DEPARTMENT OF CLINICAL CHEMISTRY
SHEFFIELD CHILDREN'S NHS FOUNDATION TRUST

GLUTARATE DEHYDROGENASE

Relevant disorders

Glutaric Aciduria Type 1

Related Metabolic Tests

Organic acids
Acylcarnitines

Indication for Test

Glutaryl-CoA dehydrogenase deficiency (GAI; McKusick 231670) is an inherited disorder of lysine, hydroxlysine and tryptophan metabolism resulting in a severe dystonic-dyskinetic syndrome. Patients usually present with acute onset during intercurrent infection in the first year or so of life, but slow progressive deterioration may occur in some patients. Mortality is high but a few patients show a less severe course. Not all patients with GAI excrete significant amounts of urinary glutaric acid, and 3(OH) glutarate in the urine may only be mildly elevated. Elevated glutarylcarnitine in blood is a useful marker for the disease but may also occasionally give false negative results. Specific enzyme assay is often the only conclusive means of diagnosis. All patients with a diagnosis of GAI should have enzyme confirmation particularly when future antenatal diagnosis for the family may be a possibility as some patients have significant residual enzyme activity that may approach 'heterozygote levels'. The enzyme defect can be demonstrated in cultured fibroblasts or fresh lymphocytes. GAI may present clinically as closely mimicking the "shaken baby syndrome" with bilateral subdural haematomas and retinal haemorrhages and may therefore need to be excluded in cases of suspected NAI.

Methodology

[1,5-^{14}C]glutaryl-CoA is metabolised by cell sonicates via glutaryl-CoA dehydrogenase (dehydrogenation and decarboxylation) to release $^{14}CO_2$ which is 'trapped' by the sodium hydroxide impregnated filter paper disc in the lid of the assay tube. The trapped radioactivity is counted and activity calculated in relation to the amount of cell protein used in the assay.

Sample requirements

Skin biopsy for fibroblast culture or cultured fibroblasts

Transport information/Contact details

Send by first class post to:

Department of Clinical Chemistry
Sheffield Children's NHS Foundation Trust
Western Bank, Sheffield
S10 2TH, UK

Simon Olpin (Consultant Clinical Scientist)
0114 2717267

Turn Around Time

6 – 8 weeks. This may be longer if the cells do not grow adequately.

Reference Ranges

Interpretation will be provided with the report.

References

- Christensen E, and Brandt NJ. Clinica Chimica Acta, 88 (1978) 267-276.
- Christensen E. Prenatal Diagnosis Vol. 14:333-336 (1994).