Gamma-Glutamyl Transpeptidase (GGT) Test

- Evaluates GGT levels, useful for detecting liver disease and alcohol use.

Gamma-glutamyl transferase (GGT) functions as an enzyme that associates with the plasma membrane[1,2] and is predominantly expressed in various organs, including the renal system, hepatic tissue, spleen, pancreas, and small intestine, among others. The concentration of GGT is most elevated in the kidneys, with the liver following in terms of expression levels.[3,4] It is noteworthy that renal pathology seldom leads to an elevation in serum GGT levels; conversely, such elevations are more frequently observed in hepatic disorders.[3,5] Within the hepatic context, GGT is primarily situated on the capillary side of hepatocytes as well as on the membranes of the epithelial cells lining the bile ducts. Conditions such as hyper-synthesis within the liver, impediments to bile excretion, and damage or hyperplasia of the bile duct epithelium can result in heightened serum GGT levels, which serve as a diagnostic aid for cholestatic liver diseases.[5]

The principal function of GGT is to facilitate the metabolism of L-glutathione (GSH) at the lateral aspect of the plasma membrane, enabling the conversion of amino acids into GSH precursors and fostering the conjugation of certain endogenous compounds, including leukotrienes and prostaglandins, as well as exogenous agents to GSH, thereby enhancing cellular metabolism and the elimination of foreign substances.6 Furthermore, GGT is implicated in the generation of reactive oxygen species (ROS), which can induce DNA damage and modulate cellular proliferation and apoptosis through pro-oxidant mechanisms. Consequently, serum GGT serves as a biomarker for oxidative stress, playing a role in redox homeostasis and inflammatory responses, and is associated with the pathogenesis of cardiovascular diseases, metabolic syndrome, diabetes, cancer, and other health conditions.[7]

Although GGT can act as a biomarker for bile duct injury and oxidative stress, thereby assisting in the diagnostic process of hepatobiliary diseases,[7,8] its clinical significance is frequently overlooked owing to its lack of specificity. Indeed, increased GGT levels are commonly observed across a spectrum of hepatic diseases, and a thorough comprehension of the characteristics of GGT in relation to diverse liver disorders may provide valuable insights into the underlying mechanisms of liver disease and aid in the identification of therapeutic targets. Notable conditions contributing to abnormal GGT levels in clinical

practice include primary biliary cholangitis (PBC), drug-induced liver injury (DILI), alcoholic liver disease (ALD), and non-alcoholic fatty liver disease (NAFLD).

References

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