

## Bilirubin & Alkaline Phosphatase

Liver enzyme tests are common for life insurance applicants. Liver enzyme tests were discussed in the Rx for Success titled *Liver Test*. In addition to liver enzymes (AST, ALT, GGTP), common liver tests also include bilirubin and alkaline phosphatase. These are discussed below. Prothrombin time, platelet count, and protein electroporesis are additional tests that might be used in clinical medicine to provide clues to severity. Bilirubin is considered a test of liver function but it is not specific to the liver. In fact, most bilirubin elevations are due to hemolysis of red blood cells or the benign genetic enzyme deficiency, Gilbert's syndrome. Bilirubin is formed primarily by the breakdown of a substance in red blood cells called "heme". Bilirubin is processed/conjugated in the liver and secreted into the bile. Bilirubin does not rise due to liver disease until 10-50% of the liver is non-functional. Yellow discoloration of the skin and eyes (jaundice) occurs when the bilirubin is  $\geq 3$  mg/dl. Bilirubin elevation due to Gilbert's disease is usually  $< 3$  mg/dl but values as high as 6 mg/dl have been reported. Fasting causes bilirubin to increase in Gilbert's syndrome. AST, ALT and GGTP are not elevated by Gilbert's syndrome. If the obstruction to bile flow (known as Cholestasis) is outside the liver (*e.g., stone or tumor in duct which carries bile from the liver*) or if there is diffuse disease of the bile ducts inside the liver, bilirubin increases along with ALP and GGTP. Alkaline phosphatase is found mainly in liver and bone with some 20% derived from intestine or placenta. Cholestasis causes bile duct cells to increase synthesis of ALP. Isolated elevations of ALP  $< 1.5X$  normal usually resolve spontaneously and are of no concern. Late in pregnancy, ALP may rise from placental origin up to  $2X$  normal. Normal values for alkaline phosphatase are age specific and are higher (3-5X adult normal) in children and adolescents due to bone growth. Adult values are expected after about age 20. Marked increase of bone ALP (*i.e., 6X-8X normal and GGTP normal*) is likely to be due to a destructive bone processes such as Paget's disease or metastatic cancer (*e.g., prostate*). In general, liver disease causes elevation in more than one liver test. For example, cholestasis elevates bilirubin, alkaline phosphatase, AST, and ALT. When only one test is elevated on a screening blood sample for life insurance, it is less likely to represent liver problems. The exception is ALT, which can be the sole elevation in hepatitis. For this reason, insurance companies add a hepatitis screen when the ALT is elevated.

**If your client has elevated liver enzymes, please answer the following:**

1. How long has this abnormality been present? \_\_\_\_\_ (years)
  
2. Please give the date and results of the most recent liver enzyme tests.
  - a) AST/SGOT  
\_\_\_\_\_
  - b) ALT/SGPT  
\_\_\_\_\_

