



## Rx FOR SUCCESS

## 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 electrophoresis 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.

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**RATINGS FOR LIVER TEST**

Rate for cause or see below.

IF THE CAUSE IS UNKNOWN AND THERE IS SIGNIFICANT ELEVATION OF ONLY ONE TEST	
Bilirubin: <ul style="list-style-type: none"> <li>• ≤ 6.0 mg/dl</li> <li>• &gt; 6.0 mg/dl</li> </ul>	No rating Decline
Alkaline phosphatase: <ul style="list-style-type: none"> <li>• Age &gt; 20 years, ≤ 3X laboratory reference range</li> <li>• Age ≤ 20 years, ≤ 5X laboratory reference range</li> <li>• Others</li> </ul>	No rating No rating Individual Consideration
AST: <ul style="list-style-type: none"> <li>• ≤ 5X normal</li> <li>• &gt; 5X normal</li> </ul>	No rating Decline
ALT: <ul style="list-style-type: none"> <li>• ≤ 4X normal</li> <li>• &gt; 4X - 5X normal</li> <li>• &gt; 5X normal</li> </ul>	No rating Table B Decline
GGTP: <ul style="list-style-type: none"> <li>• &lt; 4X normal</li> <li>• &gt; 4X - 5X normal</li> <li>• &gt; 5X normal</li> </ul>	No rating Table B Decline

IF THE CAUSE IS UNKNOWN AND THERE IS ELEVATION OF TWO OR MORE (AST, ALT, GGTP) WITH NO SIGNIFICANT ELEVATION OF BILIRUBIN OR ALP, RATE FOR HIGHEST ENZYME	
• ≤ 2X normal	No rating
• > 2X but ≤ 3X normal	Table B
• > 3X but ≤ 4X normal	Table D
• > 4X but ≤ 5X normal	Table F
• > 5X normal	Individual Consideration

For entering the tables, the following values will be considered significant elevations:

• AST, ALT, GGTP	> laboratory reference range
• Bilirubin	≥ 2 mg/dl
• ALP: <ul style="list-style-type: none"> <li>▶ 20 years, non-pregnant</li> <li>▶ ≤ 20 years</li> <li>▶ Pregnancy</li> </ul>	> 1.5X adult laboratory reference range > 5X adult laboratory reference range > 3X adult laboratory reference range

To get an idea of how a client with a history of Bilirubin & Alkaline Phosphatase would be viewed in the underwriting process, use the Ask “Rx”pert Underwriter on the next page for an informal quote.

**Ask “Rx”pert Underwriter (Ask Our Expert)**

After reading the *Rx for Success* on Bilirubin & Alkaline Phosphatase, use this form to Ask “Rx”pert Underwriter for an informal quote.

Producer \_\_\_\_\_ Phone \_\_\_\_\_ Fax \_\_\_\_\_  
 Client \_\_\_\_\_ Age/DOB \_\_\_\_\_ Sex \_\_\_\_\_

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

**1. How long has this abnormality been present?**

Years \_\_\_\_\_

**2. Please indicate the number of episodes and date of last episode.**

- a) AST/SGOT \_\_\_\_\_
- b) ALT/SGPT \_\_\_\_\_
- c) GGTP \_\_\_\_\_
- d) ALP \_\_\_\_\_
- e) Bilirubin \_\_\_\_\_

**3. Have these results been:**

- Increasing
- Decreasing
- Stable
- Fluctuating up and down
- Unknown

**4. Does your client drink alcohol? (Answer all that apply.)**

- Yes. Please note amount and frequency. \_\_\_\_\_
- No
- Drinking pattern changed recently. \_\_\_\_\_

**5. Is your client on any medications (prescription and/or non-prescription)?**

- Yes. Please give details. \_\_\_\_\_
- No

**6. Please check if your client has had any further studies for evaluation.**

- a) Hepatitis A, B, or C  Normal  Abnormal
- b) Iron studies  Normal  Abnormal
- c) Liver ultrasound, CT scan, or MRI  Normal  Abnormal
- d) Liver biopsy  Normal  Abnormal
- e) No further evaluations  Normal  Abnormal

**7. Does your client have any other major health problems (e.g., stroke, etc.)?**

- Yes. Please give details. \_\_\_\_\_
- No