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ST VINCENT'S PATHOLOGY

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LD ISOENZYMES INFORMATION SHEET

PHYSIOLOGY

Lactate Dehydrogenase (LD) is an enzyme found in many cells of the body and measured in serum as a marker of cell damage. If there is an elevation of LD without a clear cause, measurement of LD isoenzymes can be useful to assist with determining the source of the LD in the serum.

LD is an enzyme made up of 4 subunits. Each of these subunits may be of the H (heart) or M (muscle) types. The composition of each of the subtypes (LD 1 to 5) is as follows: LD1- HHHH, LD2 - HHHM, LD3 - HHMM, LD4 - HMMM, LD5 - MMMM. The isoenzymes have varying half-lives in the circulation from about 100 hours for LD1 to about 10 hours for LD5. In normal serum the most prominent form is LD2 although all types are normally present. LD is found in most cell types in the body with isoenzymes LD1 and LD2 found in high concentrations in red blood cells and cardiac myocytes, and LD5 in muscle cells and hepatocytes.

PATHOLOGY

Raised levels of the various LD isoenzymes generally reflects damage to tissues containing high concentrations of that isoenzyme with subsequent release into the circulation. Thus, myocardial infarction or red cell destruction leads to an increase in circulating concentrations of LD1 and, to a lesser extent LD2 and damage to skeletal muscle or hepatocytes is marked by an increase in LD5. The table below shows possible causes of elevations.

CAUSES OF ELEVATED LD ISOENZYMES

- Predominant elevation of LD1
  - Haemolysis (in-vivo or in-vitro)
  - Ineffective erthryopoiesis (e.g. vitamin B12 or folate deficiency)
  - Myocardial infarction or other cardiac damage (e.g. trauma, cardiac surgery)
  - Malignancies (childhood ALL, Wilm's Tumour, Germ cell carcinoma)
  - Renal infarct
- Predominant elevation of LD5
  - Rhabdomyolysis (any cause, CK and AST also elevated)
  - Hepatitis (any cause, ALT and AST also elevated)
- Predominant elevation of LD2-4
  - Lymphoma, leukaemia
  - Infectious mononucleosis (together with LD 5)
  - Damage to spleen, lungs, lymph nodes, platelets
- Mixed pattern (all isoenzymes)
  - Interpretation uncertain. Usually does not add to clinical interpretation.

- Unusual patterns
  Macro LD (LD-antibody complex, marked by missing, extra, or abnormal bands)
  Congenital deficiency of M or H (not associated with clinical effects)

CLINICAL USE

LD isoenzymes are of use in evaluating the cause of an unknown elevation of LD. Often the clinical setting and other tests can answer the question more directly, e.g. elevated CK in rhabdomyolysis, elevated ALT in liver damage, falling haemoglobin in haemolysis. It not appropriate to measure LD isoenzymes if the total LD activity is not raised above the reference interval.

LD ISOENZYME REPORTING AT SYDPATH

This test is referred to an external laboratory. In addition to fractionating the LD which is reported as a percentage of the total LD activity, a repeat total LD measurement is performed.

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