

**Alanine Aminotransferase** (also known as ALT or SGPT)

NORMAL: 0-35 Units per liter.

Alanine aminotransferase (ALT) is an enzyme found mainly in the liver. High levels (>50) indicate damage to liver cells as a result of infection (hepatitis, infectious mononucleosis, etc.) or toxic levels of drugs (e.g. acetaminophen [Tylenol]) or chemicals (e.g. chloroform) or alcohol. Excessive alcohol consumption plus heavy use of acetaminophen is particularly dangerous. ALT levels may be modestly elevated with liver tumors or cirrhosis of the liver.

**Aspartate aminotransferase** (serum glutamic oxaloacetic transaminase (SGOT))

NORMAL: 17-59 Units per liter.

Aspartate aminotransferase (AST) is an enzyme found in red blood cells and in liver, heart, muscle pancreas and kidney. Damage to these tissues releases AST into the bloodstream. Very high levels (>10x normal) suggest recent liver damage. More moderate elevation can indicate damage to liver or other tissues.

**Alkaline Phosphatase** (ALP)

NORMAL: 38–126 international units per liter (IU/L)

This enzyme is produced primarily by liver and bone. Abnormally high levels suggest liver damage or obstruction of the bile ducts from gallstones or cancer. Bone disease may also cause elevated ALP.

**Bilirubin**

NORMAL:

- Total bilirubin 0.3–1.0 milligrams per deciliter (mg/dL)
- Direct bilirubin 0.1–0.3 mg/dL
- Indirect bilirubin (total bilirubin level minus direct bilirubin level) 0.2–0.7 mg/dL.

Bilirubin is a yellow-brown pigment that is produced when the liver breaks down hemoglobin from old red blood cells. It is secreted into bile and then enters the intestine where it is eventually excreted in feces, accounting for the characteristic brown color of stool. There are two forms of bilirubin: indirect (unconjugated) bilirubin, which is poorly soluble in water, and direct (conjugated) bilirubin, which is water soluble. The sum of the two is “total bilirubin.”

High blood levels of bilirubin can be caused by liver damage from hepatitis or from blockage of bile ducts or abnormally rapid destruction of red blood cells (hemolytic anemia).