

## Tutorial 7: Cardiovascular System (CVS)

### Cardiovascular System (CVS): Learning Objectives

- Describe the morphologic features of major CVS conditions
  - Atherosclerosis
  - Thrombus - fresh vs organized
  - Aneurysm
  - Myocardial infarction
  - Effects of heart failure
  - Valvular disease
- To appreciate the morphologic sequence of events in myocardial infarction
- Make relevant clinico-pathological correlations for these conditions

## Virtual slides reviewed

- *Slide 1: Coronary artery fresh thrombus*
- *Slide 2: Coronary artery organised thrombus*
- *Slide 3: Heart – Acute myocardial infarction*
- *Slide 4: Heart – Healed infarct*

## 02227 Normal Heart



00143



01964



01323



01706

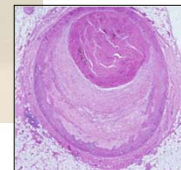


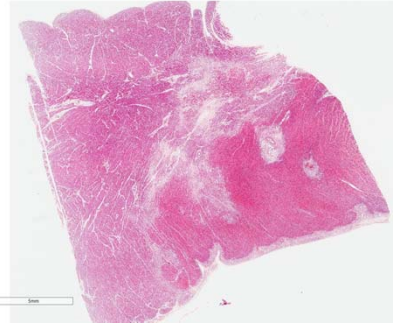
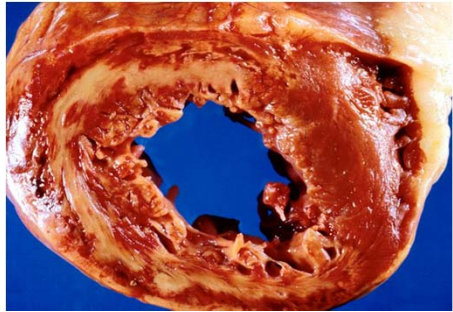


*A 55-yr-old man collapsed whilst jogging and died soon after. He had several episodes of severe crushing chest pain before. An autopsy was done.*

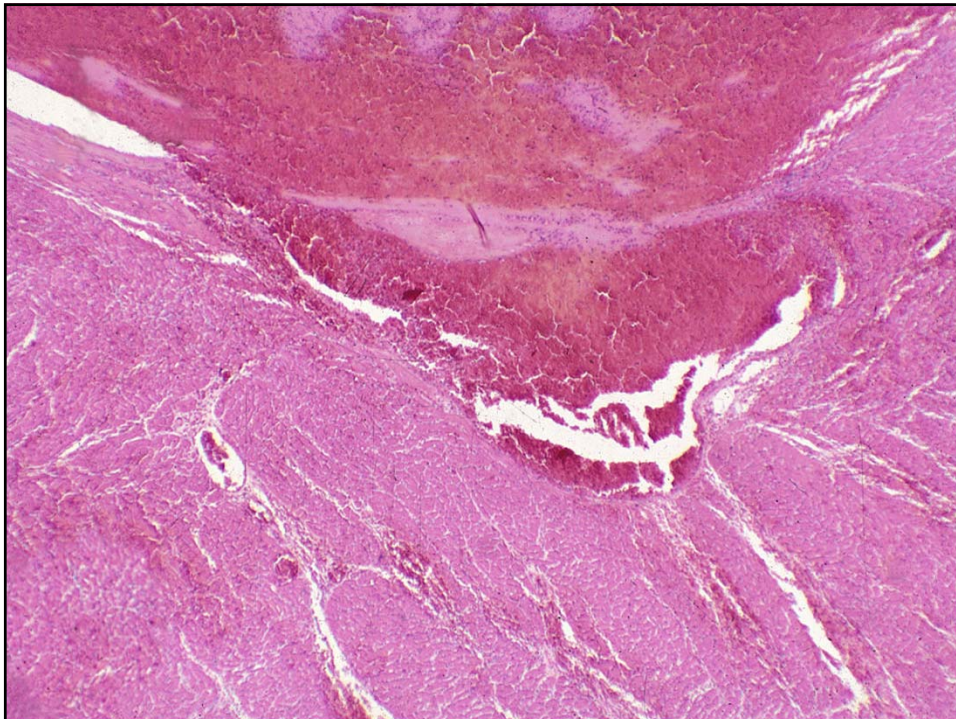


## 03815 Heart

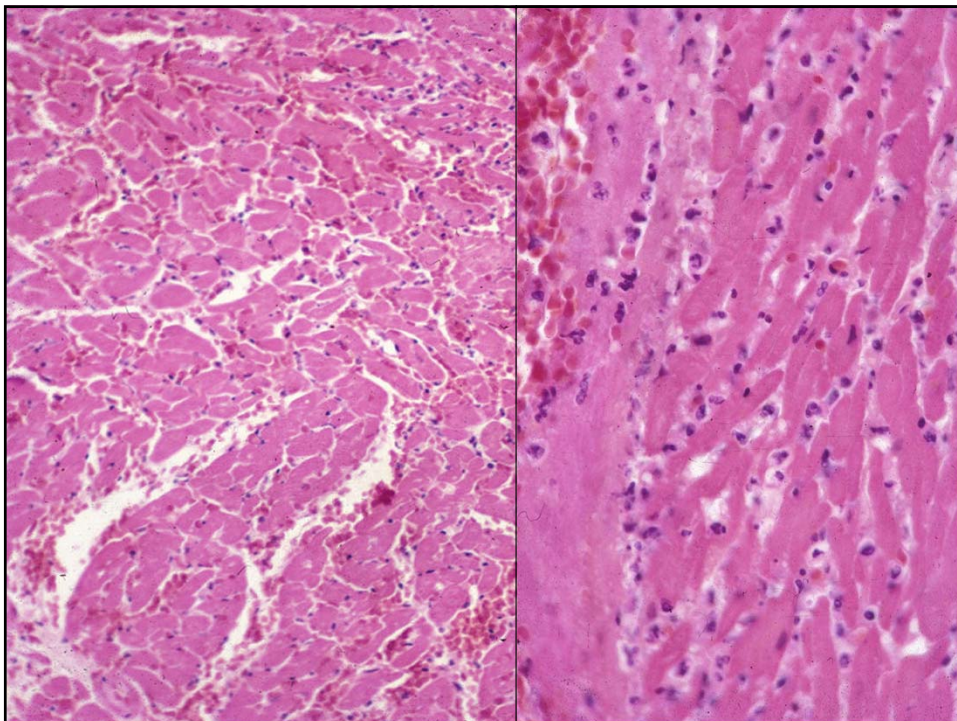
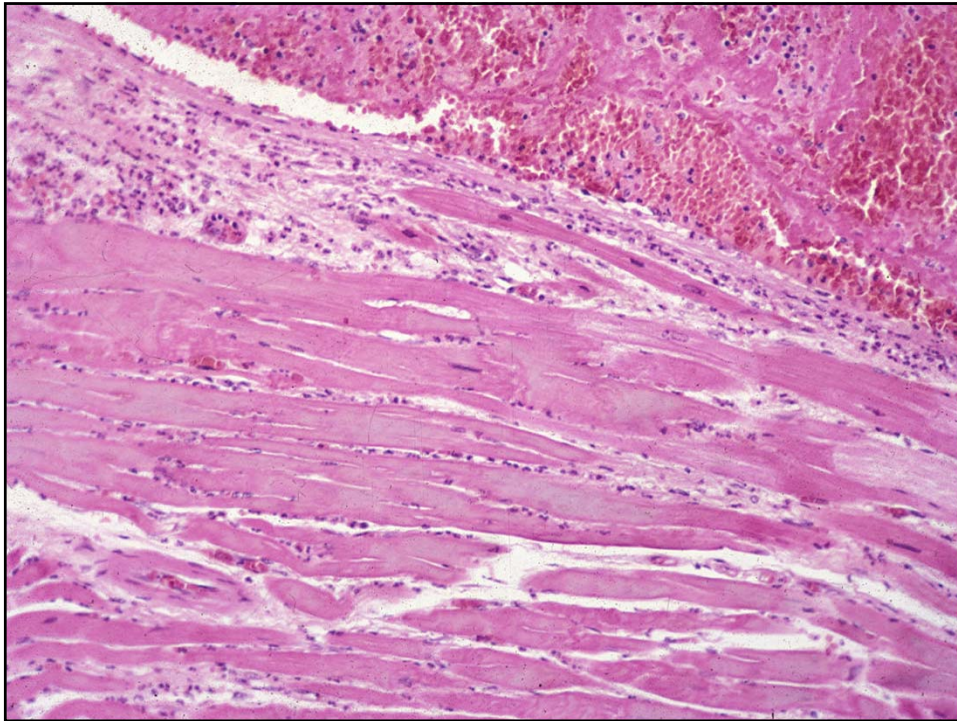


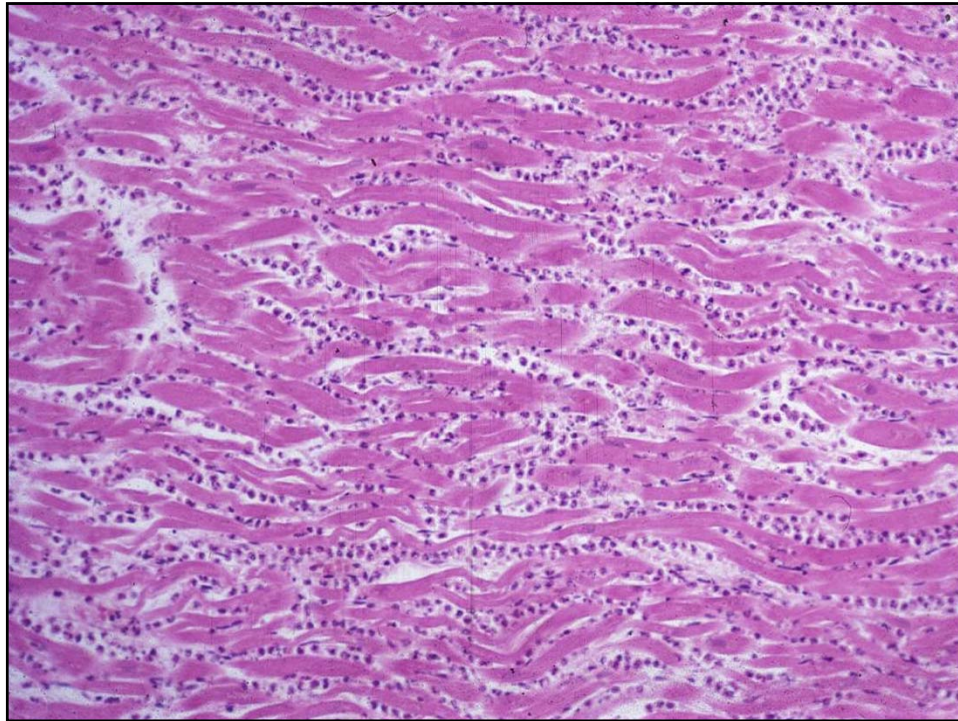


Virtual slide 3









### Questions:

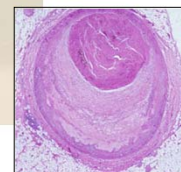
- 1. What is the type of tissue necrosis shown?
- 2. What are the characteristic histopathologic features?
- 3. What is the commonest cause of this pattern of necrosis?
- 4. What is the corresponding naked eye (gross) appearance of this affected region?
- 5. How old is the infarct shown in this slide?
  - 6 hr, 12 hr, 24 -72 hr, 10 days, 3 months.

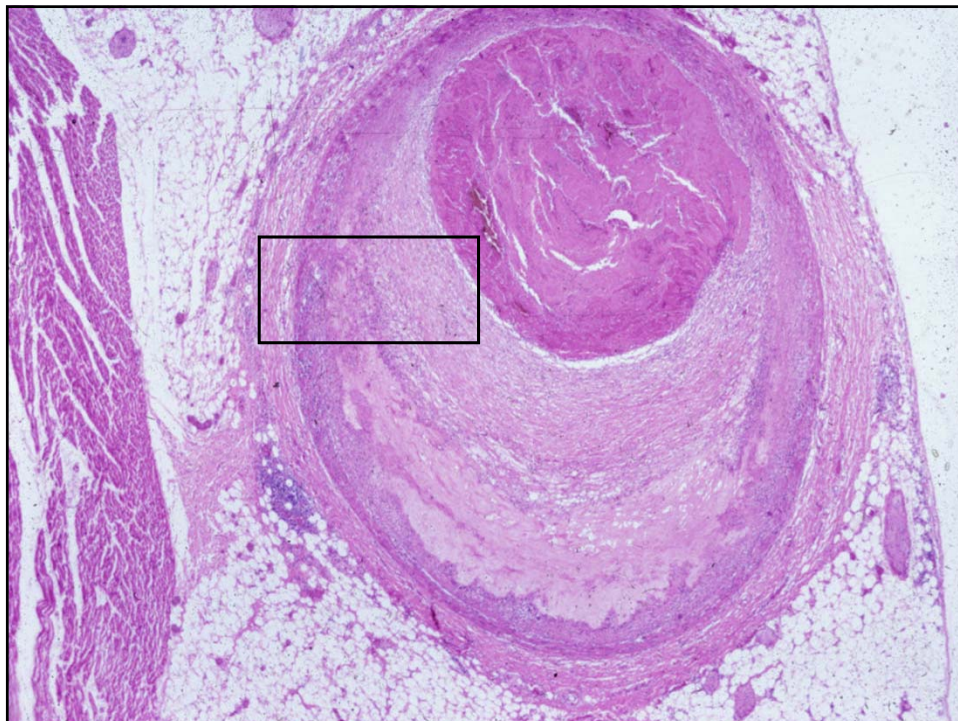
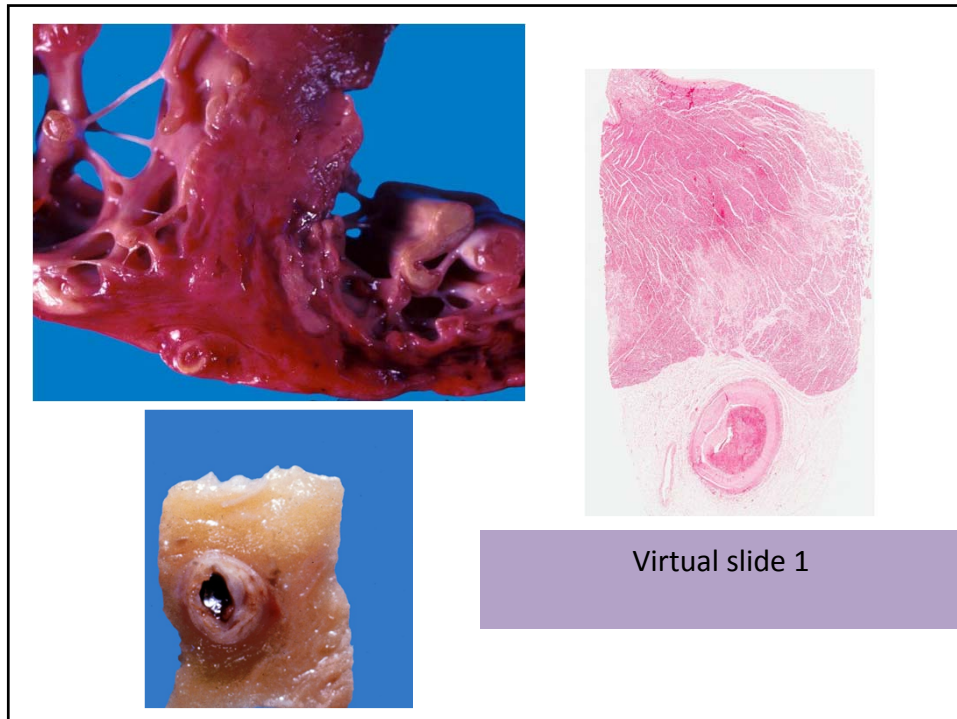


## Morphologic sequence of events in Myocardial Infarction

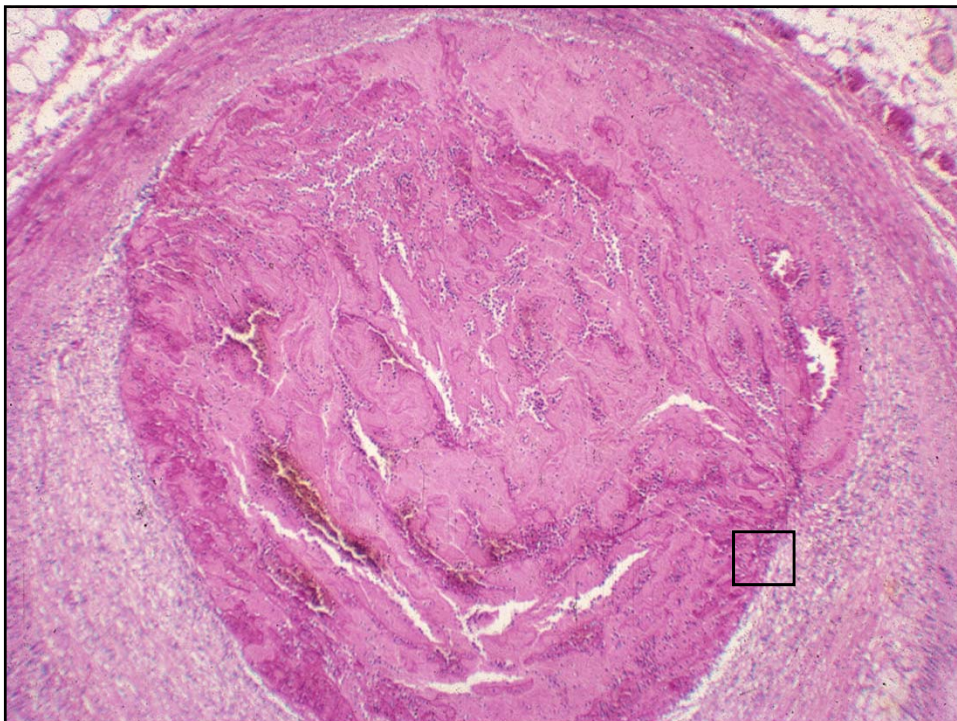
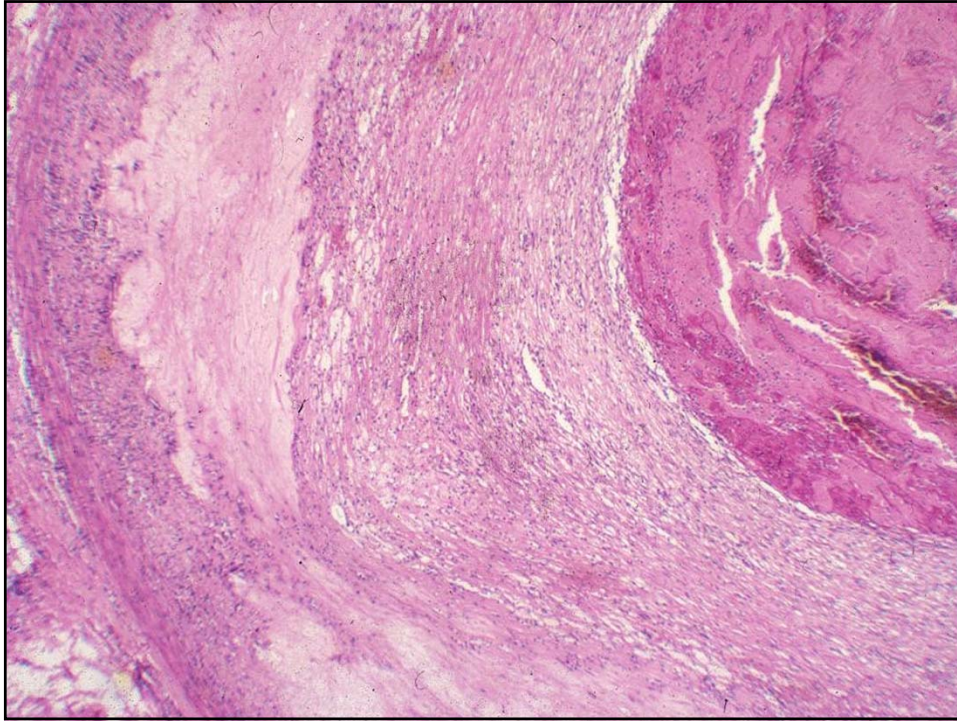
- cell injury/death : 12-24h
  - loss of nuclei (karyolysis)
  - increased cytoplasmic eosinophilia
  - loss of myofibrils
- acute inflammation : 24-72h
  - infiltrate of neutrophils
- chronic inflammation : 3-7 D
  - infiltrate of lymphocytes, macrophages
- healing :
  - 7-14 D granulation tissue
  - 2-8 W fibrosis

### 03815 Heart

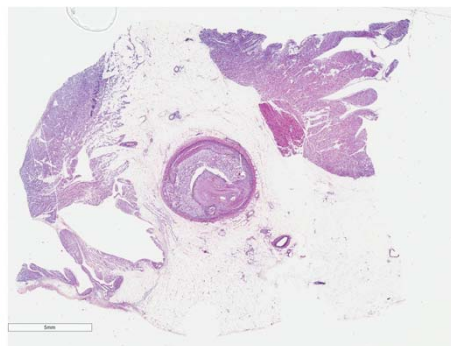
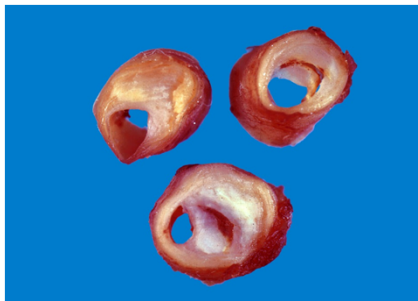
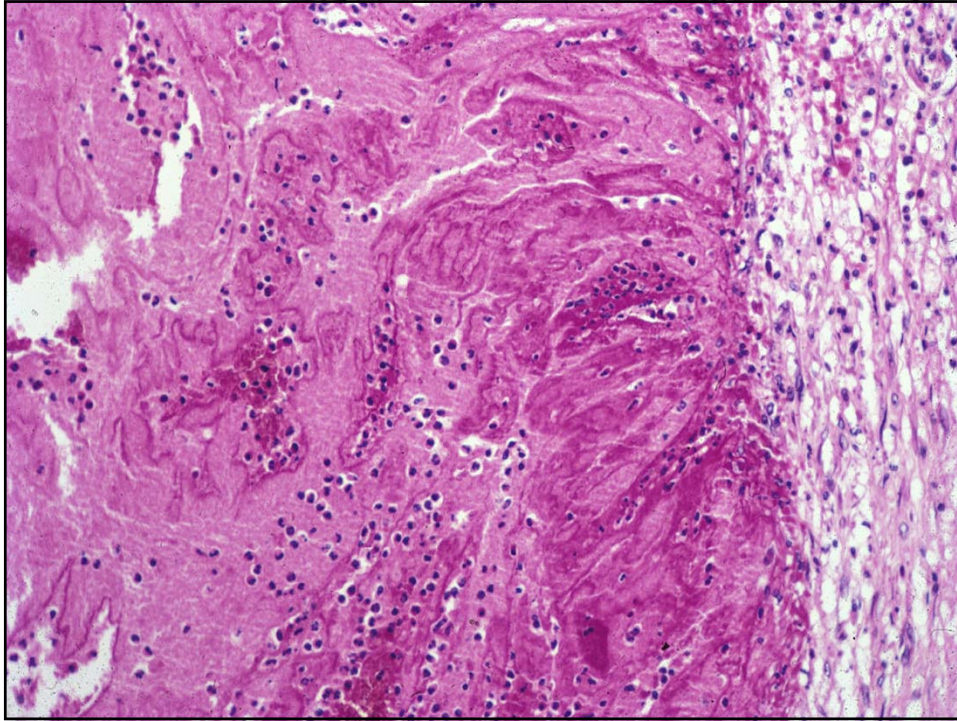






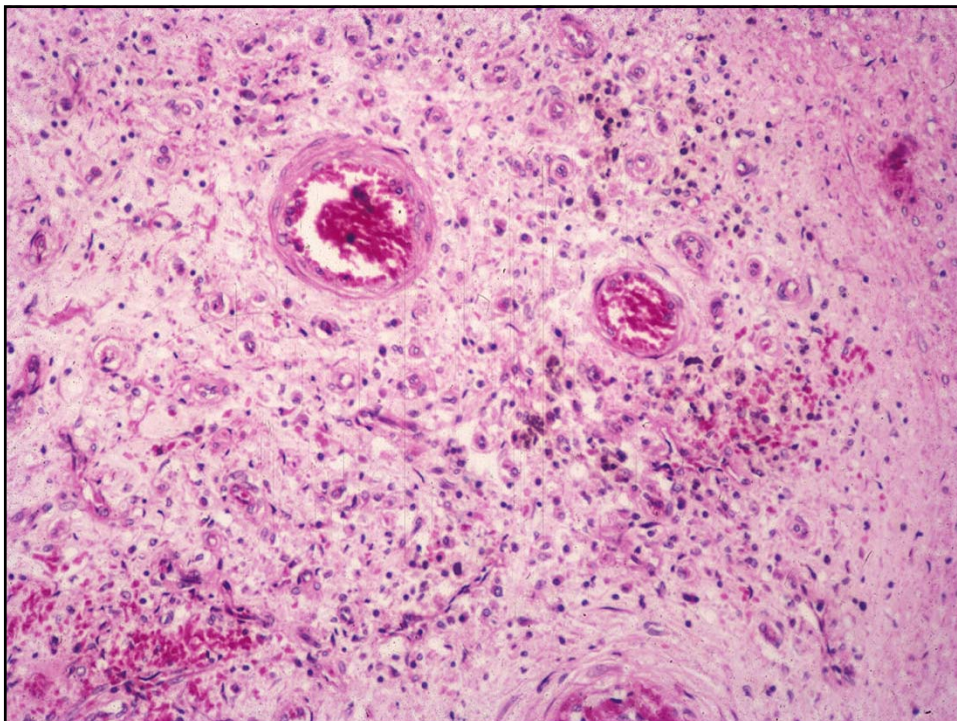


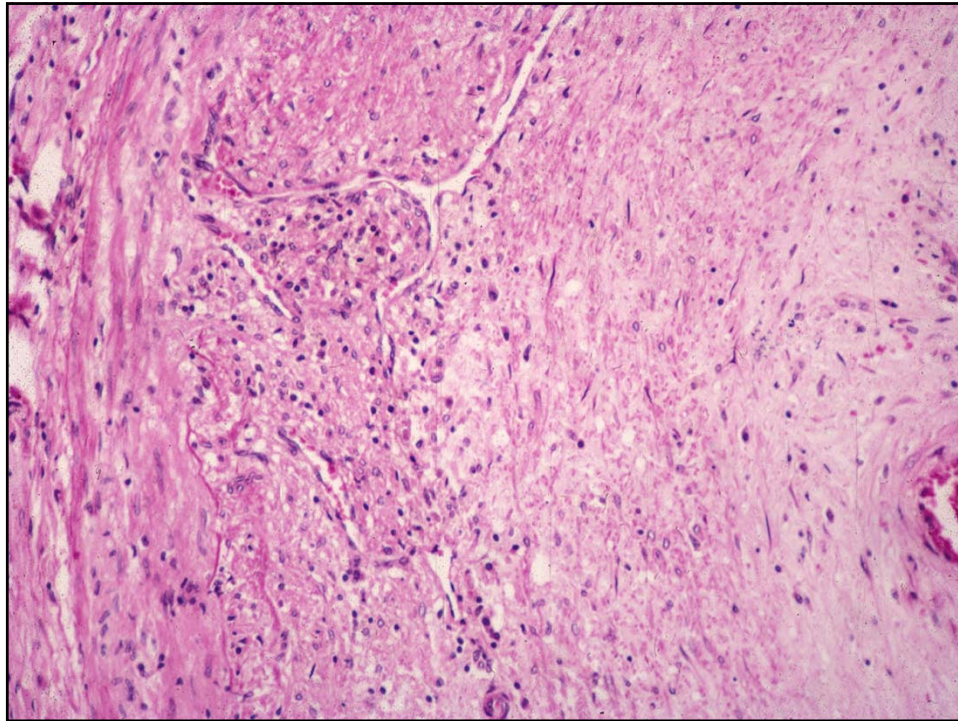




Virtual slide 2







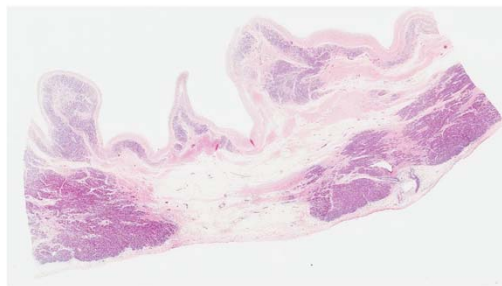
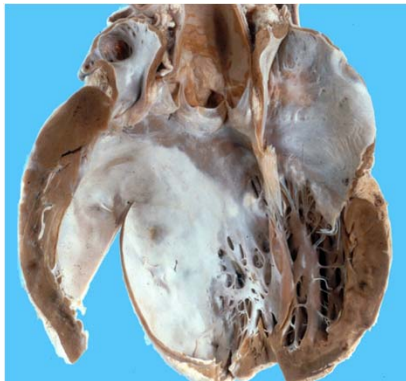
### **Coronary artery thrombosis**

#### **Questions :**

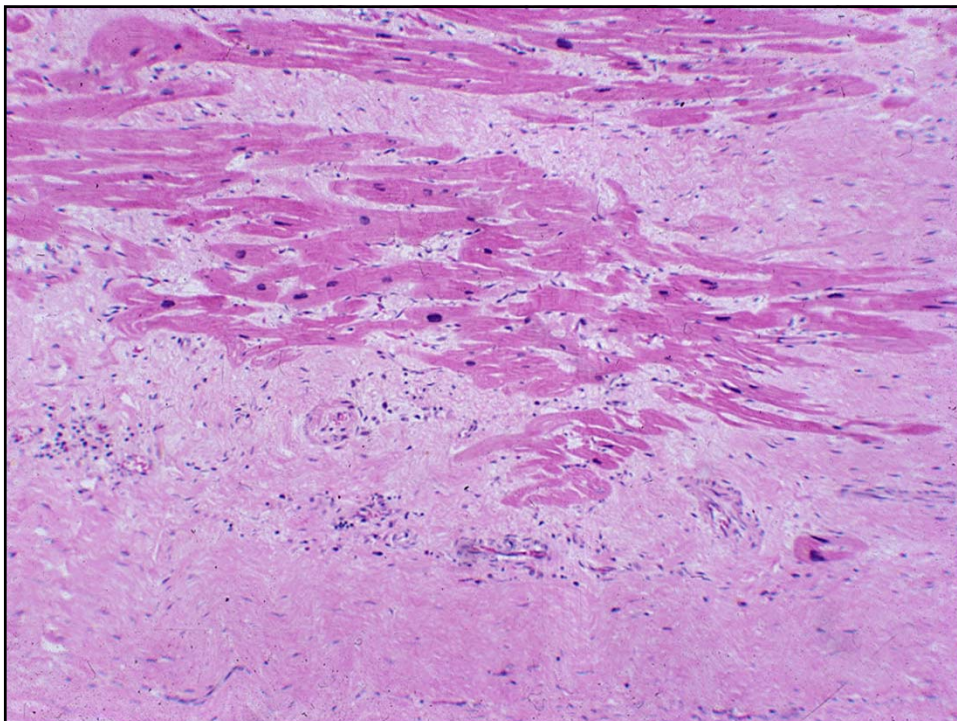
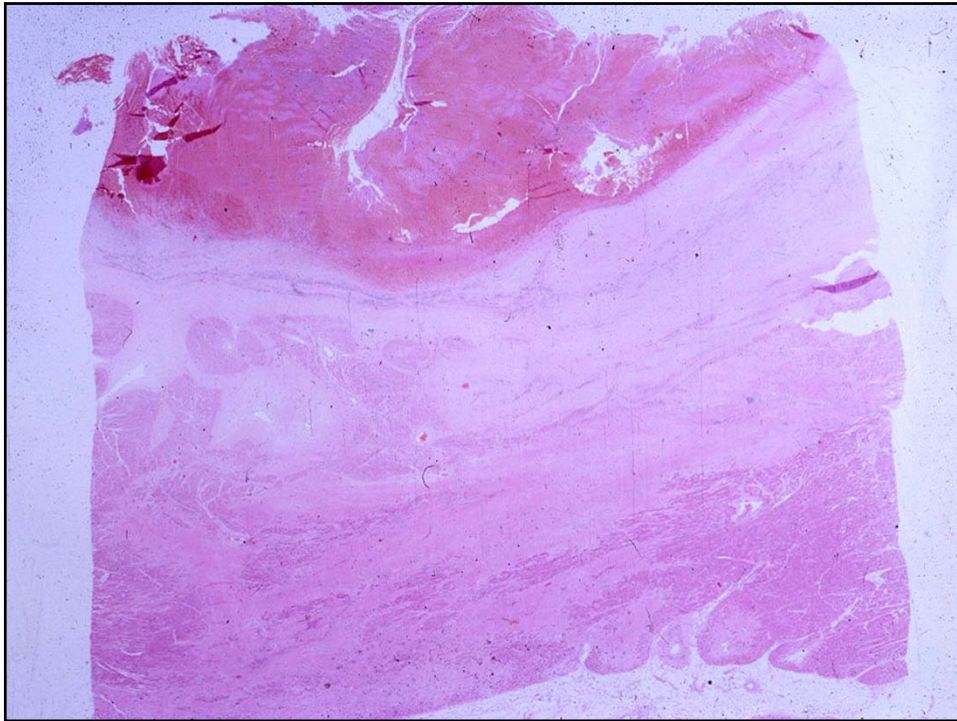
- 1. What is the most probable risk factor in this patient for coronary artery thrombosis ? Look carefully at slide 1 – do you see evidence of this?
- 2. Compare & contrast the key microscopic features in early and late thrombi:
- 3. What are the possible fates of this lesion?



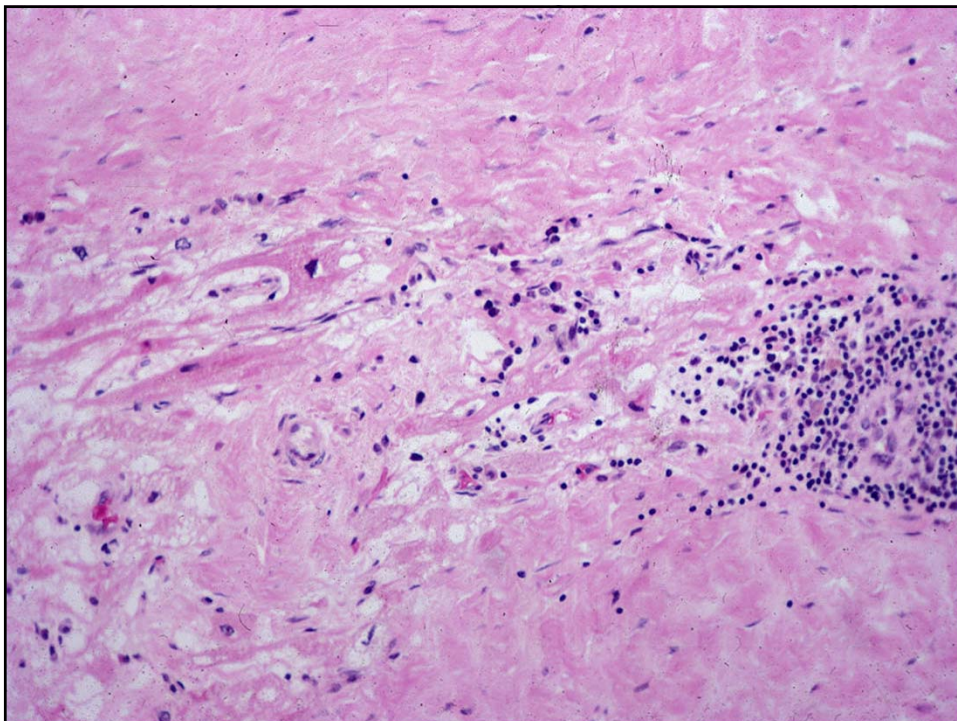
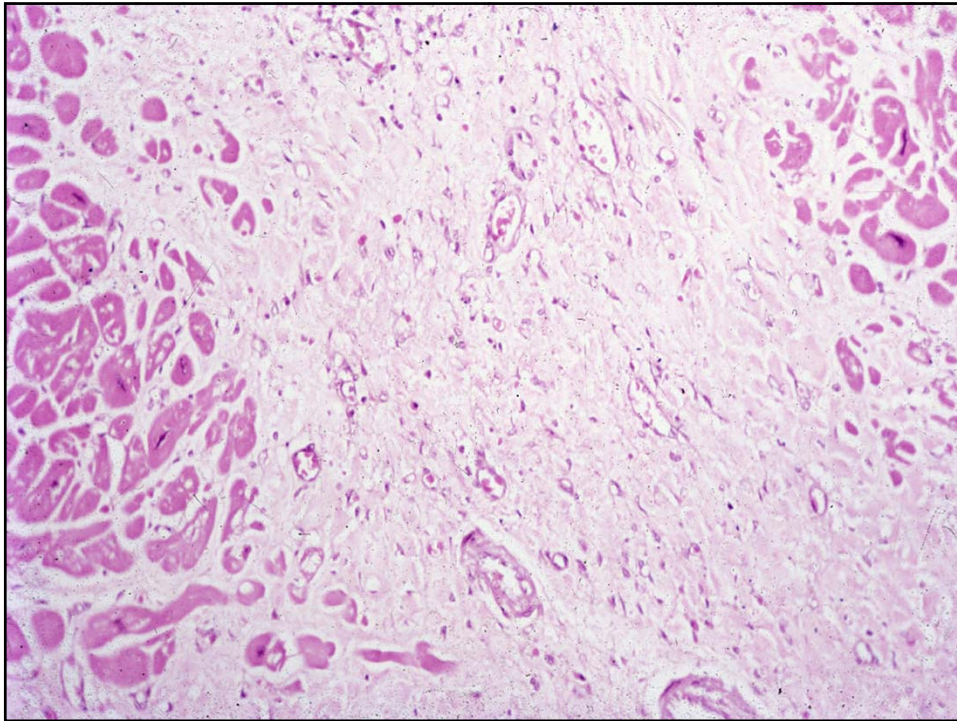
04655



Virtual slide 4







## Slide 4

### Questions :

- 1. What pathological process does this slide show?
- 2. What are the key histopathologic features?
- 3. How old is this lesion?
- 4. What are some possible outcomes of myocardial infarction and when would you expect them?

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01699



03888



01692

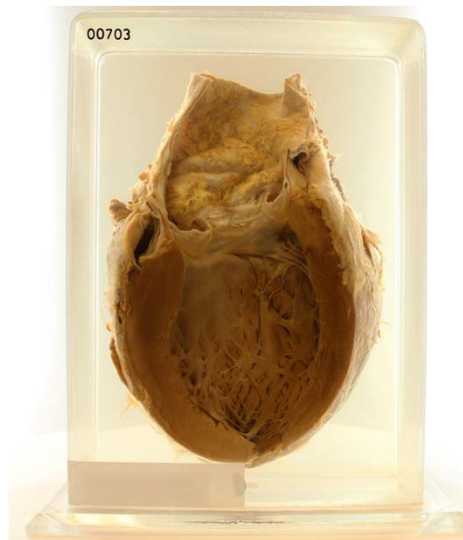


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00703



00722



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01742





Questions ?

## Tutorial 8 : Respiratory System

### Respiratory System: Learning Objectives

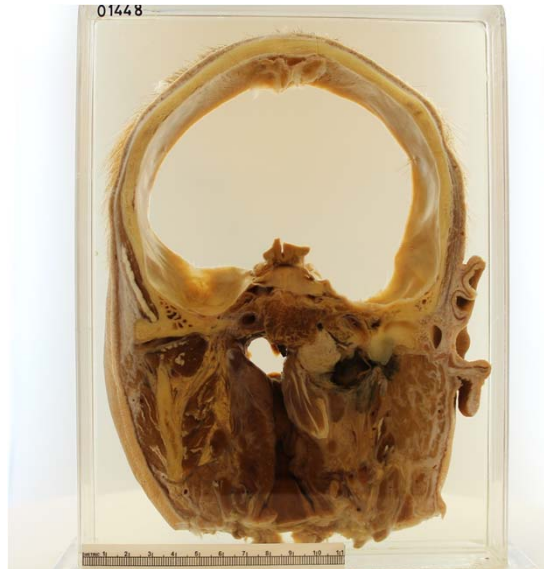
- To appreciate the pathophysiology of common respiratory conditions
  - Non-neoplastic and neoplastic
- To describe the gross and microscopic features of these conditions
- To make relevant clinico-pathological correlations for these conditions
- To revise General Pathology concepts:
  - Acute inflammation
  - Granulomatous inflammation
  - Chronic venous congestion

## RESPIRATORY SYSTEM

- *Slide 5 : Lung – Bronchopneumonia*
- *Slide 6 : Lung – Miliary tuberculosis*
- *Slide 7 : Lung – Abscess*
- *Demo slide : Lung – Chronic venous congestion*

Upper Aerodigestive Tract

01448



01288



04436



Lung

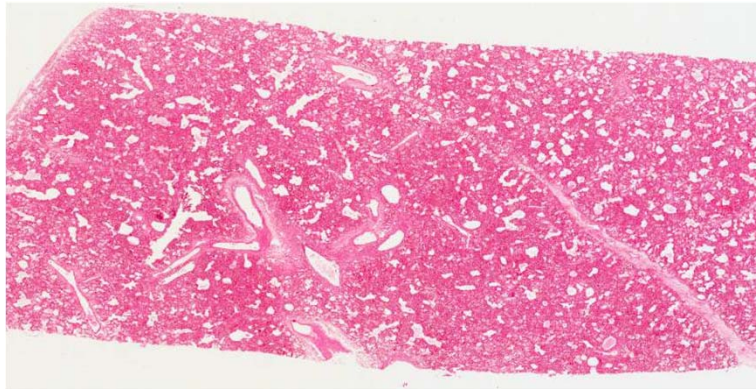
Normal Lung



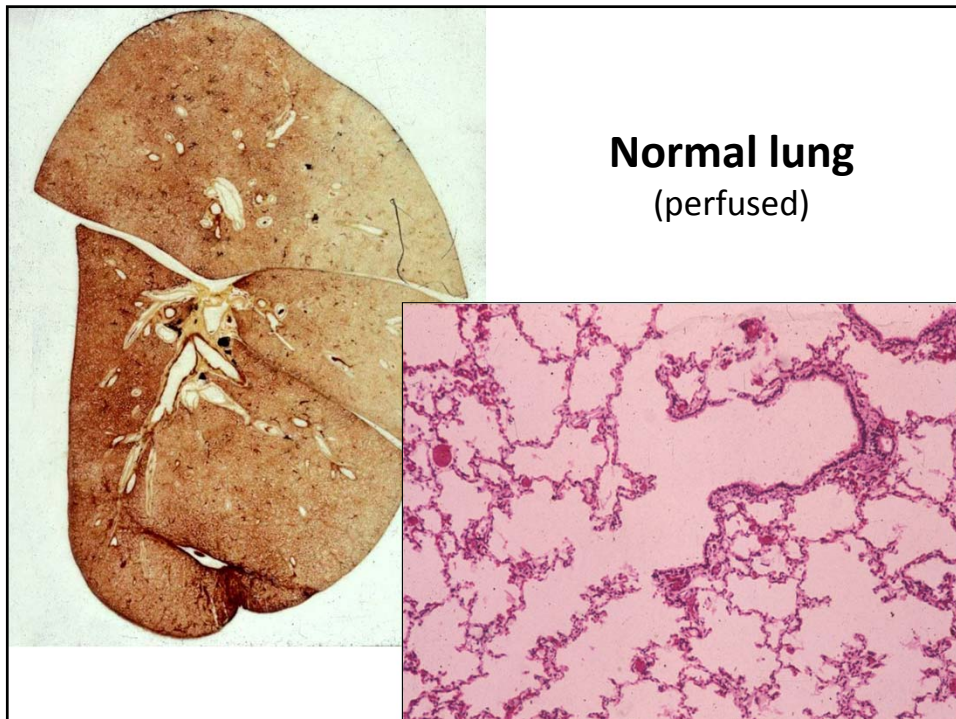
01323



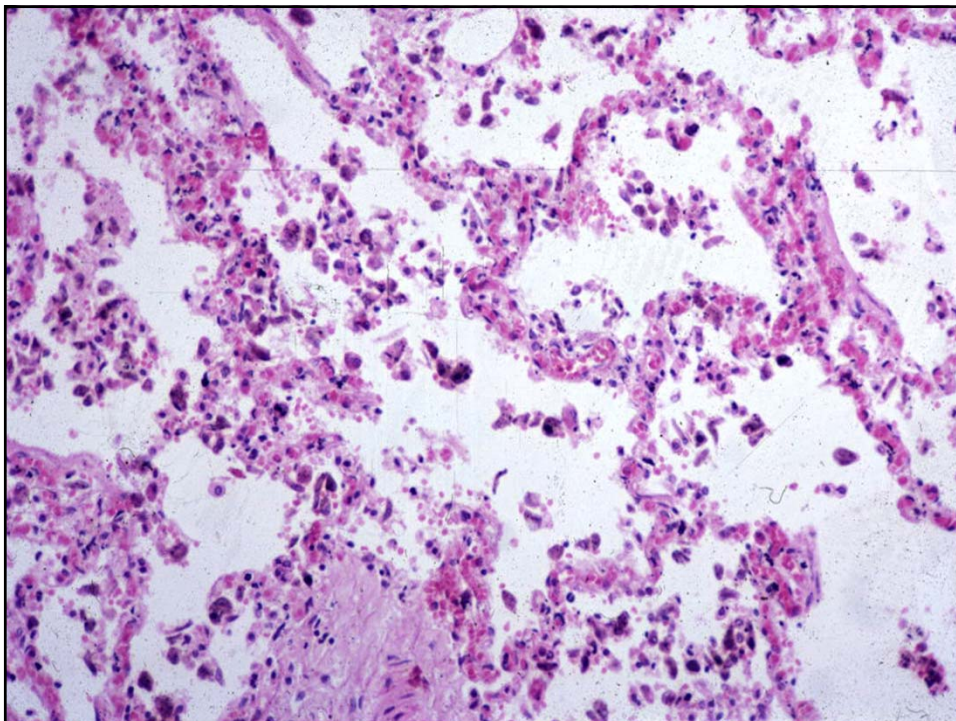
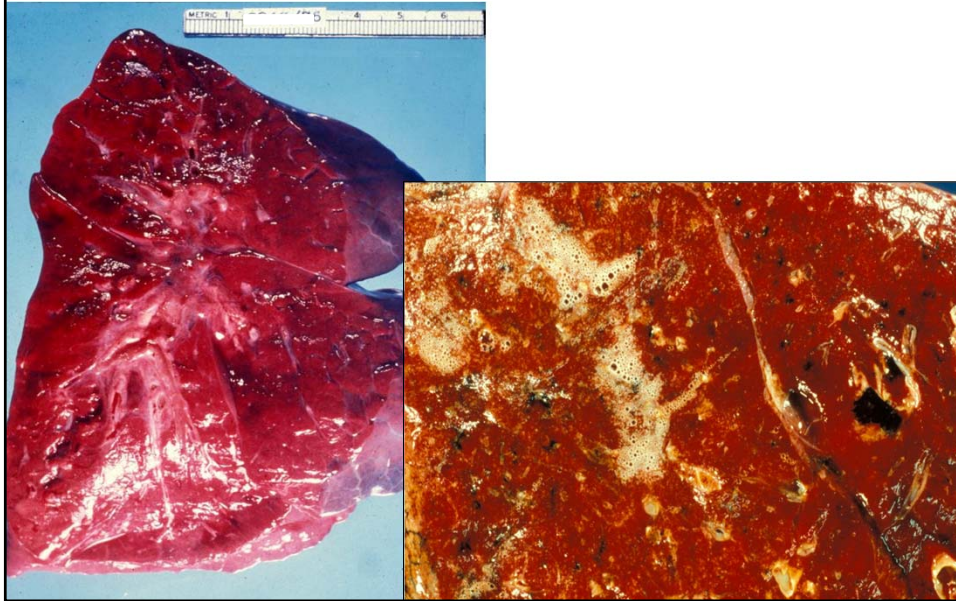




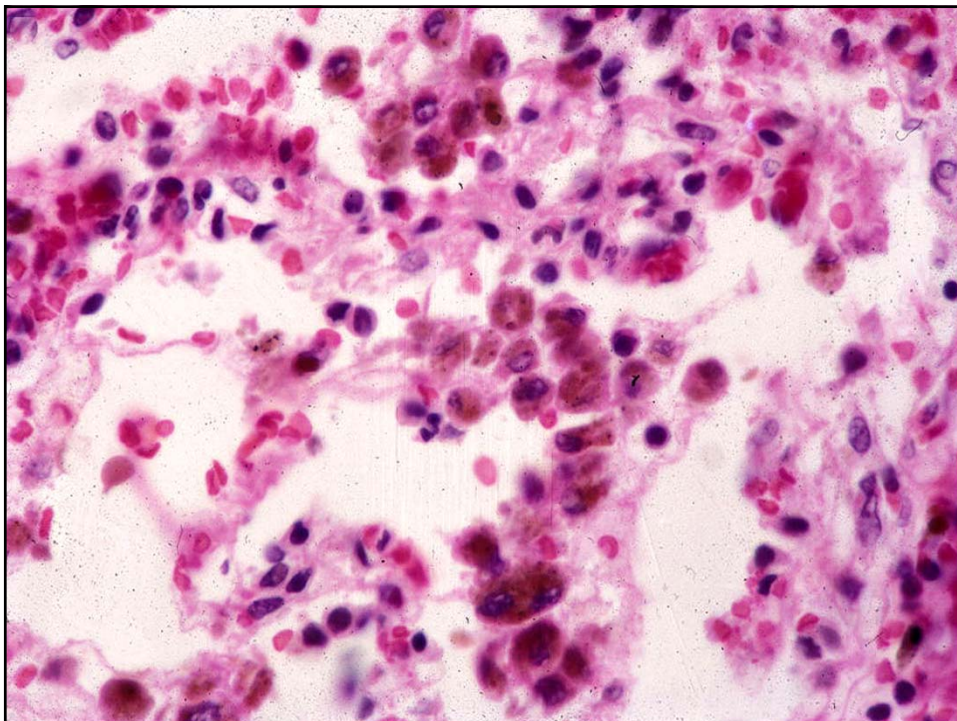
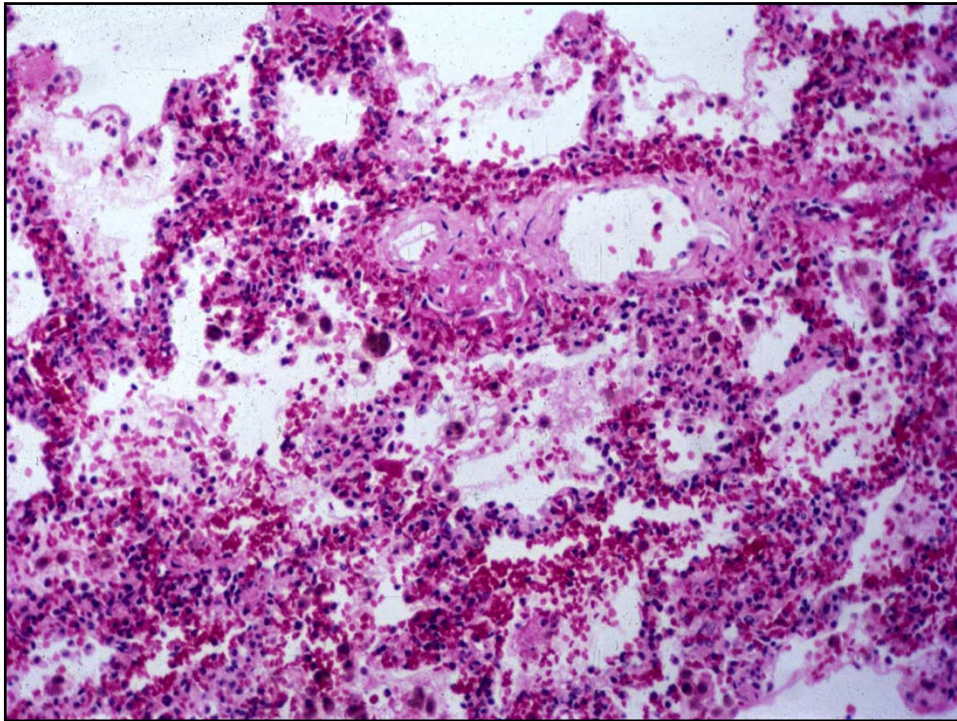
Demo Virtual SLIDE

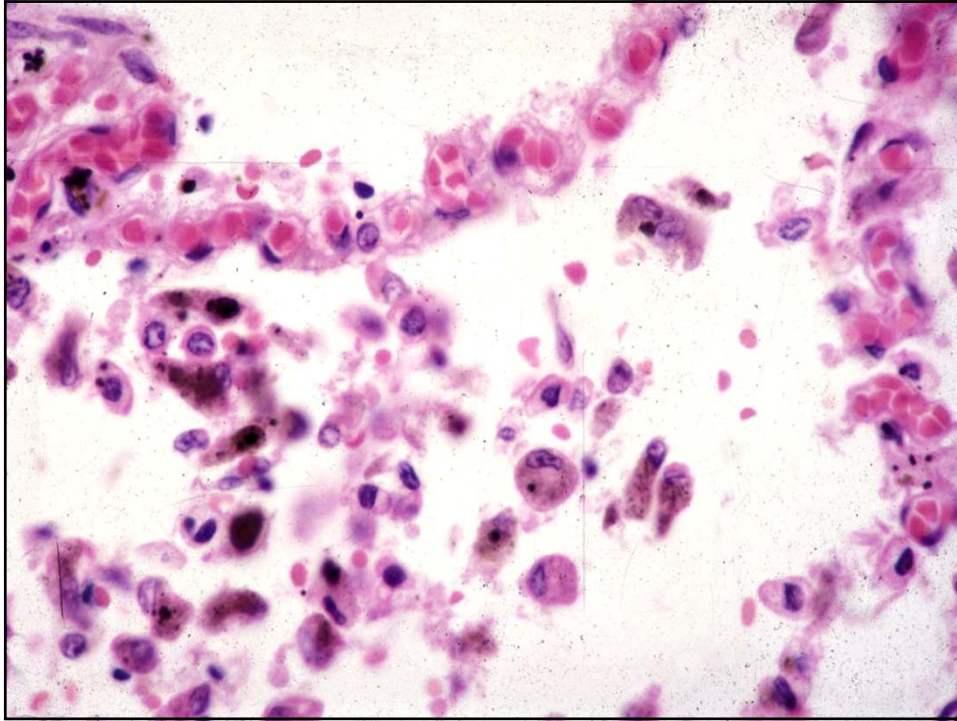


## Lung: Chronic venous congestion









- Revise General pathology lesson –  
Haemodynamic Disorders

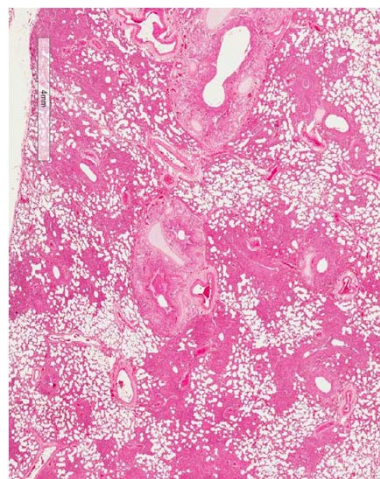


02887 (revision)



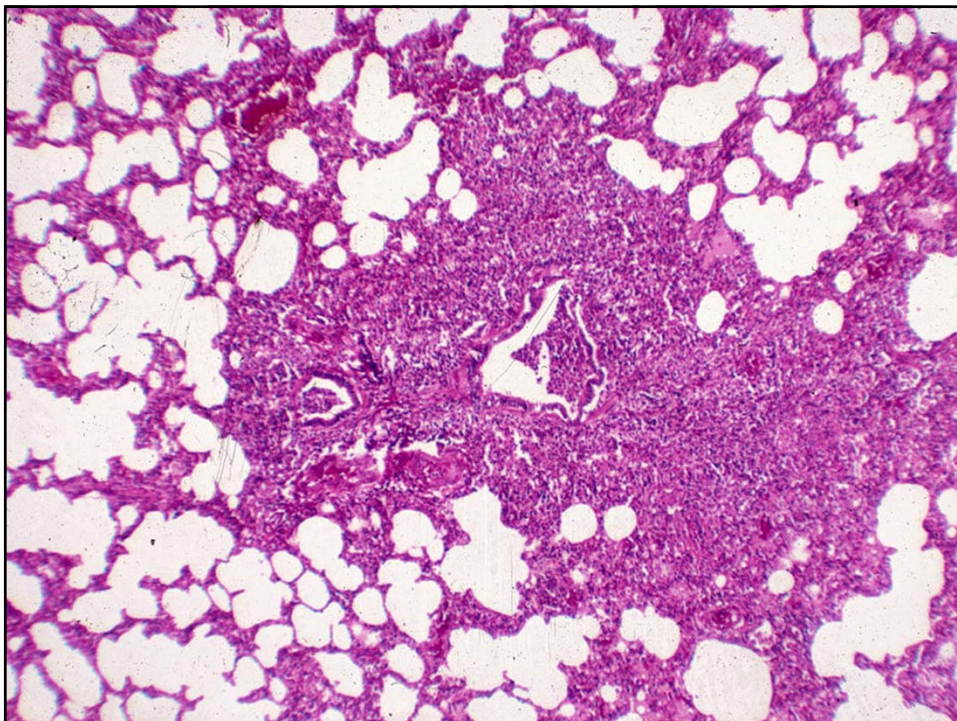
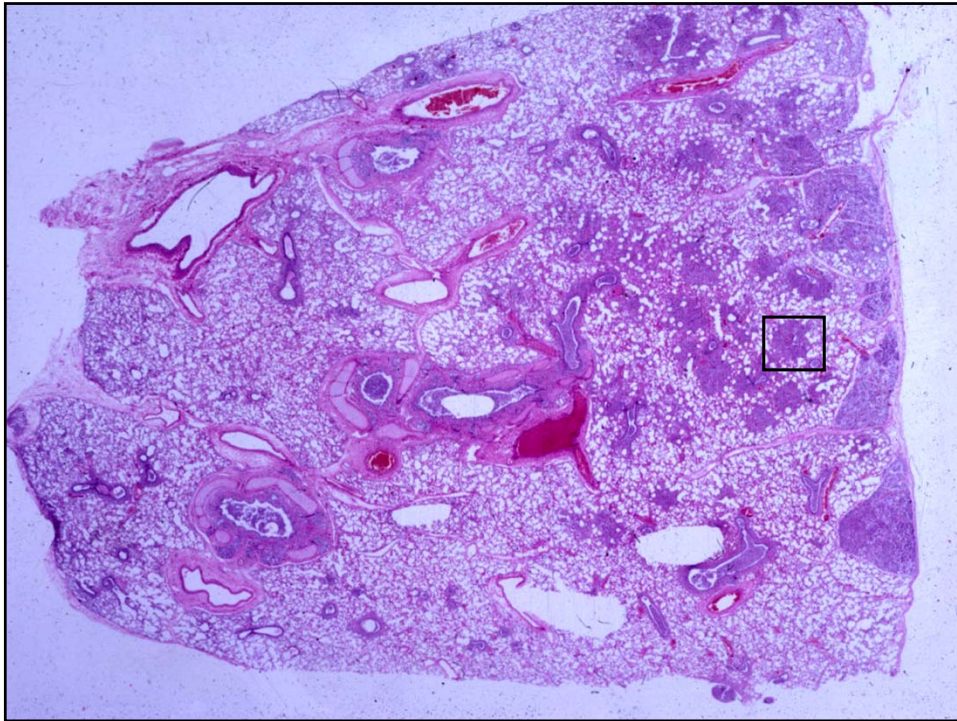
*(Revision pot) A 70 yr old bed-ridden man was found dead in his one-room flat. An autopsy was performed.*



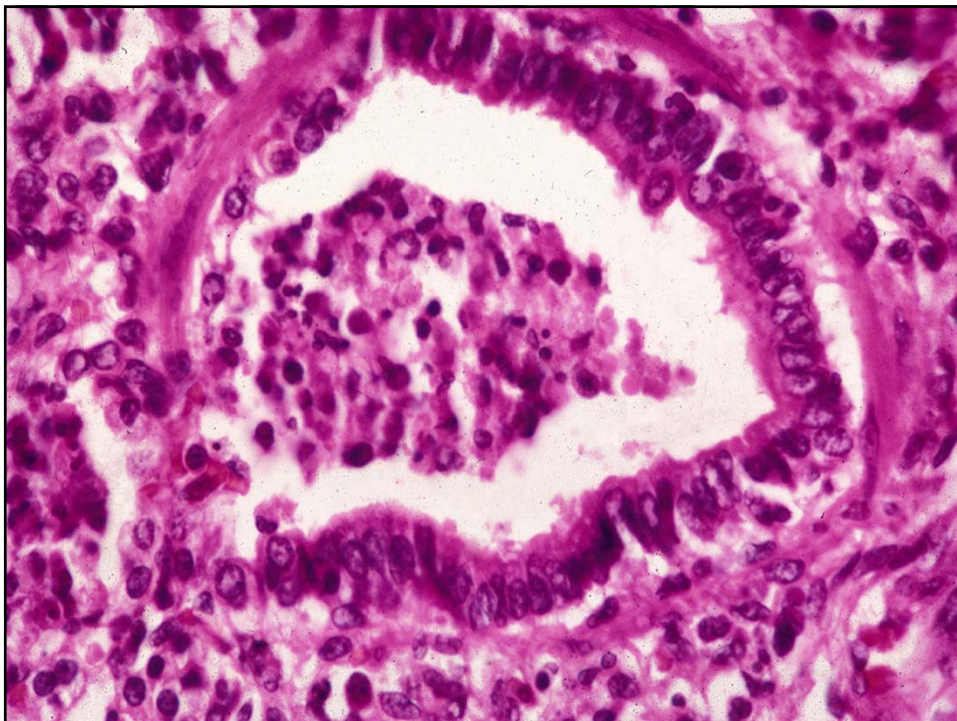
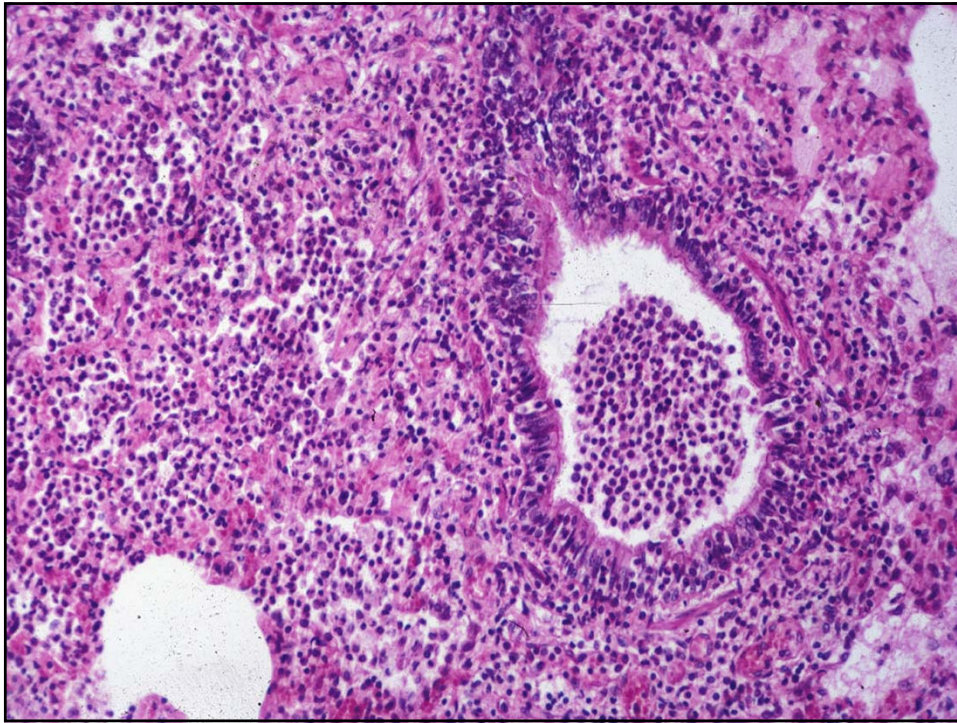


Virtual slide 5

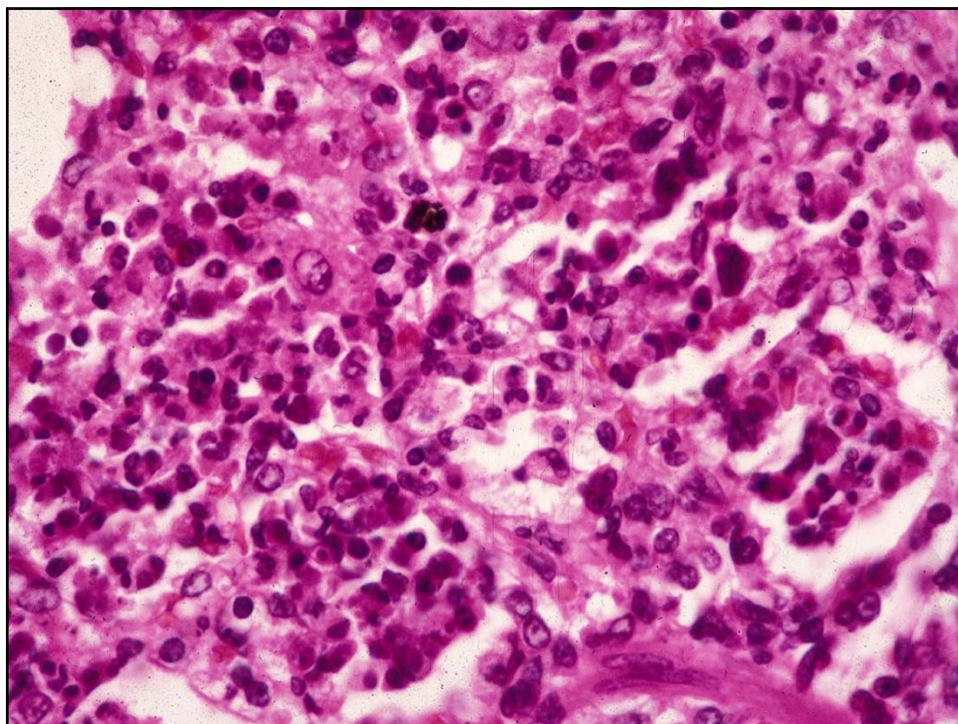












## Questions : Bronchopneumonia

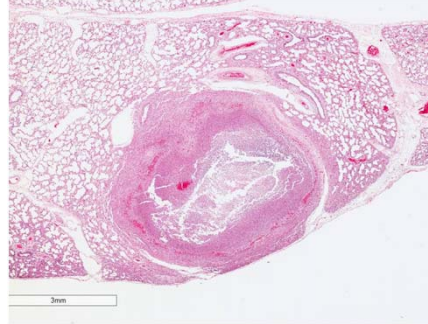
1. List the main histopathologic features.
2. What pathological process does it represent?
3. What clinical manifestations might he have had?
4. **True – False MCQs:**
  - Pneumonia is associated with:
    - a) infection by *streptococcus pneumoniae*.
    - b) weak host defence mechanisms and infection by bacteria that are commonly present in the oropharynx and nasopharynx
    - d) a higher incidence in infancy and old age.
    - e) infection by *H. influenzae* in young children
    - f) decreased likelihood of occurrence in patients with splenectomy

03820 (revision)

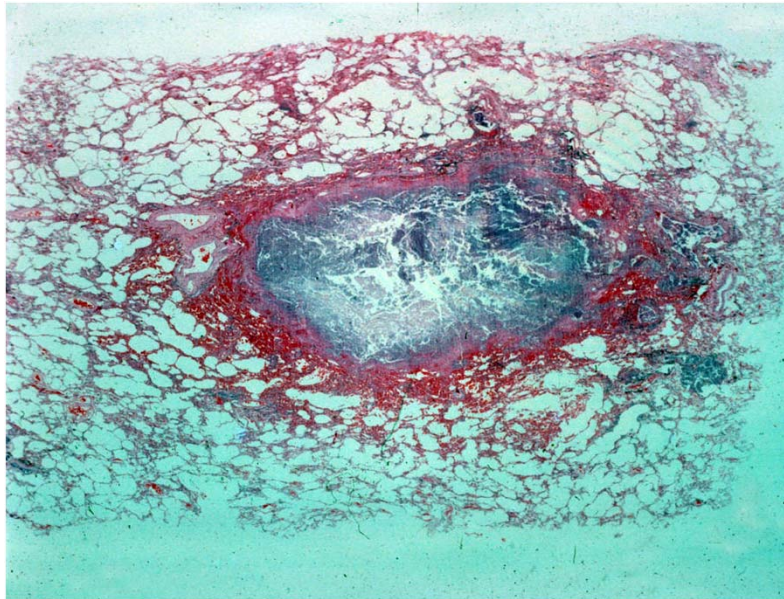


*A 60 yr old alcoholic with poor dentition presented with cough productive of copious purulent sputum and fever.*

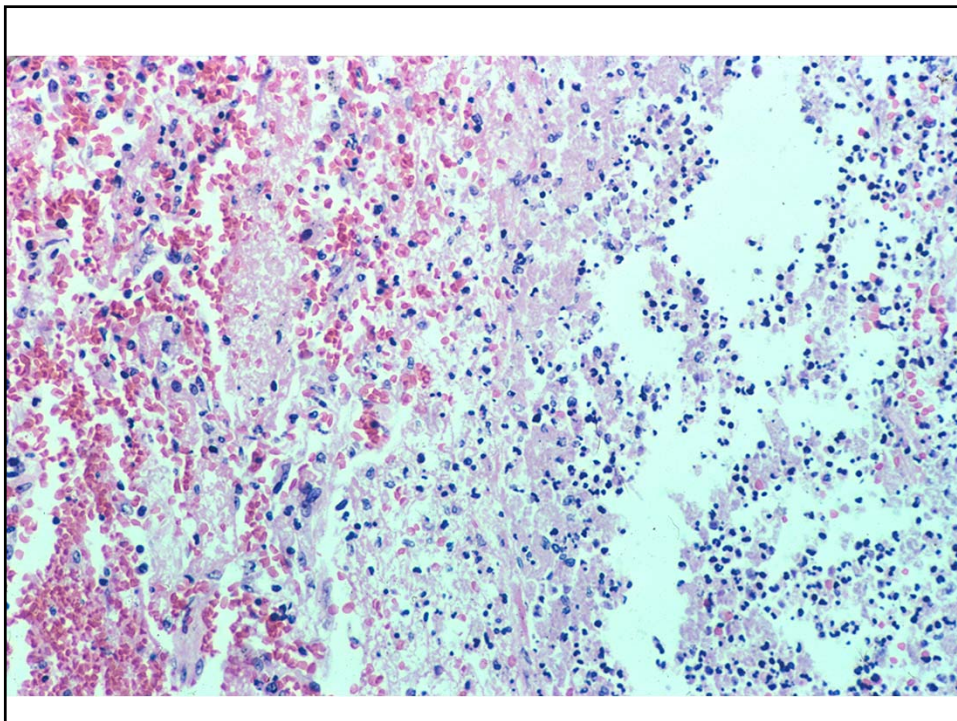
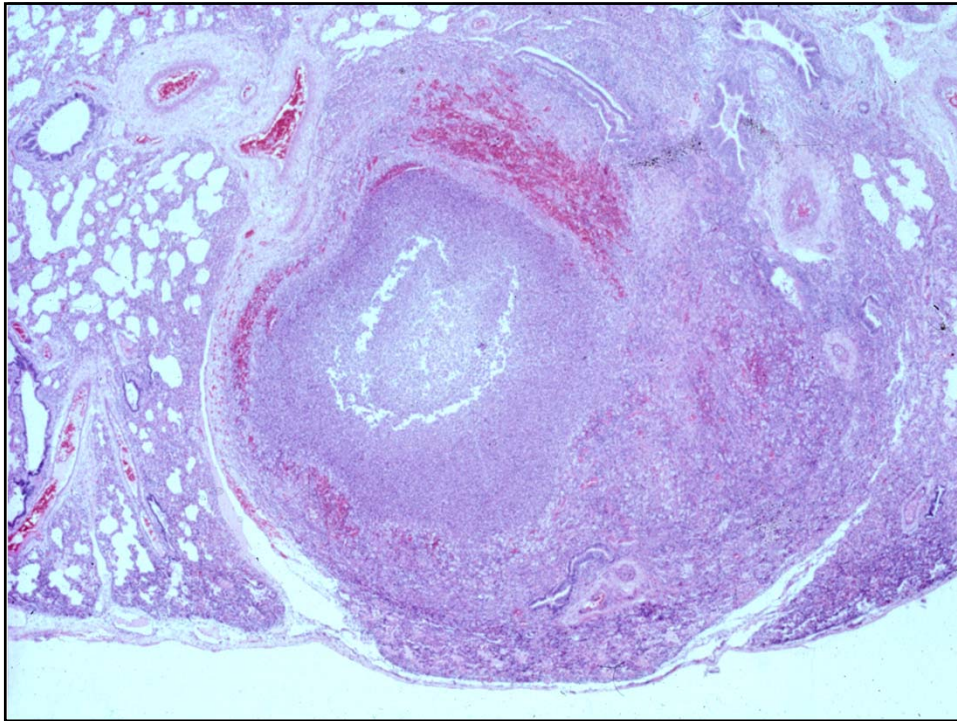


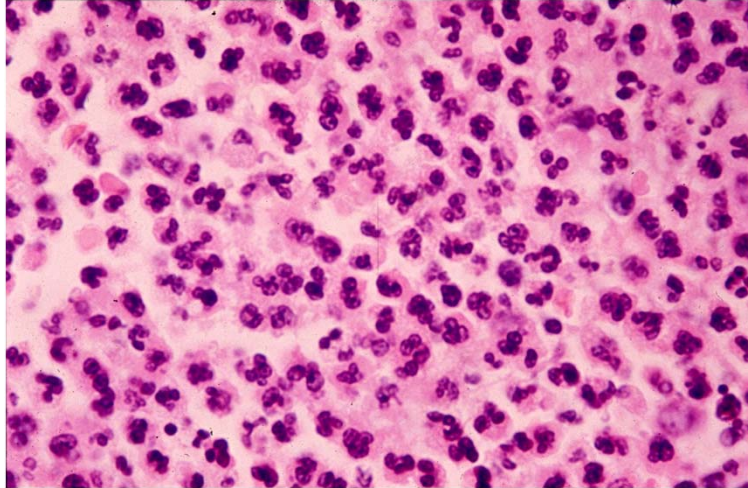


Virtual slide 7







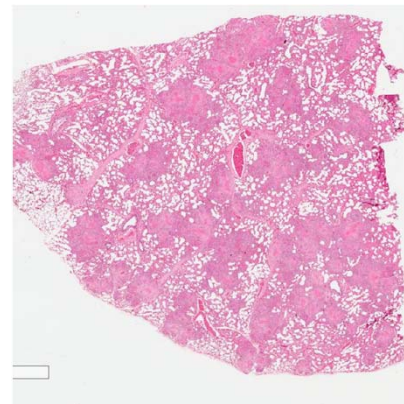
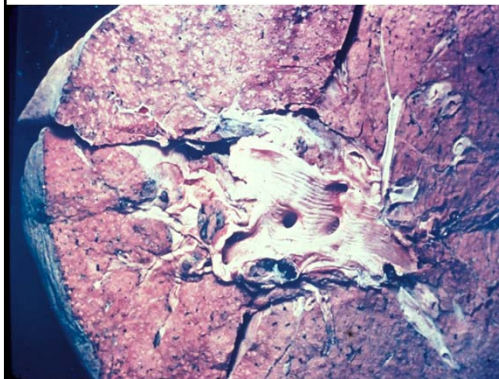


## Questions - Abscess

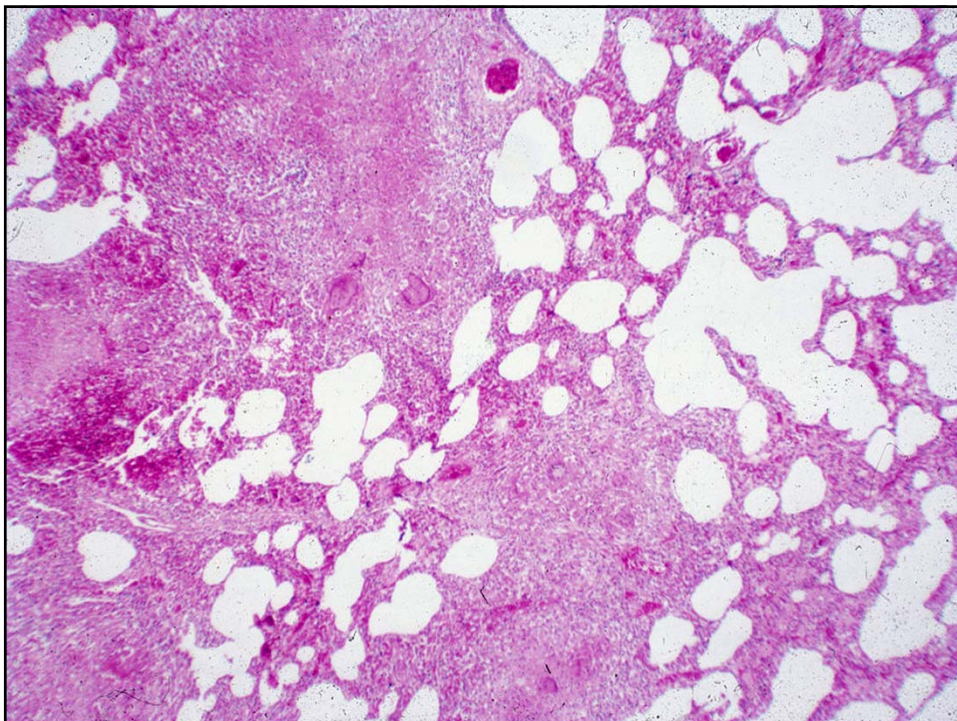
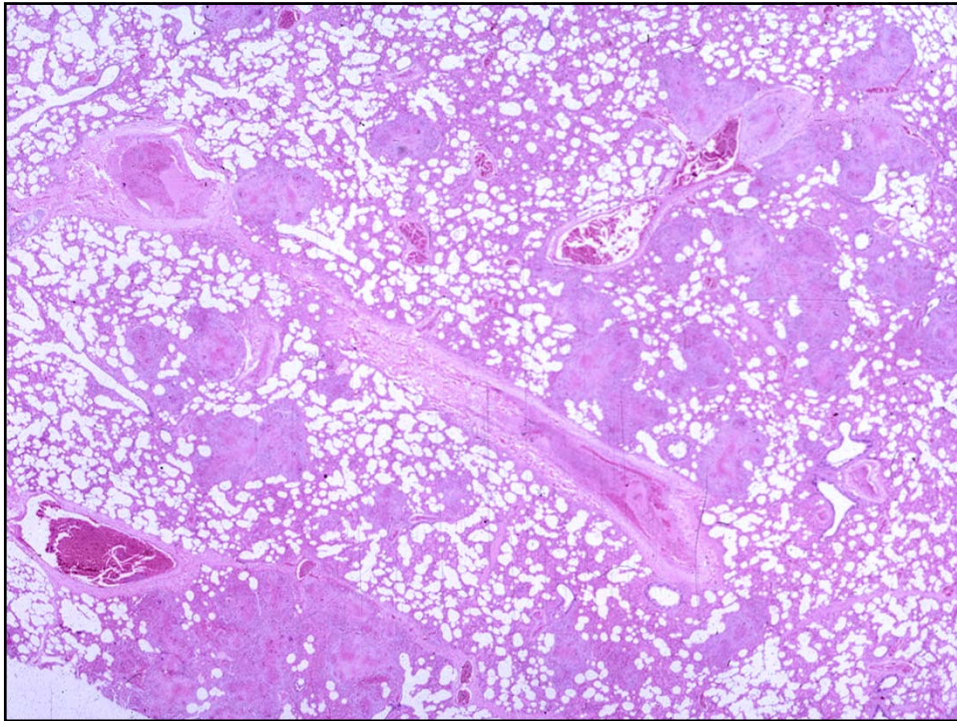
1. List the main histopathologic features.
2. How can lung abscesses arise?
3. What are some complications that may result?



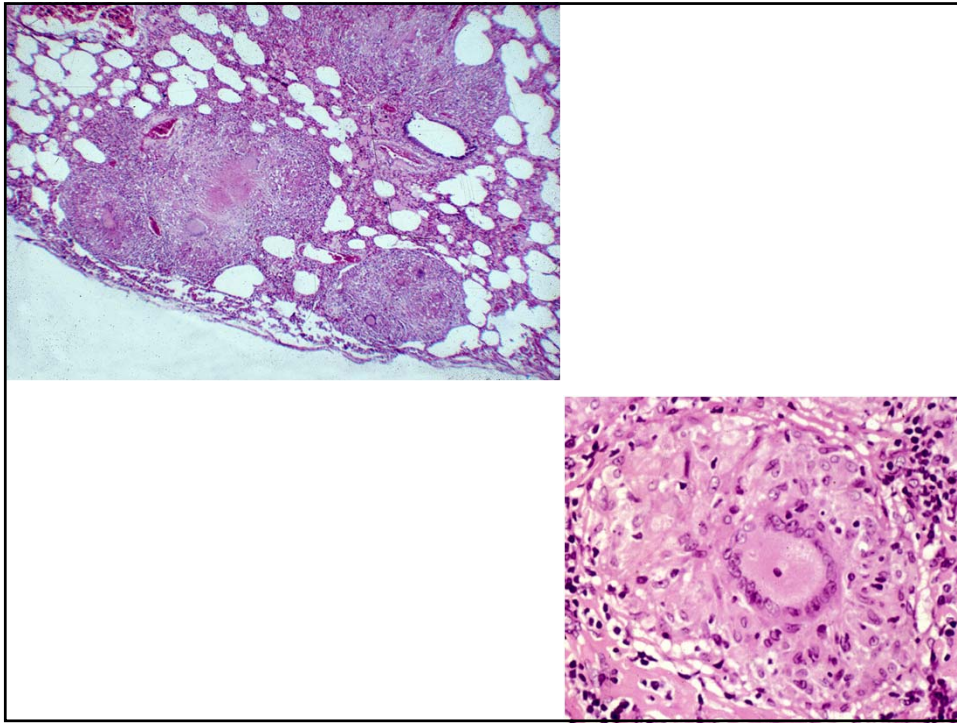
01303



Virtual slide 6







### Questions :

1. What type of pathologic process is shown?
2. How do granulomas form?
3. What are other causes of granulomas?



## Answers :

1. What type of pathologic process is shown?
  - Necrotising granulomatous inflammation (chronic inflammation)
2. How do granulomas form?
  - T cell mediated immune reaction – poorly degradable agents (mycobacteria) → foreign antigen engulfed by macrophages → present to antigen-specific T cells → cytokines :IFN-gamma – activate macrophages → epithelioid macrophages and multiNc giant cells
3. What are other causes of granulomas?
  - Other mycobacteria; fungal organisms; foreign bodies
  - Non-infectious conditions eg. Wegener's granulomatosis, sarcoidosis

01297 (revision)



01318



00710



01810



02278



04535



05085





02135 (revision)



Questions ?

## Tutorial 9 : GIT

### Gastrointestinal Tract (GIT): Learning Objectives

- Describe the gross features of the gastrointestinal conditions
- Make relevant clinico-pathological correlations for the conditions
- To appreciate the histologic features and pathogenesis of common inflammatory and neoplastic conditions of the GASTROINTESTINAL TRACT

## GASTROINTESTINAL SYSTEM

- *Slide 8 : Stomach – Chronic peptic ulcer*
- *Slide 9 : Appendix – Acute appendicitis*
- *Demo slide : Stomach – Adenocarcinoma*

03774 SG



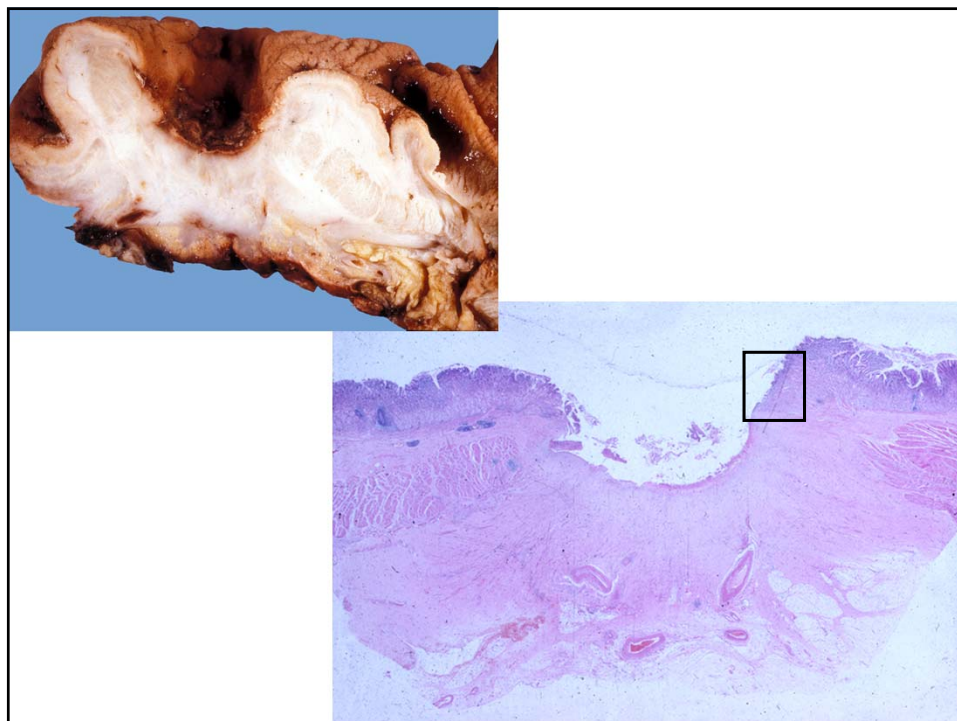
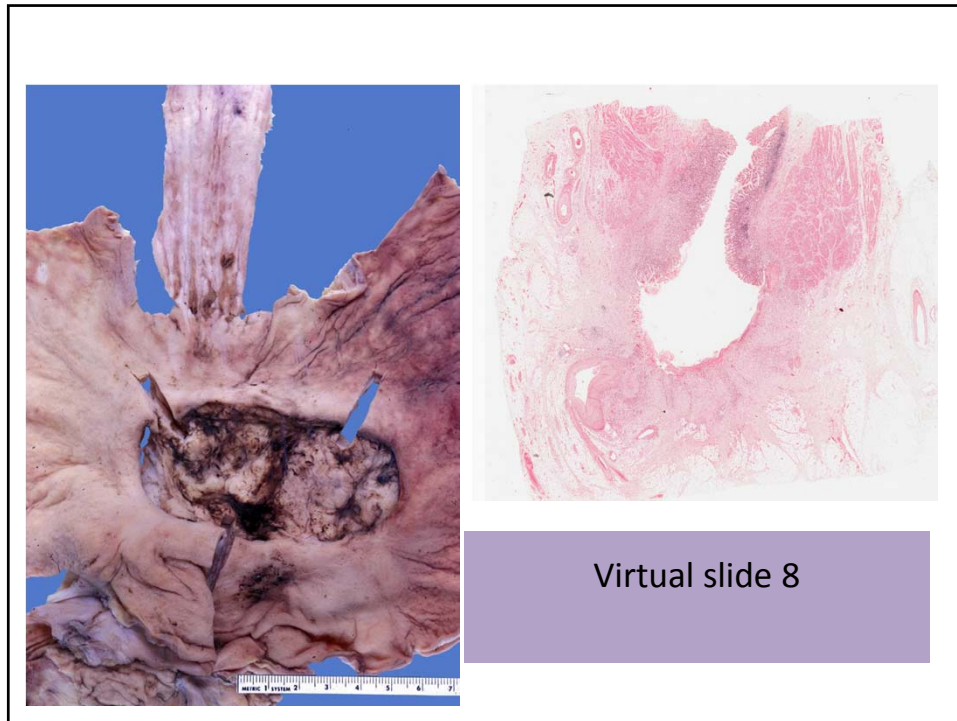
04610

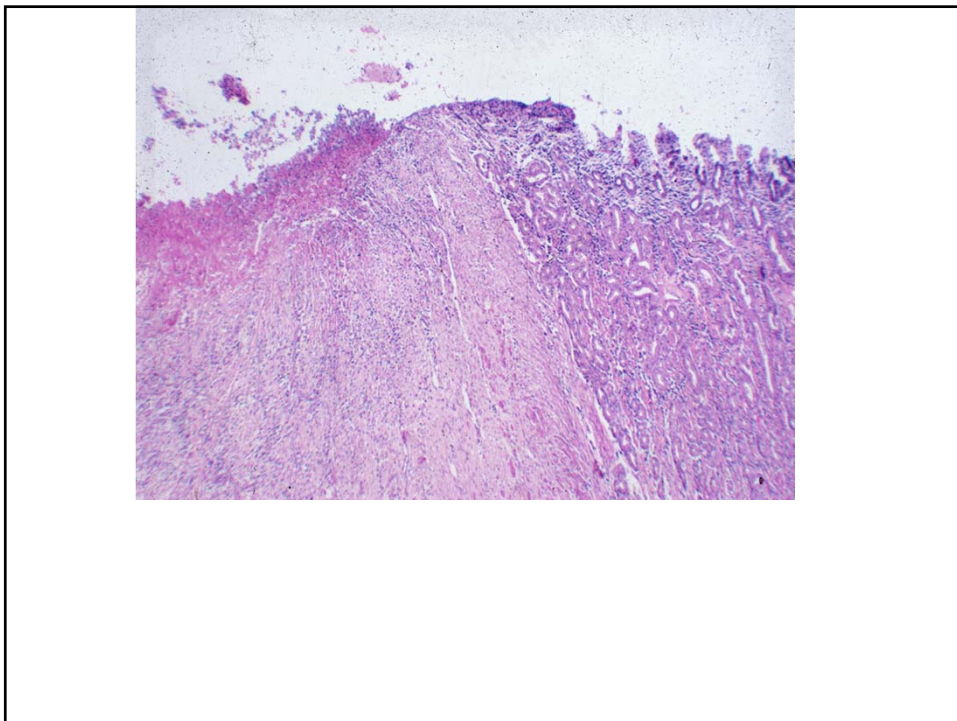
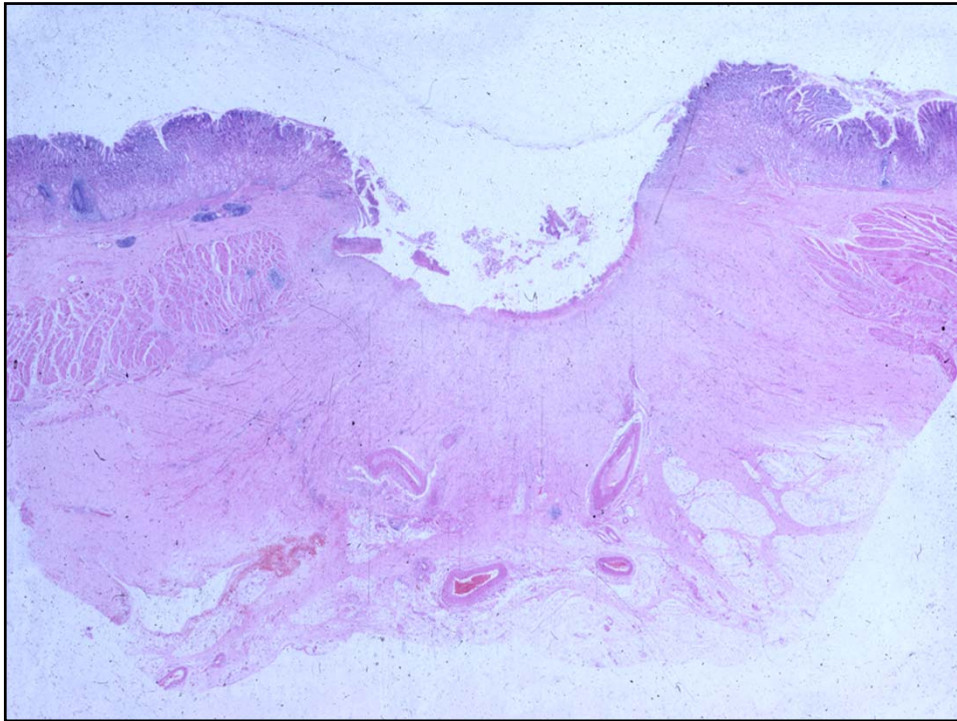


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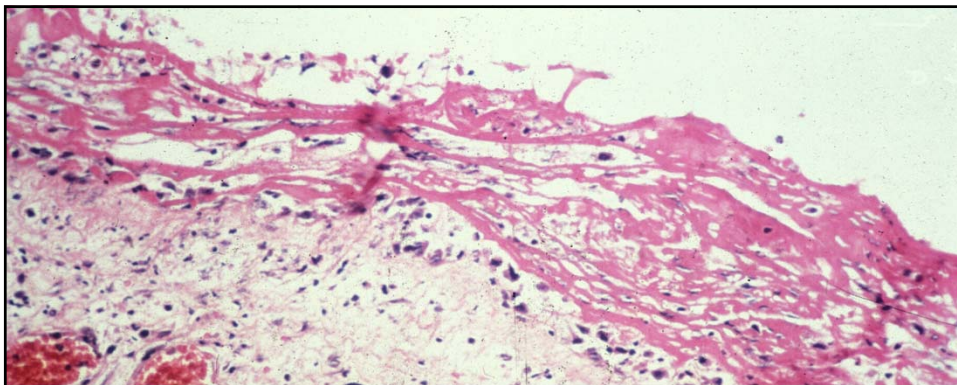
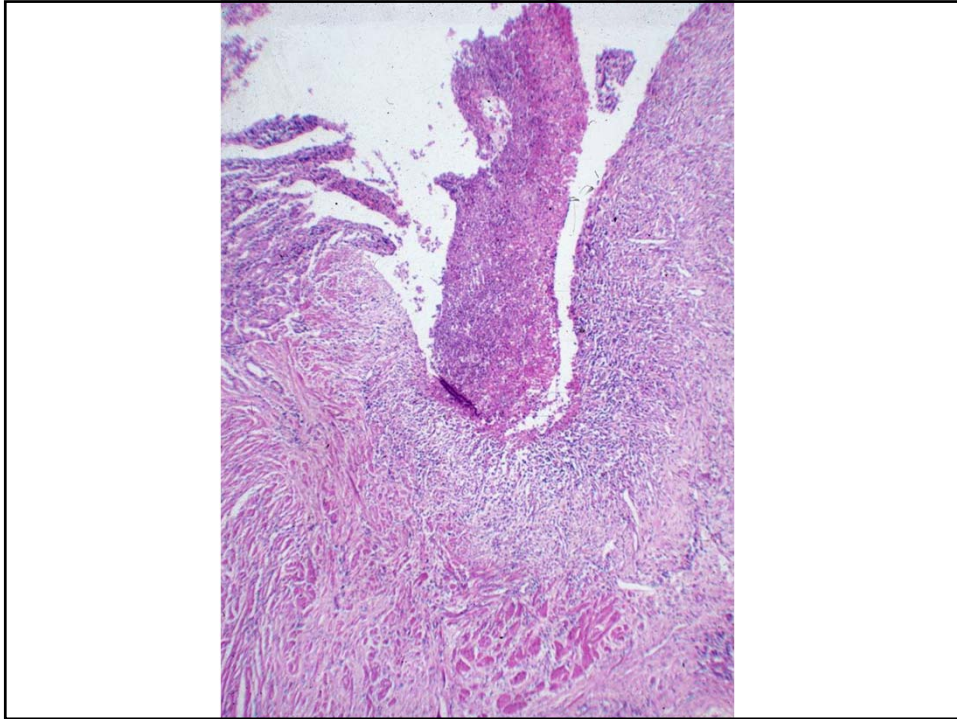






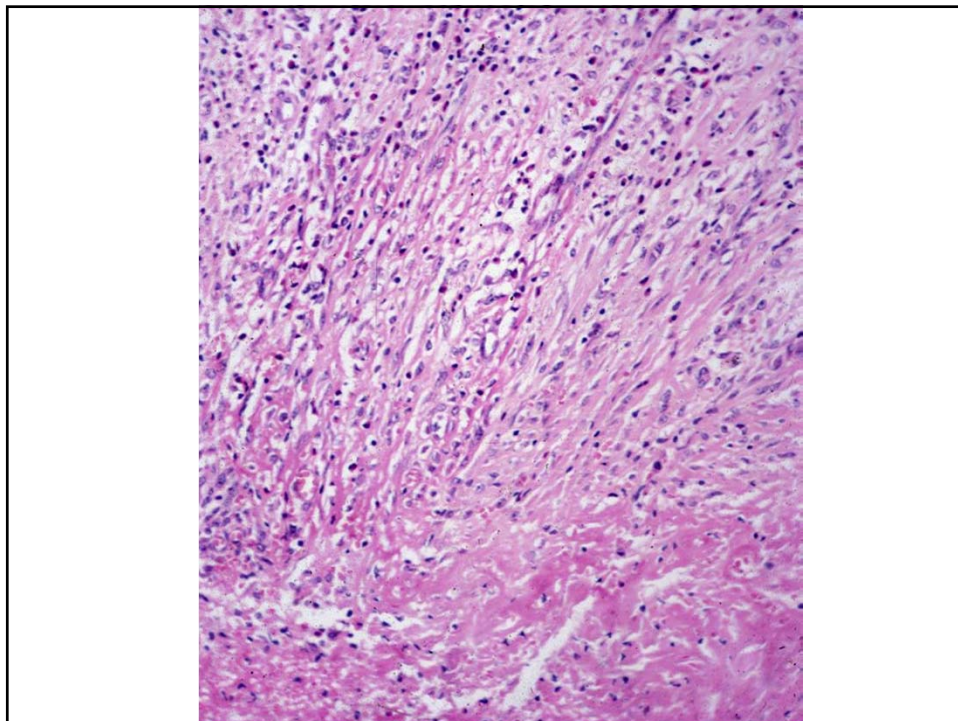
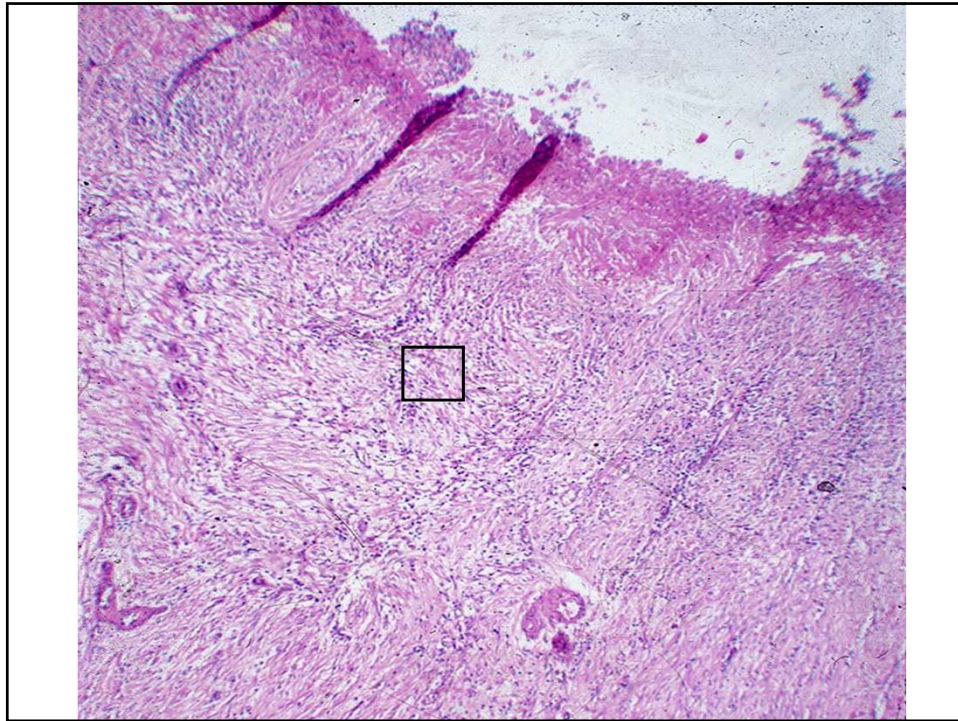






FIBRINOPURULENT SURFACE EXUDATE

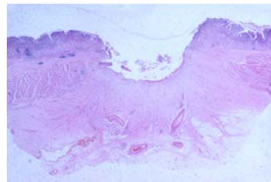




## Questions:

1. What pathological processes are illustrated?

2. How deep is the ulcer (which layer)?



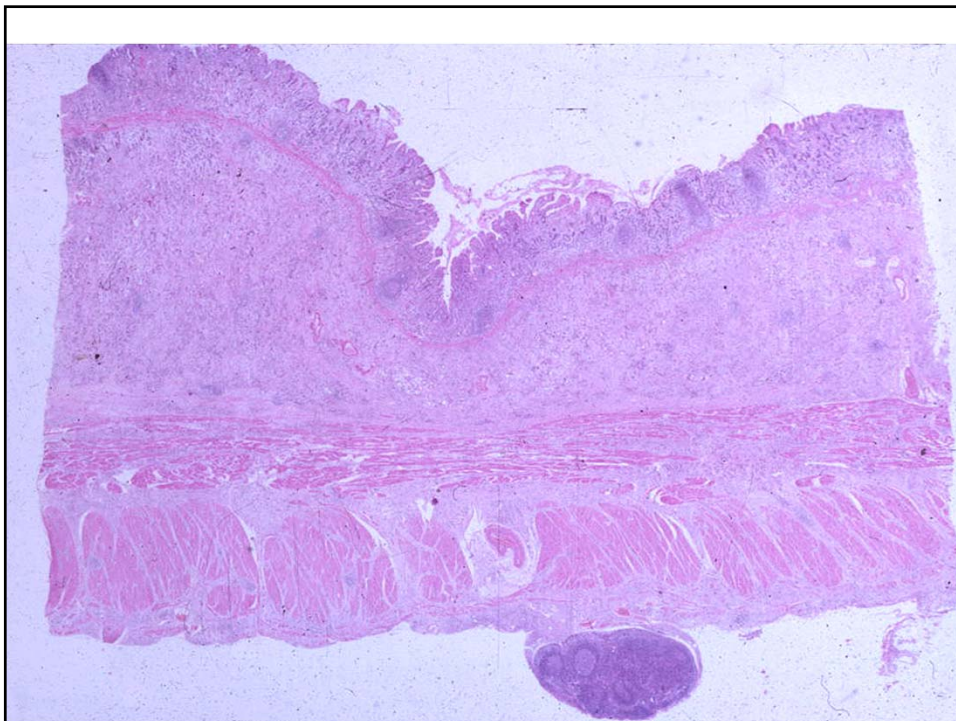
3. Describe the 4 zones characteristic of peptic ulceration.

04754

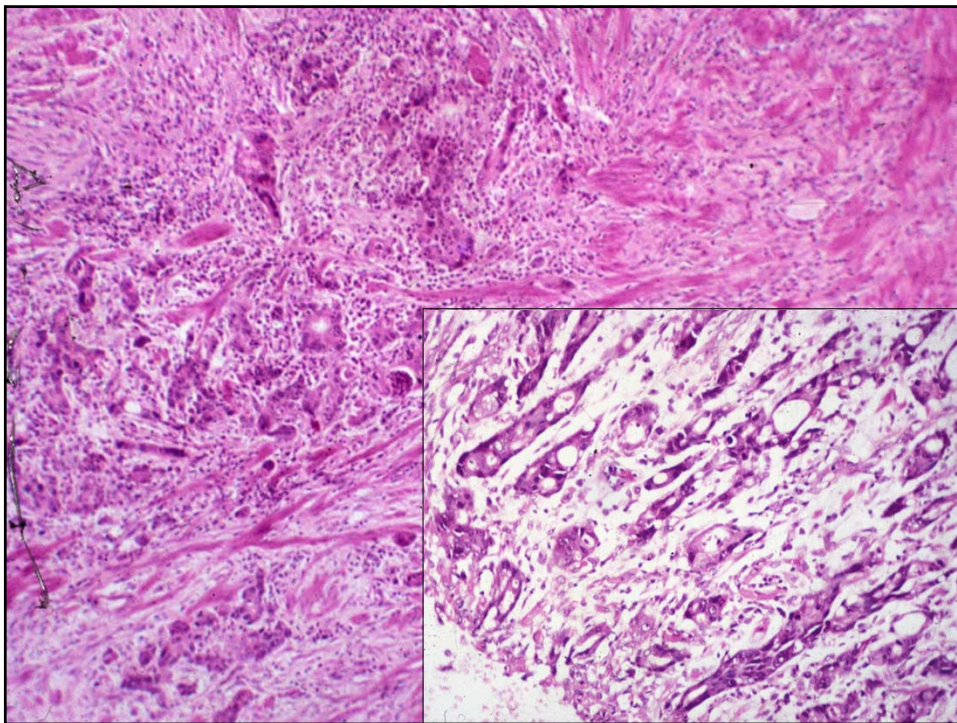
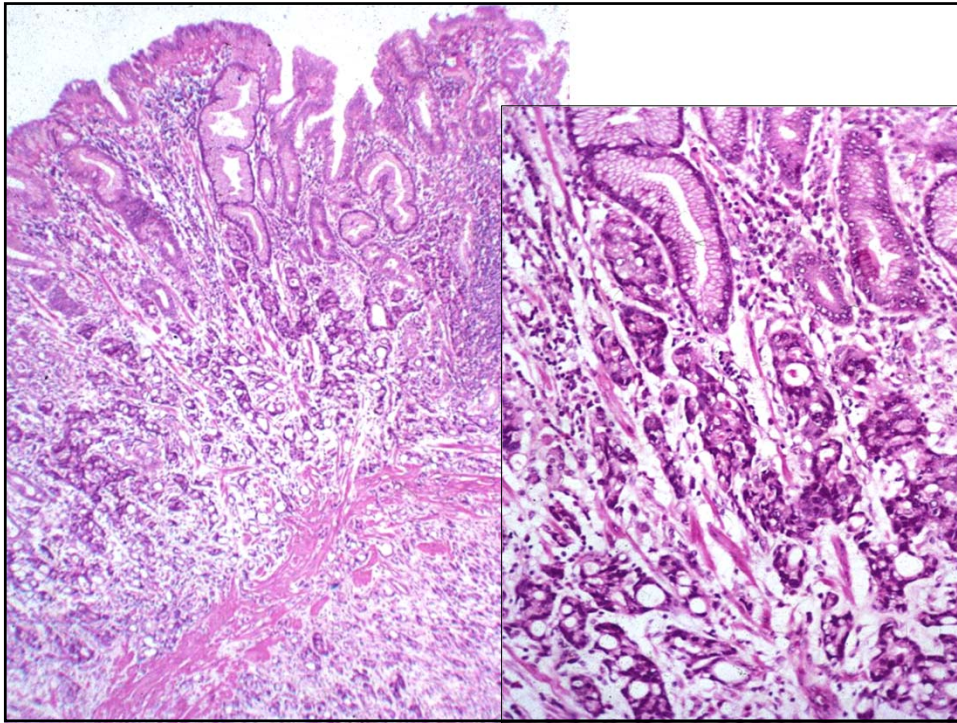
- A 66 year old man complained of mild epigastric discomfort after meals for the last 5 months and occasional nausea.
- He has lost 7 kg over 2 months.
- After endoscopic gastric biopsy, a gastrectomy was then performed.











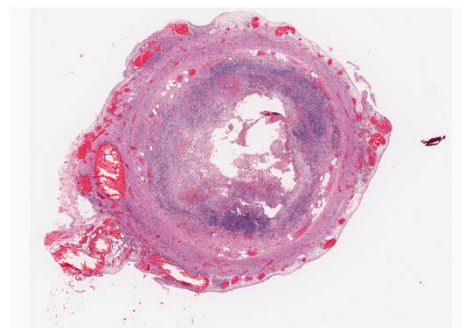
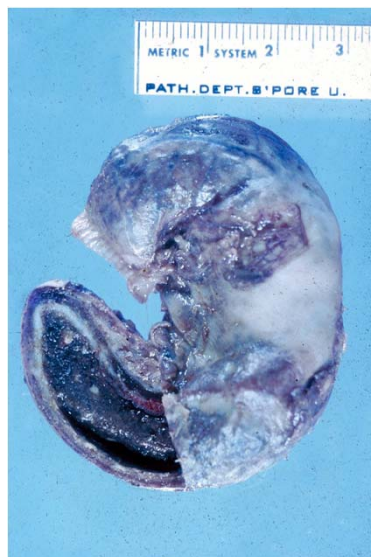
## Questions:

1. What are the key histologic features in this case?
2. What important prognostic features are assessable on the slide?
3. What are some risk factors for the development of gastric adenocarcinoma?

01576

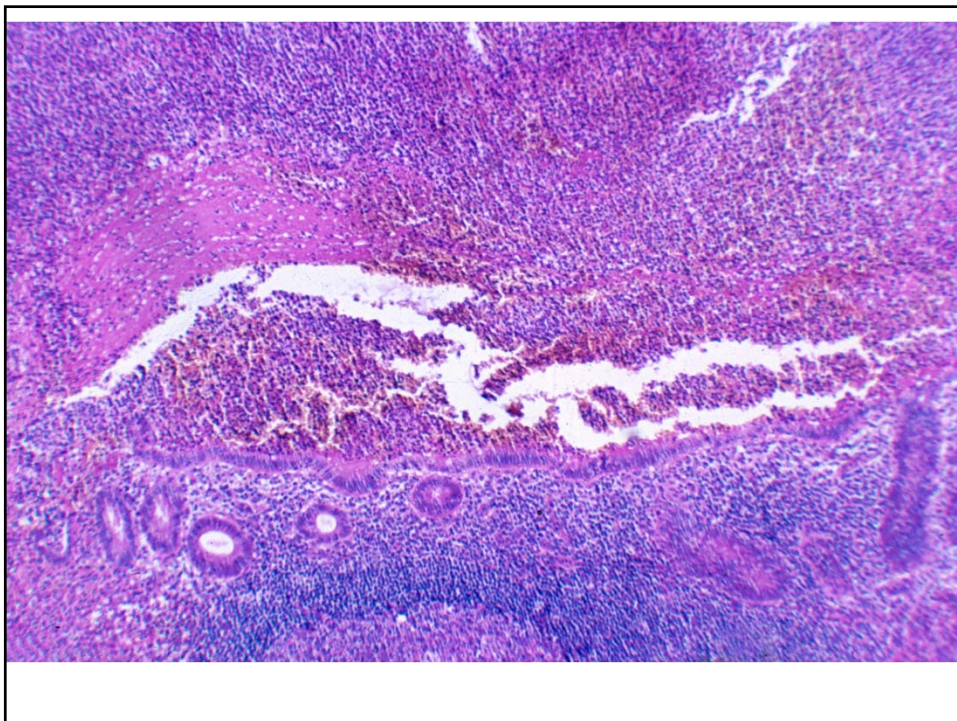
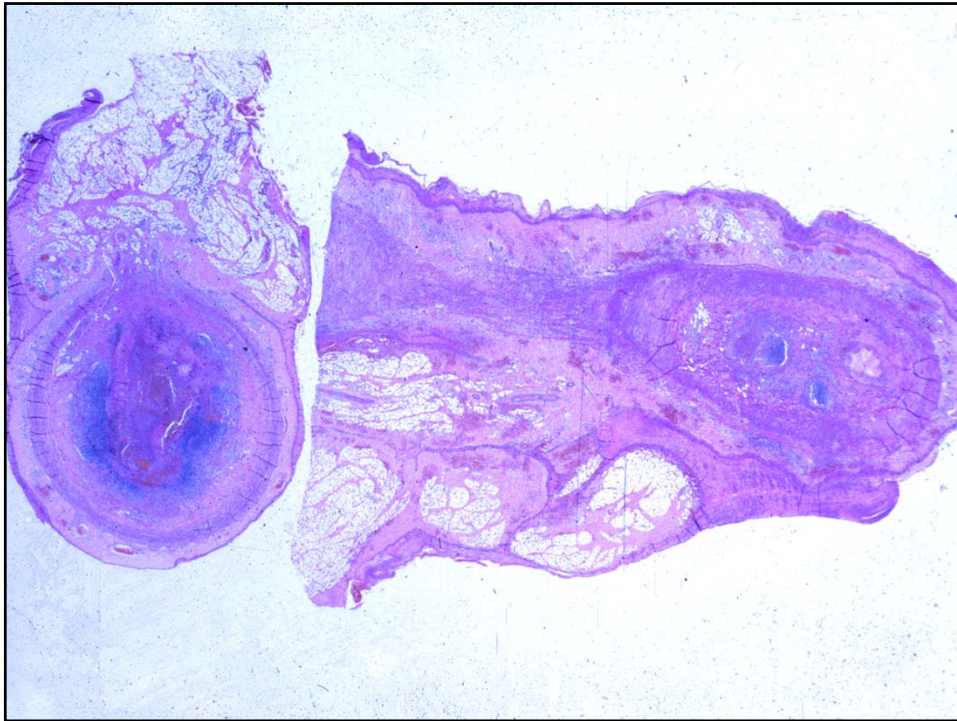


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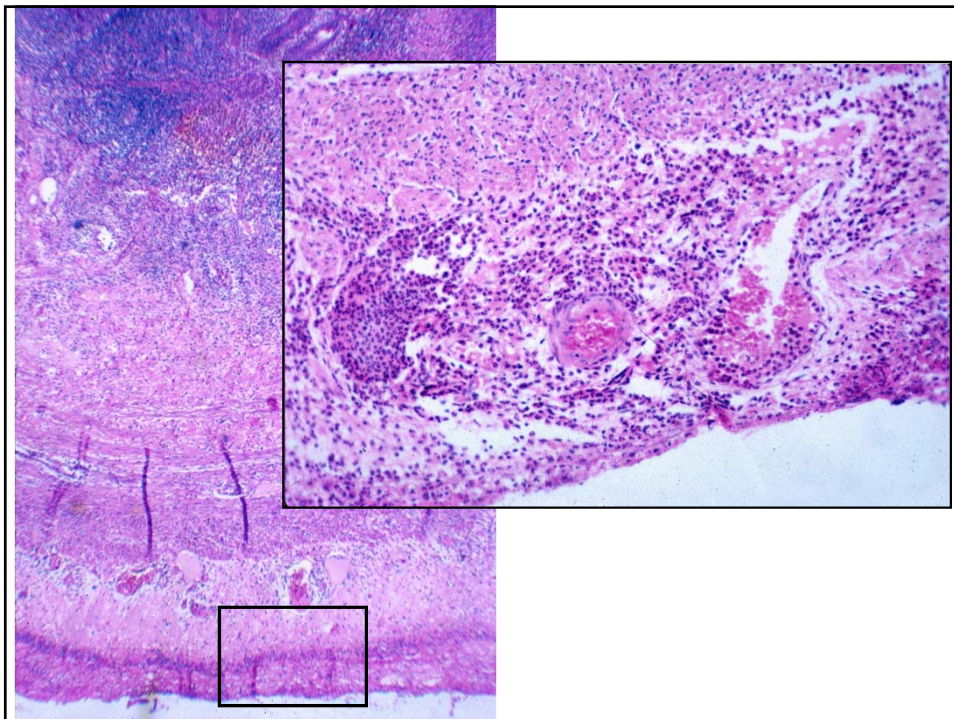
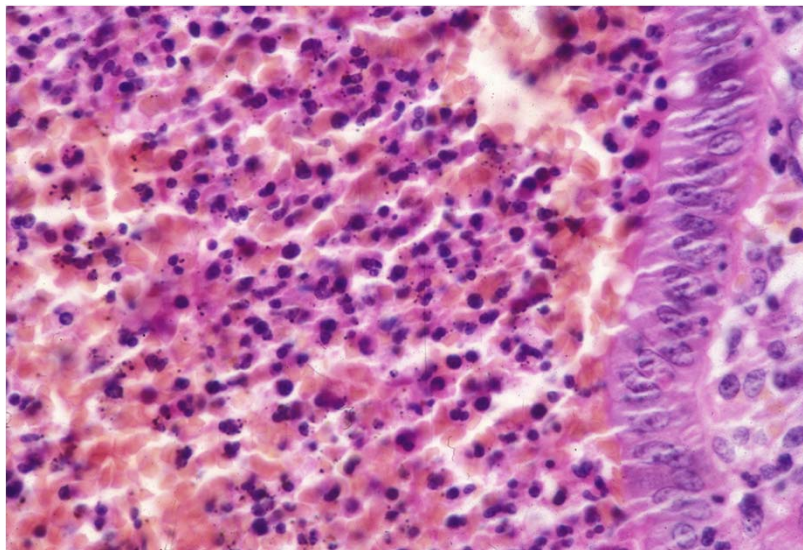


Virtual slide 9









## Questions :

What would the clinical picture be?

A. Clinical presentation

B. Physical examination

02074





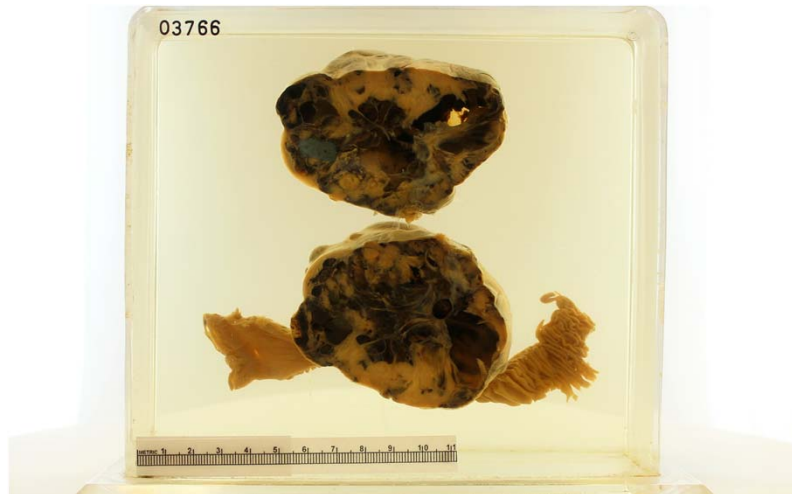
01628



03861



03766 Jejunum



01902



03546



04359





01801



03752



05084



04756



Questions ?



## Tutorial 10 : Liver and Biliary Tract

### Liver and Biliary Tract: Learning Objectives

- Describe the gross features of non-neoplastic and neoplastic liver and biliary conditions
- Make relevant clinico-pathological correlations for the conditions
- To revise the histologic features and pathogenesis of:
  - Fatty change (steatosis)
  - Chronic venous congestion
- To appreciate the histologic features and pathology of:
  - Cirrhosis
  - Metastatic carcinoma in the liver

## HEPATOBIILIARY SYSTEM, PANCREAS

- *Slide 11 : Liver – Fatty change*
- *Slide 12 : Liver – Chronic venous congestion*
- *Slide 13 : Liver – Cirrhosis*
- *Demo slide : Liver – Metastases (Secondary adenocarcinoma)*

Gallbladder

00455



04880





## Liver

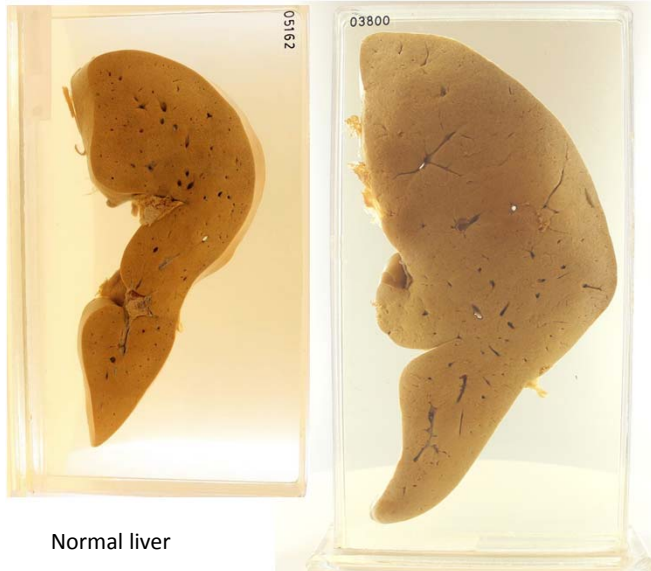
## Normal Liver



A 58 year old known alcoholic is found to have an enlarged liver on abdominal examination.



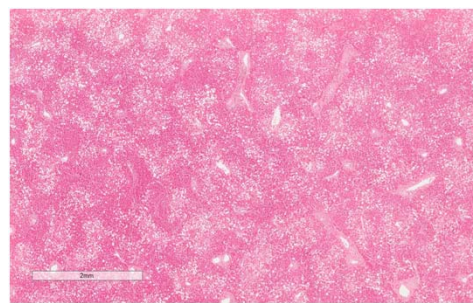
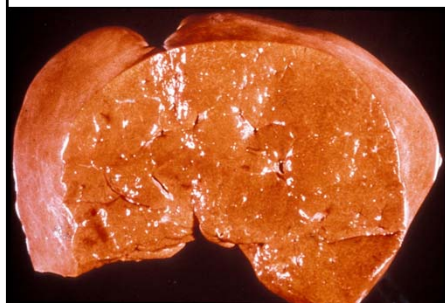
## 03800 Liver Fatty Change



Normal liver

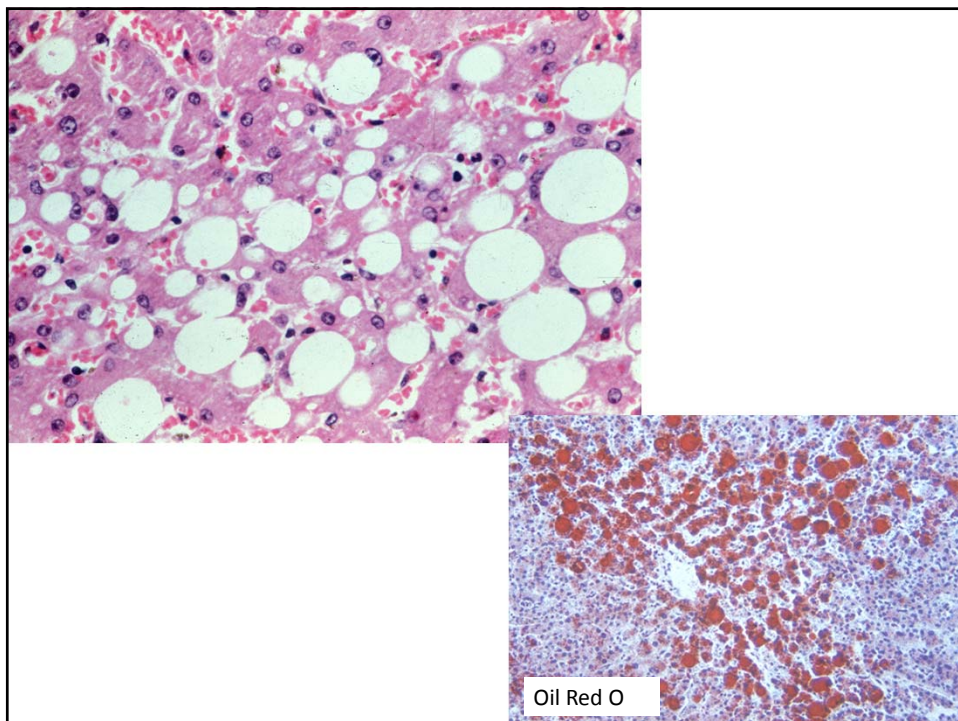
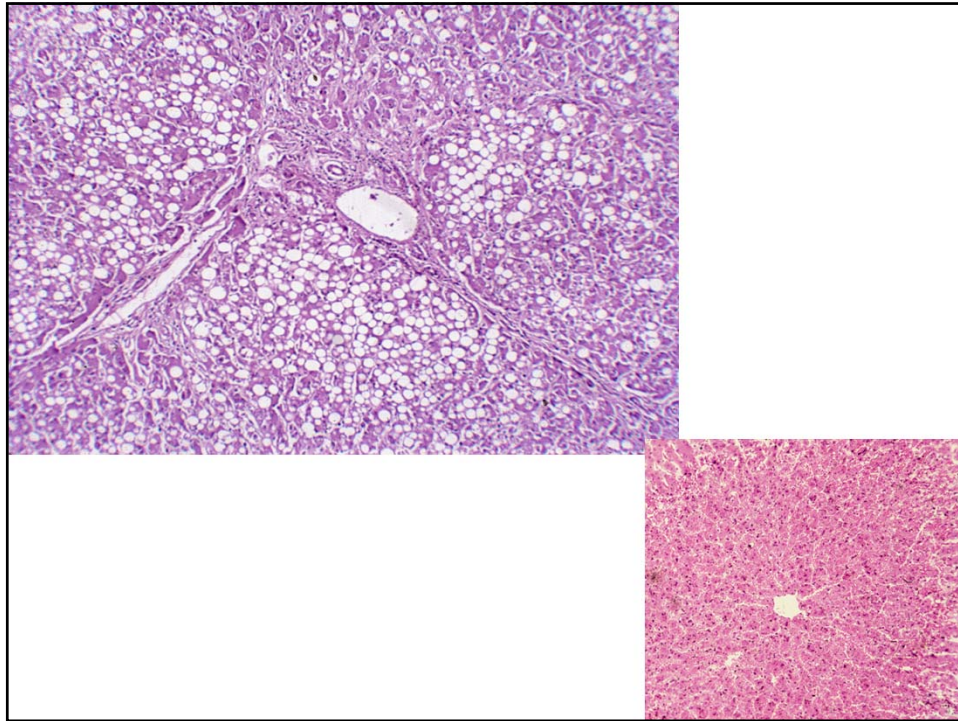


## 03800 Liver : Fatty change



Virtual SLIDE 11  
*Fatty change*





## Questions:

1. What are the main causes of fatty change in the liver?
2. What are the consequences of fatty liver?

REVISE general pathology lesson.

*A 40-yr-old woman who had been suffering from chronic rheumatic valvular disease since adolescence developed progressive breathlessness before she died. An autopsy revealed amongst other findings an enlarged congested liver.*

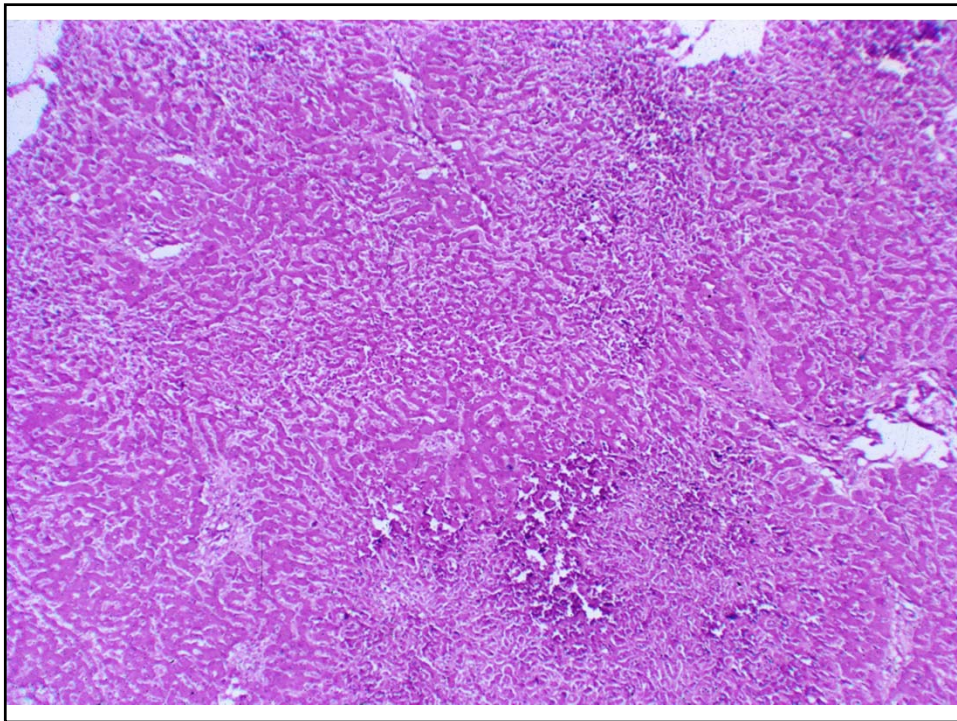
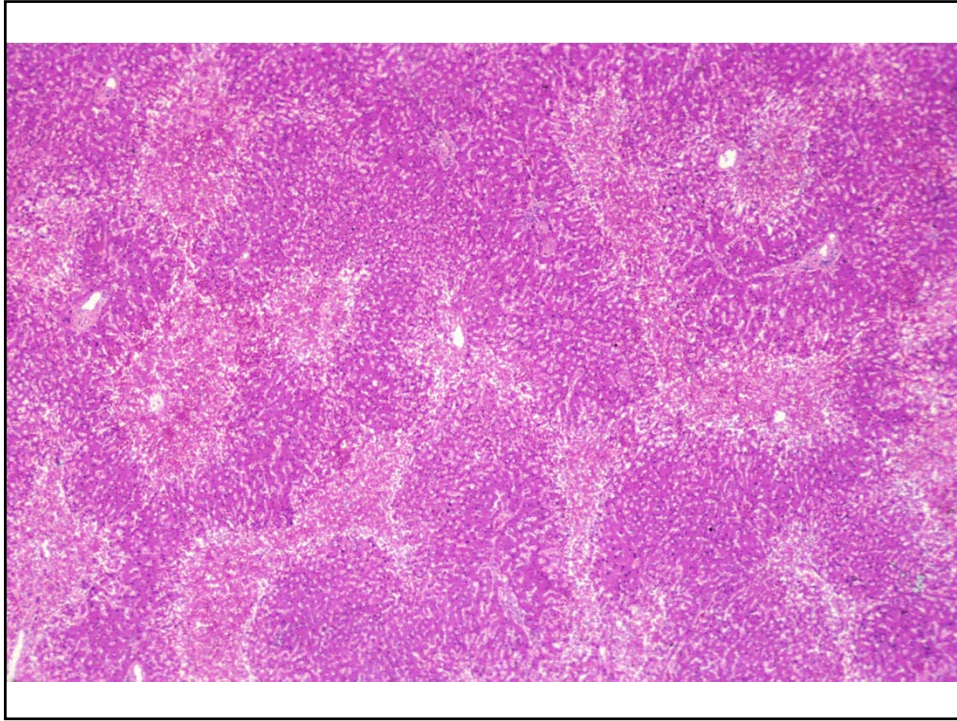


## 01964 Liver

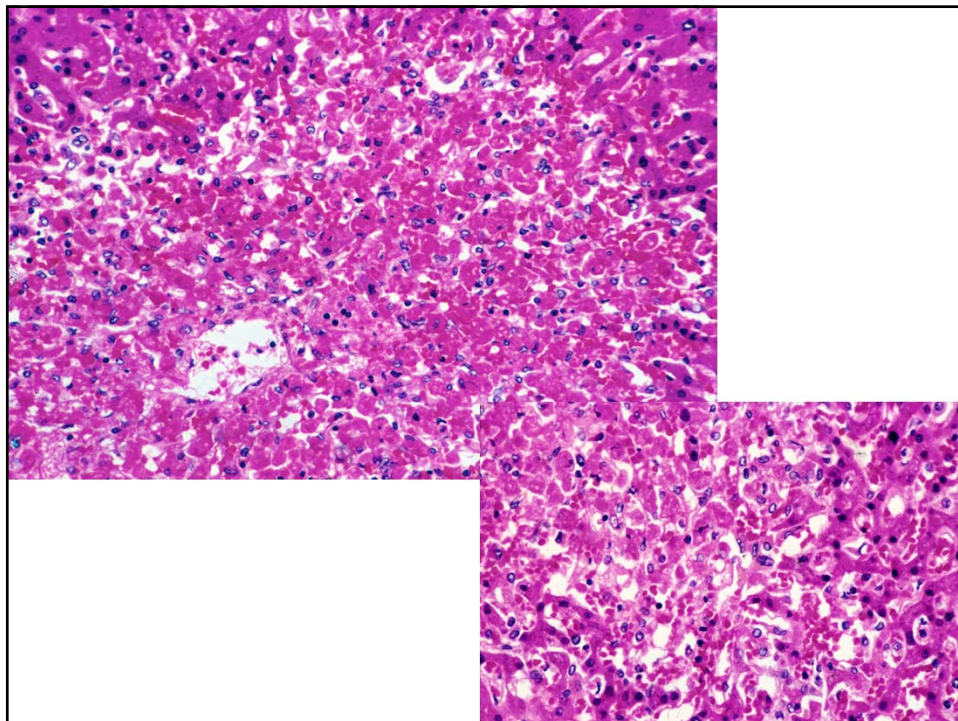
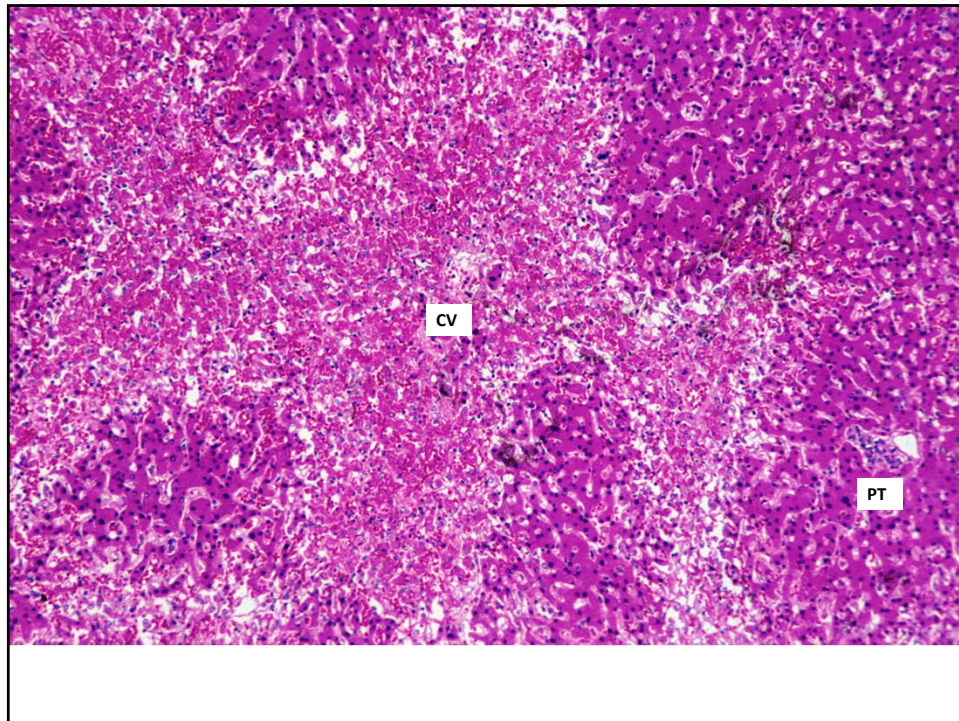


Virtual SLIDE 12  
*Liver - Chronic venous congestion*









## Questions

REVISE the general path lesson –  
Haemodynamic disorders.

02240





01469



04180

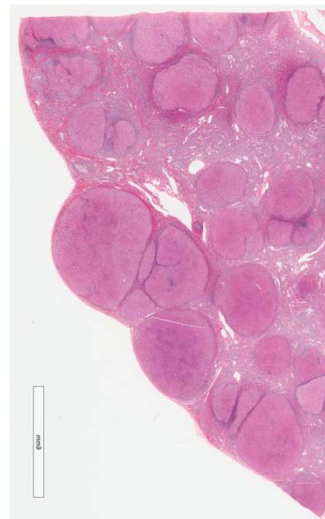


01512



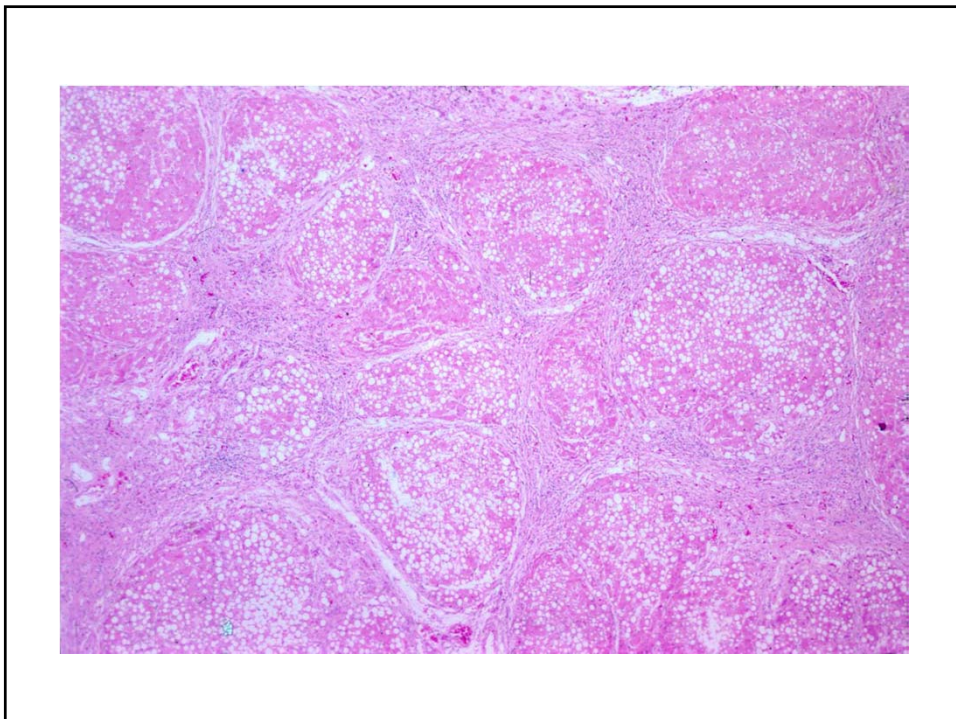
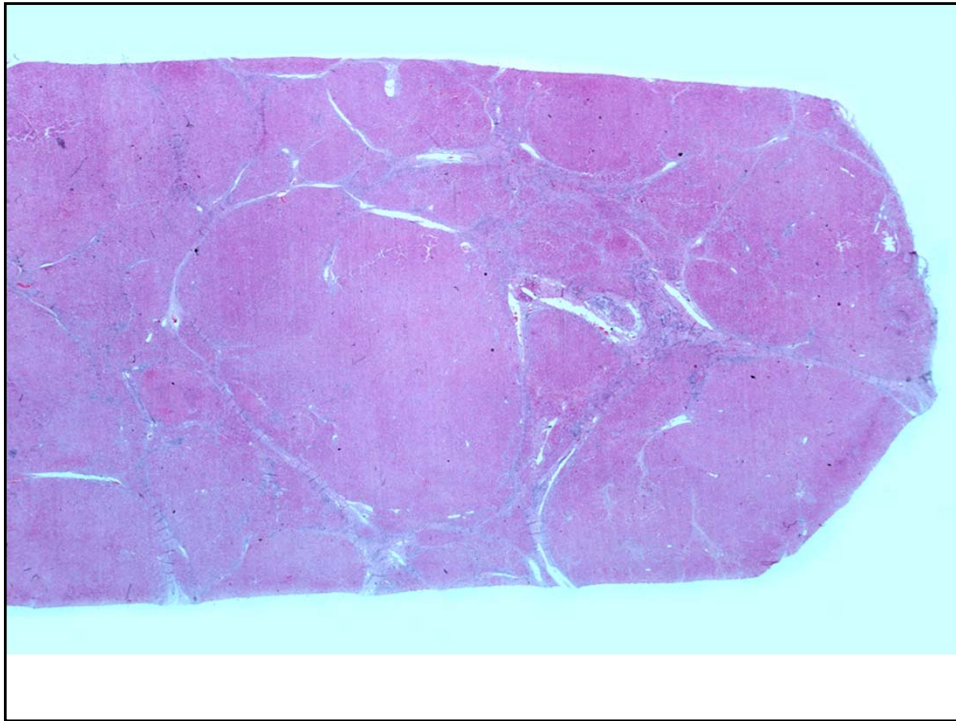
*A 60-year-old man had a long history of chronic liver disease. He presented with jaundice and a massive bout of gastrointestinal bleeding before he died.*



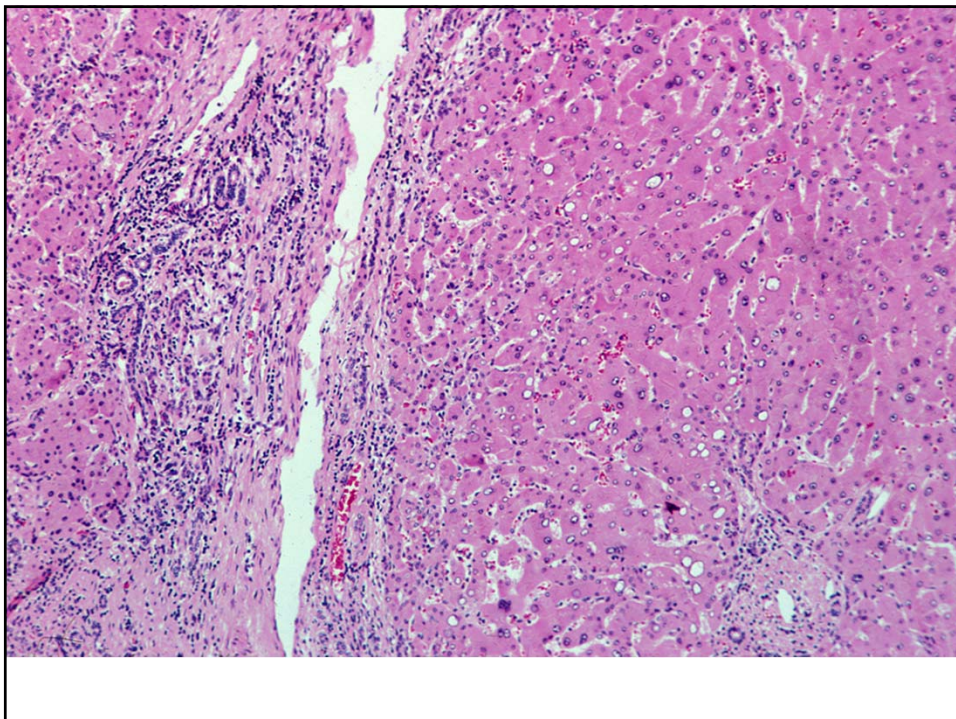
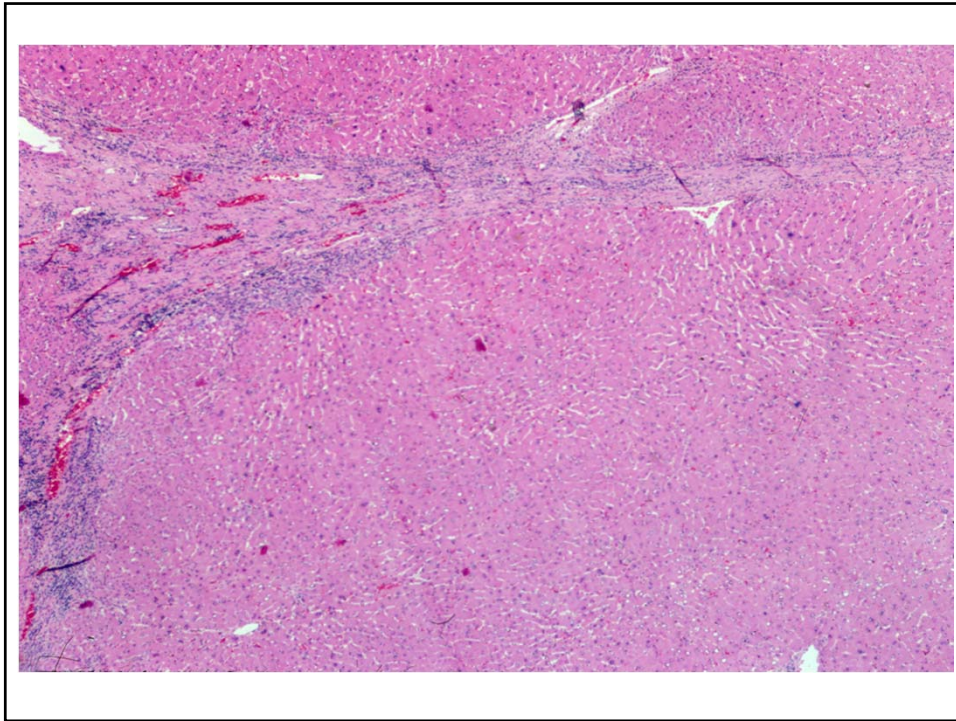


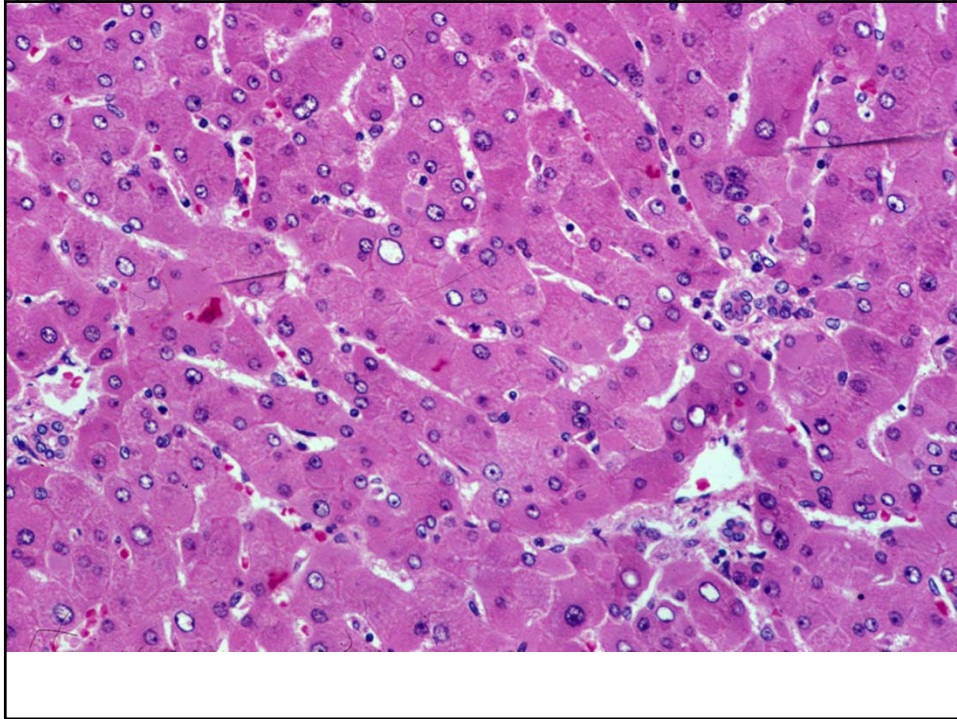
Virtual SLIDE 13  
*Cirrhosis*











## Questions

1. What are the key histologic features?
2. What are the pathological processes present?
3. State the common aetiologies for cirrhosis:



05445



05534



04157



01543



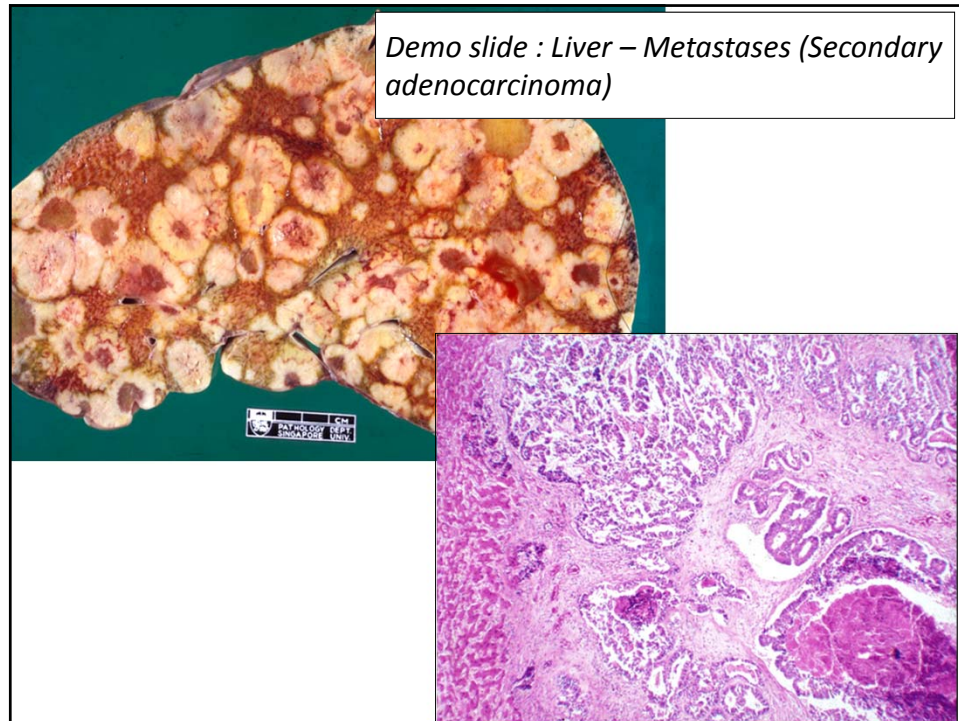
*A 57 yr old woman was noted to have liver enlargement 3 months after resection of a colonic carcinoma.*



### Liver: Metastases (Adenocarcinoma)







## Questions:

1. What are the key histologic features?
2. Where are the likely primary sites to be?
3. How can you differentiate histologically between a primary and secondary adenocarcinoma in the liver?

01563



Pancreas

00587



05623





01381 (revision)



Questions ?

## Tutorial 11 : Diseases of the Lymphoreticular System

### Diseases of the Lymphoreticular System: Learning Objectives

- To appreciate the main pathological conditions causing enlarged lymph nodes
  - Infections
  - Metastatic disease
  - Primary lymphoid malignancies
- Describe the gross features of the disease conditions
- To appreciate the salient microscopic features of examples of main pathological conditions:
  - Slide 14 : Lymph node – Tuberculosis
  - Slide 15 : Lymph node – Metastases (Secondary squamous cell carcinoma)
  - Slide 16 : Lymph node – Non-Hodgkin lymphoma, diffuse
- Make relevant clinico-pathological correlations for the respective conditions

## 05177 Spleen Normal



## 05026





04690 (revision)



02291



00376



03728



00829



00832

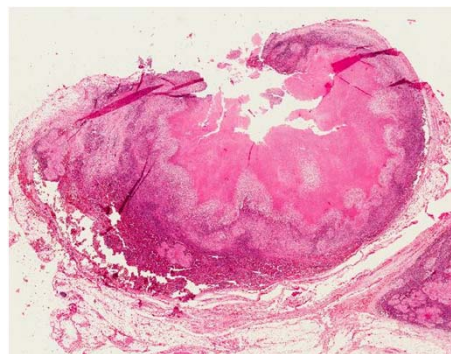




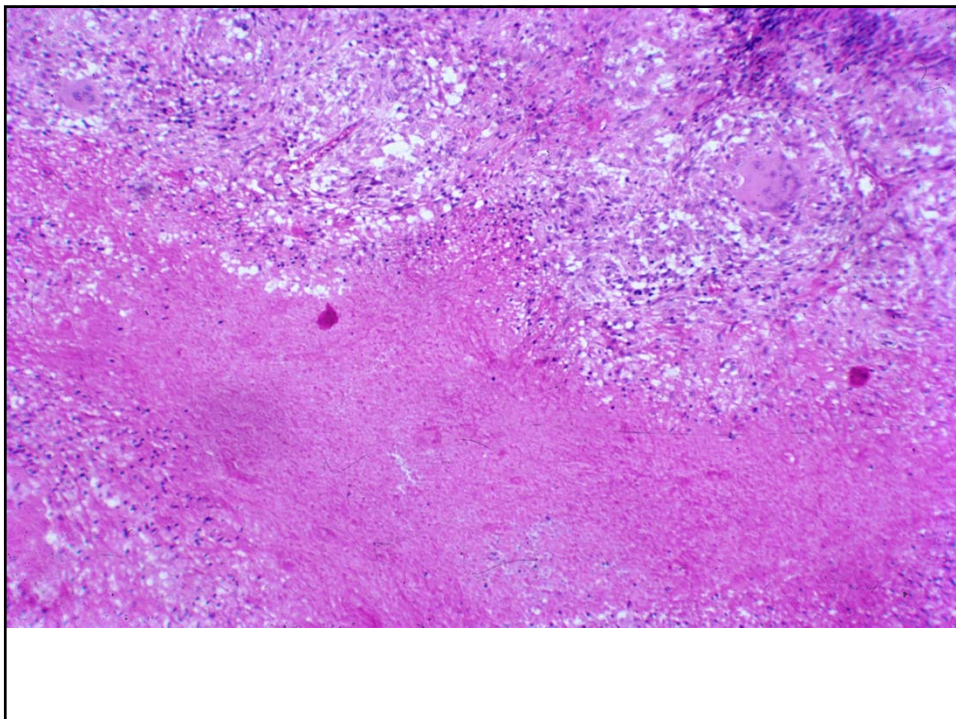
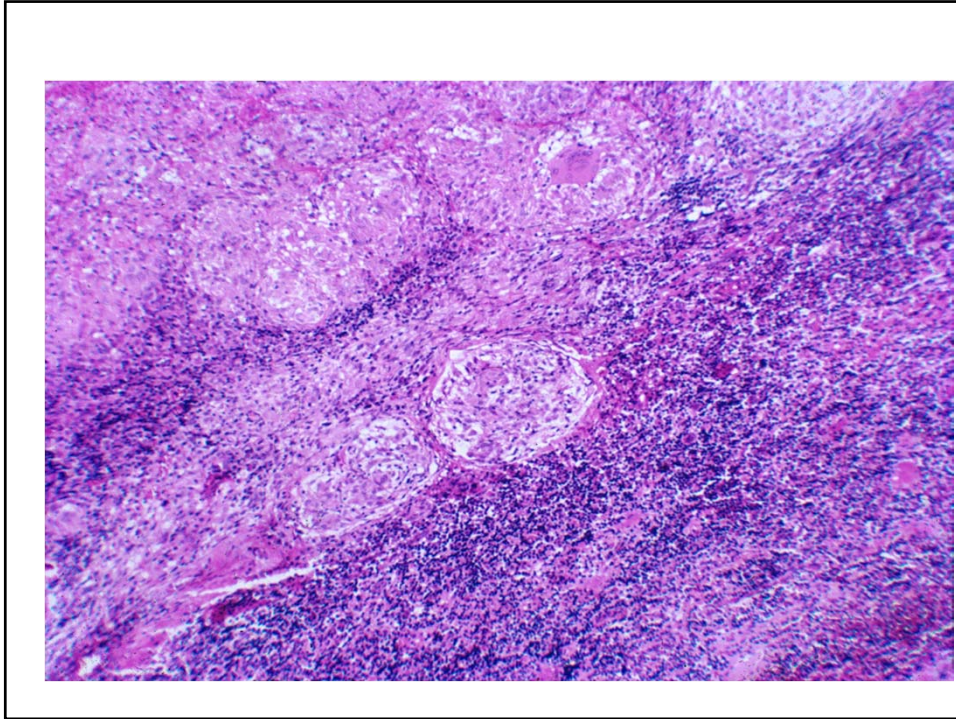
*A 45-yr-old heavy smoker complained of a swelling on the left side of his neck for 1 month, associated with haemoptysis.  
Physical examination revealed a 2cm swelling in the left side of the neck.  
Chest X-ray revealed a left lung shadow.*



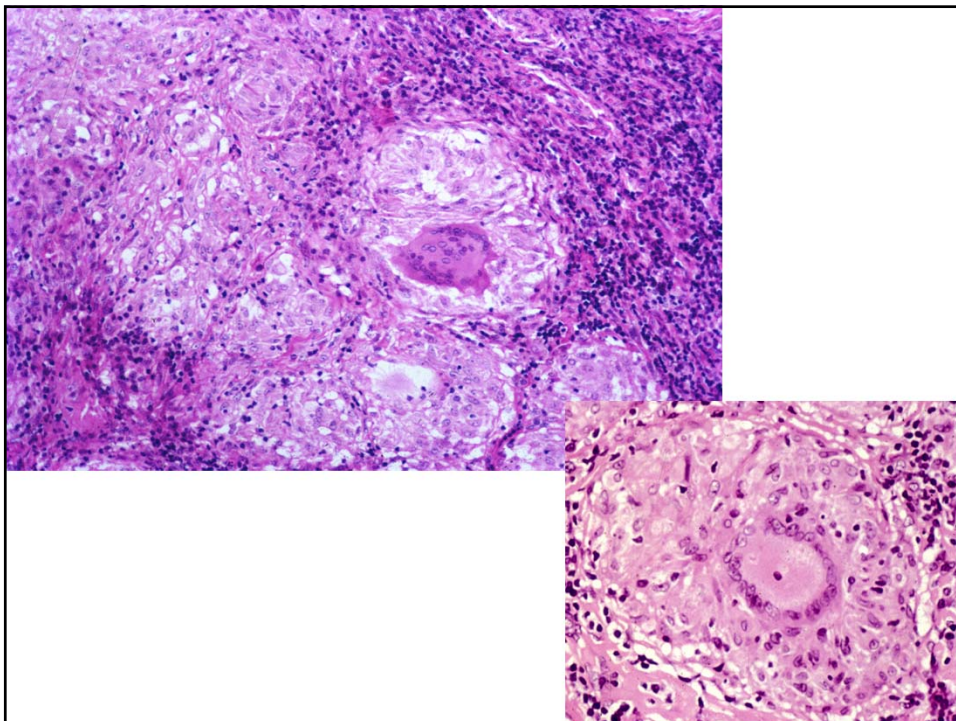
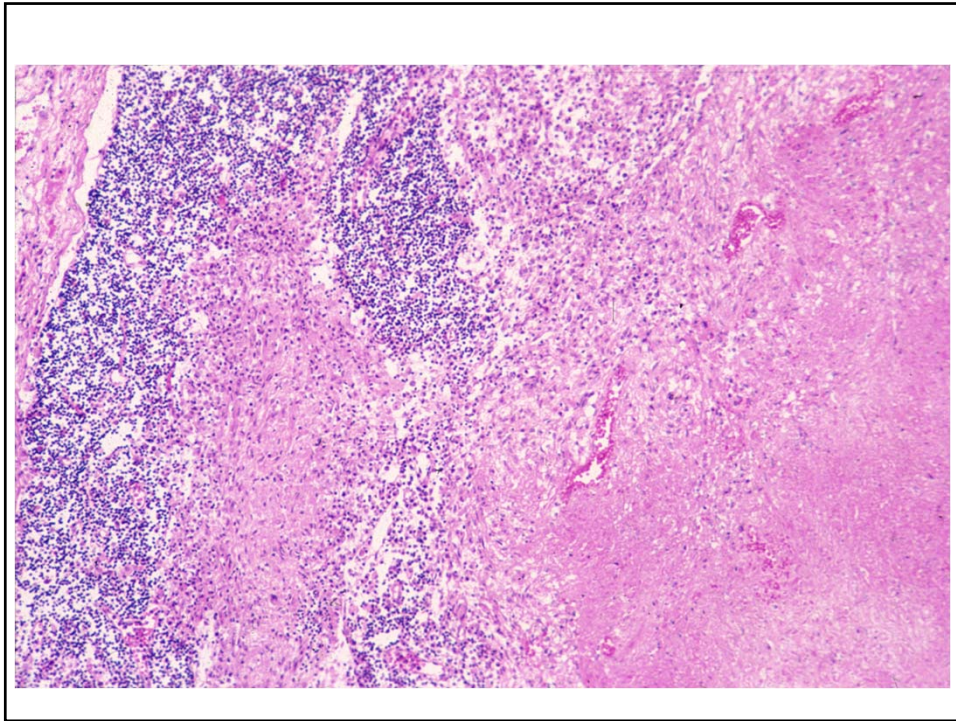
00850



Virtual SLIDE 14









### Questions :

1. What are the key histologic features?
2. Name one other important diagnosis to consider (heavy smoker, haemoptysis, neck mass).
3. How would you confirm the infective aetiology?

01297 (revision)



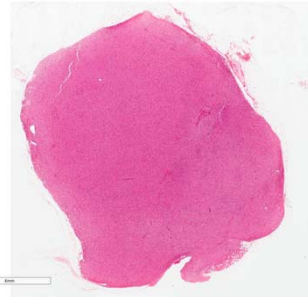
00340



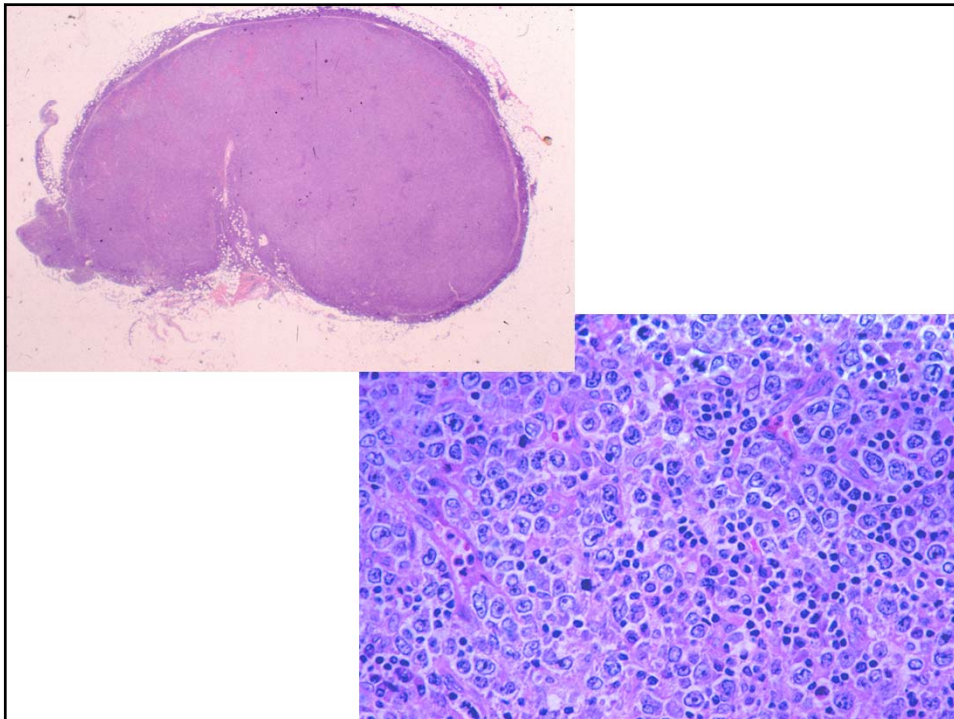
02798



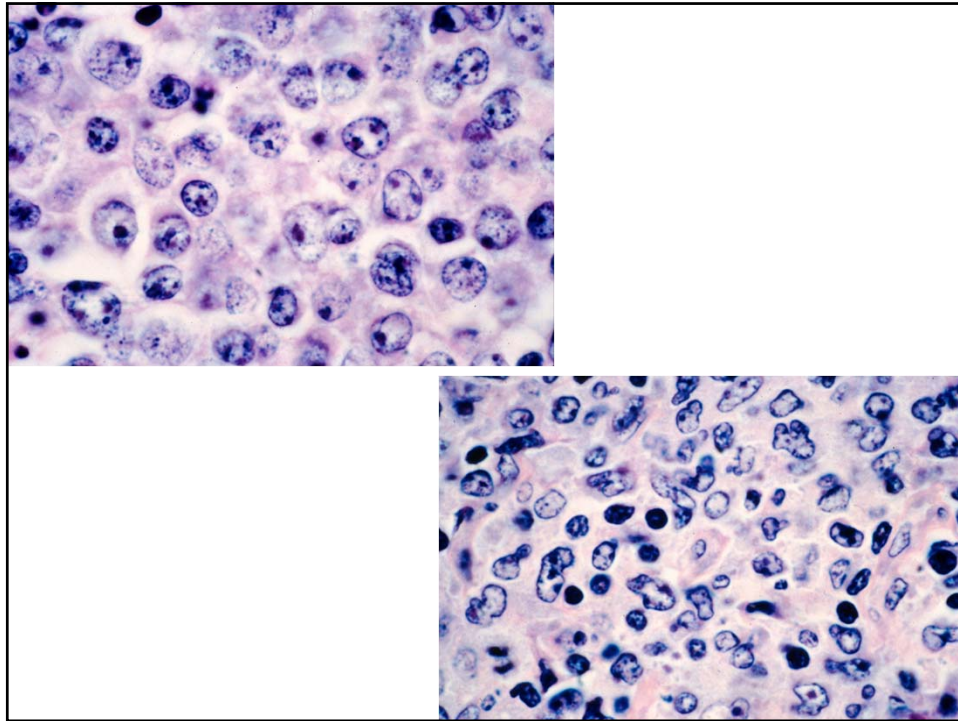
- A 50 yr old Chinese man complained of a rapidly enlarging painless neck mass. He had no other symptoms.
- Physical examination revealed no pallor, jaundice or skin hemorrhages. There was a 2-cm-diam., non-tender, firm swelling on the right side of the neck.



Virtual SLIDE 16







### Questions:

1. What are the key histologic features?
2. What other symptoms may the patient have complained of?
3. How aggressive do you think this lesion is likely to be?

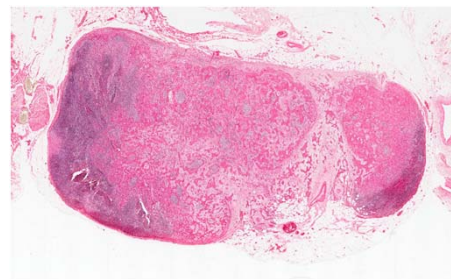
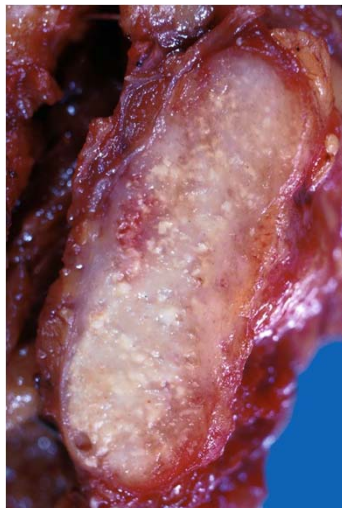
02120



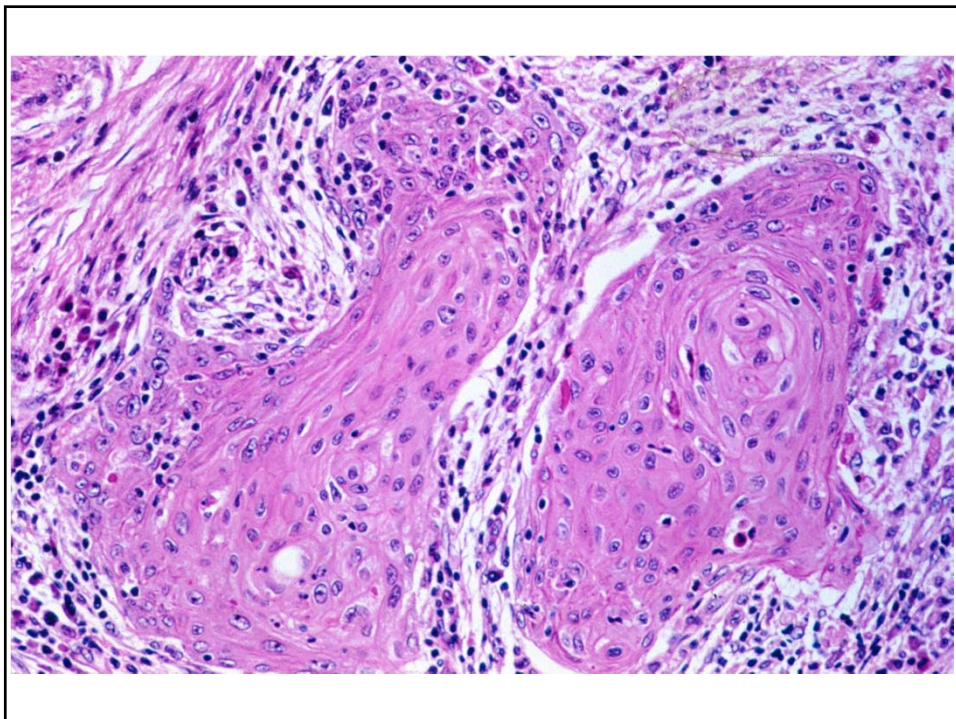
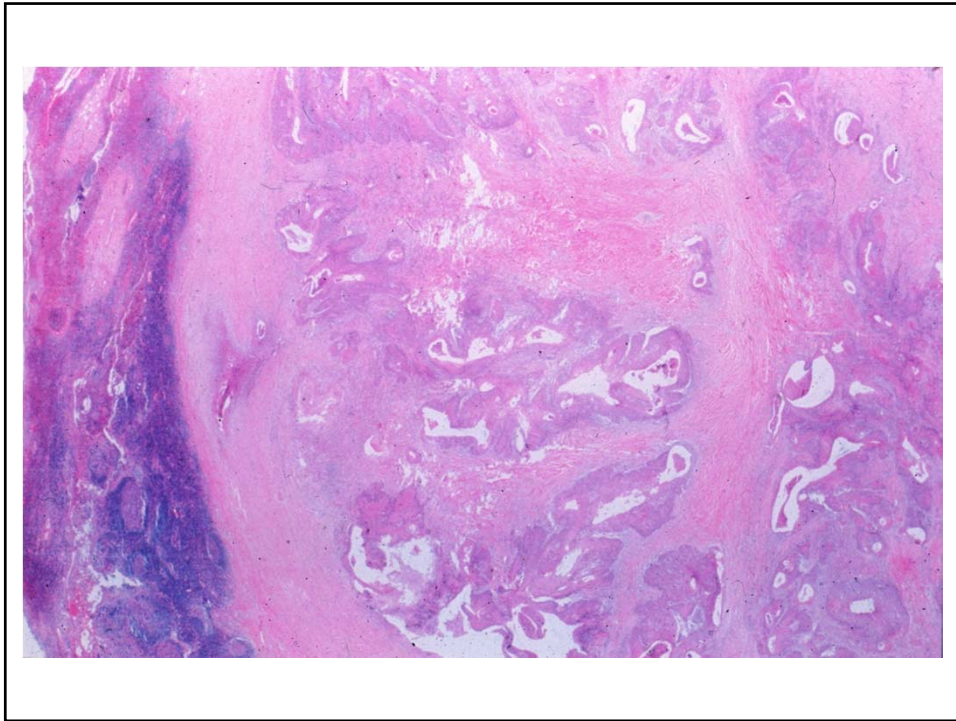
*A 45-yr-old heavy smoker complained of a swelling on the left side of his neck for 1 month, associated with haemoptysis.*

*Physical examination revealed a 2cm swelling in the left side of the neck.*

*Chest X-ray revealed a left lung shadow.*



Virtual SLIDE 15





## Questions:

1. What are the key histologic features?
2. What sort of biopsy would you recommend?
3. What else would you examine in this patient?

01088





Questions?

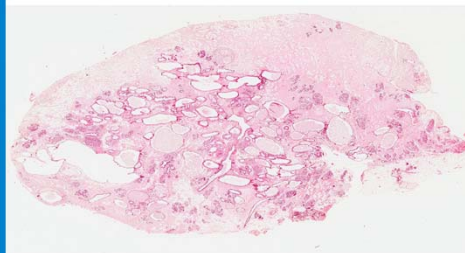
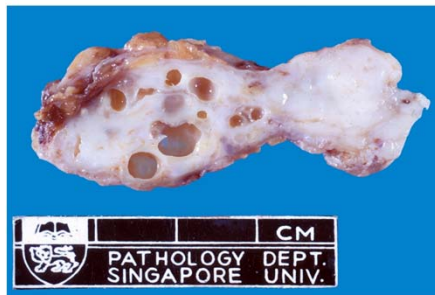
## Tutorial 12 : Breast

### Breast: Learning Objectives

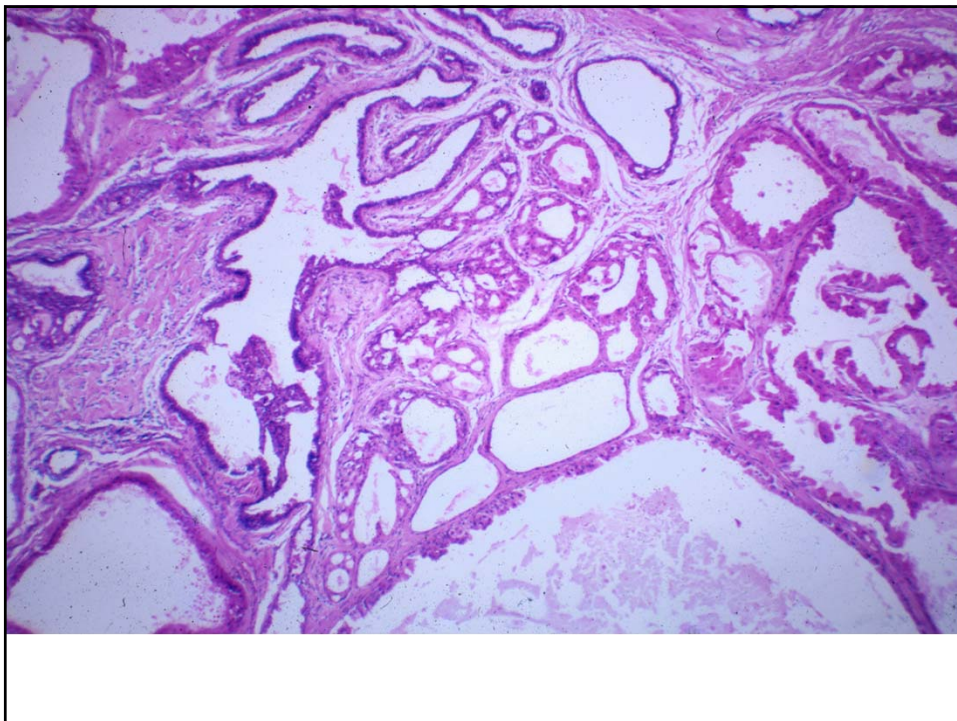
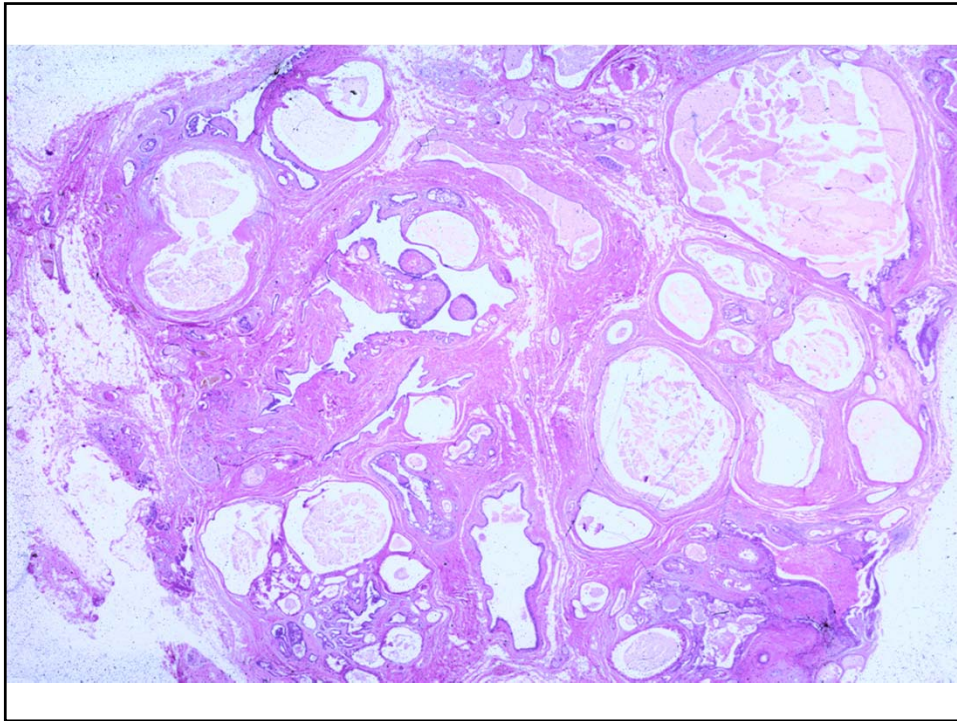
- Describe the gross features of common breast conditions
- To appreciate the histopathologic features of common breast conditions:
  - *Slide 18 : Breast – Fibrocystic change*
  - *Slide 19 : Breast – Invasive ductal carcinoma*
- Make relevant clinico-pathological correlations for these conditions



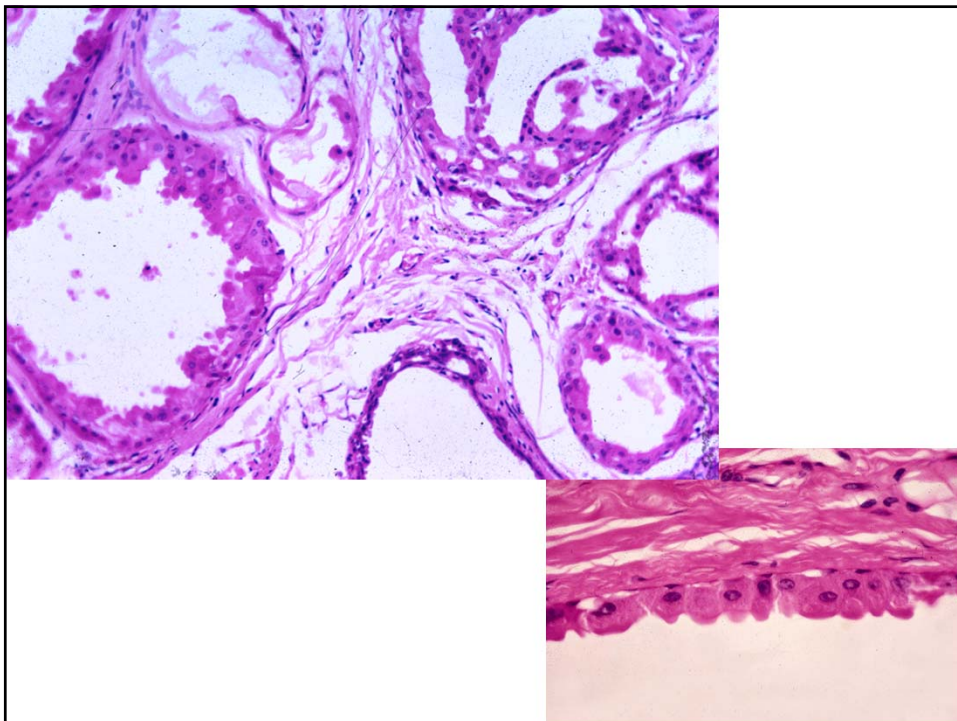
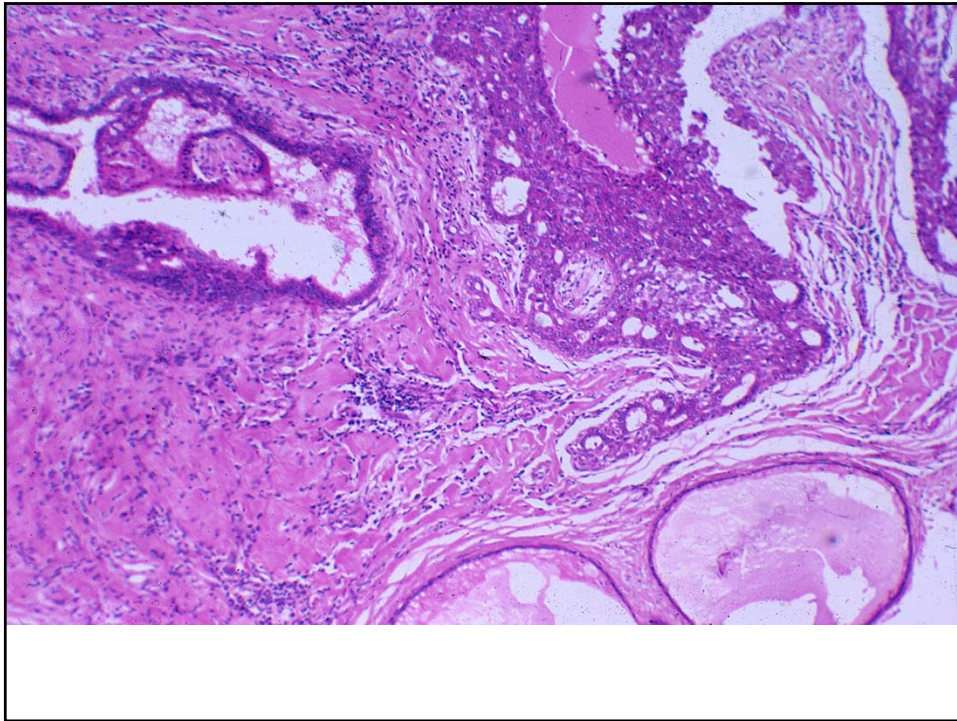
- A 40-yr-old woman noted a vague mass in both breasts, associated with premenstrual tenderness. She has a family history of breast cancer.
- Palpation revealed bilateral ill-defined nodularity which was more marked in the upper outer quadrant of the left breast. This area was biopsied.



Virtual SLIDE 18









### Questions :

1. What are the key histologic features?
2. What clinical features make malignancy less likely?
3. What histologic features increase the risk of malignancy?

### 04687 Breast lump



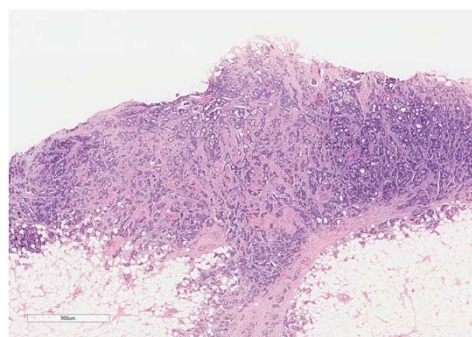
00237



04987

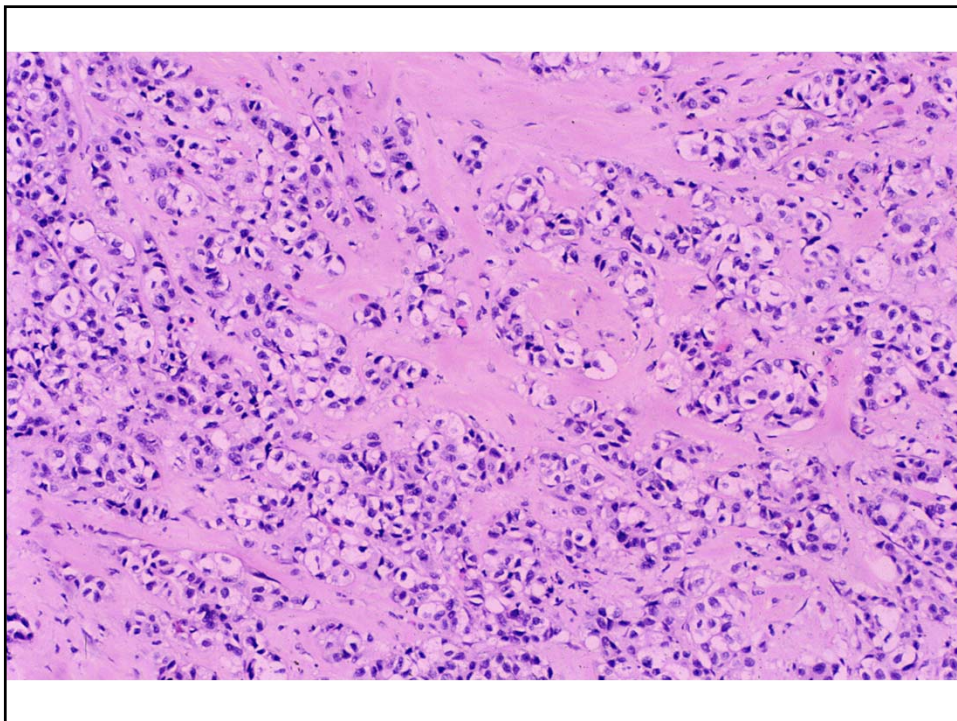
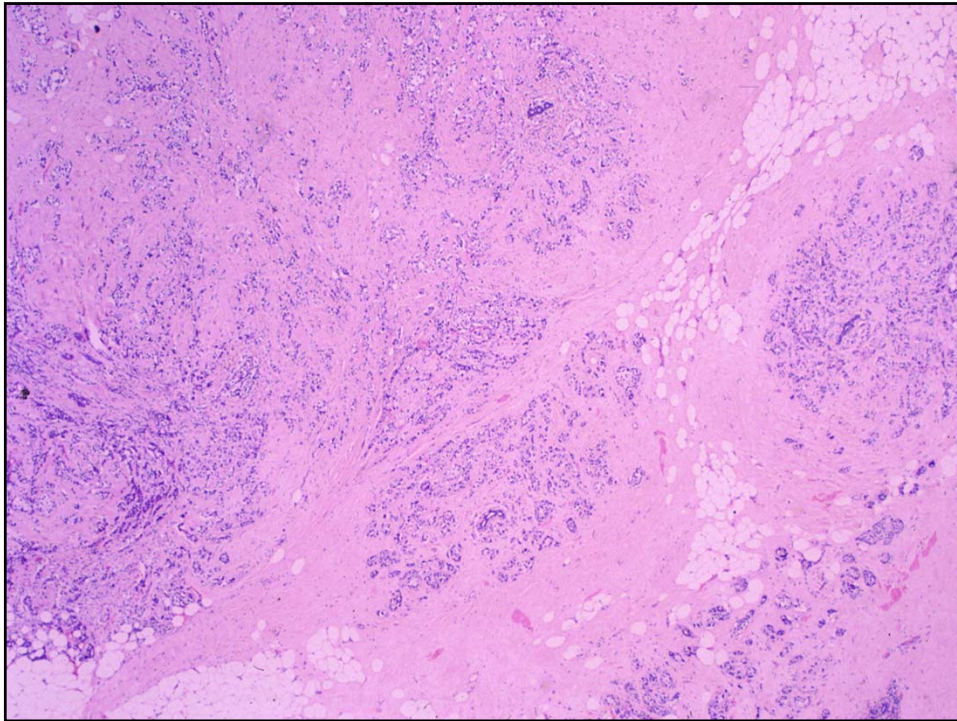


*A 55-yr-old postmenopausal woman was found to have a 2.5 cm hard, irregular, non-mobile mass in the right breast.*

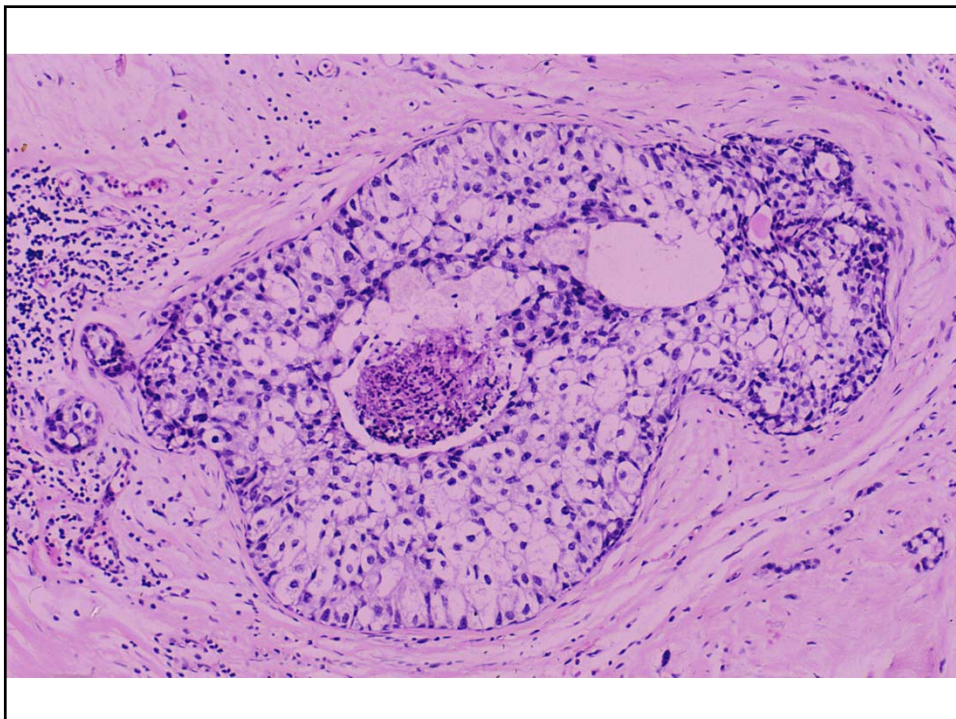
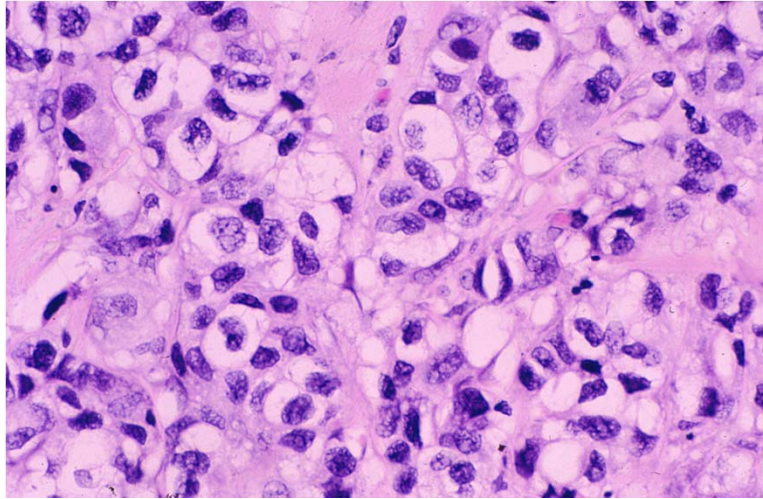


Virtual SLIDE 19









## Questions:

1. What are the key histologic features?
2. What are the histologic features which may have prognostic value?
3. TRUE – FALSE :
  - a. BRCA-1 and BRCA-2 are oncogenes
  - b. Inflammatory carcinoma typically has a good prognosis
  - c. DCIS increases the risk of invasive carcinoma by about 10 times
  - d. Early menarche and late menopause are associated with increased risk of breast cancer

04267





05567





## Tutorial 13 : Thyroid Disease

### Thyroid Disease: Learning Objectives

- To appreciate the clinical, gross and microscopic diagnostic features of the most common thyroid neoplasms:
  - Follicular adenoma (Slide 23)
  - Papillary carcinoma (Slide 25)
- Make relevant clinico-pathological correlations for major endocrine conditions
  - Thyroid
  - Adrenal

05180 Thyroid Normal



03455





00896



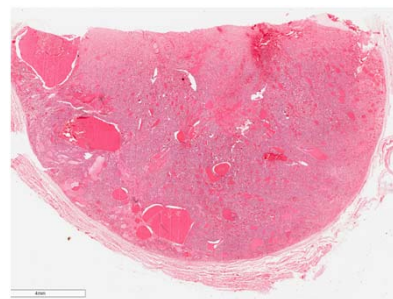
05013

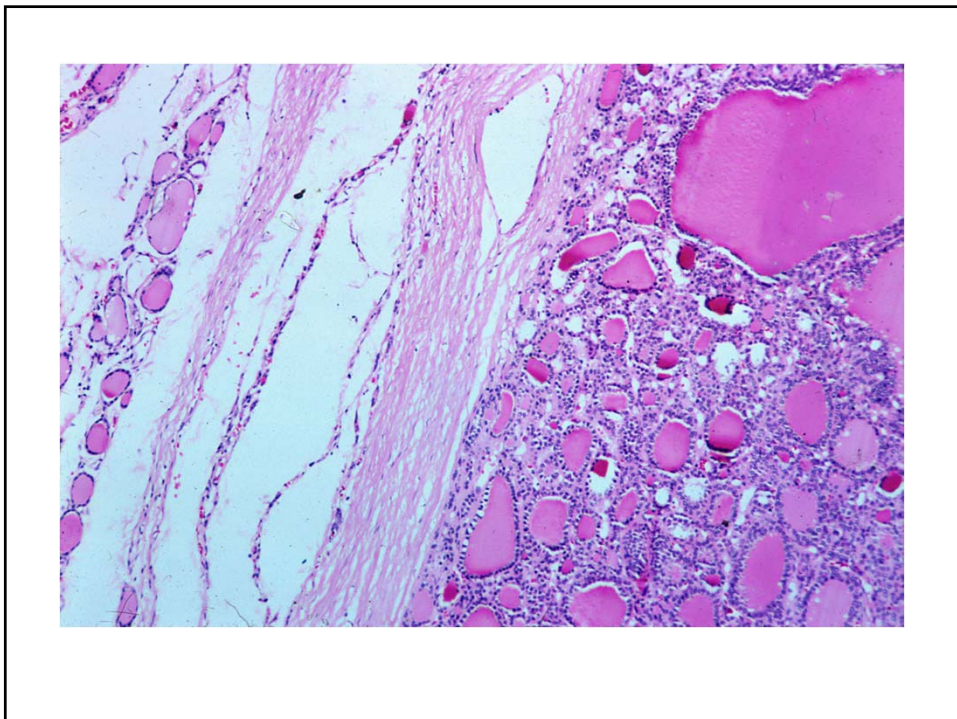
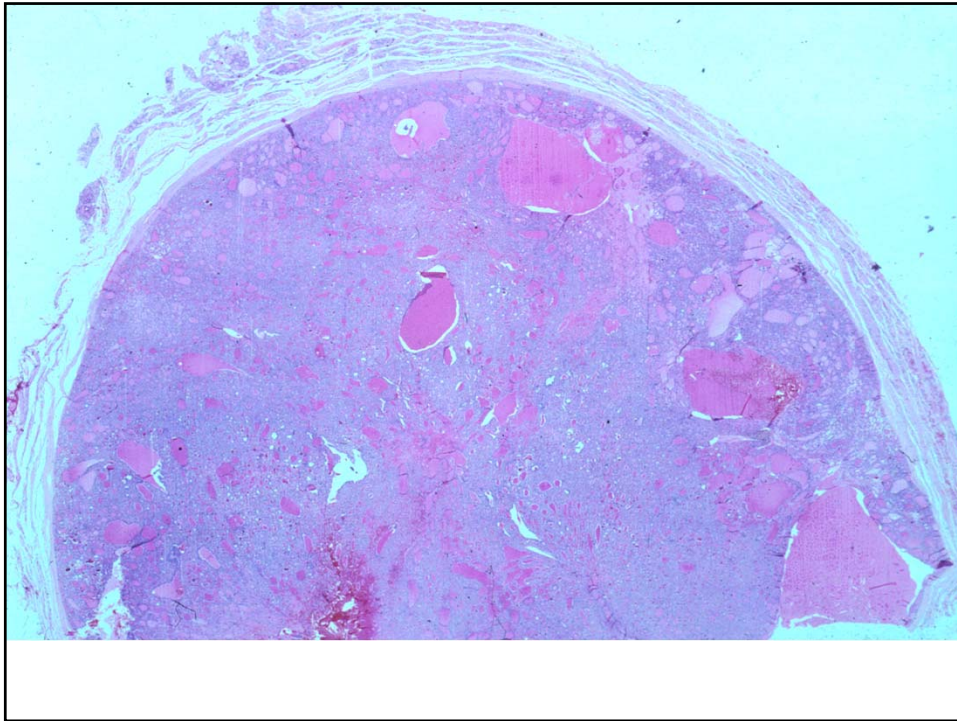


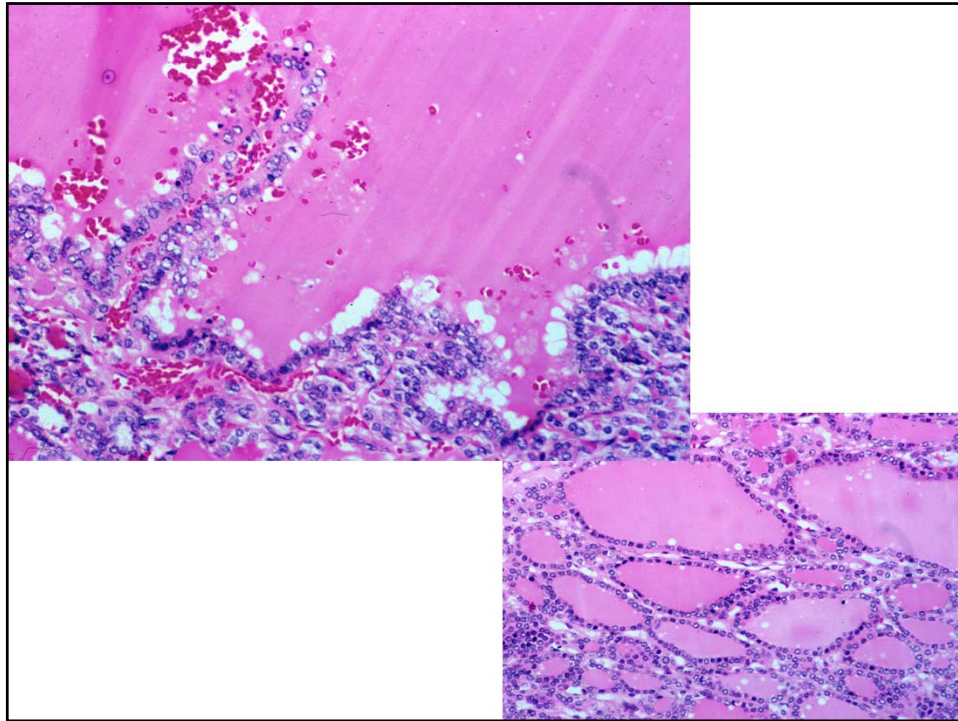
A 42 year old lady presented to her GP with a neck lump. On examination, a 3.5cm nodule was detected in the thyroid. Surgery was performed, and here is the surgical specimen.

**02259**

Virtual SLIDE 23







### Questions :

1. What are the key histologic features?
2. What is the closest differential diagnosis, and how are they differentiated?
3. What is the commonest cause of a thyroid nodule?



00357



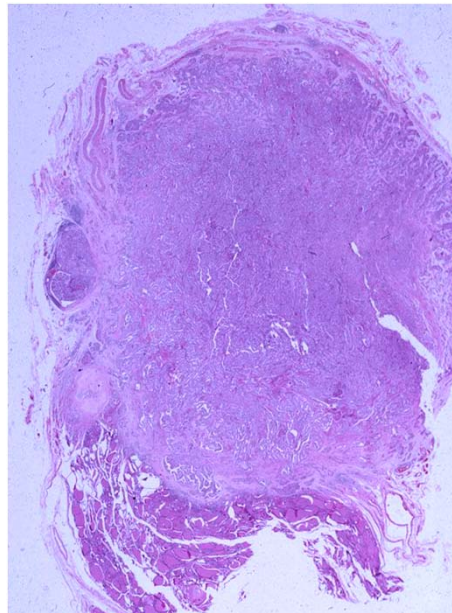
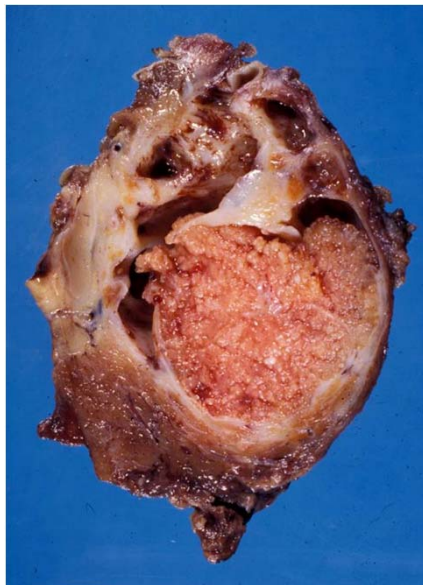
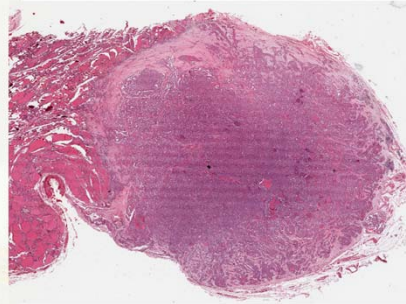
36 year old lady with an abnormal thyroid  
ultrasound scan.



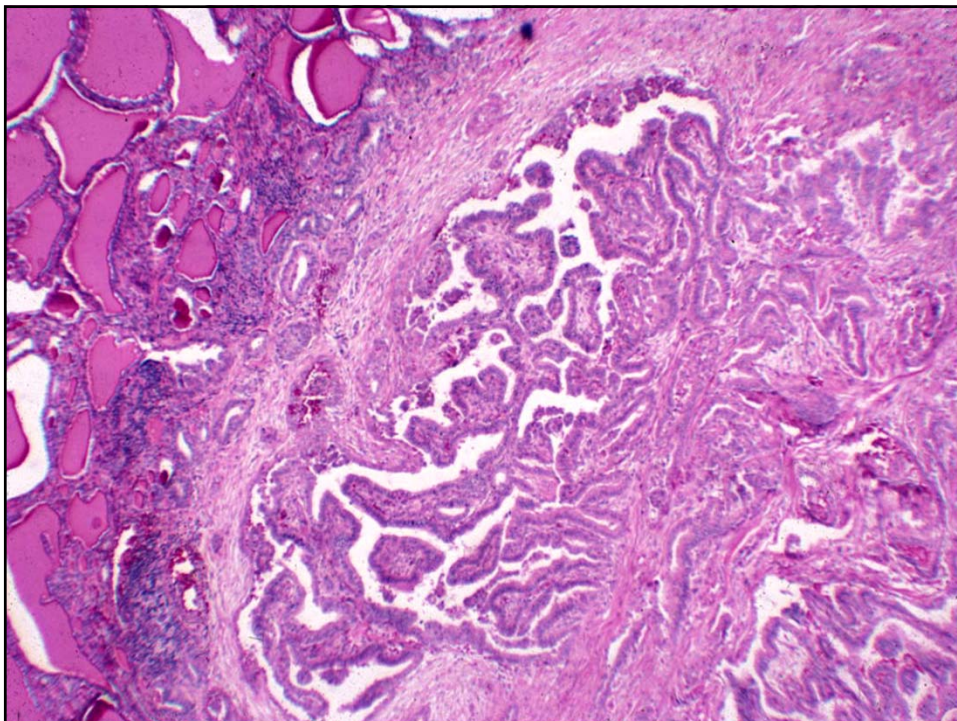
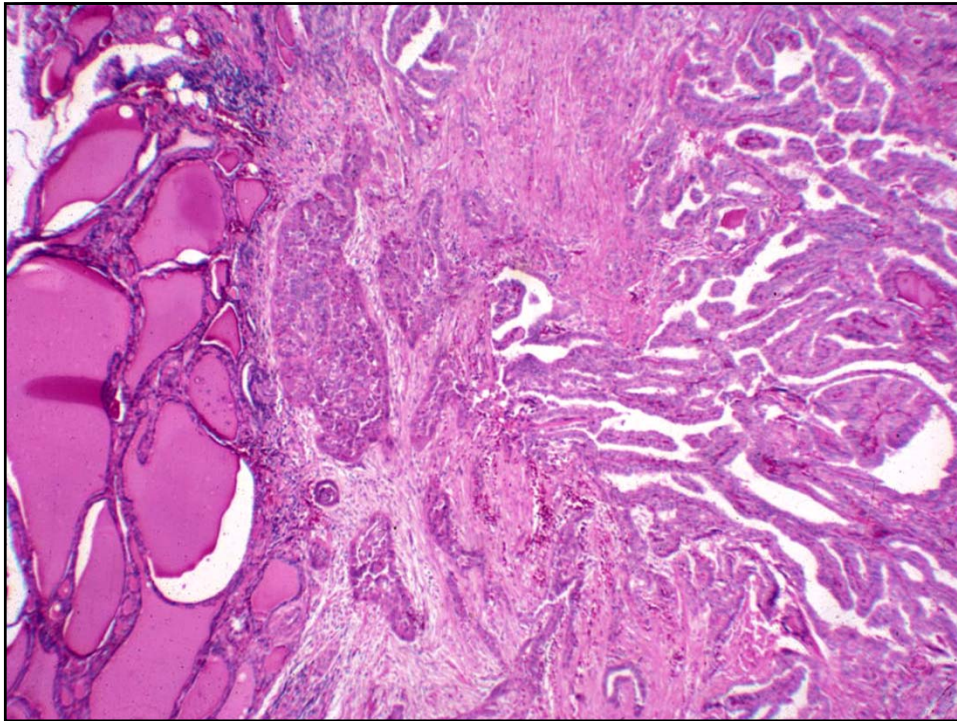
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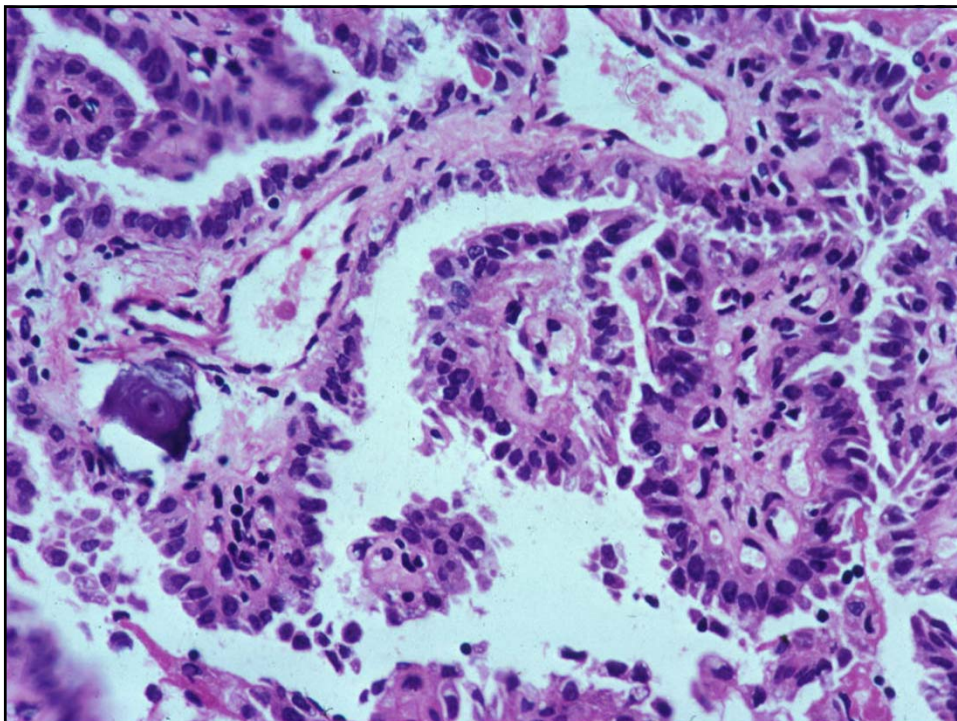
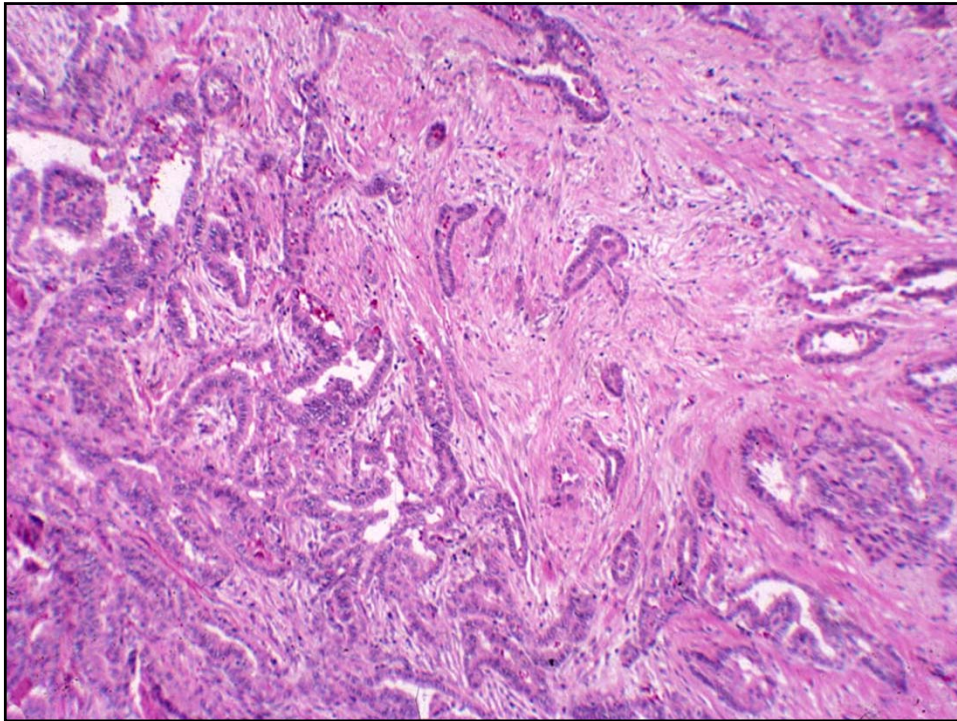
Virtual SLIDE 25



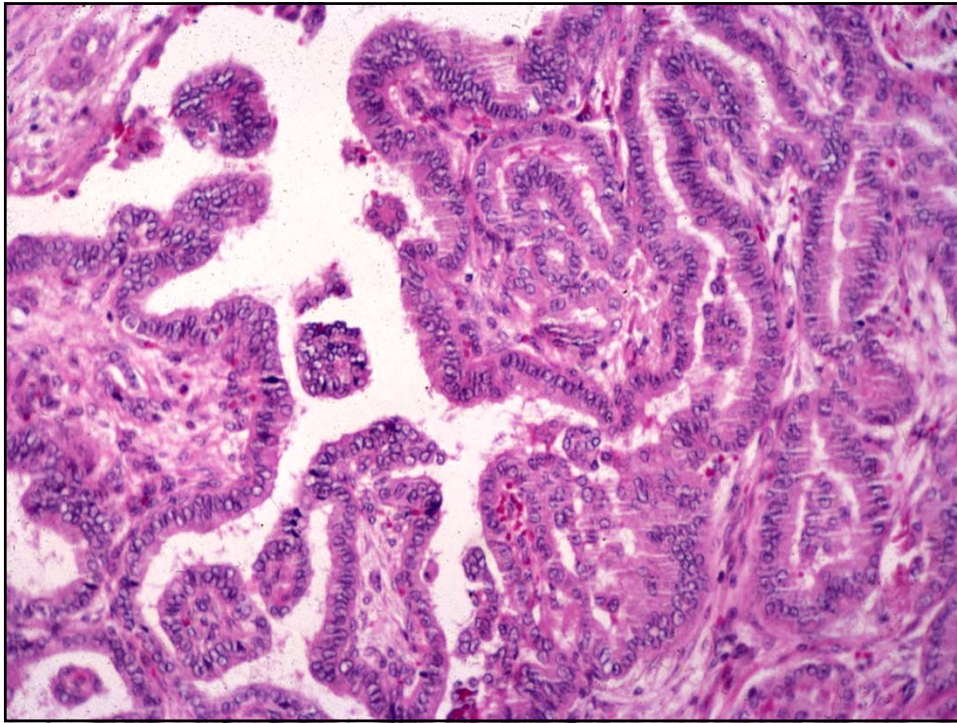












## Questions :

1. What are the key histologic features?
2. Name 2 other variants of papillary thyroid carcinoma.
3. How does this cancer spread and what is the prognosis?

04051



001864





Questions ?

## Tutorial 14 : Urogenital Pathology

### Urogenital Pathology: Learning Objectives

- To describe the gross features of the main urogenital conditions
- To draw relevant clinicopathologic correlations of the main conditions
- To appreciate clinicopathologic features and gross and microscopic morphology of:
  - Renal infarct (Slide 17)
  - End Stage Kidney (Demo slide)



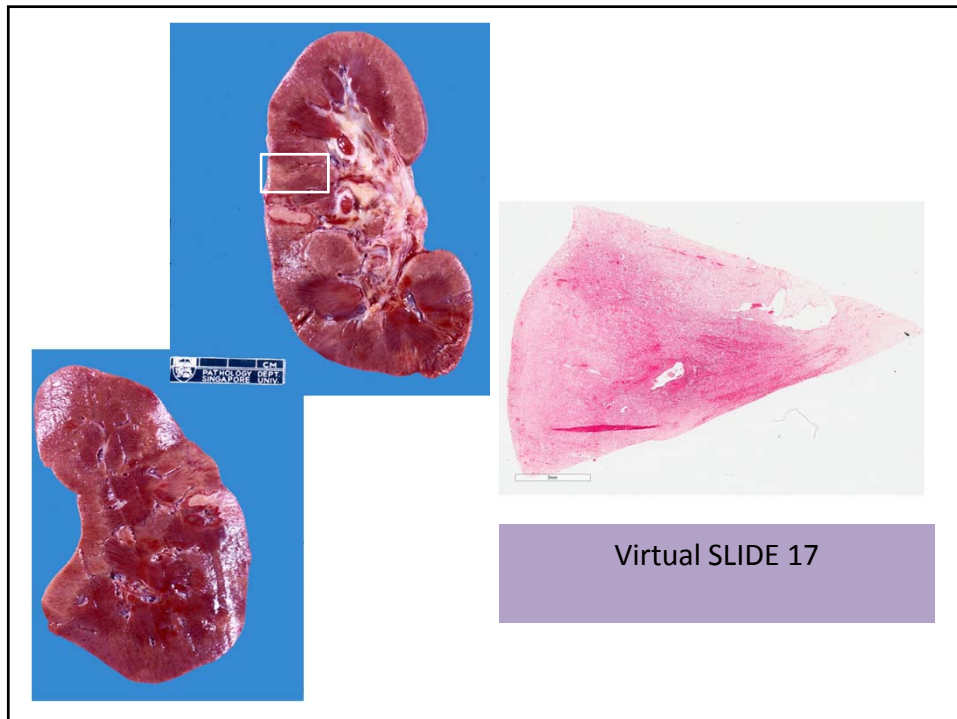
## 05164 Kidney and Adrenal Normal

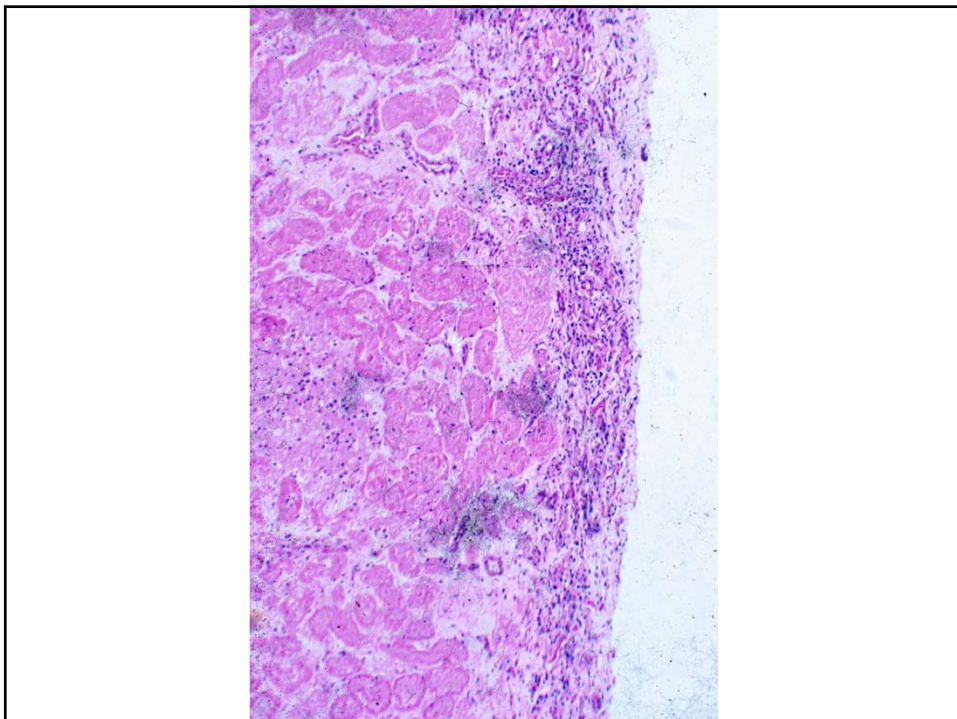
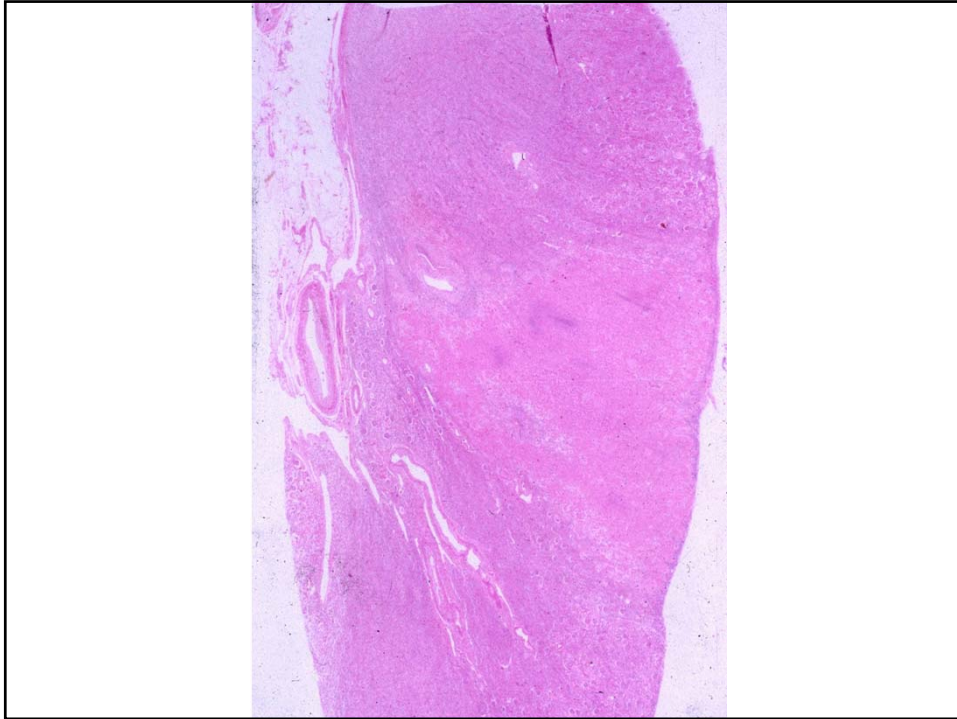


## 03234

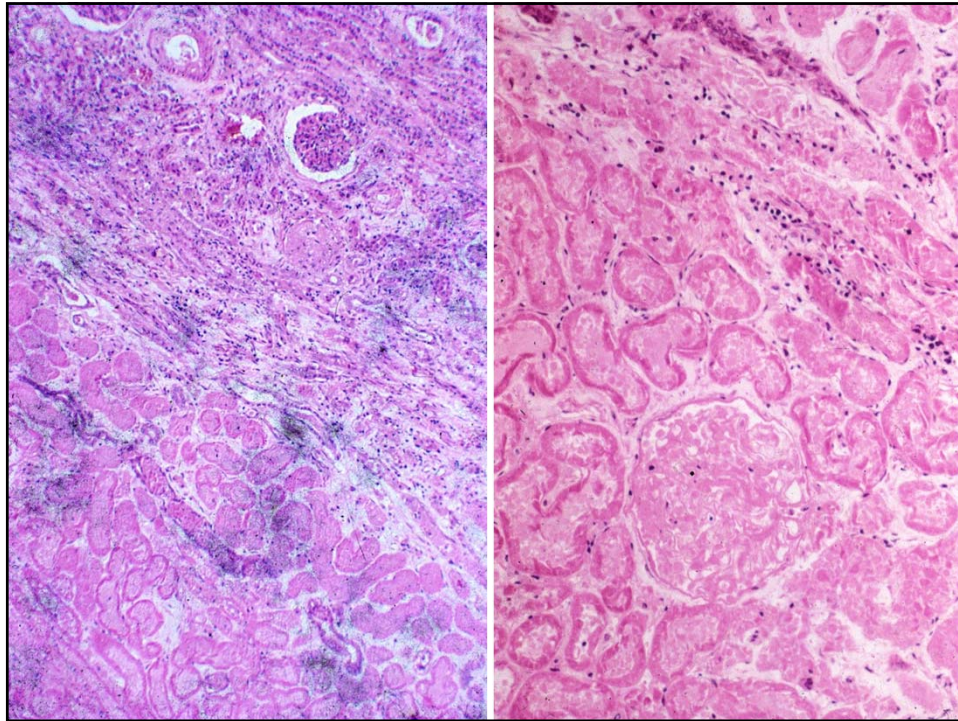


## 01816 (Revision)









### Questions :

1. What are the key histologic features?
2. Name 1 common cause.
3. True or false?
  - a. The patient will experience acute renal failure.
  - b. The infarct may be asymptomatic.
  - c. The patient may experience haematuria.
  - d. The kidney is relatively resistant to infarcts because of good collateral circulation.
  - e. The contralateral kidney is also likely to show infarcts.

00293



00951



00397



02121

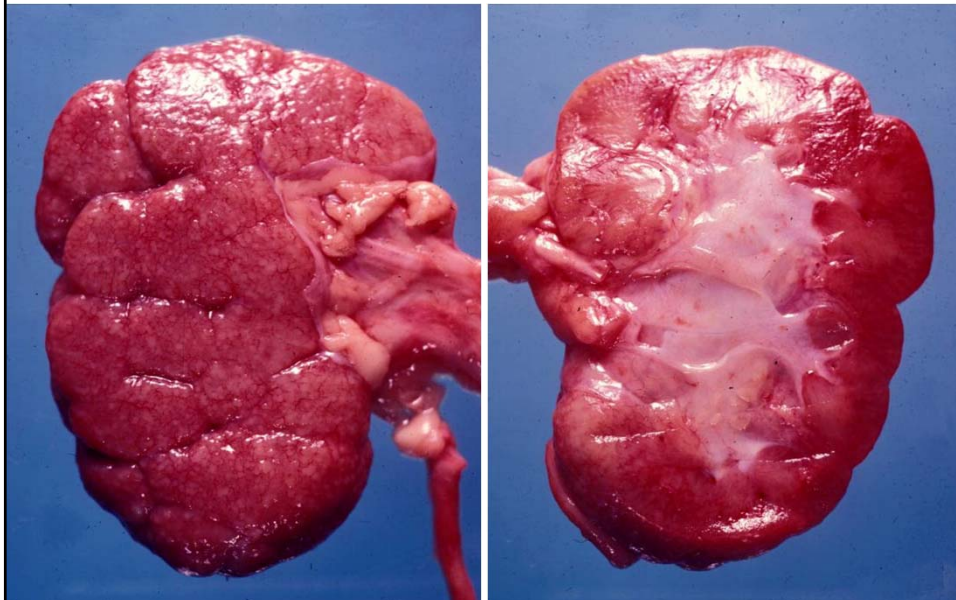




*A 65-yr-old man succumbed to chronic renal failure. He had a long history of hypertension. An autopsy was performed.*



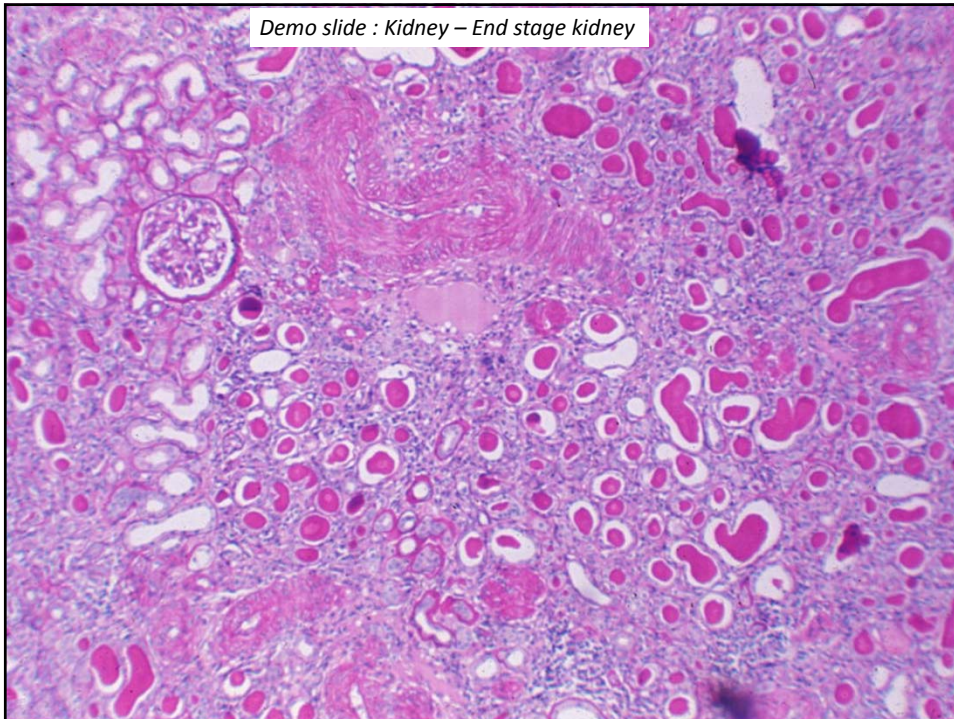
### Kidney: End-stage changes



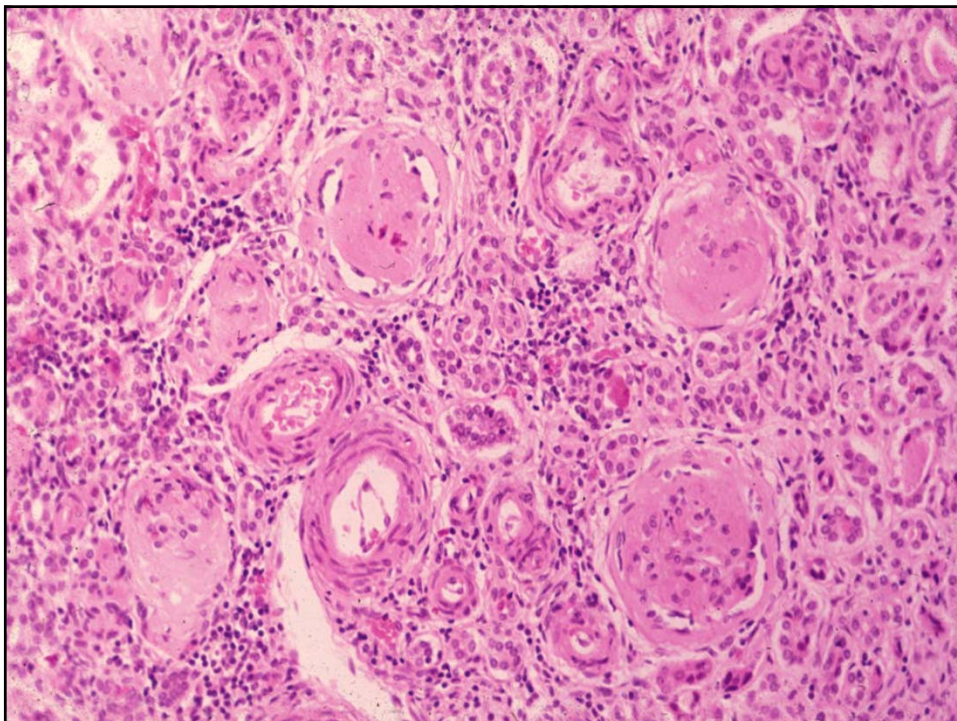
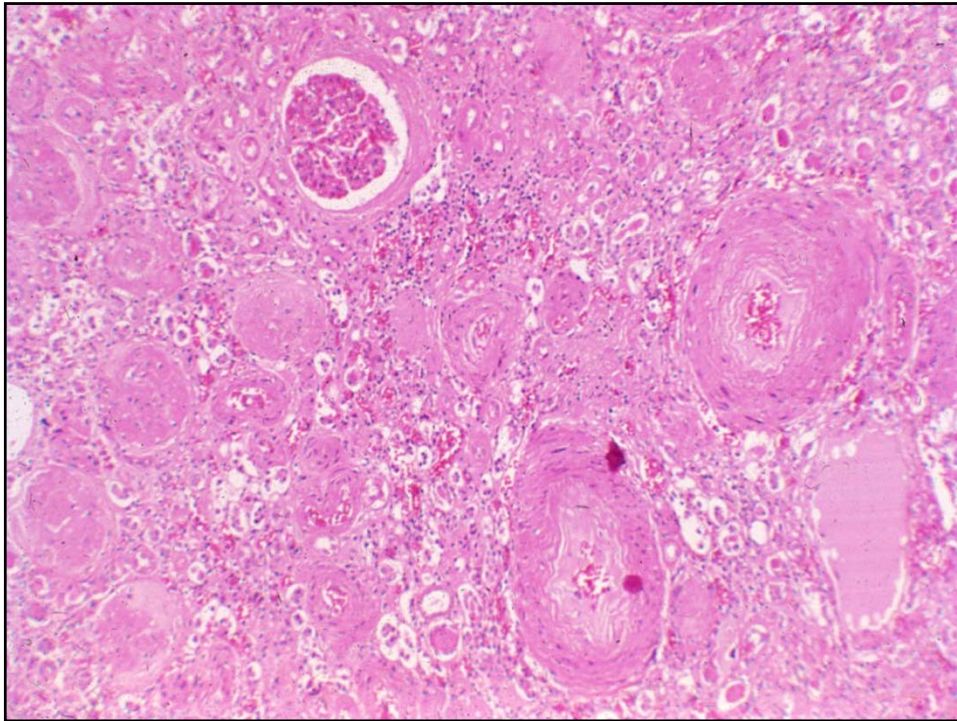
## Kidney: End-stage changes



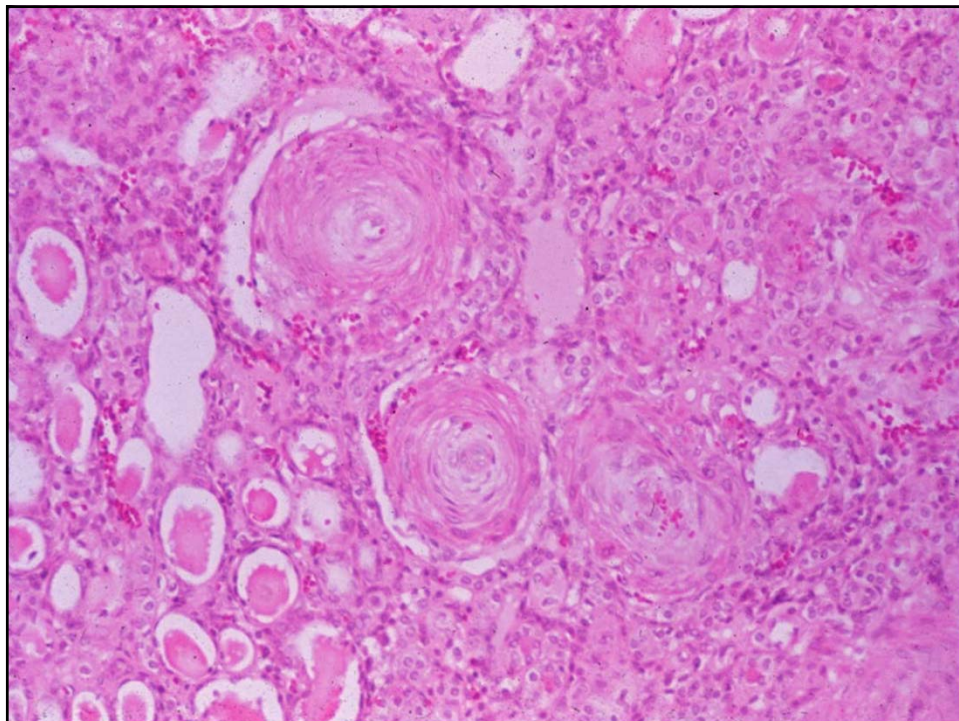
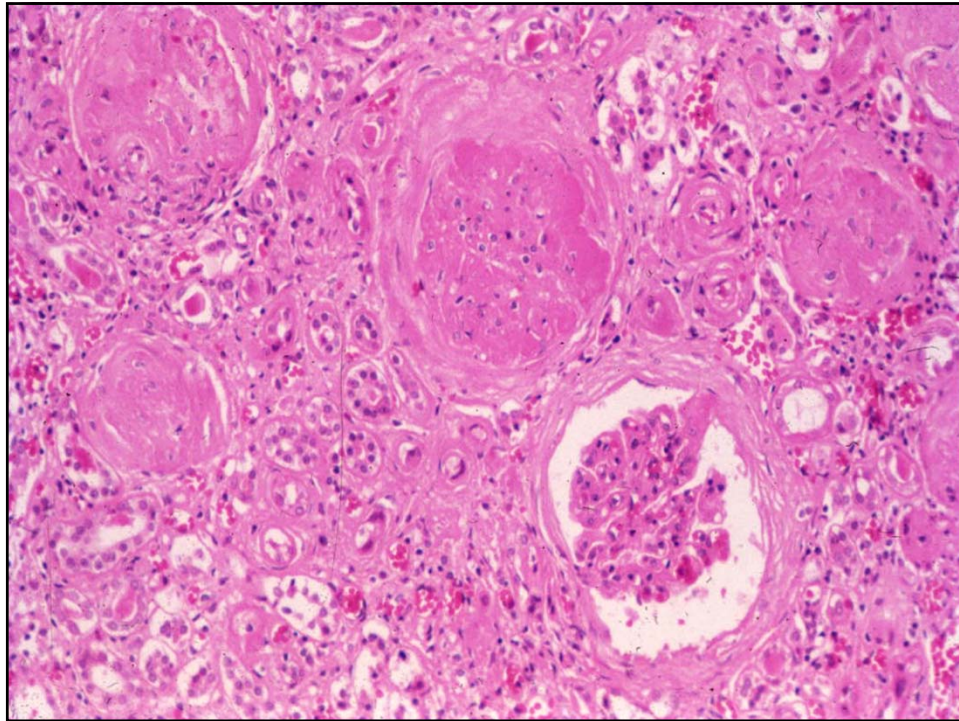
Demo slide : Kidney – End stage kidney













## Questions :

1. What are the key histologic features?
2. What is 'end stage renal disease' ?
3. What are some causes of chronic renal failure?

03080



01197



03654



01221



00176

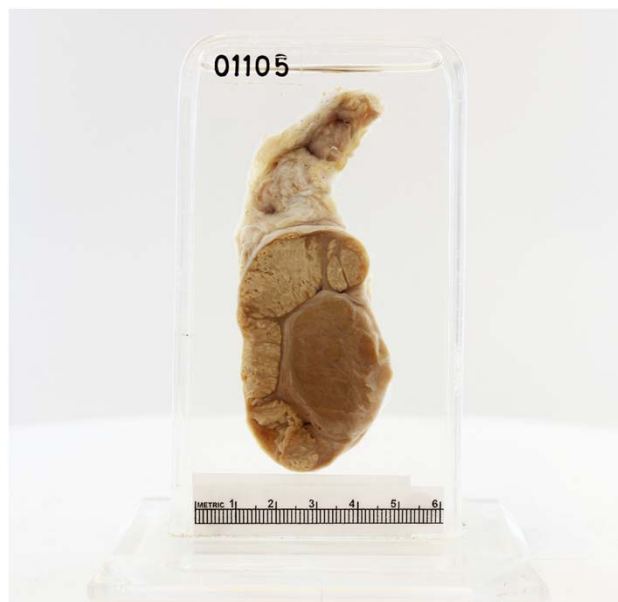




02447



01105



00384



00384 Testis Seminoma



Questions ?

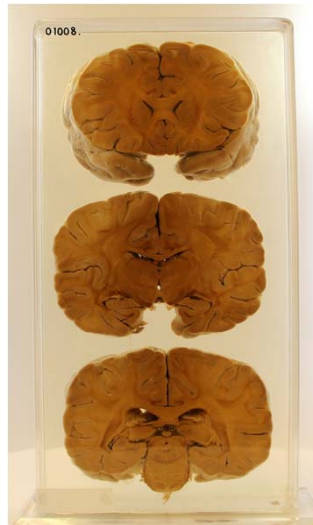


## Tutorial 15 : CNS Pathology

### CNS Pathology: Learning Objectives

- To appreciate key clinicopathologic, gross and microscopic morphologic features of main CNS diseases including:
  - Brain infarct (demo slide)
  - Cerebrovascular disease eg. *Cerebral infarct*
  - Intracranial haemorrhage
  - CNS tumours (eg. *Glioblastoma multiforme*, *meningioma*, *medulloblastoma*, *metastatic adenocarcinoma*)
  - CNS infections

## 01008; 1009 Normal Brain



## 01940



00005



01896



04389



03299





03606



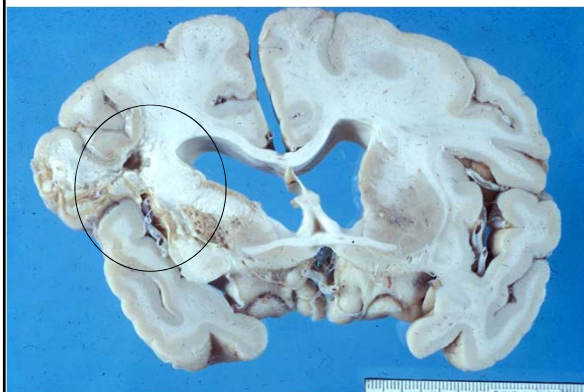
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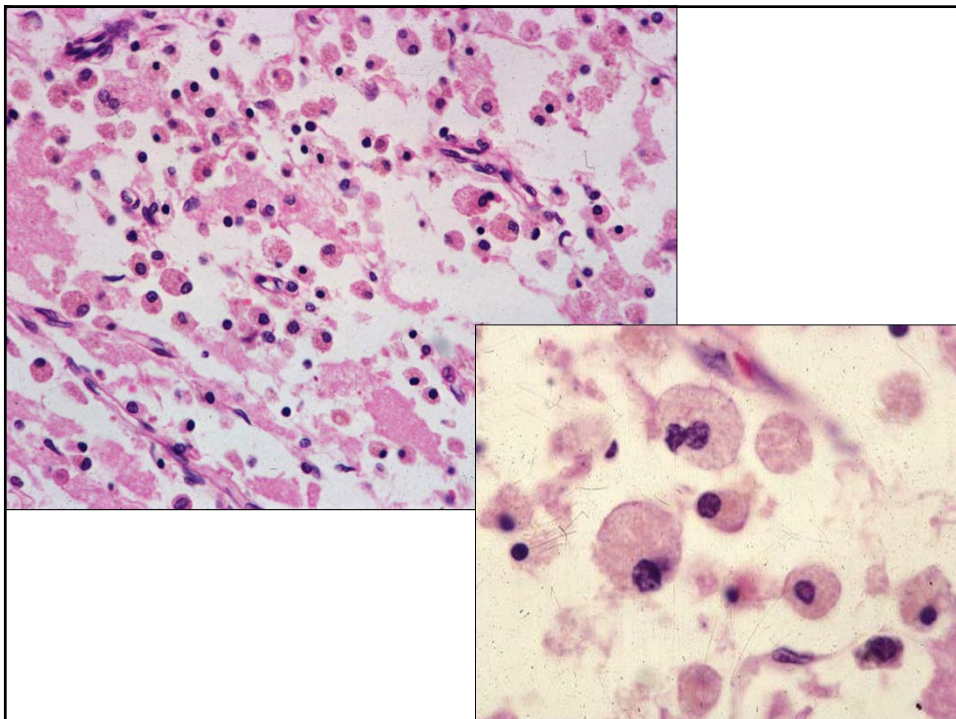
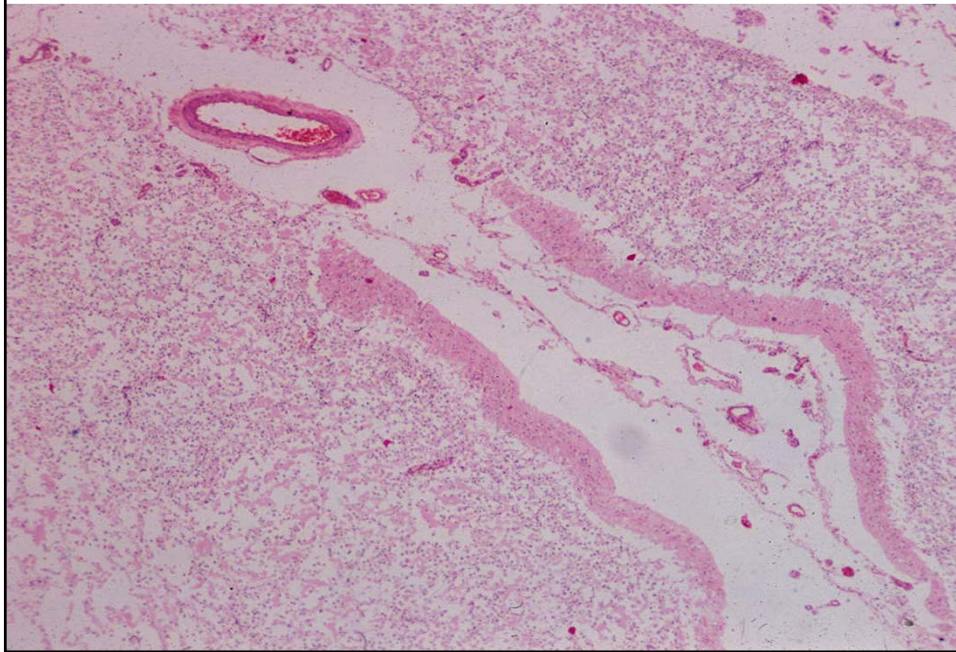
00013



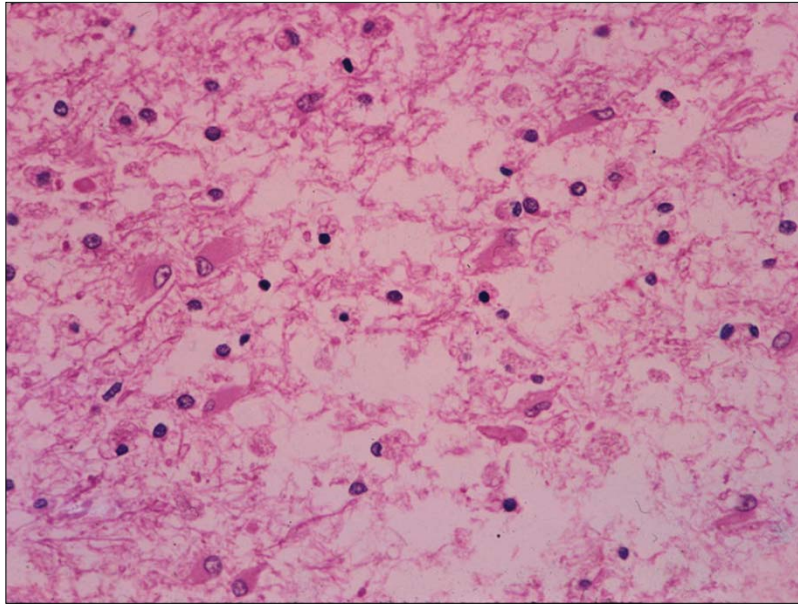
Virtual SLIDE



Cerebral infarct (Liquefactive necrosis)





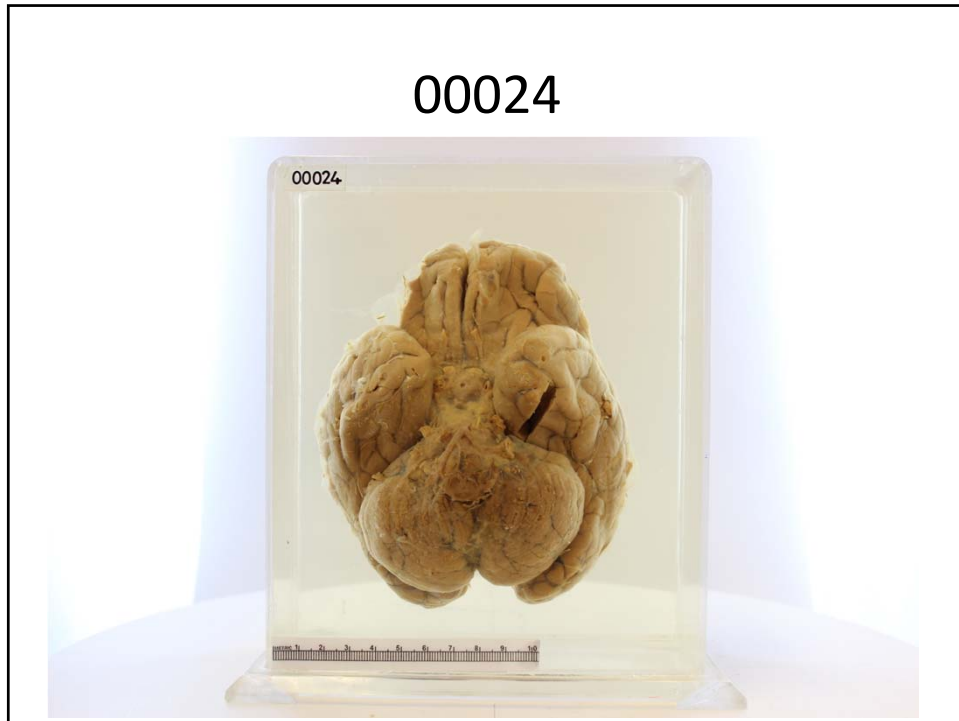


## Questions

- 1. What are the key histologic features of cerebral infarct?
- 2. What is another example of liquefactive necrosis?
  - A. Kidney infarction
  - B. Abscess
  - C. Pancreatitis
  - D. Foreign body granuloma
  - E. Intestinal ischaemia



00024



00016



00020



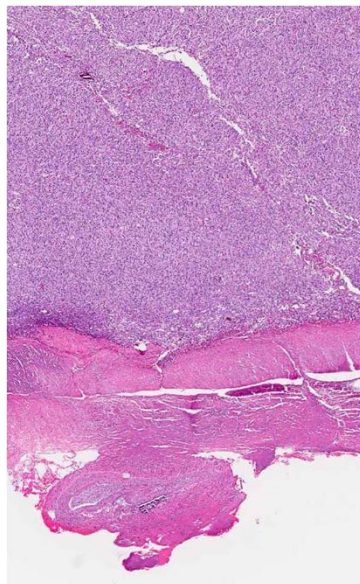
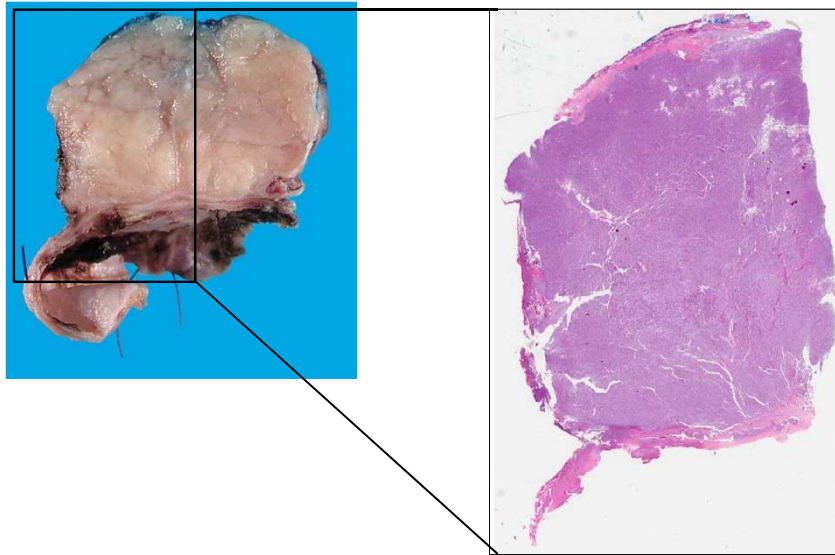
0000



*A 60 year old lady complained of headache and seizures, over a long period.*

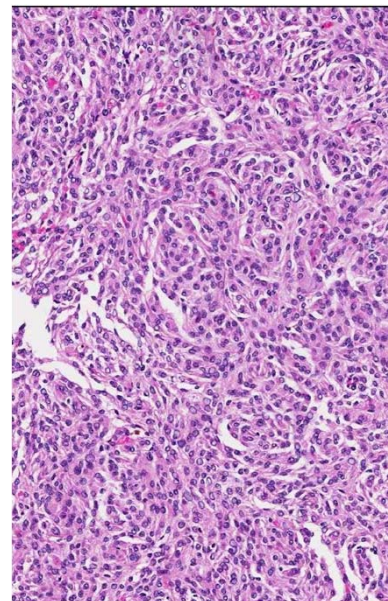


## Microscopy



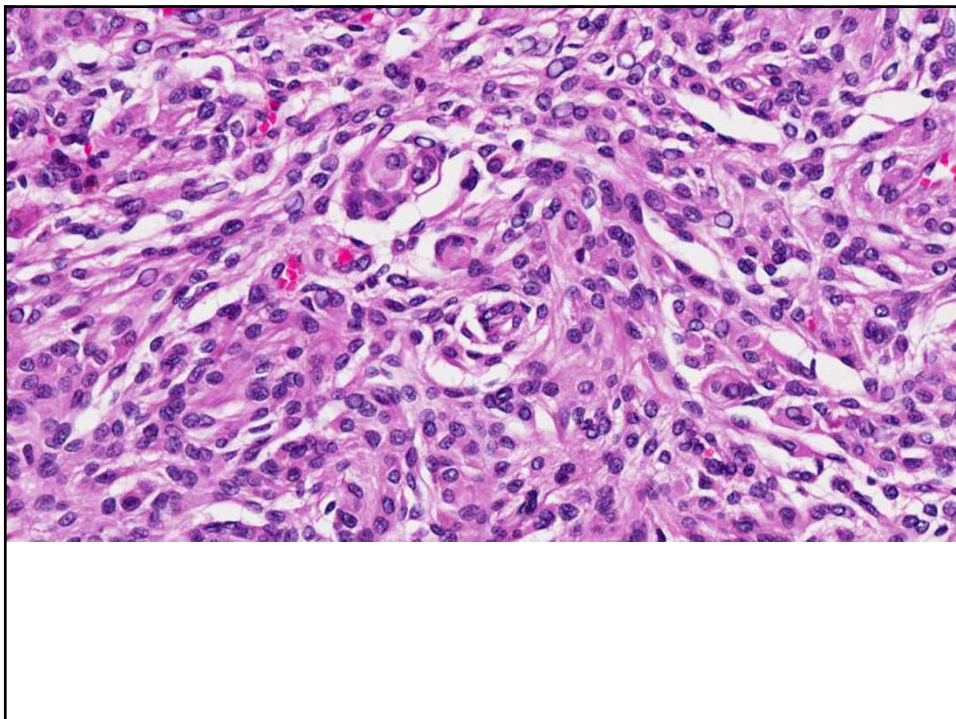
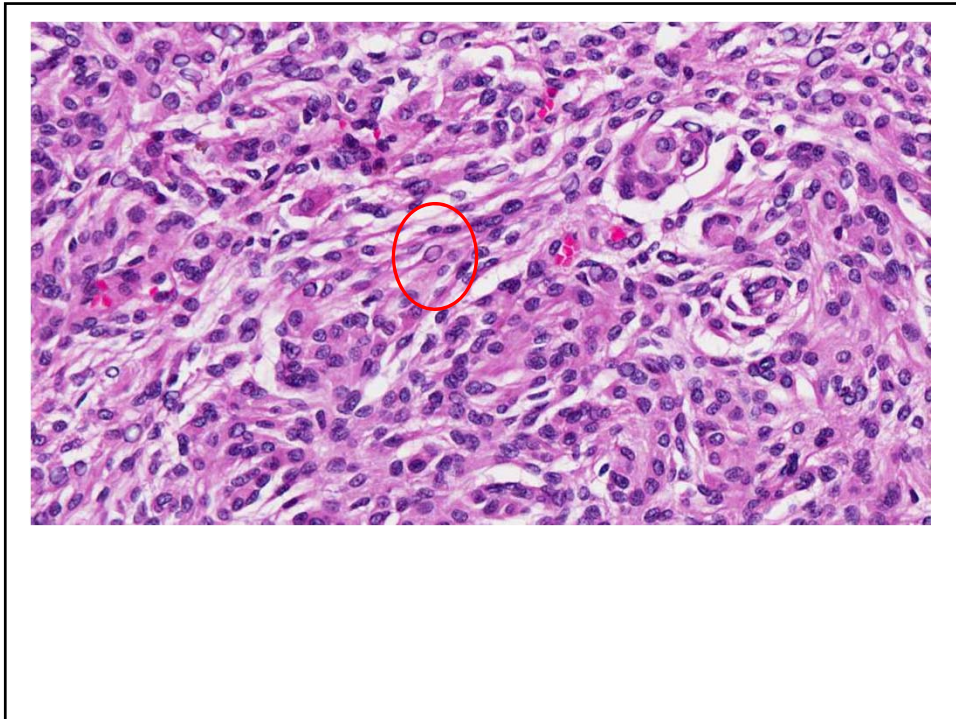
Tumour

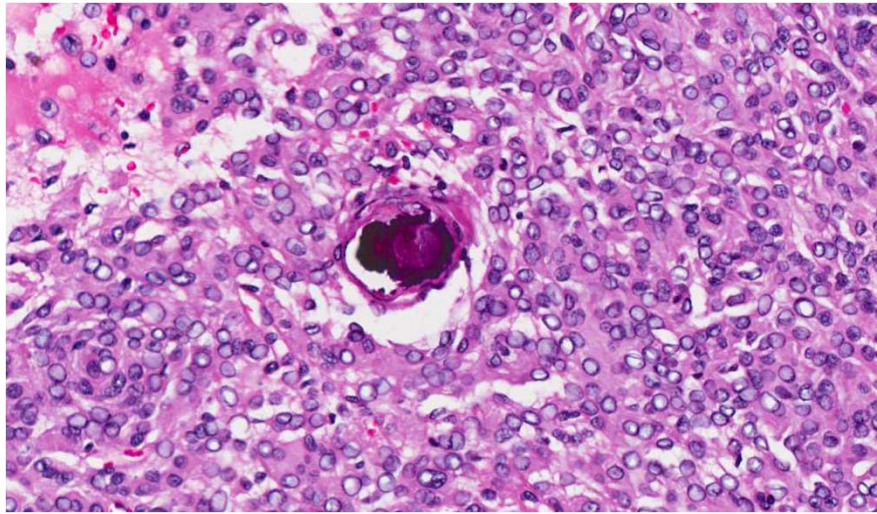
Dura



Meningothelial whorls







- Psammoma bodies

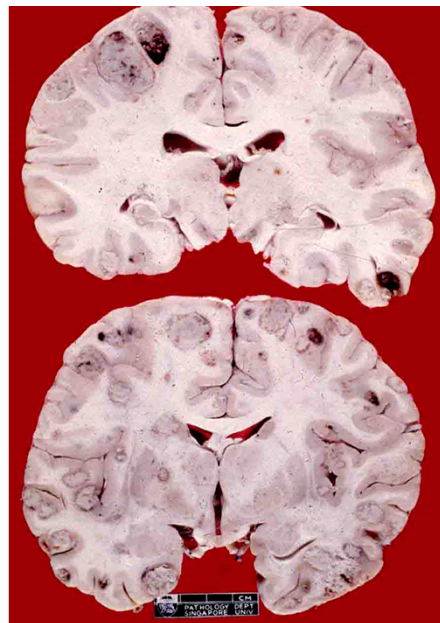
## Questions : Meningioma

1. What are the key histologic features?
2. What cells do meningiomas arise from?
3. Where are they most likely to occur?

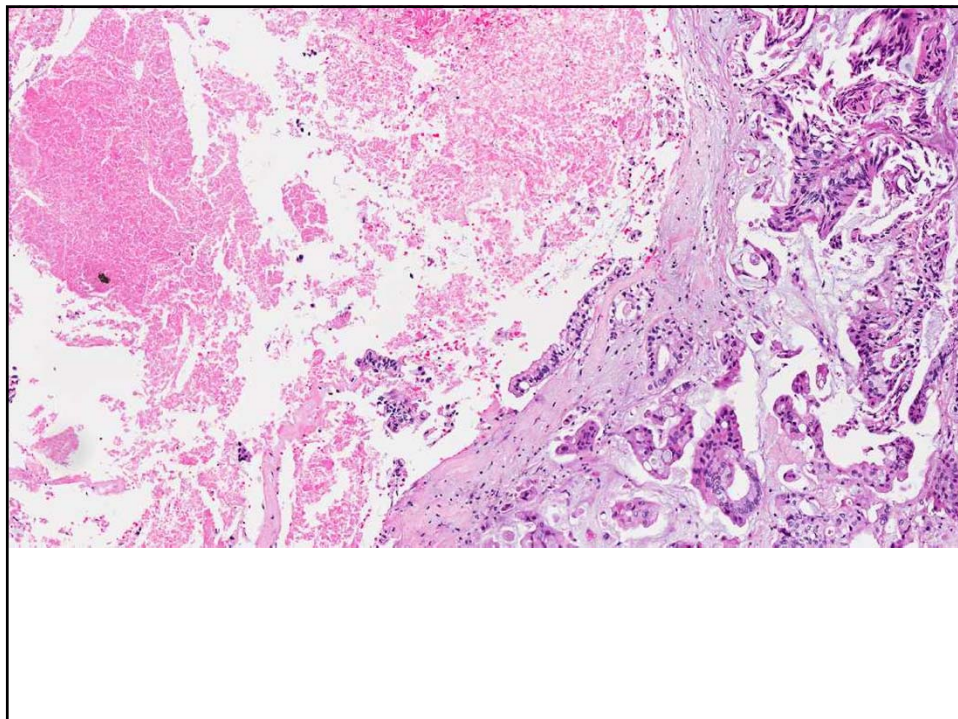
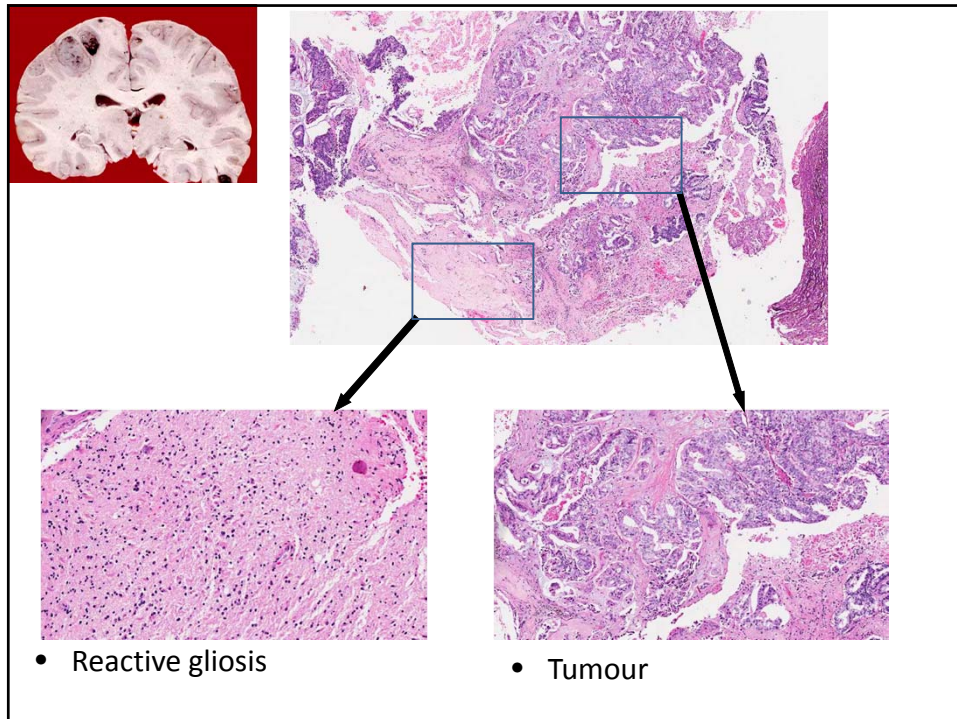
*A 66 year old lady complained of headache and seizures, and progressive loss of weight. She has a past history of breast carcinoma.*



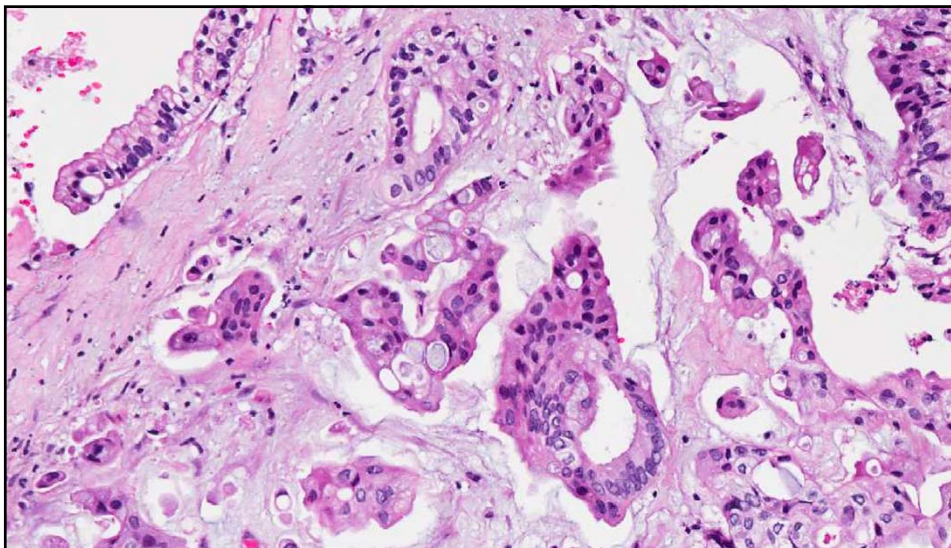
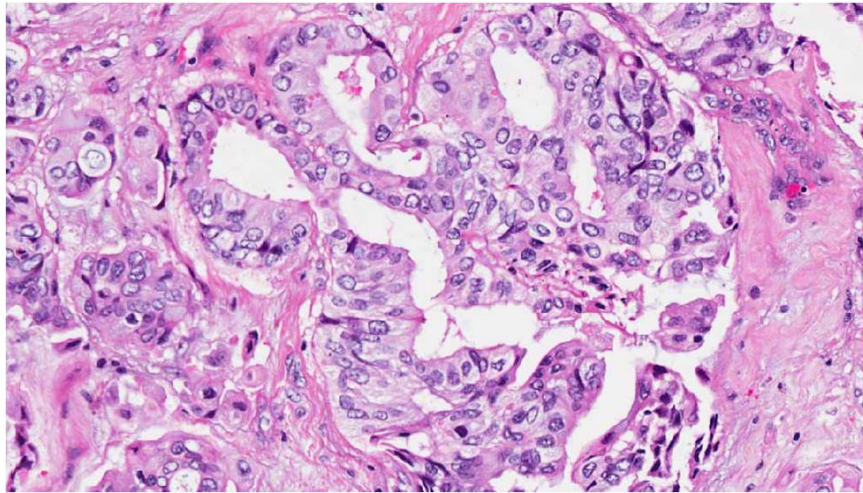
*Secondary carcinoma (metastatic adenocarcinoma)*







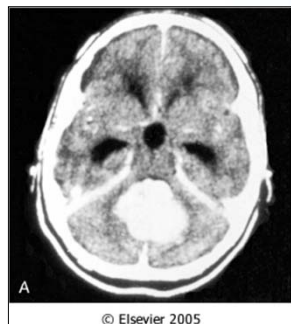




## Questions: Metastatic adenocarcinoma

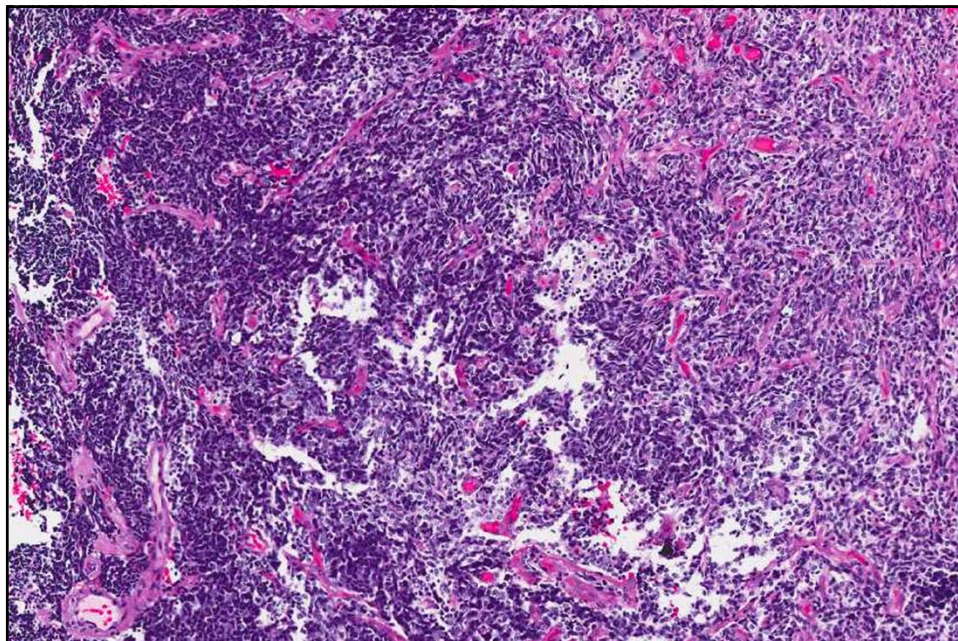
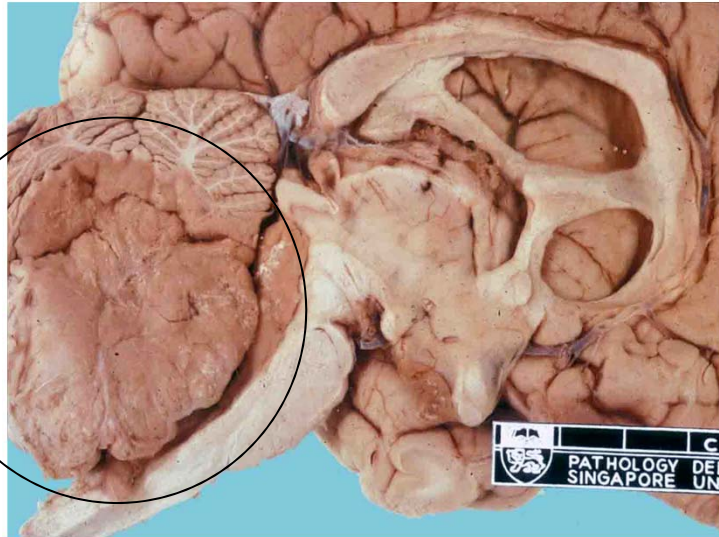
- 1. What are the key histologic features?
- 2. What are the common sources?

*A 7 year old boy has been experiencing unsteady gait and truncal ataxia.*



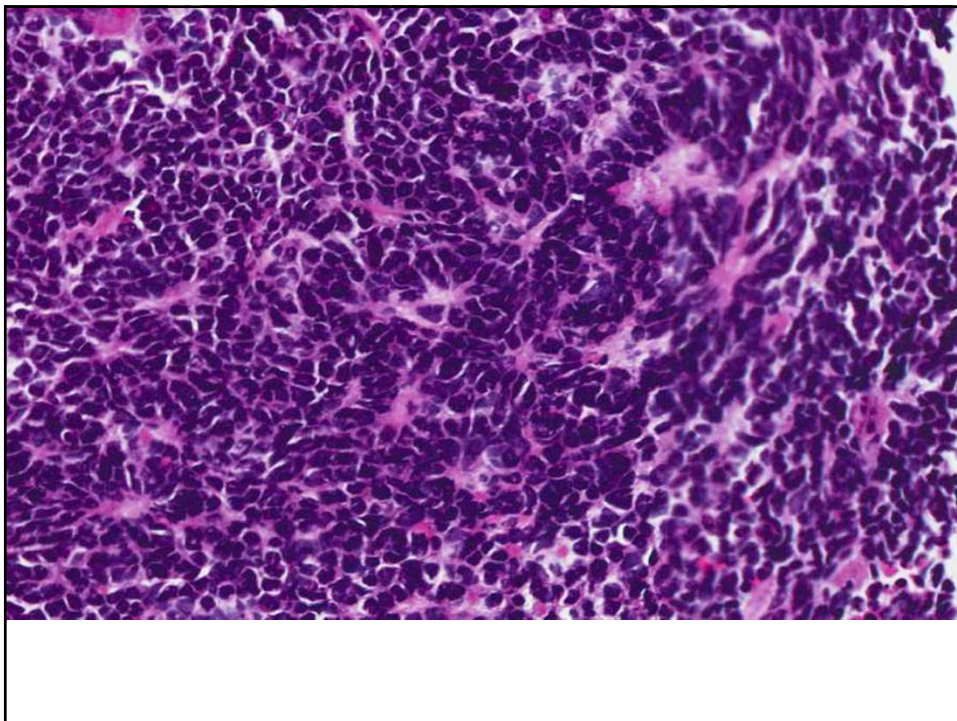
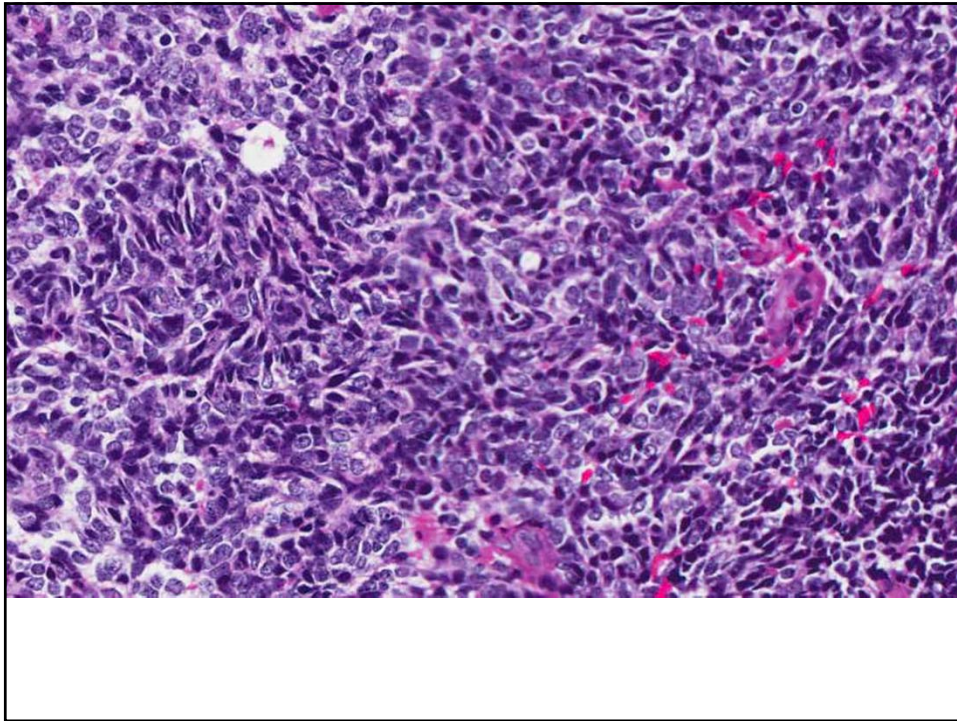


## *Medulloblastoma*



- Highly cellular , necrosis
- “Small blue round cell tumour”







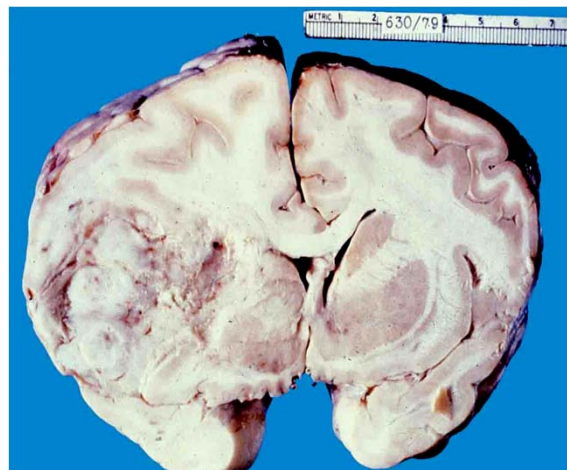
## Questions : Medulloblastoma

- 1. What are the key histological features?
- 2. True or False – Medulloblastomas:
  - a) Occur most frequently in individuals older than 16
  - b) Occur most frequently in the cerebellar vermis
  - c) Are associated with amplification of *MYC*
  - d) Prognosis is better in children <3 years of age

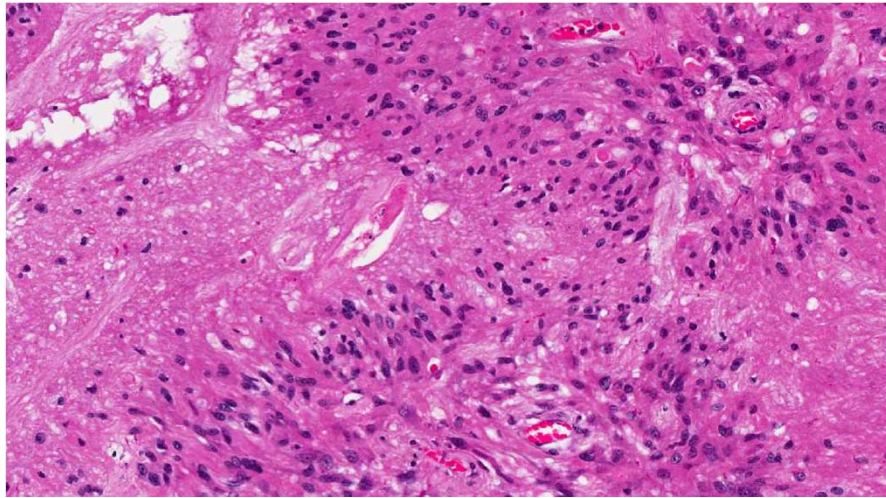
02931



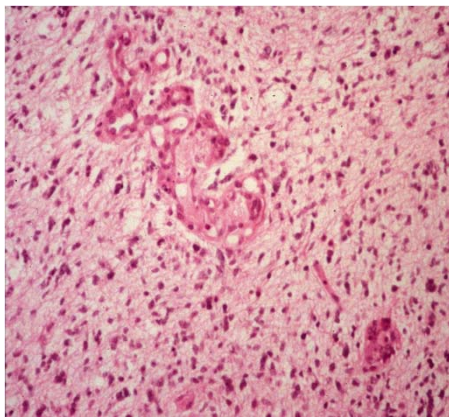
A 57 year old man complains of  
worsening headache and nausea.



Glioblastoma multiforme

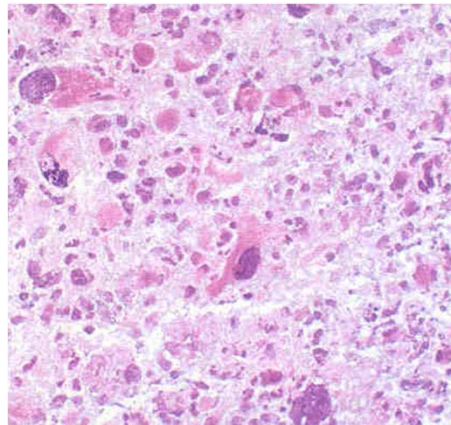


Palisading necrosis



- Microvascular proliferation

- Marked cellular pleomorphism
- Mitoses





## Questions : Glioblastoma

1. What are the key histologic features?
2. What is the prognosis?
3. True or false?
  - a. This is a primary glial tumour.
  - b. This tumour may arise secondarily from a pre-existing low grade glioma.
  - c. This tumour may give rise to raised intracranial pressure.
  - d. This tumour often affects younger adults.
  - e. This tumour may cross the midline, giving rise to a 'butterfly' appearance on imaging.

Questions ?