BIOTINIDASE

Also known as:

Multiple Carboxylase deficiency

Relevant/Related disorders

Biotinidase deficiency; Holocarboxylase synthetase deficiency

Indication for Test

Biotin is a cofactor required by acetyl CoA carboxylase, pyruvate carboxylase, propionyl carboxylase and 3 methylcrotonyl CoA carboxylase. It is covalently bound to these enzymes and following the carboxylation reaction is released as biocytin. The biocytin is then regenerated to biotin by the action of biotinidase.

In the absence of biotinidase activity, combined carboxylase deficiency results. Characteristic symptoms include metabolic acidosis, hypotonia, seizures, ataxia, impaired consciousness, skin rash and alopecia.

The condition can easily be treated with pharmacological doses of biotin.

Methodology

The biotinidase activity in plasma is measured by its action on biotin 4-amidobenzoic acid at pH 6.0 to release 4-aminobenzoic acid (PABA). The PABA is measured by reaction with sodium nitrite, ammonium sulphamate and N-1-naphthylethylenediamine, which produces a purple coloured product.

Biotinidase activity is expressed in U/L (nmol/min/ml).

Sample requirements

1ml venous blood in a lithium heparin tube. Separate and send 0.5 ml plasma. Store at -20˚C until transport (e.g. if over a weekend).
The plasma can usually be transported at room temperature but ideally sent by courier on dry ice.

Turn Around Time

5 – 14 days. If requested urgently can be performed more quickly.

Transport information/Contact details

Send by first class post Monday – Thursday with normal packaging.

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Reference range

Reference range: 2.5 – 10.5 U/L
Homozygote: zero activity
Heterozygote: approx. half lower limit
Neonates have activities up to 75% lower than the mean of the normal range.

Comments:

Cases of biotinidase deficiency have activities close to zero.
A slightly low result may reflect a deteriorated sample, for example the activity will be lower if the plasma is left at room temperature for more than two days. A repeat fresh sample should confirm this (the plasma can usually be transported at room temperature but ideally sent by courier on dry ice).

An increased result has no significance in the absence of other biochemically suggestive findings, but has been described in association with holocarboxylase synthetase deficiency.

References

- Adapted from Wolf et al, Biotinidase deficiency, Clin Chim Acta (1983):131: 273-281.
- Reference range from Birmingham Childrens Hospital.
- Inborn Metabolic Diseases – Diagnosis and Treatment, 5th Edition. Saudubray, van den Berghe, Walter (Editors). Published by Springer.