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ST VINCENT'S PATHOLOGY

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ASPARTATE AMINOTRANSFERASE (AST) INFORMATION SHEET

PHYSIOLOGY

AST (Aspartate aminotransferase) is an enzyme with transaminase activity which is found in many tissue types, with the highest concentrations in the liver, skeletal muscle, cardiac muscle and red cells. AST catalyses the transfer of an ammonia group (NH3) from aspartate to alpha-ketoglutarate producing oxaloacetate and glutamate. AST is found in the cell cytoplasm and mitochondria and these forms have half-lives in the circulation of about 14 and 6 hours respectively. Average within-person variation in serum activity has a CV of about 12%. AST has been previously known as Serum Glutamic Oxaloacetate Transaminase (SGOT) and the Enzyme Commission reference is EC 2.6.1.1.

PATHOLOGY

Raised levels of AST may be found in the circulation in patients with damage to any tissues containing high levels of AST. Thus hepatitis, skeletal or cardiac muscle damage and haemolysis can all cause elevated serum AST. ALT and AST are usually both elevated in damage to hepatocytes however ALT is more specific for liver disease than AST. In monitoring chronic hepatitis due to any cause (eg hepatitis B or haemochromatosis) AST may be more sensitive than ALT for minor disease progression. In alcoholic hepatitis or acute hepatic destruction the AST may be more elevated than the ALT (elevated Deritus ratio, AST:ALT) however other causes of a raised AST need to be excluded to make this assessment. In cholestatic liver disease the AST and ALT may be elevated but usually to a lesser extent than the elevation found in ALP and GGT.

In muscle damage AST and CK may be markedly elevated with only a minor rise in ALT. There is relatively more AST compared to CK in cardiac tissue than skeletal muscle, so a ratio of CK/AST >11 is more likely to indicate a skeletal muscle source and CK/AST <11 then a cardiac source in more likely. Note that serum troponin measurement is the recommended test to assess cardiac muscle damage.

CAUSES OF ELEVATED SERUM ALT

- Any cause of hepatitis (hepatocellular damage)
  - Acute or chronic viral infections (eg Hepatitis A, B, C; EBV)
  - Toxic injury from drugs or chemicals (may be dose-dependent or idiosyncratic)
  - Alcoholic hepatitis (AST commonly higher than ALT)
  - Hypoxic hepatitis (marked by rapid fall in levels after restoration of blood supply)
  - Primary or metastatic malignant neoplasms
  - Heart failure
  - Autoimmune hepatitis (test with LKM antibodies)

- Collagen vascular diseases: SLE
- Granulomatous diseases

- Cirrhosis (often only modest elevations)
- Biliary obstruction (ALP and GGT more elevated)
- Rhabdomyolysis (CK and AST markedly more elevated)
- Inherited disorders (e.g. haemochromatosis, Wilson's disease, alpha-1-antitrypsin deficiency)
- Myocardial Damage - Myocardial infarction, trauma, myocarditis.
- Red Cell damage - Intravascular or in-vitro haemolysis, pernicious anaemia
- Other
  - Pulmonary embolism, pancreatitis
  - Macro-AST (AST-immunoglobulin complex)