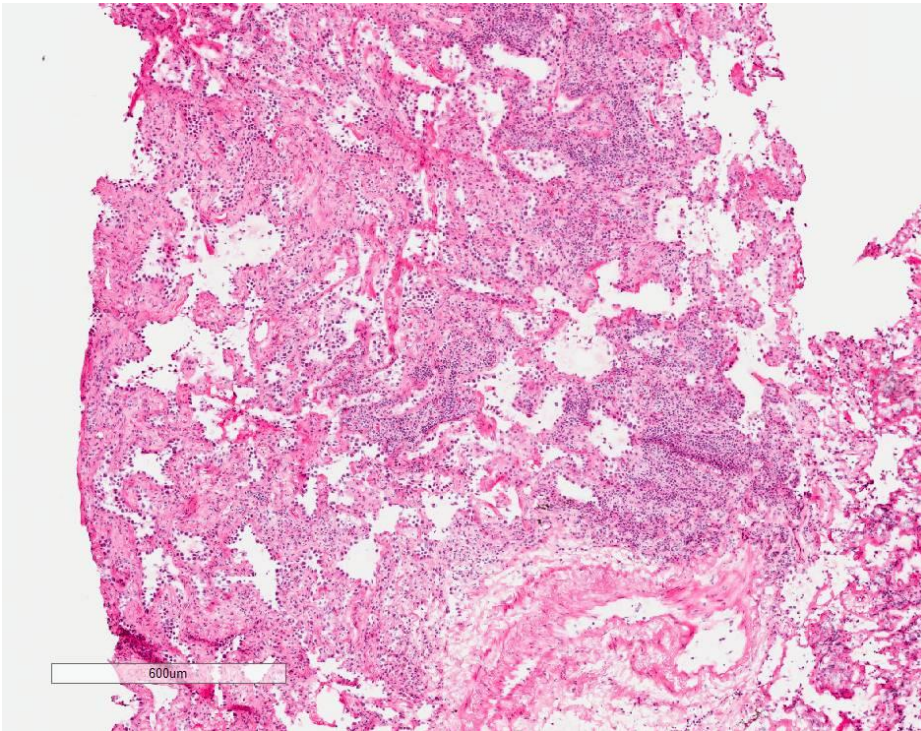


Fibrin and inflammation

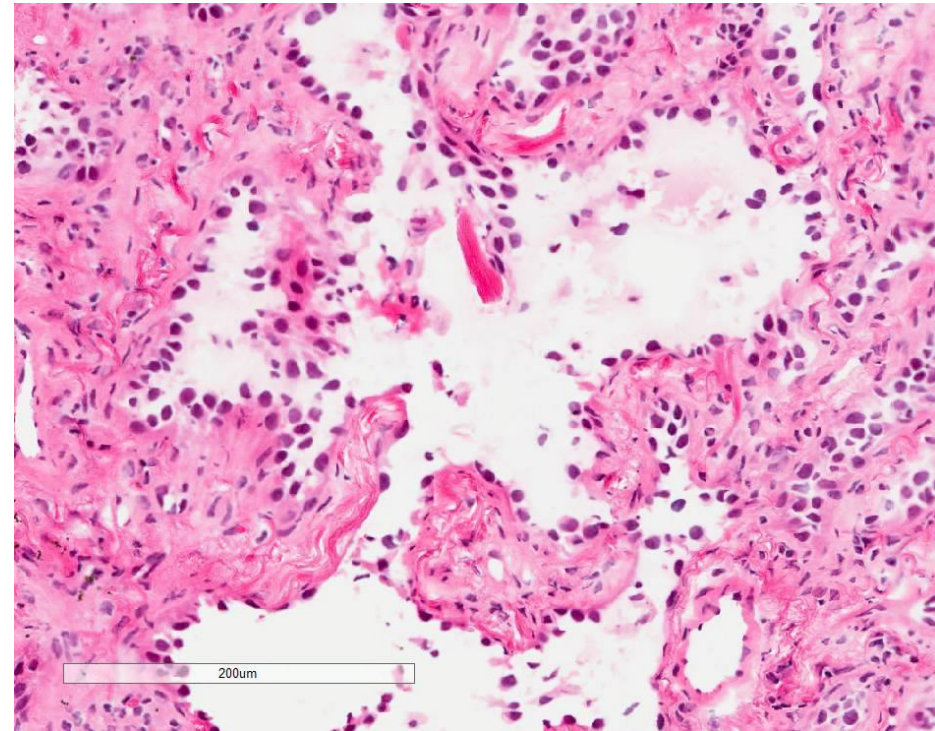


Epithelial atypia and acute inflammation

Adenocarcinoma

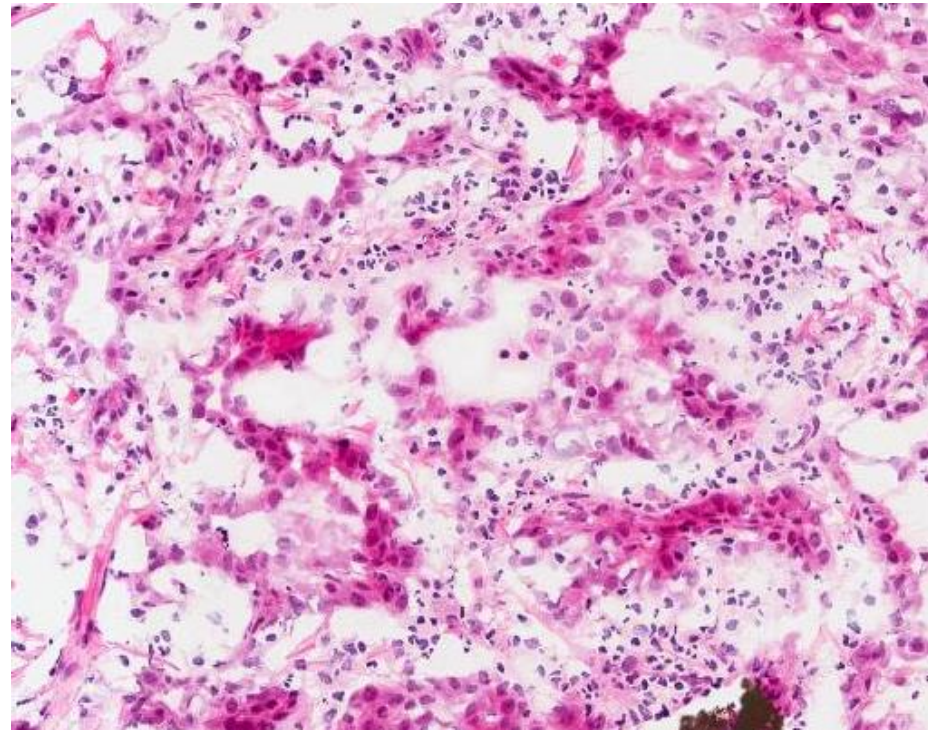
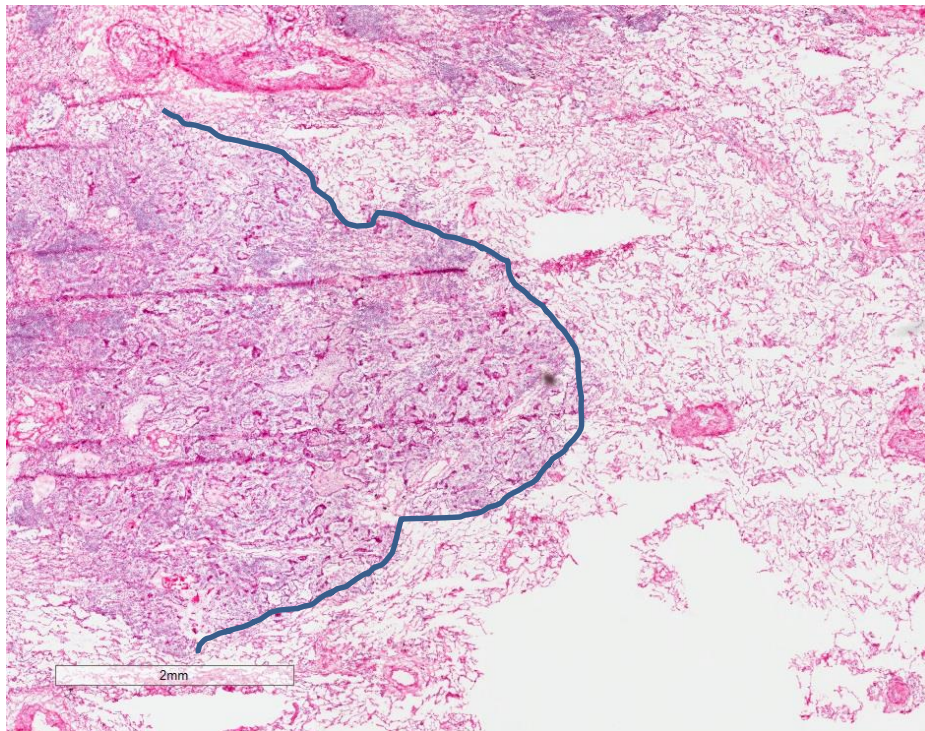


Fibrosis



Monotonous atypia

Inflamed tumour

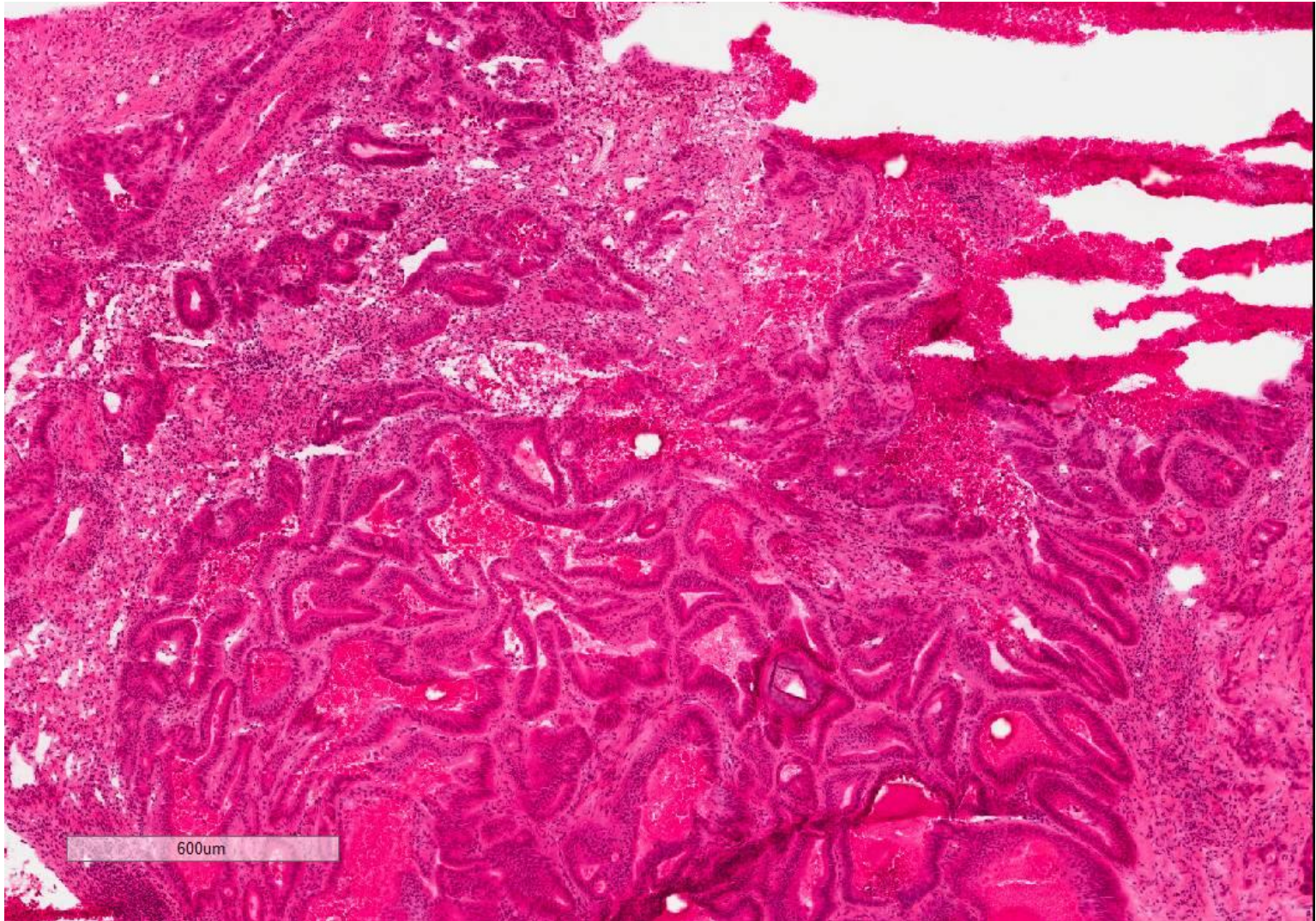


Sharp demarcation

Primary vs Secondary

- Some are more obvious
 - Colorectal carcinoma
 - Clear cell renal cell carcinoma
 - Thyroid carcinoma
- Some are less obvious
 - Breast carcinoma
 - Pancreatic carcinoma
 - Squamous cell carcinoma anus/H&N
 - Melanoma
- Intraoperative TTF-1 IHC?

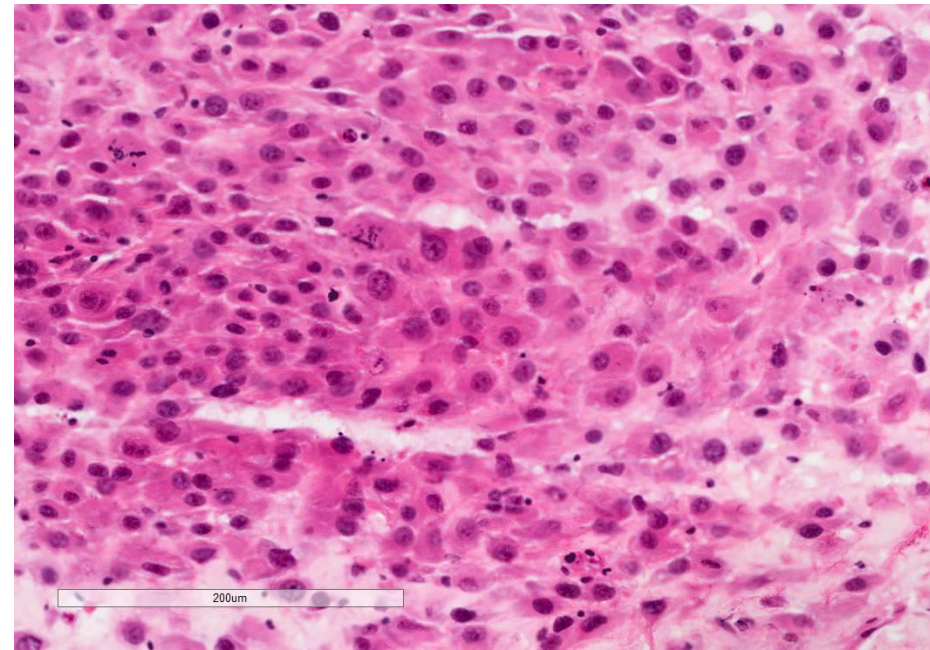
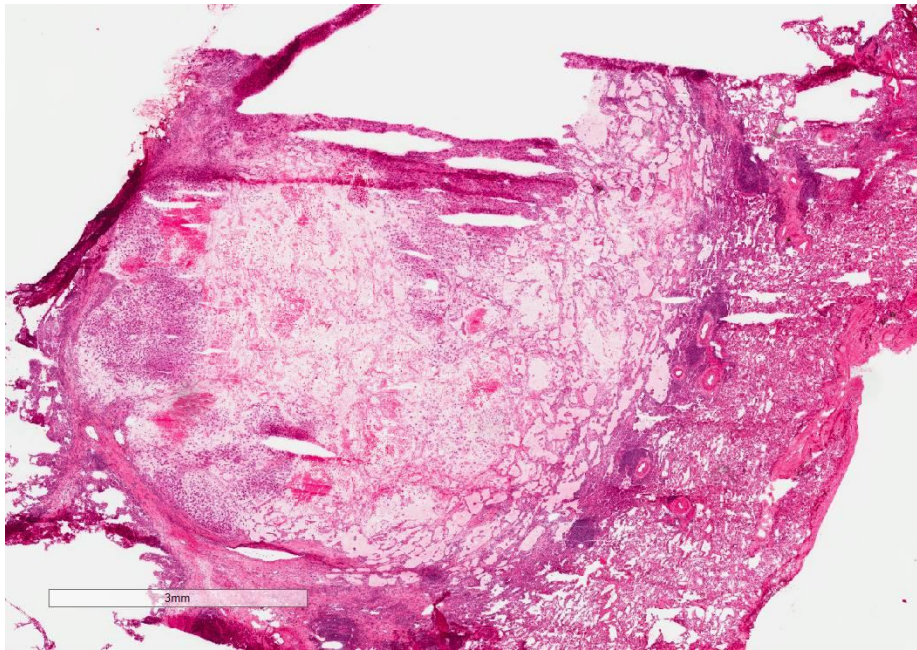
Sometimes it's clear



Metastatic colorectal carcinoma

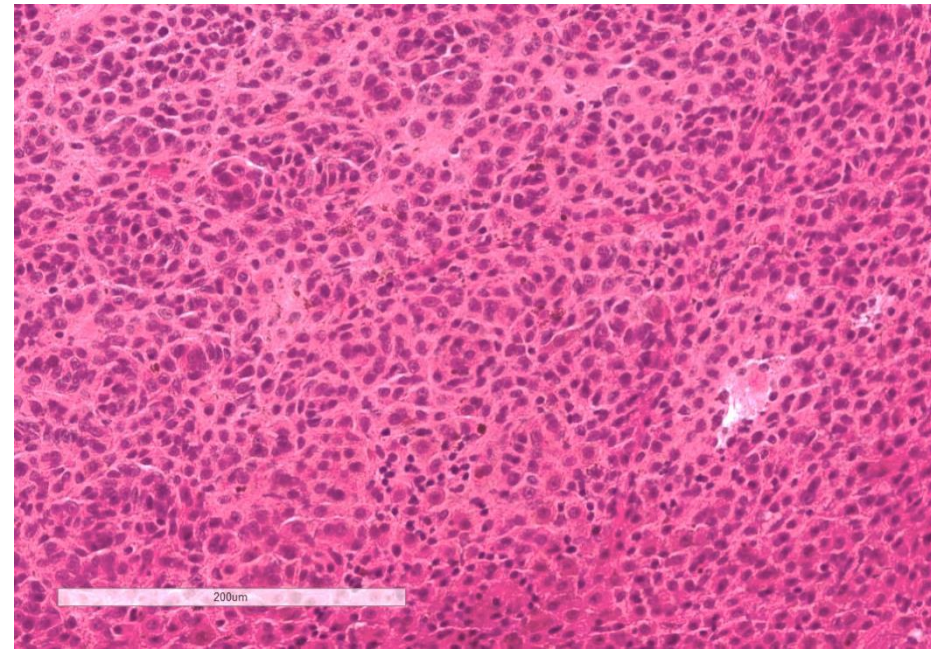
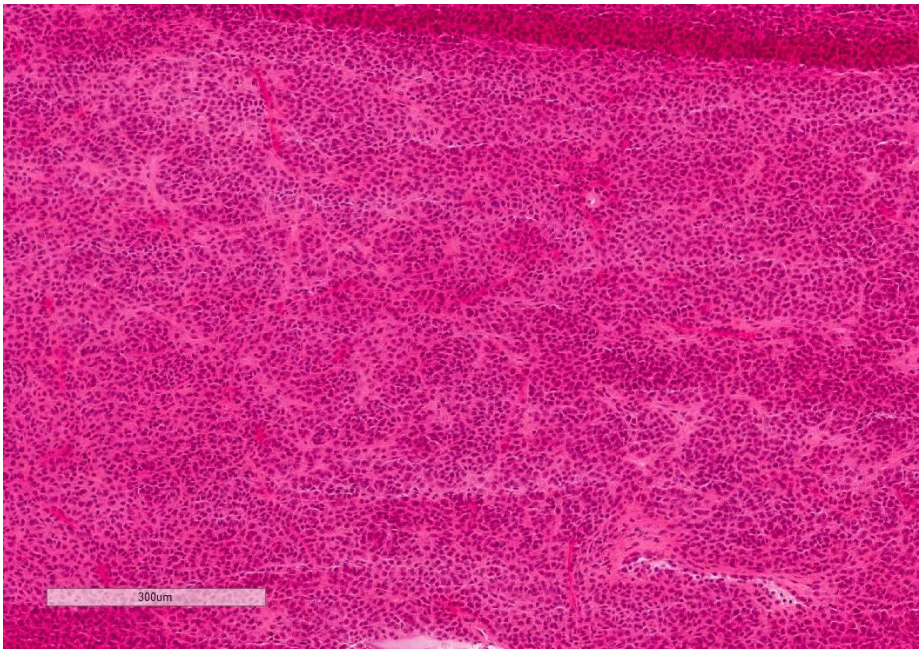
Sometimes it's not!

Clinical History Essential



Metastatic melanoma

“Previous TCC ? Lung primary ? Met”

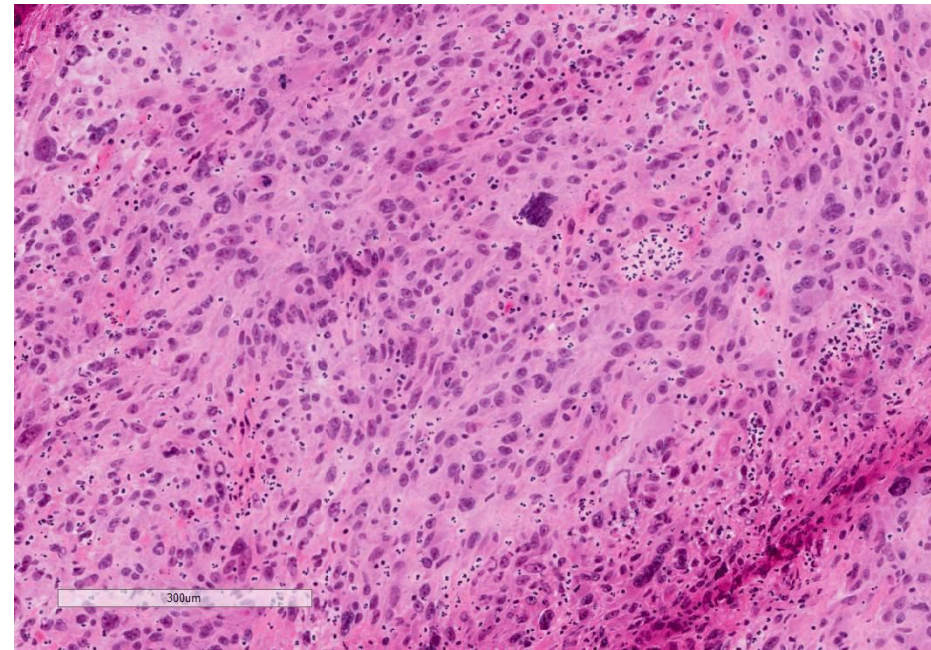
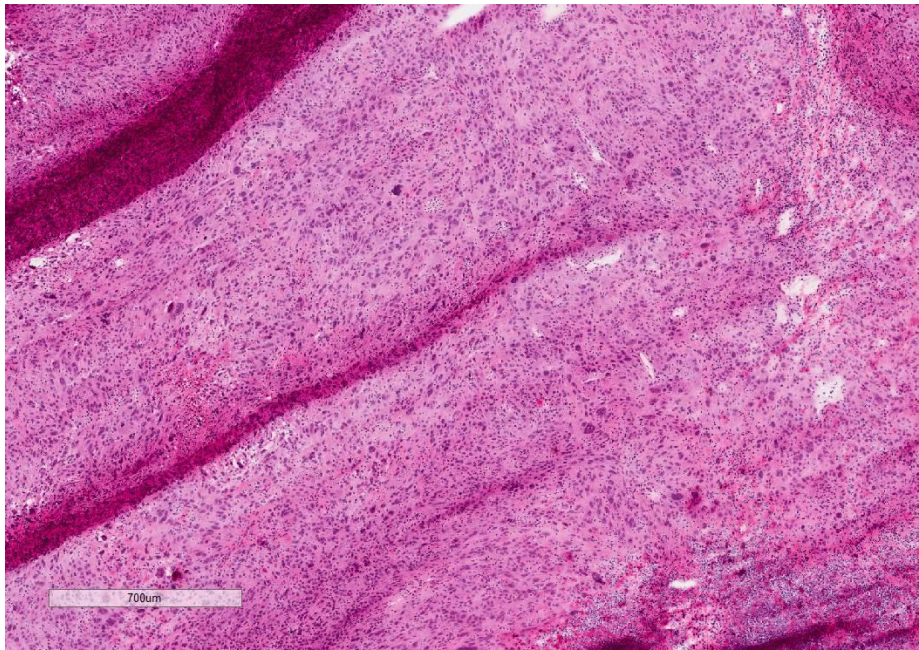


Metastatic melanoma – melanin present

Go as far as confidently can

...but don't push it

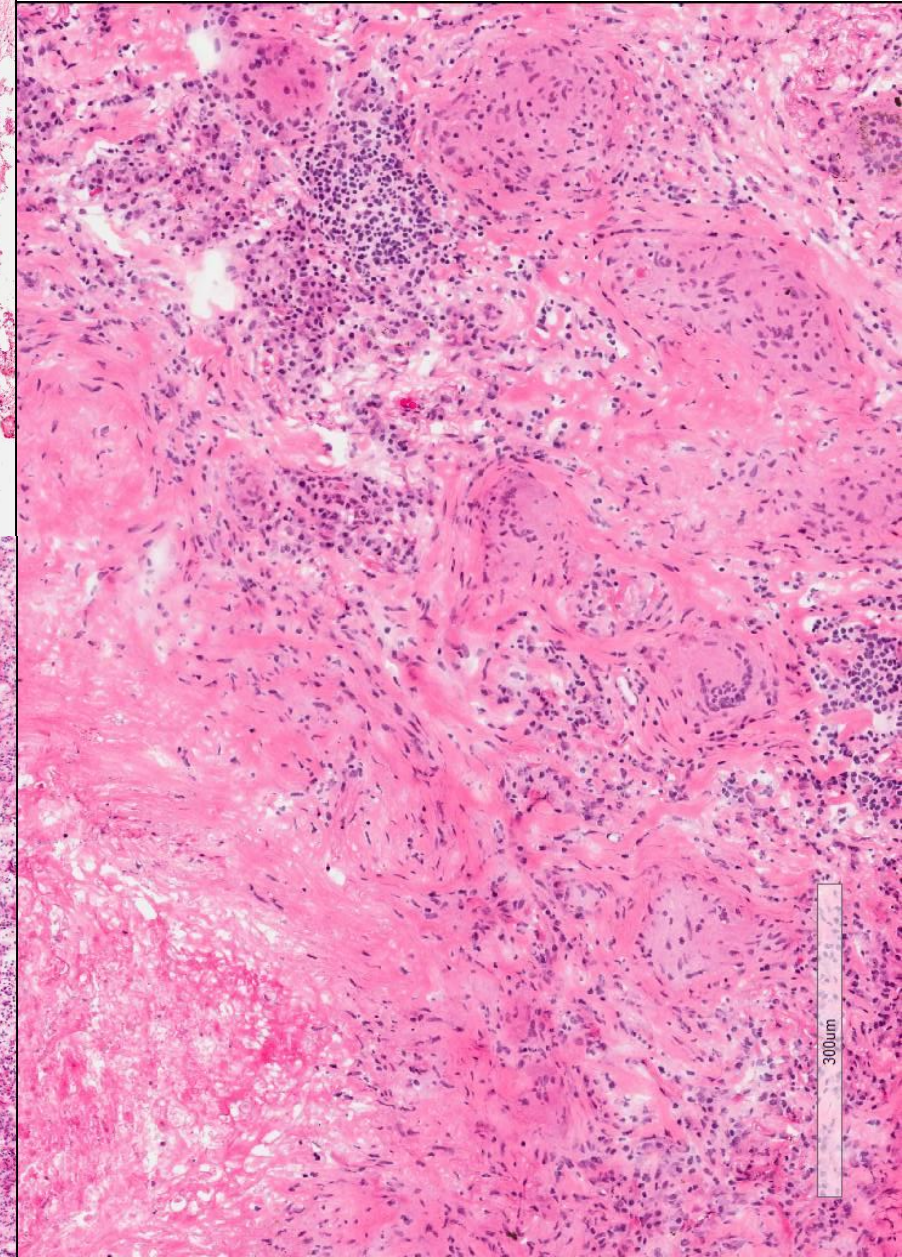
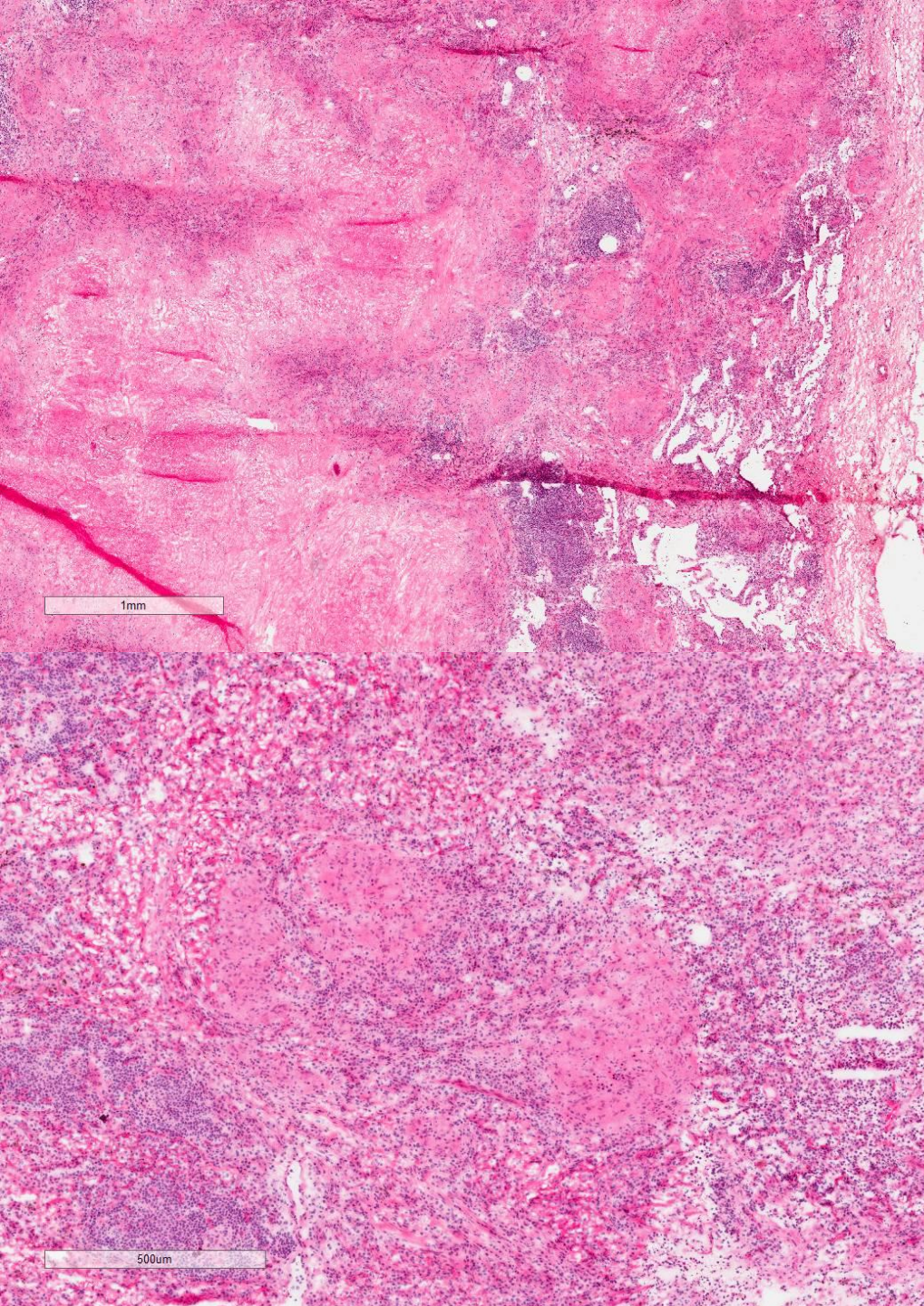
Malignant neoplasm NOS



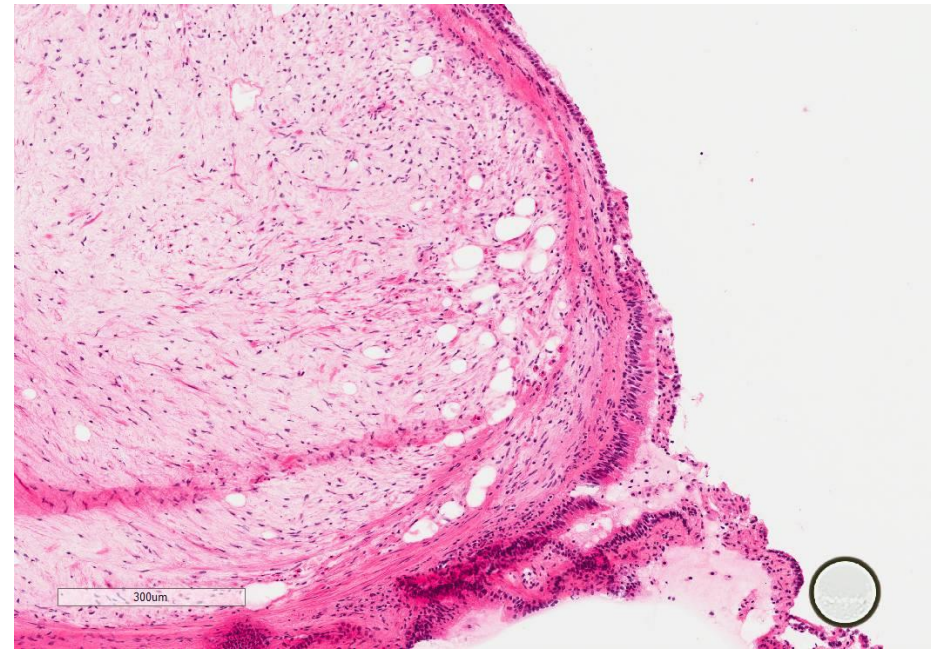
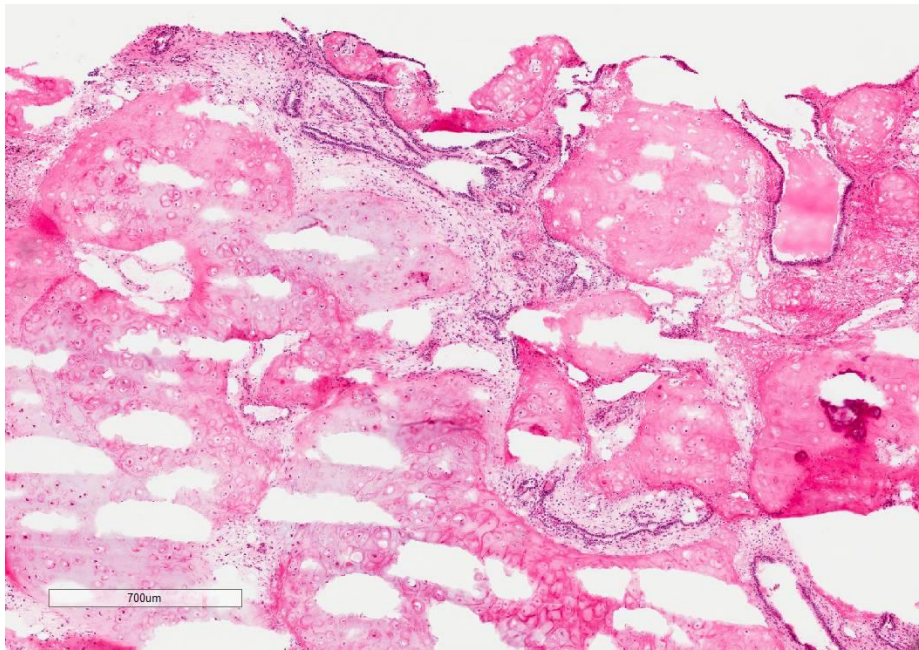
Benign Lesions

- Inflammatory
 - Granulomas
 - Organising pneumonia
- Fibrotic
 - Non-specific
 - Hyalinising granulomas
- Hamartoma
- Other

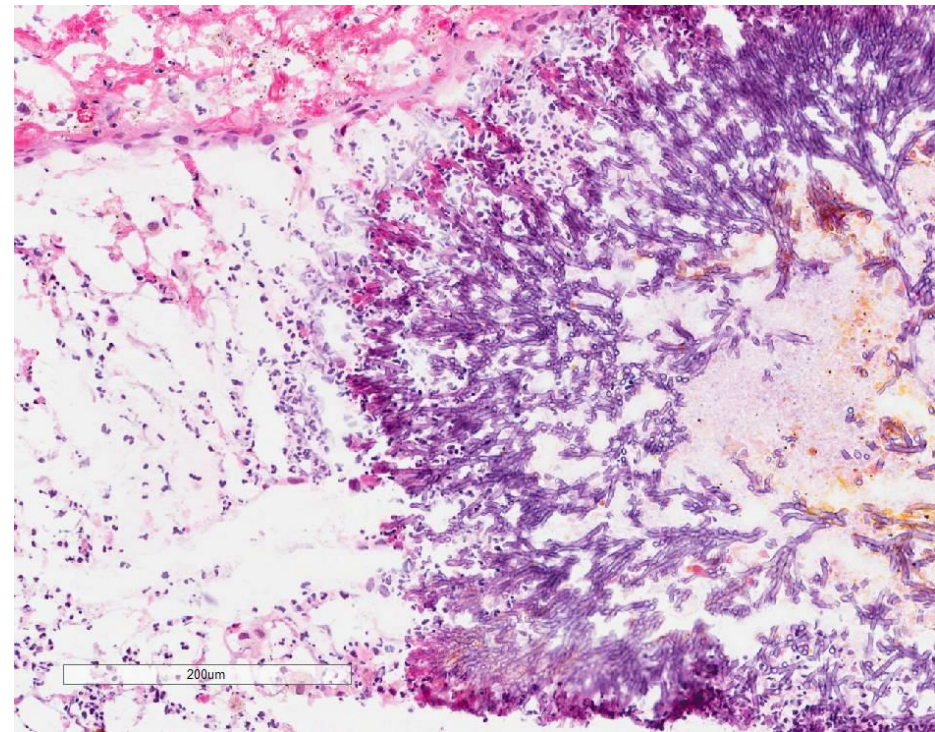
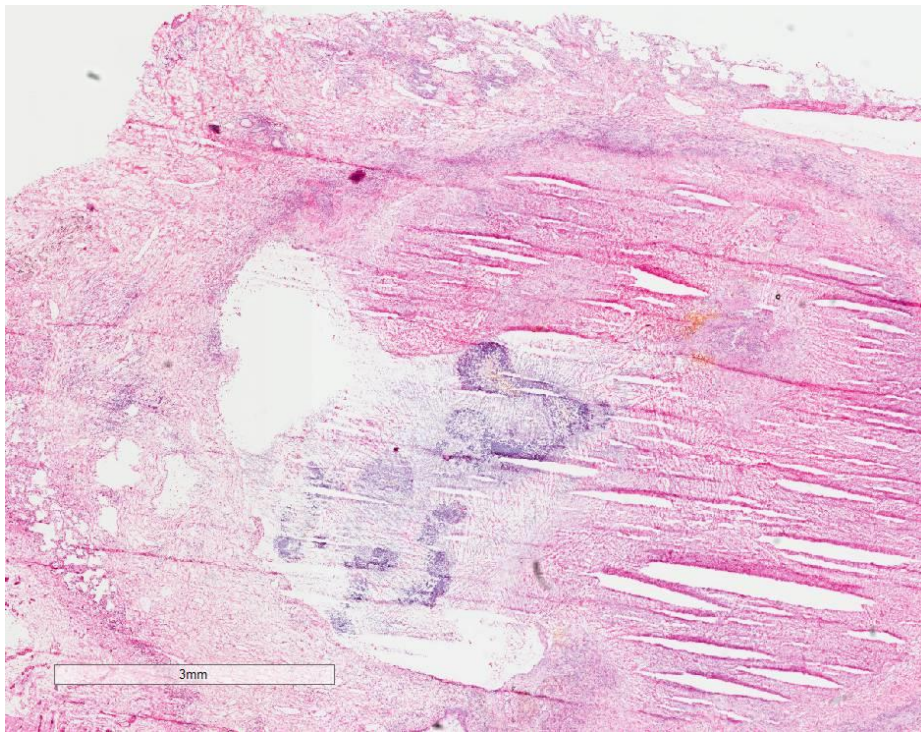
Granulomas



Chondroid hamartoma



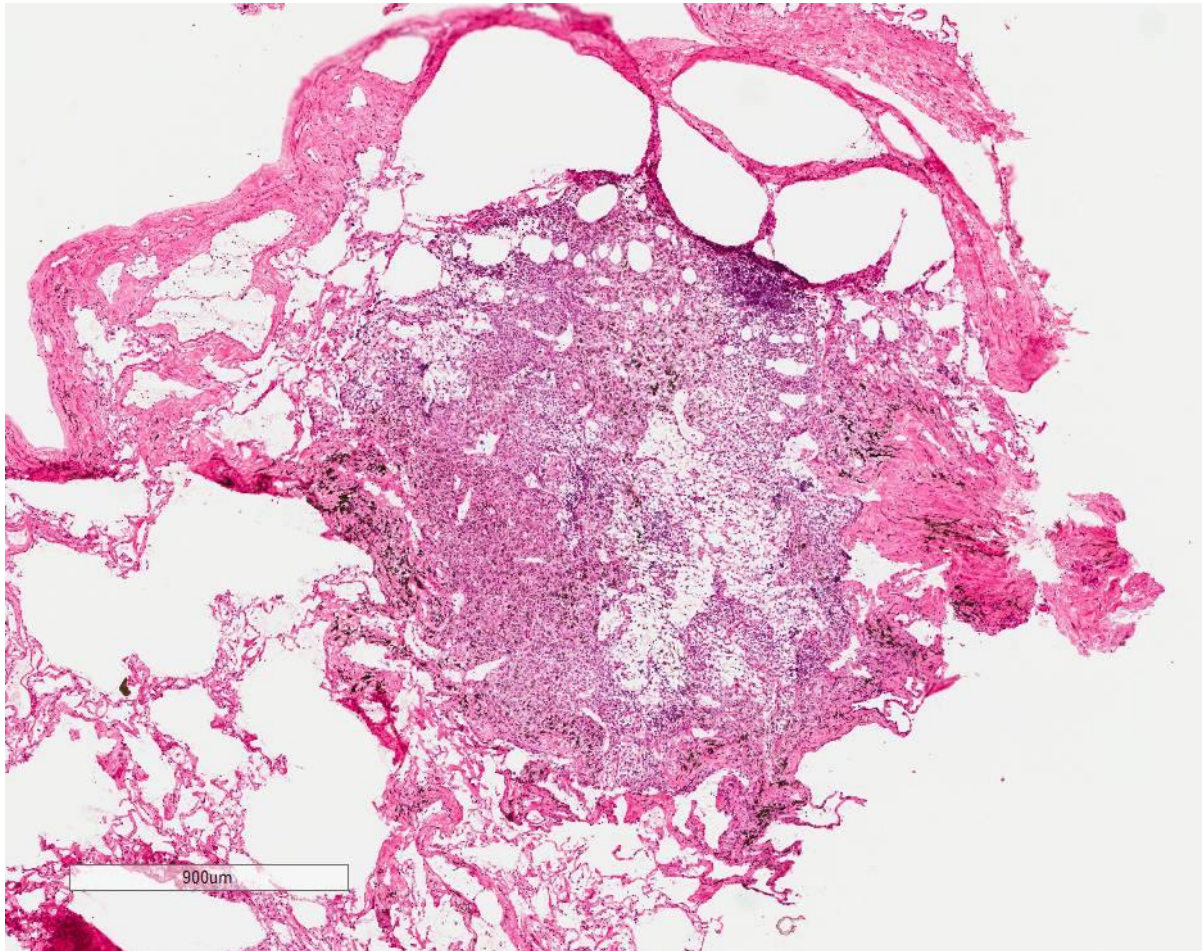
Necrotic nodule - Aspergilloma



Lung nodule - Lymphoid lesions

- Intrapulmonary lymph nodes
- Nodular lymphoid hyperplasia
- Lymphomas
 - Hodgkins
 - Non-Hodgkins
 - Low grade
 - High grade

Lymphoid lesions

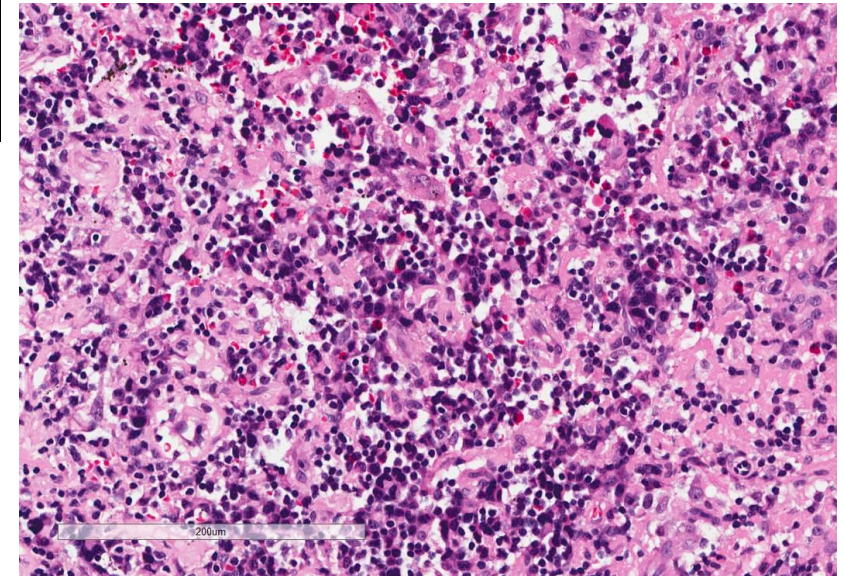
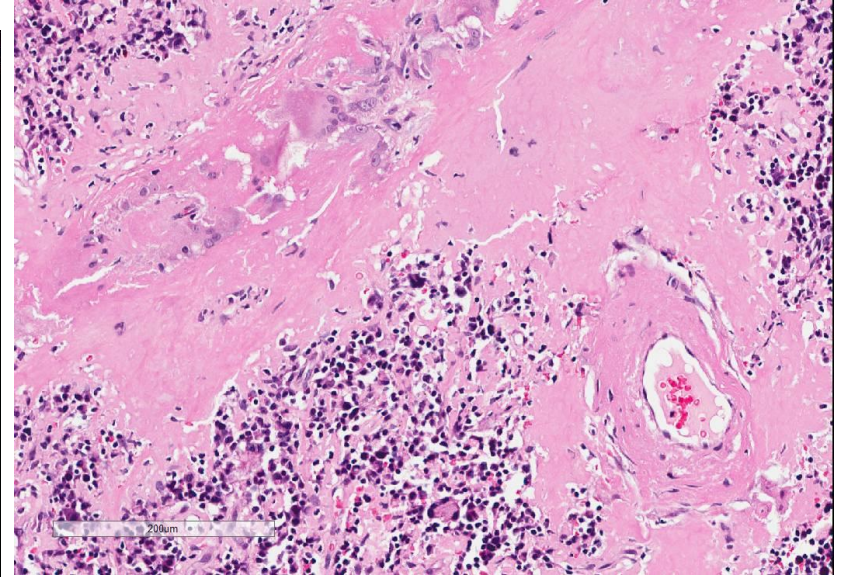
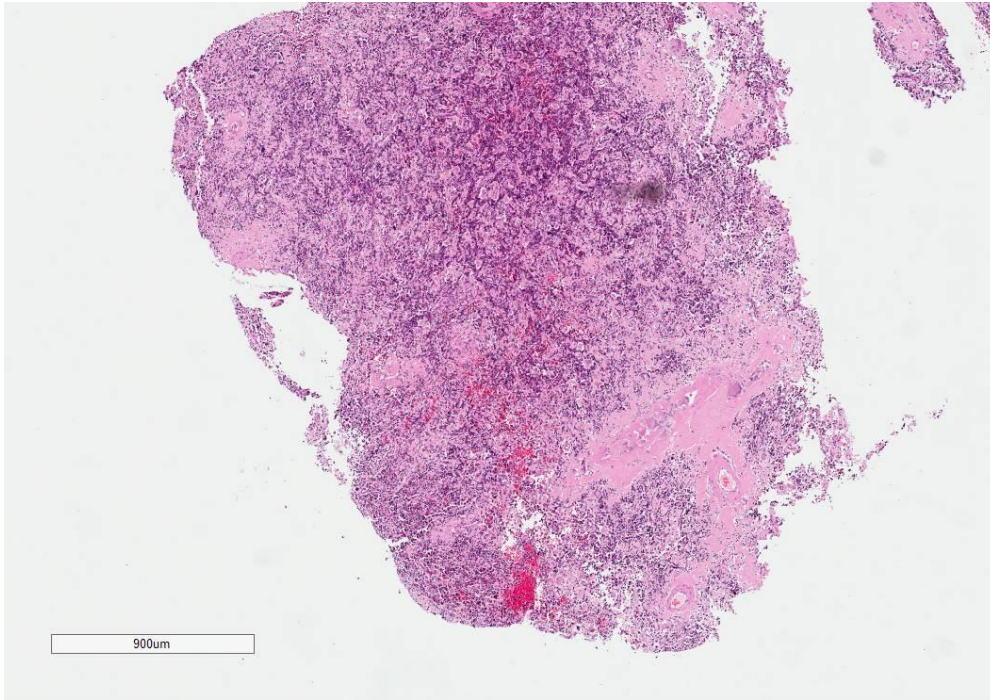


Intra-pulmonary lymph node

Lymph node staging and investigation of mediastinal lymphadenopathy

- Embed whole node
- Inspect sub-capsular sinus
- Beware small cell carcinoma
- Beware other pathologies
 - Other tumours esp lymphoid
 - Benign mesothelial inclusions

“mediastinal lymphadenopathy ? cause”



Amyloid and plasmacytoma

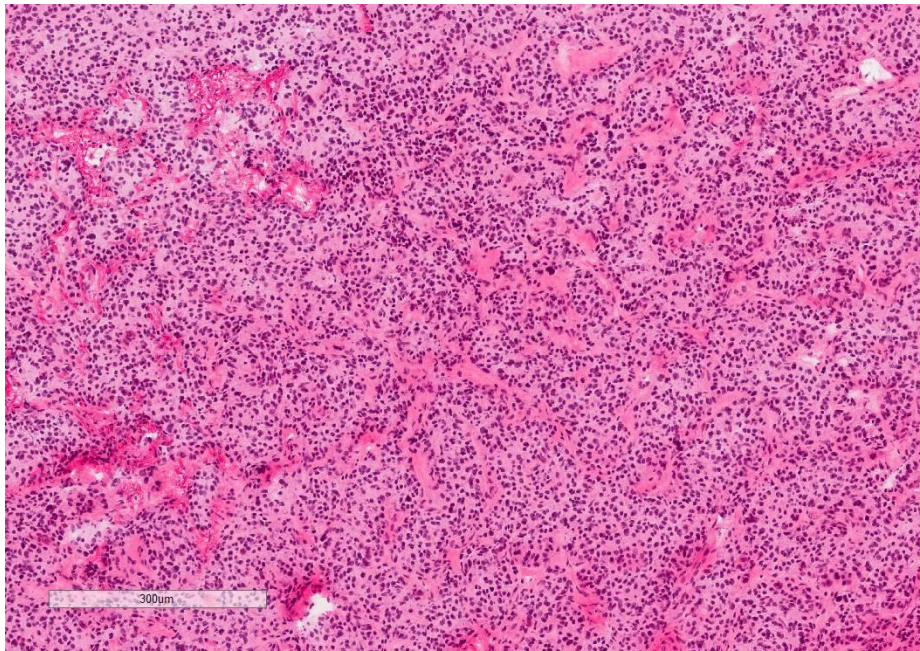
Margins

- Bronchial margin
 - Look at peribronchial soft tissue
 - Mucosal lymphatic channels
 - CIS: Note presence but may not be prognostic
- Soft tissue and vascular margins
- Pleural margins

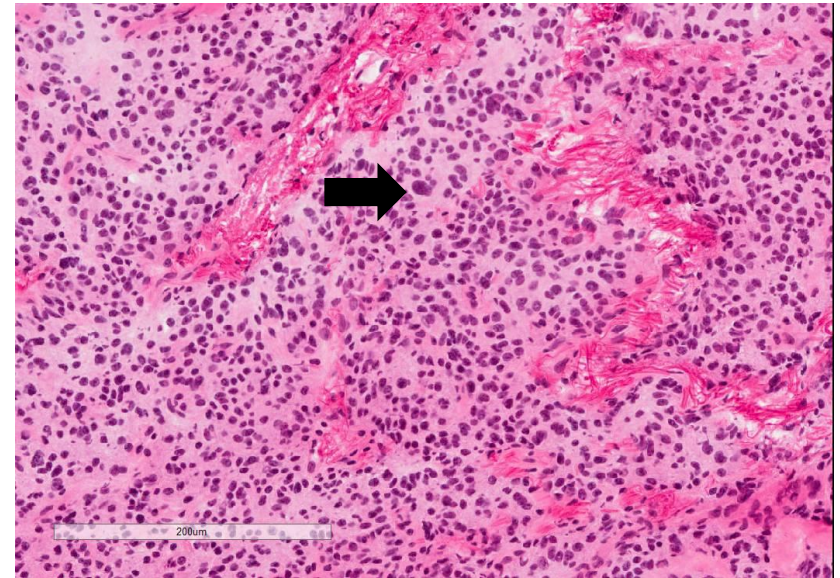
Neuroendocrine lesions

- Carcinoids: pitfalls
 - Cytological **atypia**
 - Peripheral **spindle** cell morphology
 - Can **grow under reactive type 2 pneumocytes** mimic adenoca
 - **Crush** artefact – mimic small cell
 - Overlying reactive **squamous atypia**

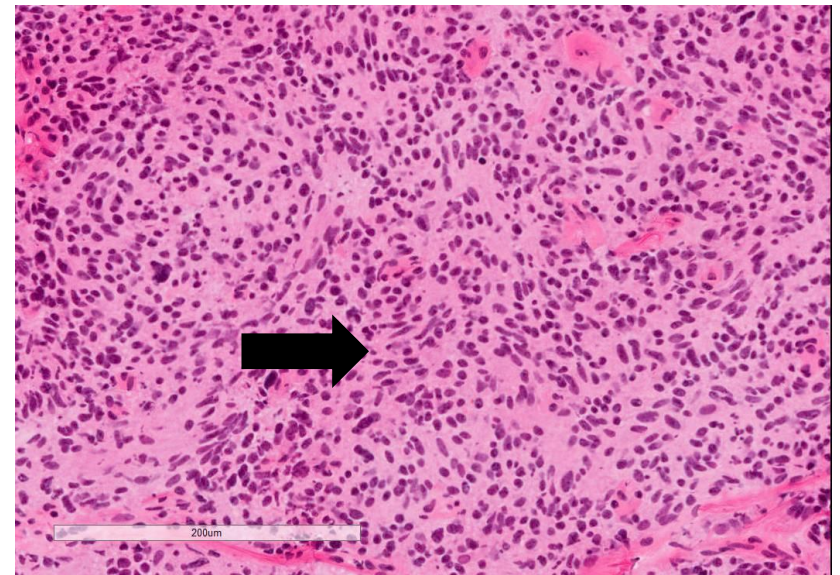
Carcinoid



Organoid architecture

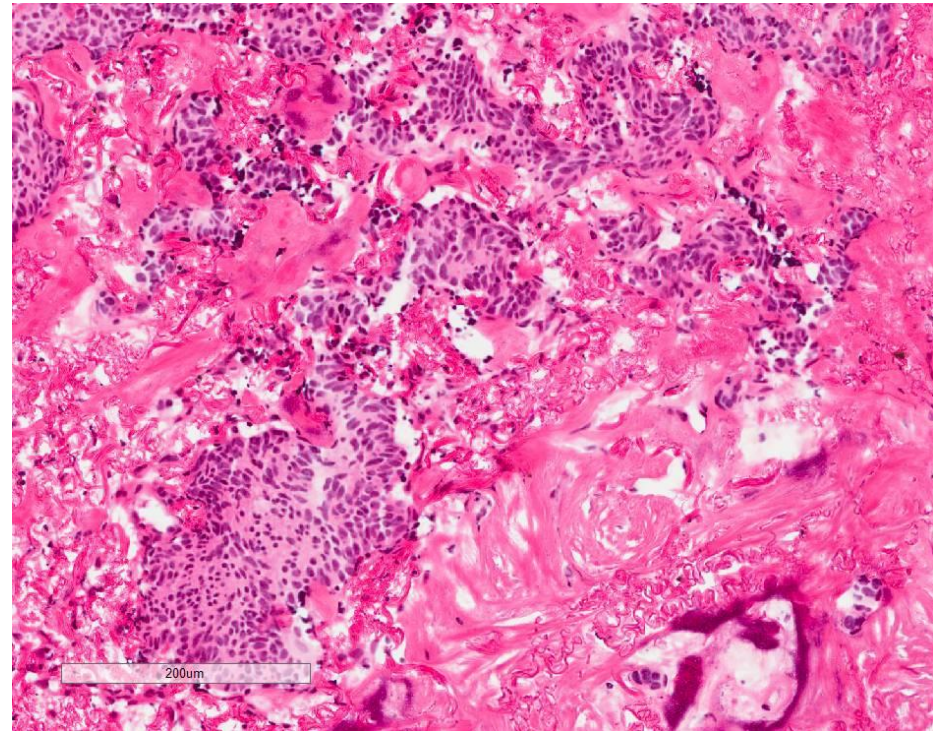
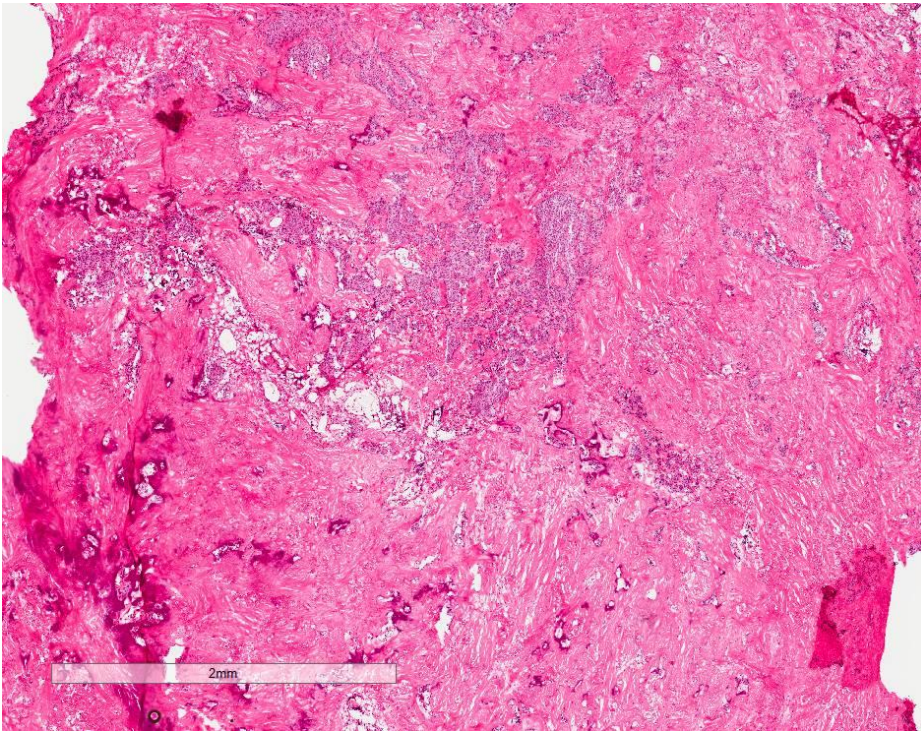


Random atypia



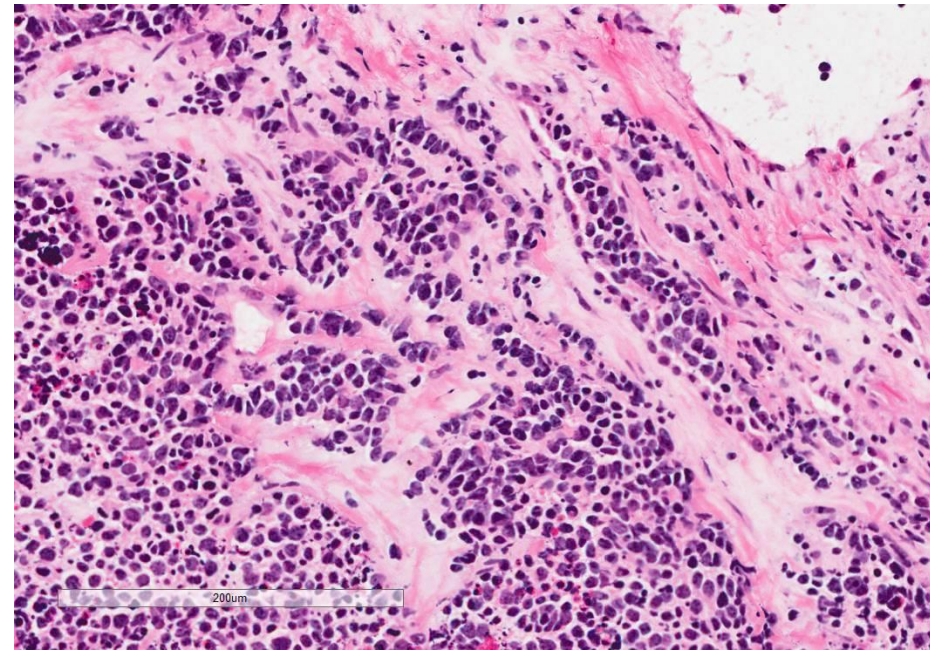
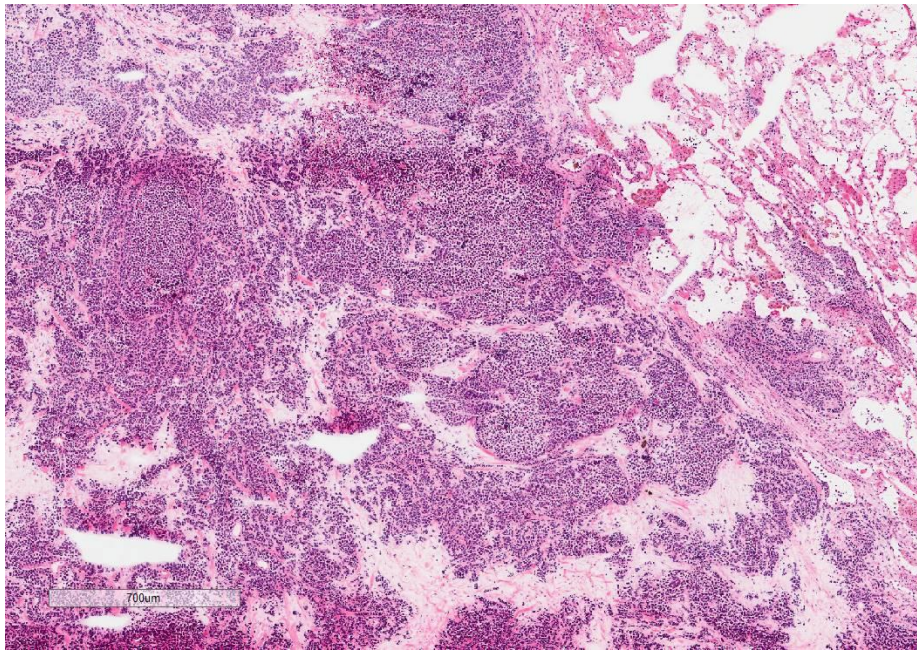
Spindle cell morphology

Sclerotic nodule - Carcinoid



Small cell tumours

Small cell carcinoma



Cells look bigger on FS

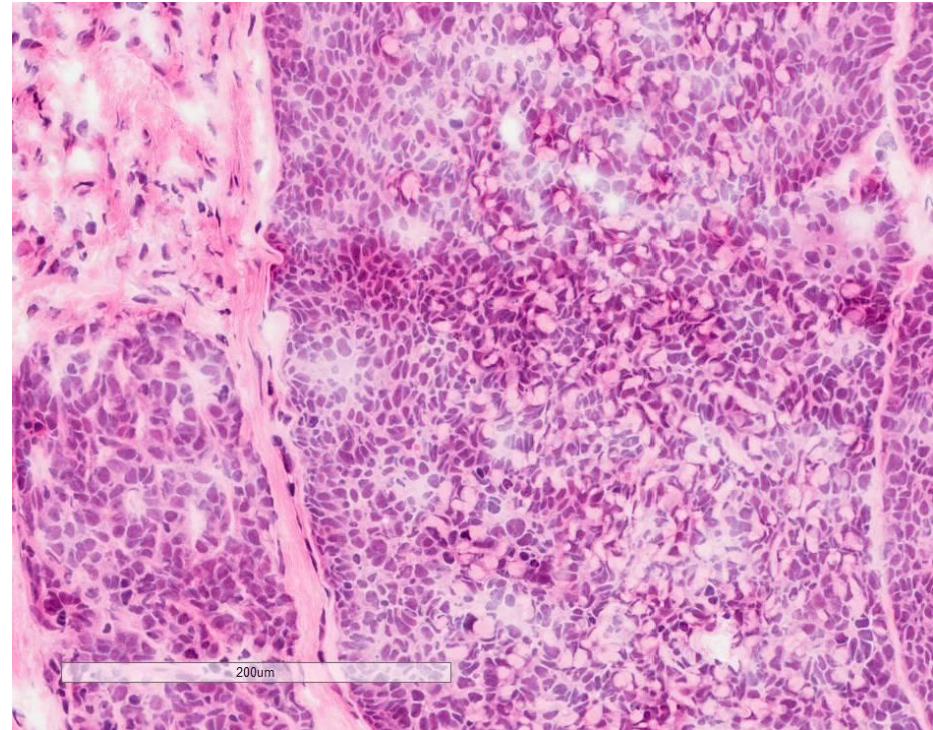
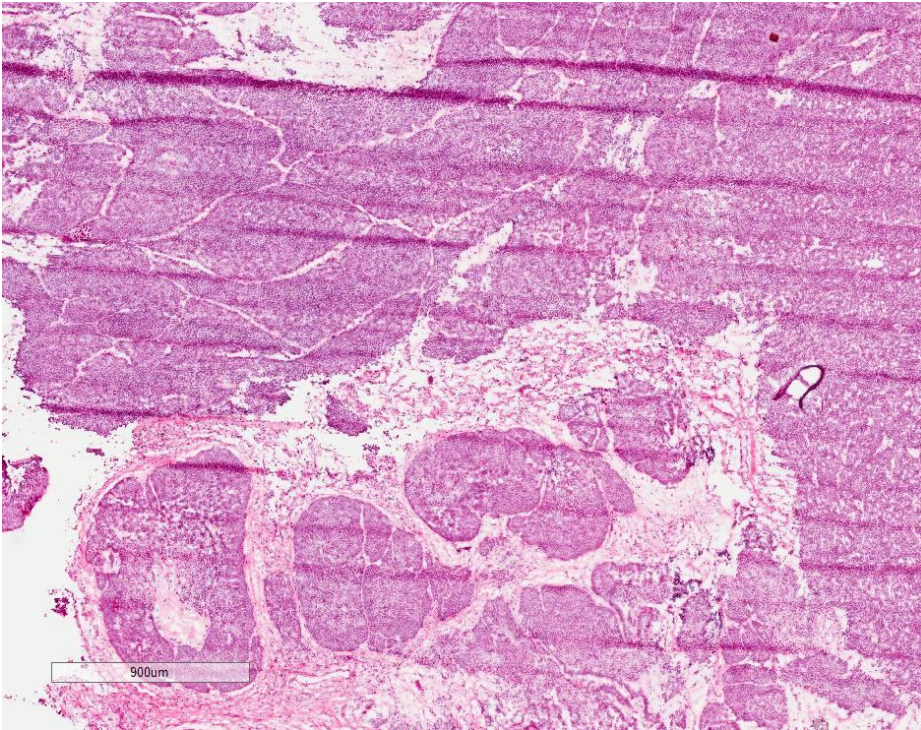
Apoptosis, necrosis, mitoses, moulding, smearing

Beware crush artefact

If in doubt – defer to paraffin

Other small cell tumours

Basaloid carcinoma

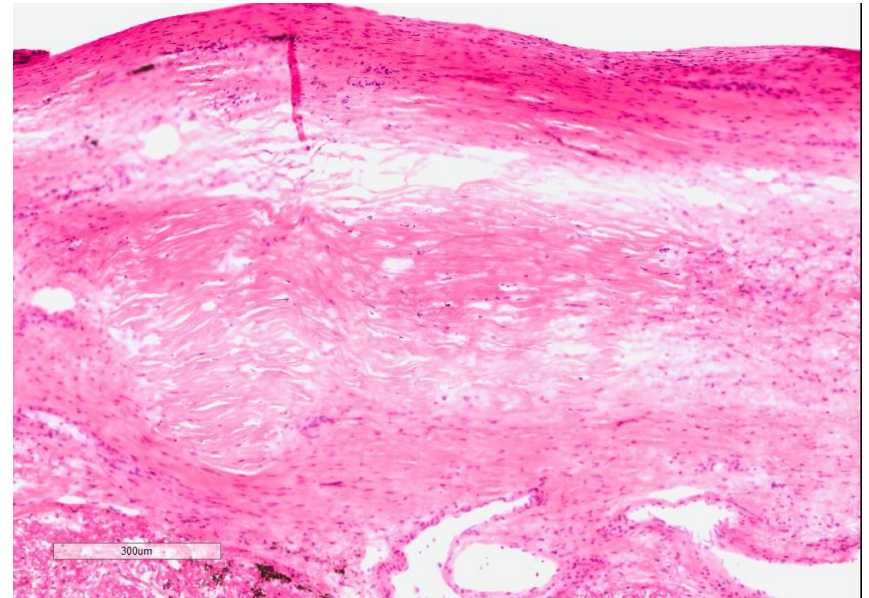
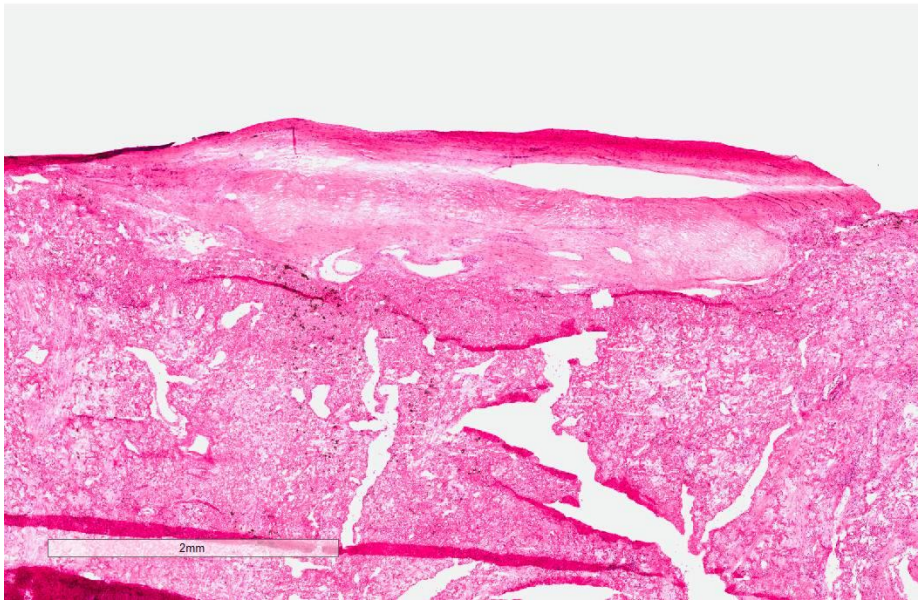


Basaloid cells in solid islands
Peripheral palisading
Hyaline basement membrane like material

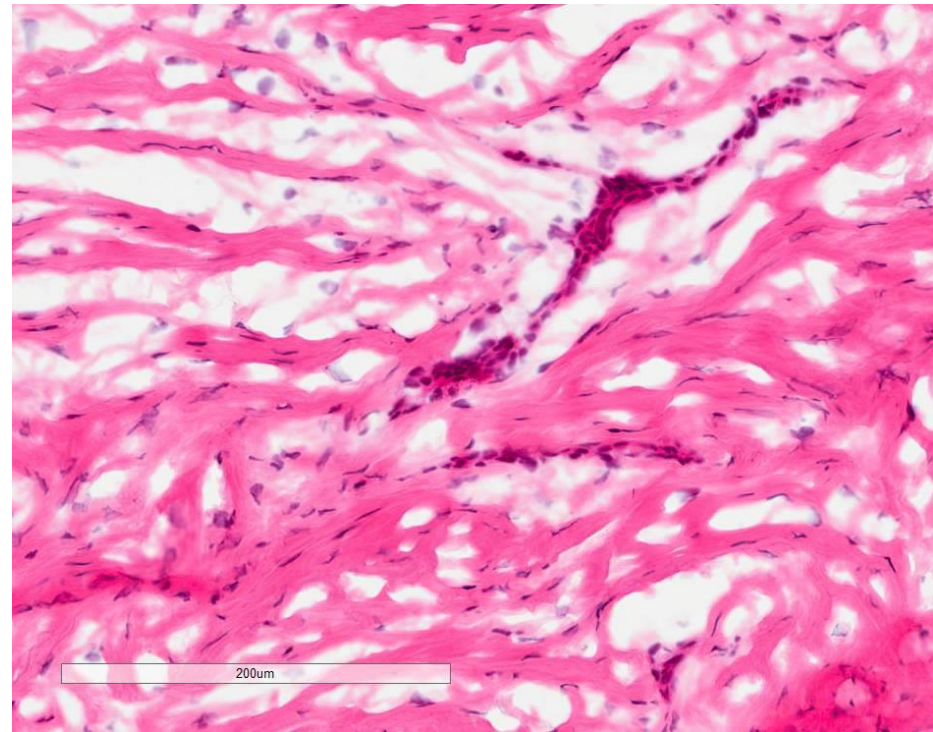
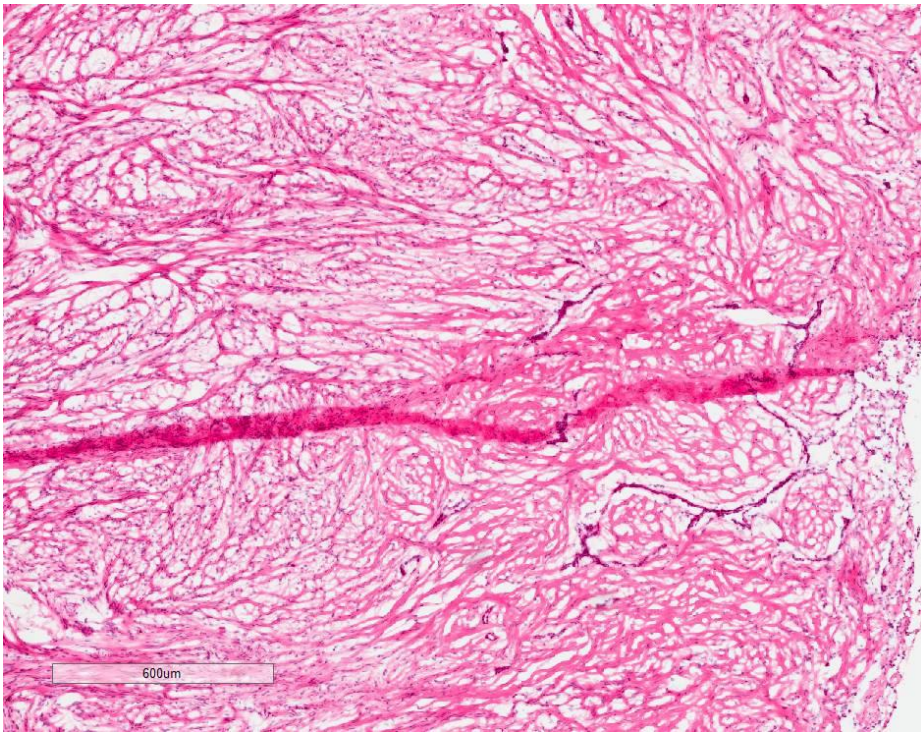
Pleura

- Benign vs malignant
 - Lesion seen on pleura during cancer resection.
- Rare tumours
- What if see dense fibrosis, no overt features of malignancy
 - “Favour reactive fibrosis but the possibility of desmoplastic mesothelioma cannot be entirely excluded”

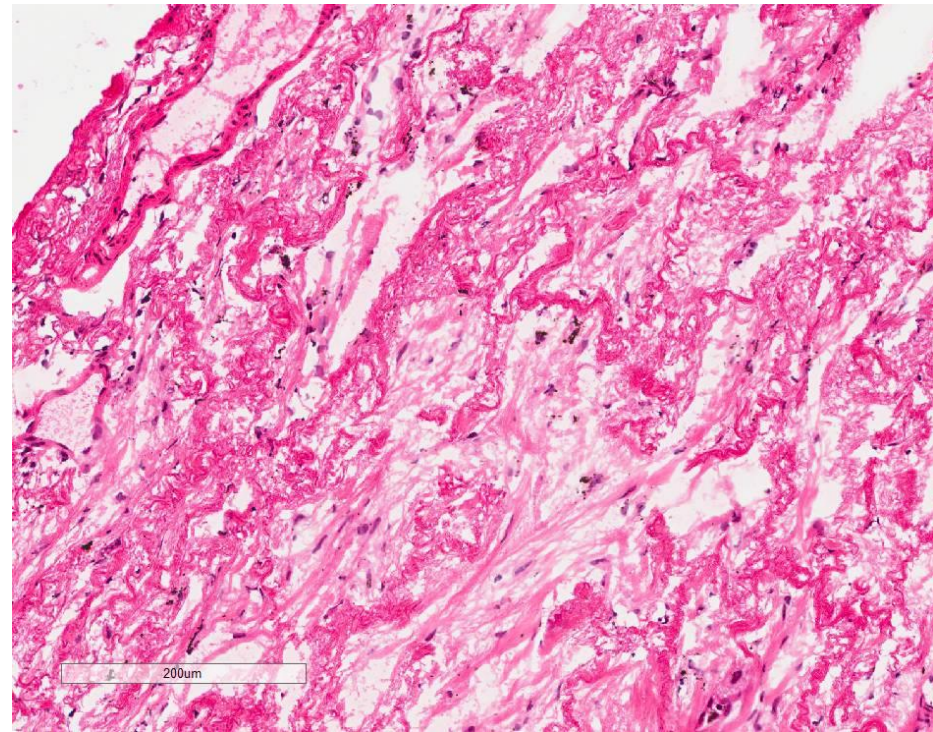
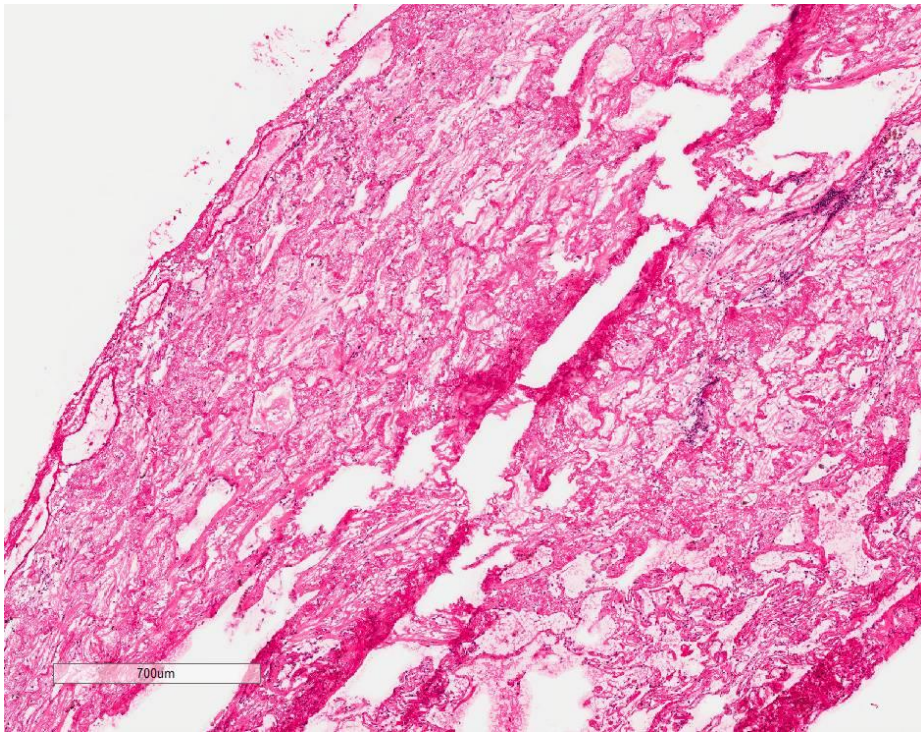
Pleural nodule – Pleural fibrosis



Pleural nodule - SFT



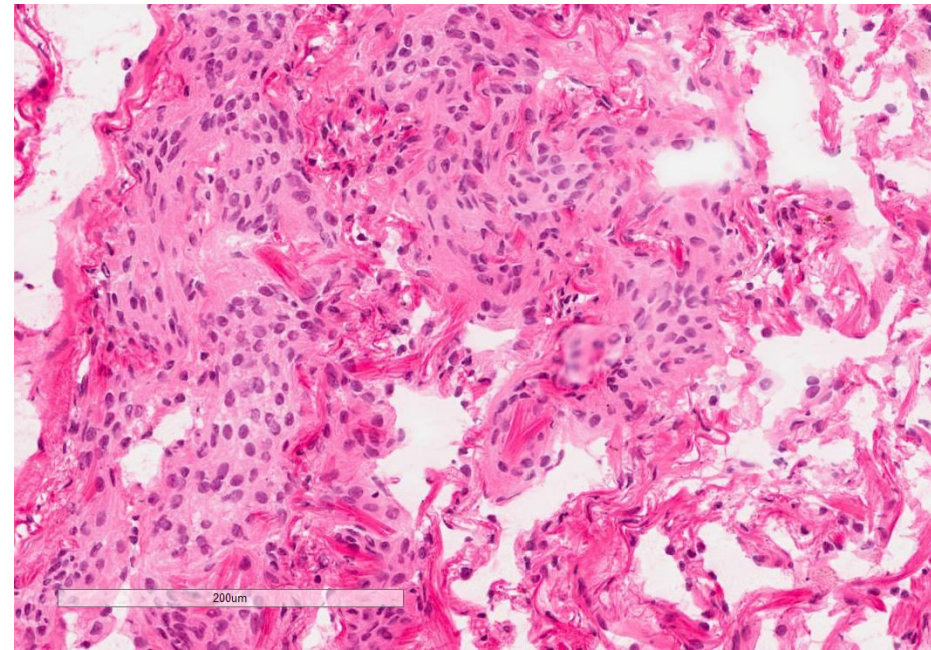
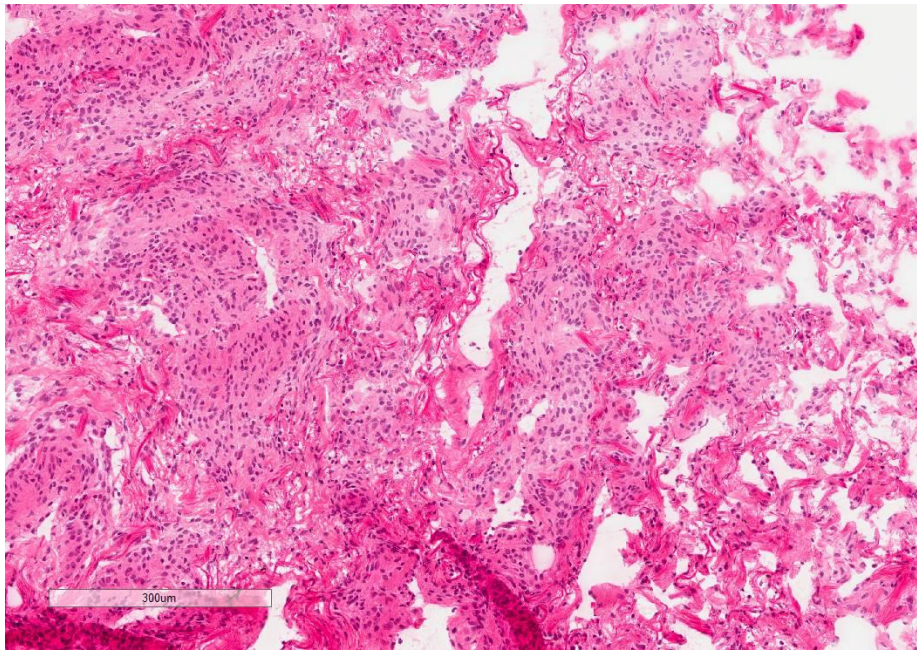
Sub-pleural nodule – Apical cap



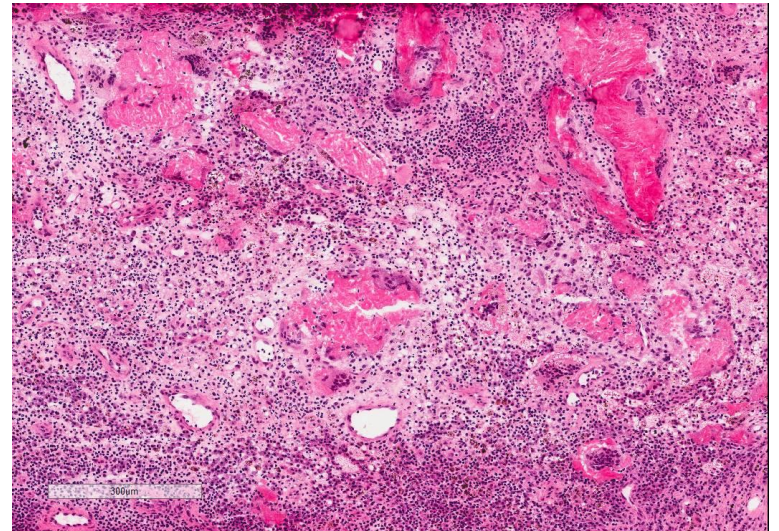
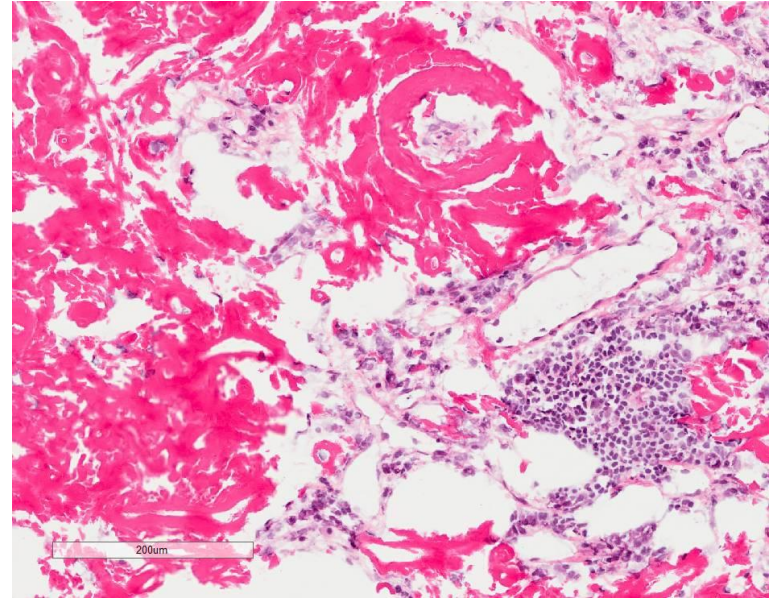
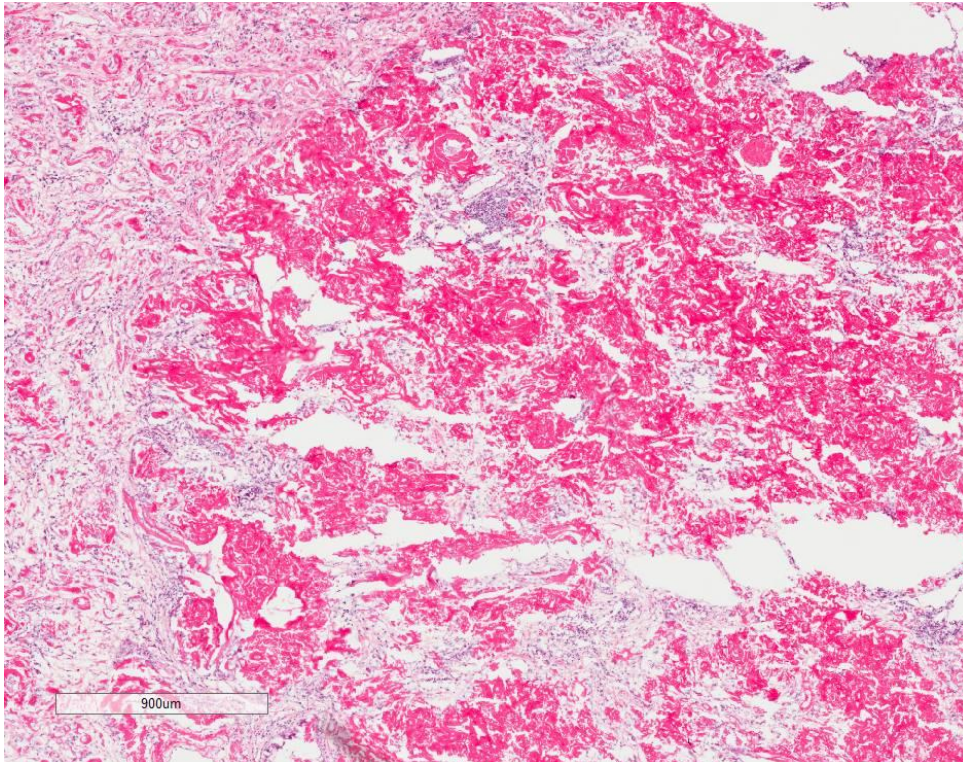
Oddities

- Incidental findings
 - Meningothelioid nodules
- Odd infiltrates
- Rare tumours

Meningothelioid nodule

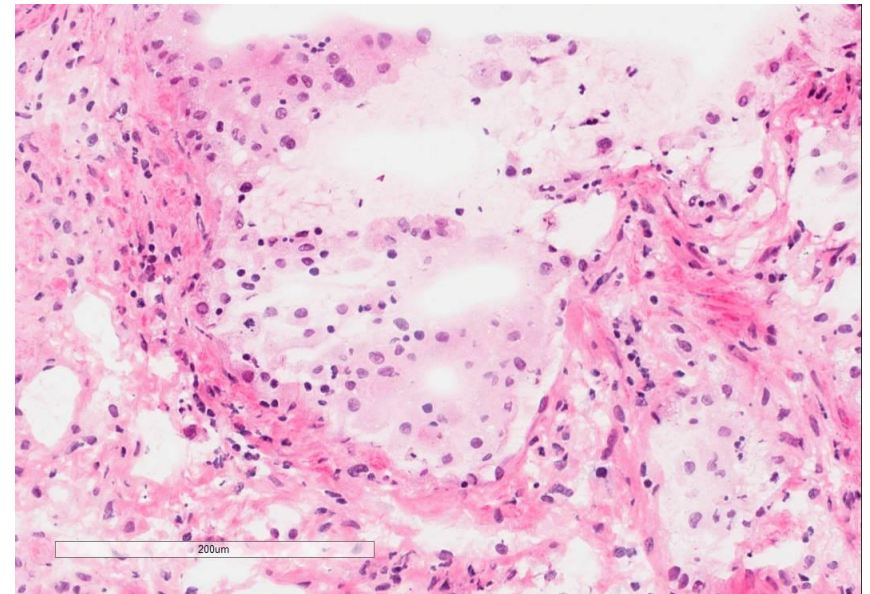
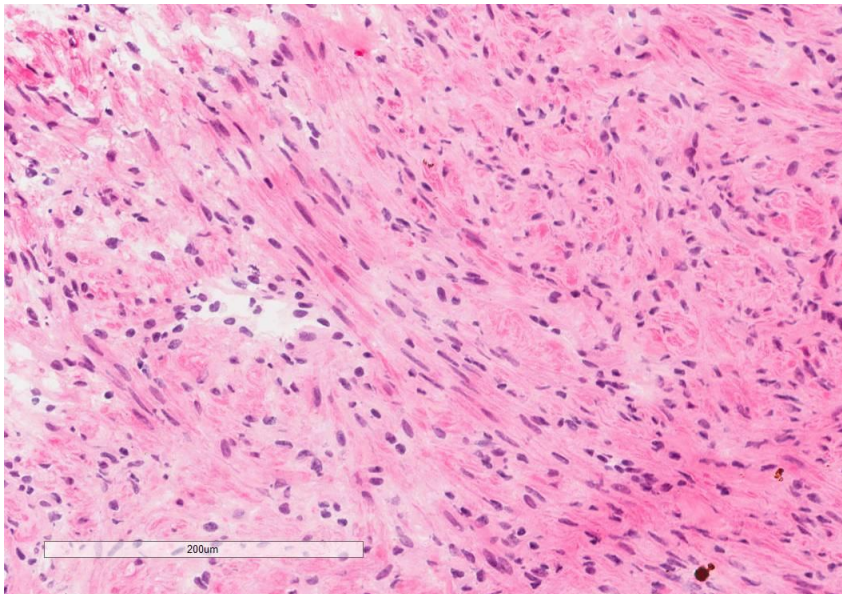
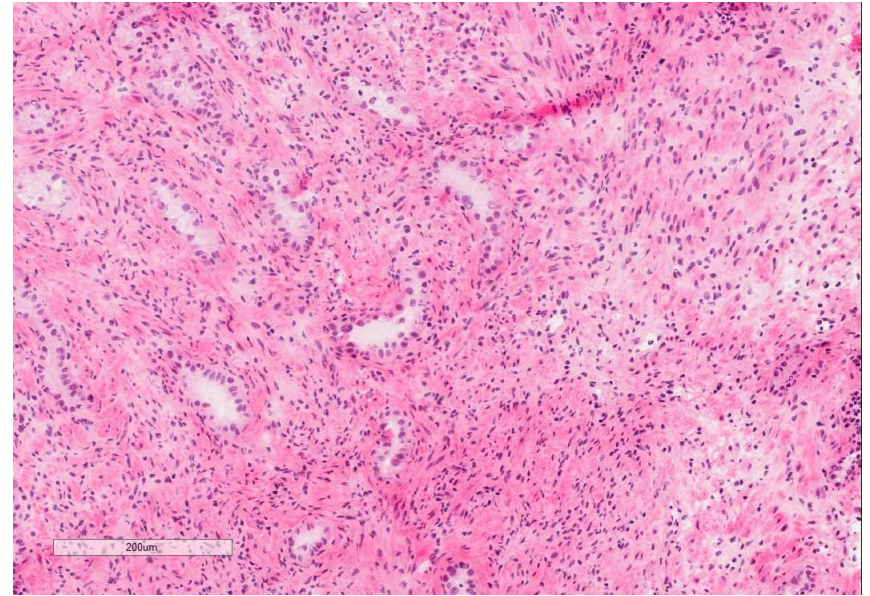
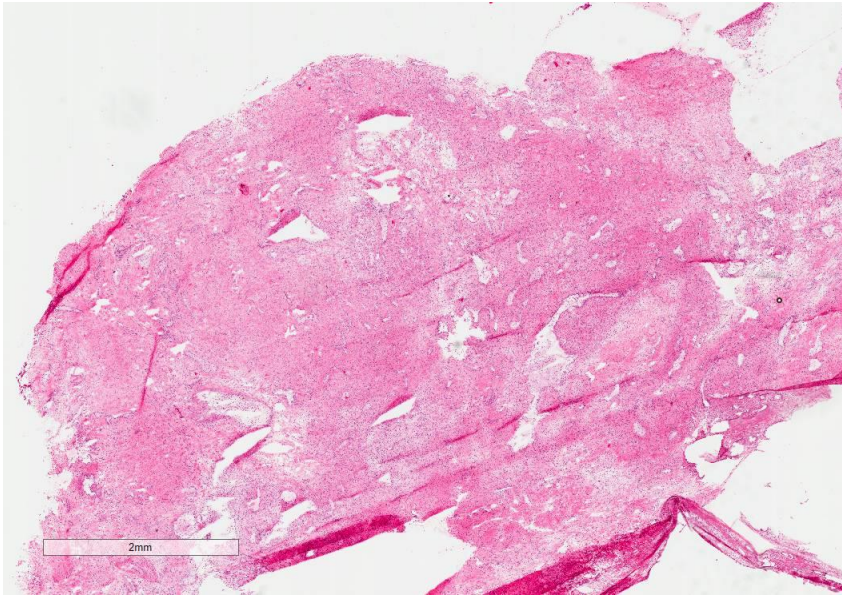


Amyloid



To Scottsdale and back...

Final diagnosis -Unusual variant Hamartoma



Conclusion

- Common things occur commonly but can see whole spectrum of lung pathology on FS
- Go down the diagnostic algorithm as far as you confidently can....
- But if in doubt express the difficulty and defer to paraffin section
- Don't be afraid to show it around
- Talk to your surgeon

End

