Bilirubin (total)

General Information

Can be ordered as either a standalone test or as part of a standard liver function profile comprising ALT, ALP, Albumin, Total Protein and Total Bilirubin.

Collection container:
Adults - serum (with gel separator, 4.9mL Sarstedt brown top).
Paediatrics - lithium heparin plasma (1.2mL Sarstedt orange top tube)
Neonates – capillary samples are acceptable

Type and volume of sample:
Serum or lithium heparin plasma, minimum 1 ml whole blood required (200 µl separated serum/plasma).

Specimen transport/special precautions:
No special precautions required.

Laboratory Information

Method principle:
Colorimetric diazo method (Roche). Total bilirubin (unconjugated + conjugated), in the presence of an accelerant, is coupled with 3,5-dichlorophenyl diazonium in a strongly acidic medium to form a red azo dye.

Biological reference range or cut off:
Neonates: Levels may rise from birth to approximately 150 µmol/L at 5 to 6 days and then fall to normal childhood levels by day ten. Refer to NICE CG98 for treatment decision thresholds.
Older children and adults: <21 µmol/L

Turnaround times:
Results are available within 4 hours (routine) or 2 hours (urgent - phone lab in advance of sampling).

Clinical information

Bilirubin is the breakdown product of the haem component of haemoglobin and other haem-containing proteins. It is insoluble in water and requires conjugation with glucuronic acid in the liver to allow excretion in bile.
In plasma, it is present in three main forms:

- unconjugated bilirubin (transported reversibly bound to albumin): this is normally the major component
- conjugated (glucuronidated)
- delta bilirubin (conjugated bilirubin covalently bound to albumin).

The total bilirubin assay measures all three forms.

Hyperbilirubinaemia, defined as high blood bilirubin levels and the appearance of jaundice (bilirubin-induced yellowing of sclera and skin) has a number of causes, including increased rate of haemolysis (any haemolytic disorder), impaired conjugation (hepatocellular injury), or reduced excretion (cholestatic disease). In neonates, severe hyperbilirubinaemia carries a risk of irreversible brain damage (kernicterus) and requires urgent intervention (see NICE clinical guideline CG98). Hyperbilirubinaemia presenting within the first 24 hours of life or persisting after 14 days should always be considered pathological.

If the cause of hyperbilirubinaemia is unknown and/or conjugated hyperbilirubinaemia is suspected, direct/conjugated bilirubin can also be requested for analysis. Babies should be older than 10 days to allow correct interpretation.

Factors known to significantly affect the results:

Bilirubin is unstable when not protected from light. Add-on requests cannot therefore be accepted if the sample is older than 12 hours.

Clinical decision points:

NICE Clinical Guideline CG98 “Jaundice in newborn babies under 28 days” outlines in detail the diagnosis and treatment of neonatal jaundice, including treatment threshold tables and graphs.

In older children and adults, hyperbilirubinaemia should be interpreted in the context of other tests including those in a liver function profile, full blood count, virology and, where appropriate, imaging.

References

1) NICE Clinical Guideline CG98. Jaundice in newborn babies under 28 days (Updated Oct 2016)
2) Marshall, W. Bilirubin. Association of Clinical Biochemistry: Analyte Monographs alongside the National Laboratory Medicine Catalogue (Aug 2012)
3) BMJ Best Practice. Assessment of jaundice. (Accessed Jul 2019)

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