# Xanthochromia

## Description

Xanthochromia is bilirubin in the cerebrospinal fluid.

**The ONLY indication for CSF Xanthochromia estimation is in suspected subarachnoid haemorrhage in which the CT scan is normal.** Requests that do not meet these criteria will be rejected by the laboratory. Please bear this in mind **before** you perform the lumbar puncture.

Subarachnoid haemorrhage is characterised by sudden-onset severe headache. Risk factors for SAH include cocaine, smoking, alcohol, female, hypertension, family history, postmenopausal and connective tissue disease.

Erythrocytes undergo degradation within two to four hours following haemorrhage into the CSF. The oxyhaemoglobin released is gradually metabolised to bilirubin in a time-dependent fashion, typically reaching a significant concentration after 9-15 hours. The formation of bilirubin is enzyme-dependent and only occurs in vivo, persisting for up to a week after haemorrhage. Spontaneous oxidation of the haem group may occur after about ten days, resulting in approximately equal proportions of methaemoglobin and oxyhaemoglobin. Conversely, oxyhaemoglobin and methaemoglobin may also be produced in vitro following lysis of erythrocytes released into the CSF by bleeding during a traumatic lumbar puncture. Xanthochromia is the term given to the discolouration observed in CSF following intracranial bleeding, though a similar effect may occur in patients with jaundice and high CSF protein concentrations.

## Indication

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## Additional Info

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## Concurrent Tests

- Serum total protein
- Serum bilirubin
- CSF total protein
- CSF Microbiology + Virology (only if also ? CNS infection)
- Serum Virology (only if also ? CNS infection)

## Dietary Requirements

n/a

## Interpretation

Most positive cases of SAH exhibit both bilirubin and oxyhaemoglobin in the CSF, although bilirubin is the key spectrophotometric finding. The CSF may appear bloodstained and the CSF protein may be raised. Bilirubin occurring alone would not be expected within the first few days, but becomes an increasingly possible finding as the second week progresses.

## Collection Conditions

Lumbar puncture for xanthochromia should not be performed until twelve hours after the onset of symptoms in...
order to minimise false negative results. A CSF collection pack **MUST** be used, available from the Clinical Biochemistry Department.

The following must be indicated on the request form:
- Clinical indication for request
- Result of CT scan
- Time of onset of symptoms/event
- Time of lumbar puncture
- Whether the differential diagnosis includes meningitis/encephalitis

See lab handbook for instructions.

**Effect of not protecting samples from light**

Stability studies have shown that CSF stored in a plastic tube and exposed to spring daylight through a north-facing window showed a bilirubin decay rate of at least 0.005 AU/hour. CSF specimens must therefore be protected from light to avoid this phenomenon which may lead to false negative results. [National guidelines for analysis of cerebrospinal fluid for bilirubin in suspected subarachnoid haemorrhage; Ann Clin Biochem 2003; 40: 481–488]

**Frequency of testing**

Lumbar puncture for xanthochromia cannot be repeated due to high likelihood of generating a false positive result.