



Alanine

Aminotransferase

2.6.1.2, GPT

MW : ~100 Kda

HLT 24

By

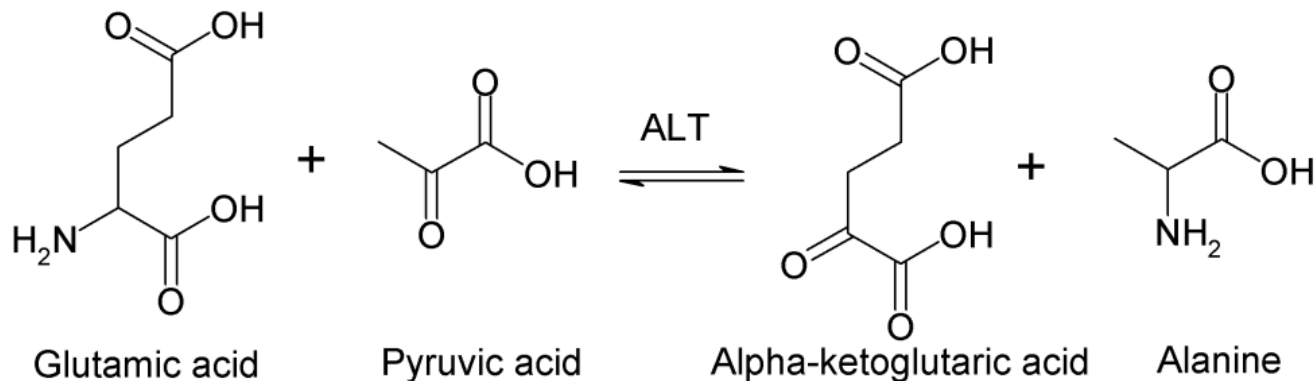
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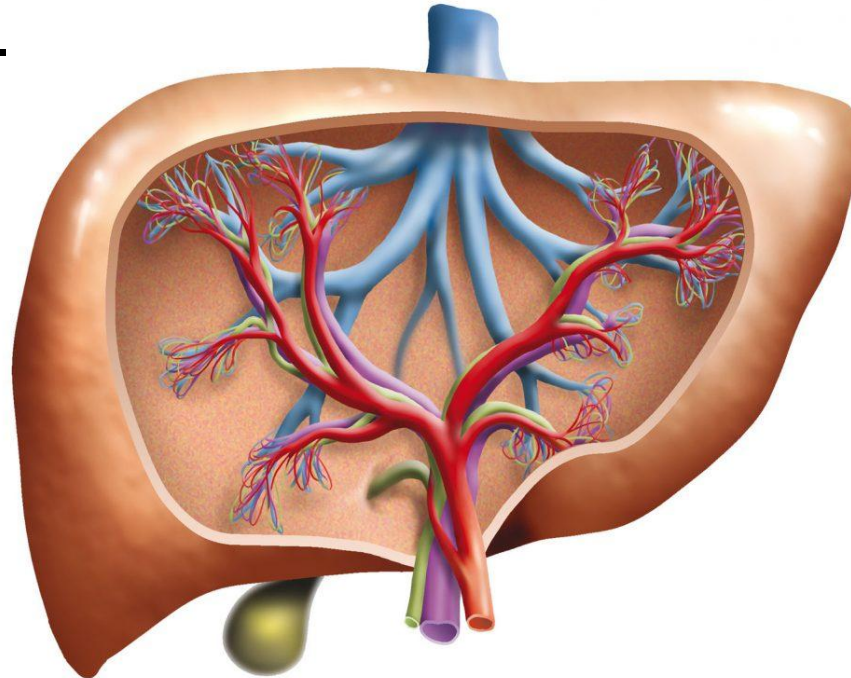
ALT (GPT)

- Alanine aminotransferase (ALT) is a transferase with enzymatic activity similar to that of AST.
- Specifically, it catalyzes the transfer of an amino group from alanine to a-ketoglutarate with the formation of glutamate and pyruvate.
- The older terminology was serum *glutamic pyruvic transaminase* (SGPT, or GPT).
- Pyridoxal phosphate acts as the coenzyme:



ALT Tissue Source

- ALT is distributed in many tissues, with comparatively high concentrations in the liver.
- Cardiac tissue contains a small amount of ALT
- It is considered the more liver-specific enzyme of the transferases.



ALT Diagnostic Significance

- Clinical applications of ALT assays are confined mainly to evaluation of hepatic disorders.
- Higher elevations are found in hepatocellular disorders than in extrahepatic or intrahepatic obstructive disorders.
- In acute inflammatory conditions of the liver, ALT elevations are frequently higher than those of AST and tend to remain elevated longer as a result of the longer half-life of ALT in serum (16 and 24 hours, respectively).
- Cardiac tissue contains a small amount of ALT activity, but the serum level usually remains normal in AMI unless subsequent liver damage has occurred.

AST/ALT ratio

- ALT levels have historically been compared with levels of AST to help determine the source of an elevated AST level and to detect liver involvement concurrent with myocardial injury.
- Most causes of liver cell injury are associated with a greater increase in ALT than AST; however.
- AST to ALT ratio of 2:1 or greater is suggestive of alcoholic liver disease, particularly in the setting of an elevated gamma-glutamyl transferase.

$$\text{AST:ALT ratio} = \frac{\text{AST}}{\text{ALT}}$$

AST:ALT Ratio

- Most causes of hepatocellular injury are associated with an AST that is lower than the ALT.
- Normal AST/ALT is 1.3
- AST to ALT ratio of 2:1 or greater suggests alcoholic liver disease, particularly in the setting of an elevated GGT.
- Nonalcoholic steatohepatitis - AST to ALT ratio is elevated in an alcoholic liver disease pattern in patients
- Alcoholic liver disease – Elevated
- Hepatitis C - Elevated
- In addition, patients with Wilson disease or cirrhosis (viral hepatitis) may have $AST > ALT$, though in patients with cirrhosis the ratio typically is not greater than two.

AST/ALT ratio..... Cont .

- The AST to ALT ratio can be elevated in a liver disease pattern in patients with nonalcoholic steatohepatitis, and it is frequently elevated in an alcoholic liver disease pattern in patients with hepatitis C who have developed cirrhosis.
- In patients with Wilson's disease or cirrhosis due to viral hepatitis may have an AST that is greater than the ALT, though the ratio typically is not greater than two.
- When the AST is higher than ALT, a muscle source of these enzymes should be considered. For example, muscle inflammation due to dermatomyositis may cause AST>ALT.

ALT Assay for Enzyme Activity

- The typical assay procedure for ALT consists of a coupled enzymatic reaction using LD as the indicator enzyme, which catalyzes the reduction of pyruvate to lactate with the simultaneous oxidation of NADH.
- The change in absorbance at 340 nm measured continuously is directly proportional to ALT activity.



- The disappearance of NADH is followed spectrophotometrically (at 340 nm).

ALT Assay Source of Error

- ALT is stable for 3 to 4 days at 4°C.
- It is relatively unaffected by hemolysis.

ALT Reference Range

- ALT, 7 to 45 U/L (37°C) (0.1 to 0.8 μkat/L)

Thank
you

