These are *general* findings, always discuss with Senior

GENERAL POINTS

- Accumulation of fluid within the pleural cavity
- Often undetectable <300mls on CXR

- **Types:**
  - Transudate
  - Excudate

- **Common symptoms:**
  - Chest pain
  - SOB
  - Cough
  - Fever (Empyema)

TRANSUDATE

Caused by changes in:
- Hydrostatic pressure
- Pleural permeability
- Oncotic pressure

Examples:
- Heart failure
- Liver cirrhosis
- Nephrotic syndrome
- Hypoalbuminemia

EXUDATE

Caused by local factors that alter:
- Pleural fluid production
- Pleural fluid absorption

Examples:
- Malignancy
- Infection:
  - Parapneumonic
  - Empyema
- Chylothorax
- PE
- Pancreatitis
- ARDS
- Meigs syndrome
- Trauma / Bleeding
- Lupus
- Sarcoidosis
- Rheumatoid effusion
- Ruptured oesophagus

INDICATION FOR THORACENTESIS

- Potential infection - Empyema
- Diagnosis is unclear
- Volume of effusion causing discomfort, hypoxia or SOB

THORACENTESIS INVESTIGATIONS

- MC&S
- pH
- Protein
- Glucose
- LDG
- Amylase
- Triglycerides / Cholesterol
- +/- Cytology (if cancer suspected)

PLEURAL FLUID - NORMAL VALUES

APPEARANCE	• Clear
WBC	• < 1000 mm/^{3}
LDH	• < 50% Serum
GLUCOSE	• Similar to Serum
pH	• 7.6 - 7.64
AMYLASE	• 30 - 110 u/l
TRIGLYCERIDES	• < 2 mmol/l
CHOLESTEROL	• 3.5 - 6.5 mmol/l

ANALYSIS - TRANSUDATE v EXUDATE

LIGHT'S CRITERIA

Used to differentiate between **Transudate** and **Exudate**
Compares **Pleural fluid** to **Serum**

Diagnostic of **Exudative** effusion if any of the following are true:
- Ratio of Pleural fluid to Serum protein > 0.5
- Ratio of Pleural fluid to Serum LDH > 0.6
- Pleural fluid LDH > 2/3 upper limit of normal serum value

PLEURAL FLUID - FURTHER ANALYSIS

APPEARANCE

CLEAR	• Normal appearance
PURULENT	• Infection • Anaerobic - putrid odour
BLOODY	• Trauma • Malignancy • TB • PE • Bleeding vessel (e.g. Aortic dissection)
MILKY	• Chylothorax / Pseudochylothorax: ◦ Lymphatic obstruction likely due to: ▪ Malignancy ▪ Chronic inflammation ▪ Thoracic duct injury
BLACK	• Aspergillus niger infection • Non-small cell lung cancer: ◦ Haemorrhage with Haemolysis • Malignant melanona

MICROSCOPY

WBC	<1000/µl	• Normal • Transudate
	>50,000/µl + predominantly Neutrophils	• Empyema • PE
	>50,000/µl + predominantly Lymphocytes	• TB • Sarcoidosis • Malignancy

PLEURAL FLUID LDH

> 1000 iu/l	• Empyema • Malignancy • Rheumatoid effusion

PLEURAL FLUID GLUCOSE

< 3.4 mmol/l	• Empyema • Malignancy • TB • Rheumatoid effusion • Oesophageal rupture
< 1.6 mmol/l	• Empyema • Rheumatoid effusion

PLEURAL FLUID pH

< 7.3	• Empyema • Malignancy • TB • Rheumatoid effusion • Oesophageal rupture

PLEURAL FLUID AMYLASE

> 110 u/l	• Pancreatitis • Malignancy • Oesophageal rupture

PLEURAL FLUID CHOLESTEROL / TRIGLYCERIDES

Triglyceride > 1.24 mmol/l + Cholesterol < 5.18 mmol/l	• Chylothorax
Triglyceride < 0.56 mmol/l + Cholesterol > 5.18 mmol/l	• Pseudochylothorax