# UNILATERAL PLEURAL EFFUSION IN ADULTS – BIOCHEMICAL INVESTIGATION

- Aspiration should not be performed for bilateral effusions in a clinical setting strongly suggestive of a pleural transudate, unless there are atypical features or a failure to respond to therapy.
- Pleural fluid aspirated for therapeutic reasons does not require laboratory testing.
- Repeat testing is only indicated if the clinical status has changed.
- Measurement of pleural fluid total protein is the most useful biochemical test for classifying an effusion as either an exudate or a transudate.
- Tests other than total protein and lactate dehydrogenase (LD) will only be undertaken after discussion with a senior clinical scientist.

The choice of test will vary depending on the clinical question to be answered.

## 1. Transudate or exudate?

- **Pleural fluid total protein**
  Values greater than 35 g/L are indicative of an exudative effusion whereas values less than 25 g/L suggest that the fluid is a transudate.
  Further tests to ascertain whether the effusion is a transudate or exudate should be limited to those patients with a pleural fluid protein concentration between 25 g/L and 35 g/L.

- **Pleural fluid lactate dehydrogenase (LD**)
  The test is indicated in patients with an equivocal pleural fluid protein concentration i.e. between 25 g/L and 35 g/L.
  A pleural fluid LD activity greater than 147 U/L ($^2/_3$ of the upper limit of serum reference range) indicates an exudative effusion is more likely.

## 2. Is it rheumatoid?

Glucose measurements may be helpful in differentiating patients with active rheumatoid arthritis from those with systemic lupus erythematosis.
A glucose concentration less than 1.7 mmol/L indicates the effusion is more likely to be associated with rheumatoid arthritis (70 – 80% of cases).
*NB: Samples for glucose measurement must be collected into a fluoride oxalate tube.*

### 3. Does this parapneumonic effusion need draining?

Pleural fluid pH measurements are rarely required. The only indication for measurement is to detect/confirm empyema in cases where pus in the fluid is not visible/obvious. A low pH (<7.2) may be associated with empyema. However, a low pH can also be associated with exudative effusions associated with rheumatoid arthritis, oesophageal rupture, malignancy and acidotic patients.
*NB. Pleural fluid pH measurement is not available in east Kent as there is no suitable method available within the Trust. Samples must not be analysed on blood gas analysers.*

### 4. Is it a chylothorax?

A true chylothorax will usually have a high triglyceride concentration. A pleural fluid triglyceride result greater than 1.24 mmol/L suggests this diagnosis except in patients receiving total parenteral nutrition.

### 5. Is pancreatitis the cause?

Amylase measurement in pleural fluid is only required if pancreatitis is suspected as the cause of the effusion. An elevated value is not specific for pancreatitis as high activities are found in 10% of malignant effusions as well as in patients with acute pancreatitis, pancreatic pseudocyst, ruptured ectopic pregnancy and oesophageal rupture.

### 6. Suspected pleural TB

Adenosine deaminase activity (ADA) is the only test of any value in diagnosing pleural TB. The test is not widely available in the UK and results can be difficult to interpret. ADA is therefore only available by consultant request.

### 7. Is it urinothorax?

Measurement of pleural fluid creatinine is helpful in patients where there is thought to be urine leakage into the pleural space.
Urinothorax has been associated with pleural fluid:serum creatinine ratios of 1.2 – 20. A pleural fluid protein concentration less than 25 g/L would add support to this finding.

## References

Light RW, Macgregor MI, Luchsniger PC, Ball WC. Pleural effusions: the diagnostic separation of transudates and exudates. Ann Intern Med 1972; 72: 507 – 13

Tarn AC & Lapworth R. Biochemical analysis of pleural fluid: what should we measure? Ann Clin Biochem 2001; 38: 311 – 22.

Maskell NA, Butland RJA on behalf of the British Thoracic Society Pleural Disease Group, a subgroup of the British Thoracic Society (BTS) Standards of Care Committee. BTS Guidelines for the investigation of a unilateral pleural effusion in adults. Thorax 2003; 58 (suppl ll): ii8 – ii17.

Lapworth R & Tarn AC. Commentary on the British Thoracic Society guidelines for the investigation of unilateral pleural effusion in adults. Ann Clin Biochem 2006; 43: 17-22

Garcia-Pachon E & Padilla-Navas I. Urinothorax: case report and review of the literature with emphasis on biochemical diagnosis. Respiration 2004; 71: 533-6