

Bilirubin

General:

Erythrocytes are destroyed in the spleen when they get old or damaged. This releases hemoglobin, which is broken down to heme, as the globin parts are turned into amino acids. The heme is then turned into unconjugated bilirubin in the macrophages of the spleen. This unconjugated bilirubin is not water soluble (BU, indirect bilirubin). It is then bound to albumin and sent to the liver.

In the liver it is conjugated with glucuronic acid, making it soluble in water (BC, bound to glucuronic acid, direct bilirubin). Much of it goes into the bile and thus out into the small intestine. Some of the conjugated bilirubin remains in the large intestine and is metabolized by colonic bacteria to urobilinogen, which is further metabolized to stercobilinogen, and finally oxidized to stercobilin. This stercobilin gives feces its brown color. Some of the urobilinogen is reabsorbed and excreted in the urine along with an oxidized form, urobilin.

Total bilirubin testing includes both BU and BC. Total and direct bilirubin levels can be measured from the blood, but indirect bilirubin is calculated from the total and direct bilirubin (Indirect bilirubin = Total bilirubin - Direct bilirubin).

Differentiating between the two is important diagnostically, as elevated levels of indirect bilirubin are usually caused by liver cell dysfunction (e.g. hepatitis), while elevations of direct bilirubin typically result from obstruction either within the liver (intrahepatic) or a source outside the liver (e.g. gall-stones or a tumor blocking the bile ducts). Bilirubin is affected by light, and therefore blood collection tubes (especially serum tubes) should be protected from sun or light exposure.

The following tests are available:

- **Bilirubin, total**

Indication: Differential diagnosis of icterus (jaundice)

Material: 1 ml serum

Stability: 7 days at 2 to 8°C (if prevented from exposure to light)

Preanalytics: Dispatch in light-protected collection tubes recommended; no lipemic samples as lipemia causes false low results.

TAT: same day, FML

Method: photometric

Units: mg/dl

Ref.- range: up to 1.1 (different in newborn)

- **Bilirubin, direct**

Indication: Suspicion of intrahepatic or extrahepatic icterus

Material: 1 ml serum

Stability: 7 days at 2 to 8°C (if prevented from exposure to light)

Preanalytics: Dispatch in light-protected collection tubes recommended; no lipemic samples as lipemia causes false low results.

TAT: same day, FML

Method: photometric

Units: mg/dl

Ref.- range: up to 0.20

- **Bilirubin, Indirect**

Material: 1 ml serum

Preanalytics: Dispatch in light-protected collection tubes recommended; no lipemic samples as lipemia causes false low results.

Stability: 7 days at 2 to 8°C (if prevented from exposure to light)

TAT: same day, FML

Method: photometric

Unit: calculation

- **Bilirubin, neonatal**

General:

Unconjugated hyperbilirubinemia in a neonate can lead to accumulation of bilirubin in certain brain regions, a phenomenon known as kernicterus, with subsequent irreversible damage to these areas manifesting as various neurological deficits, seizures, abnormal reflexes and eye movements. The neurotoxicity of neonatal hyperbilirubinemia (neonatal bilirubin) manifests because the blood-brain barrier is not fully developed, and bilirubin can freely pass into the brain interstitium, whereas elder individuals with increased bilirubin are protected.

Aside from specific chronic medical conditions that may lead to hyperbilirubinemia, neonates in general are at increased risk since they lack the intestinal bacteria that facilitate the breakdown and excretion of conjugated bilirubin in the feces (this is largely why the feces of a neonate are paler than those of an adult). Instead the conjugated bilirubin is converted back into the unconjugated form by the enzyme β -glucuronidase and a large proportion is reabsorbed through the enterohepatic circulation.

Material: 1 ml serum

TAT: 5 - 7 days*

Method: photometric

Units: mg/dl

- **Bilirubin in amniotic fluid**

General:

The determination of bilirubin in amniotic fluid is a parameter for course control and grading of the severeness of a fetal erythroblastosis (Morbus hemolyticus fetalis). This immuno-hemolytic anemia of the fetus is often caused by irregular maternal IgG antibodies against fetal Rhesus blood group erythrocytes during a Rhesus-incompatible pregnancy. This constellation is given in a Rhesus-negative pregnant women with a Rhesus-positve fetus.

Indication: Suspicion of Morbus hemolyticus fetalis

Material: 1 ml amniotic fluid

Preanalytics: frozen and light-protected dispatch recommended

TAT: 7-10 days*

Method: photometric

- **Bilirubin in Aspirate fluid**

Material: 1 ml aspirate

TAT: same day, FML

Method: photometric

Units: mg/dl

- **Porphobilinogen**

Material: 24 hour urine

TAT: 7-10 days*

Method: HPLC

Units: mg/24h

For complete list of laboratory test offered at Freiburg Medical Laboratory, please visit <http://www.fml-dubai.com/parameter-listings/>