

Pleural Fluid Analysis

Types of pleural effusion

- **Serous fluid (hydrothorax)**
 - May be transudate or exudate
 - Causes below
- **Blood (haemothorax)**
 - Exudate
 - Caused by trauma, malignancy, PE with infarct
- **Chyle (chylothorax)**
 - May be transudate or exudate
 - Leakage from thoracic duct caused by lymphoma or thoracic surgical trauma
- **Pus (empyema/ pyothorax)**
 - Exudate with pH <7.2
 - Secondary to pneumonia/ abscess

Appearances

- **Straw:** serous effusion (clear = transudate; cloudy = exudate)
- **Blood stained:** trauma, malignancy, PE with infarct
- **Frank blood:** trauma, malignancy (esp. mesothelioma)
- **Pus:** empyema
- **Food particles:** oesophageal rupture

Transudate vs exudates

Transudates vs Exudates		
	Transudate	Exudate
Pathophysiology	Hydrostatic/oncotic forces cause extravasation of fluid through a normal membrane	Inflammation causes increased permeability of pleural surface/capillaries leaking intravascular fluid (including cells, their contents and proteins)
Commonest serous causes	Heart failure (90%) Hypoalbuminaemia (i.e. liver failure, nephrotic syndrome, malnutrition)	Inflammation Infection Infarction (PE) Malignancy
Pleural fluid protein	<30g/L	>30g/L
Light's criteria (one or more = exudate) <small>Use if protein level 25-35g/L or if serum protein abnormal</small>		
Pleural fluid protein /serum protein		>0.5
Pleural fluid LDH /serum LDH		>0.6
Pleural fluid LDH		>2/3 of the upper limit of normal serum LDH

Tests

- **Cells**
 - *Cell count (normally <1x10⁹/L) + differential:* lymphocytosis occurs in tuberculosis and malignancy; neutrophilia in parapneumonic effusion, PE and pancreatitis; eosinophilia in drug reaction, asbestos, parasite infection, Churg-Strauss
 - *MC&S:* identify infective agents
 - *Cytology:* identify malignant causes
- **Tests for transudate vs exudates** (see table above)
 - *Protein*
 - *LDH*
- **pH (normally ~7.6):** if pH <7.2, empyema is likely and requires a chest drain to be inserted
- **Other tests to consider**
 - *Glucose (normally similar to serum levels):* low in **MEAT**: Malignancy, Empyema, Arthritis (rheumatoid), TB
 - *Amylase (normally similar to serum levels):* raised in pancreatitis
 - *Ziehl-Neelsen stain:* positive in tuberculosis
 - *Haematocrit:* if bloody effusion haematocrit is <1%, it is insignificant
 - *Triglycerides (normal <50mg/dl), cholesterol & chylomicrons:* chylomicrons present and triglycerides raised (>110mg/dl) in chylothorax; cholesterol is used to differentiate a pseudochylothorax (>200mg/dl)
 - *Rheumatoid factor & complement:* raised in rheumatic causes