

**Please read this bit first**

The HPCSA and the Med Tech Society have confirmed that this clinical case study, plus your routine review of your EQA reports from Thistle QA, should be documented as a "Journal Club" activity. This means that you must record those attending for CEU purposes. Thistle will **not** issue a certificate to cover these activities, nor send out "correct" answers to the CEU questions at the end of this case study.

The Thistle QA CEU No is: **MT00025**.

Each attendee should claim **THREE** CEU points for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

## April 2008

### Cerebrospinal fluid testing

Holbrook et al - Ann Clin Biochem 2007; **44**: 443-448

#### **Introduction:**

Analysis of cerebrospinal fluid (CSF) may be useful in the investigation of a number of disorders including infections (bacterial, mycobacterial, viral, fungal or protozoan), Guillain-Barre syndrome, demyelinating diseases, vasculitis, sarcoidosis and some inherited metabolic disorders. Measurement of immunoglobulin (Ig) titres for specific diseases (e.g. syphilis and Lyme disease) may also be helpful. Possibly the most critical analysis is in the diagnosis of subarachnoid haemorrhage (SAH). Missing this diagnosis may have serious consequences for the patient.

CSF is commonly analysed for glucose and protein and less widely for other analytes such as haem pigments, lactate, glycine and oligoclonal bands. There is no clear guidance as to the preferred methods, or indeed the reference ranges, for some of these parameters even though there is information in the literature.

#### **Results:**

Protein was measured almost exclusively in biochemistry laboratories (80 out of 84 responses, protein was measured in microbiology in two hospitals, neuroimmunology in one hospital and one did not offer CSF protein measurement), pyrogallol red was the most popular method (51% of those that stated their method) followed by benzethonium chloride (30%), there were 8% using Vitros technology, 3% biuret and one laboratory used Folin-Ciocalteu.

The most common reference range for protein was 0.15 – 0.45 g/L in adults, and most quoted ranges that fell somewhere between 0 and 0.45 g/L but three laboratories used 0.6 g/L and three 0.7, 0.8 and 1.0 g/L respectively as their upper limit.

Glucose was also measured almost exclusively in biochemistry departments; hexokinase was the most popular method (56%), followed by glucose oxidase (33%) with 8% using Vitros analysers. The most popular reference range was 2.5 – 4.5 mmol/L but many other ranges were quoted spanning values from 50% up to 80% of serum concentration and from a lower limit of 2.0 mmol/L to an upper limit of 6.5 mmol/L.

Twenty-five laboratories (all biochemistry) out of the 84 replies measured lactate in the CSF (30%). There were a variety of methods used, some just stating, 'lactate oxidase' or 'lactate oxidase electrode'. Two laboratories used lactate electrodes on blood gas analysers. Nearly half the laboratories measuring lactate did not quote a reference range on their questionnaire. Quoted ranges varied from 0.8 to 3.1 mmol/L with four laboratories using 1.2 – 2.1 mmol/L.

Fifty-six biochemistry laboratories used scanning spectrophotometry to detect haem pigments and bilirubin.

### **Discussion:**

Protein and glucose were analysed by almost all respondents and lactate by about one-third but there was little consensus for the reference ranges reported. Reference ranges may be based on manufacturer's recommendations, literature or derived by the laboratory. Different manufacturers' reagents may give different results and so different reference ranges may be appropriate. This has been seen for protein samples measured using pyrogallol red reagents in quality assurance schemes. For example the Olympus method gives consistently higher results than the Beckman method. Reference ranges reported in the literature are often based on methods that are no longer in common use and, although it may be a difficult exercise, ranges should be based on current methodology.

Laboratories should look at the way they are analysing CSF and check that they are conforming to best practice. Consensus reference ranges and cut-offs for CSF protein, glucose and lactate should be achievable

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### **CPD Questions:**

1. Is 'CSF biochemistry' performed in your laboratory? If so, where did you obtain your Reference Ranges?
  2. Do you detect haem pigments or bilirubin in CSFs? What is the use and clinical application of these tests?
  3. Why would labs sometimes quote different Reference Ranges for routine CSF tests?
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