DIAGNOSTIC insight
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Accession:
Ordering Clinician:
Patient:
Date Of Birth:
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Organix Comprehensive Profile

Energy Production (Citric Acid Cycle)

Citrate (L) Isocitrate (L)

Causes/Explanation

Low citrate and isocitrate excretion can be a sign of metabolic acidosis; the causes of which are: hypokalemia (causing intracellular acidosis), high animal protein diet (with an elevated acid-ash content), and urinary tract infection (UTI). Low levels of these analytes can also increase the risk of kidney stone formation. Accompanying high lactate levels provide confirmatory evidence of metabolic acidosis. In the absence of metabolic acidosis, low levels of these analytes can be the result of insufficient flow of carbon skeletons from amino acids.

Treatment

Potassium citrate. Also consider dietary strategies to minimize acidosis and increase alkalinity. In the absence of acidosis, consider treatment with a balanced mix of essential amino acids to increase levels of kreb cycle intermediates.

Alpha-ketoglutarate (H)

Causes/Explanation

Elevated a-ketoglutarate is most commonly caused by a deficiency of the coenzyme B1 required for its metabolism. Elevations for either pyruvate or the branch-chain amino-acid metabolites, which require the same coenzyme, provide further evidence of possible B1 deficiency(1). In the absence of B1 deficiency, heavy metals, in particularly arsenic(2) and mercury(3), have been shown to bind preferentially to the adjacent sulfurhydryl groups in the lipoamide subunit of a-ketoglutarate dehydrogenase. Thus a-ketoglutarate elevation (in particularly marked elevation) on its own may be indicative of heavy metal poisoning. Confirm with appropriate testing if suspected.

Treatment

B1 and B5

References

1. Toyoshima M, et al. Thiamine-responsive congenital lactic acidosis: Clinical and biochemical studies. Pediatric Neurology 2005; 33(2): 98-104.
2. Ramanathan K, et al. Ascorbic acid and alpha-tocopherol as potent modulators on arsenic induced toxicity in mitochondria. Journal of Nutritional Biochemistry. 2003; 14: 416-420.
3. Donaldson ML & Gubler CJ. Biochemical effects of mercury poisoning in rats. The American Journal of Clinical Nutrition. 1978; 31: 859-864.

B-Complex Vitamin Markers

No significant abnormalities found.

Methylation Cofactor Markers

No significant abnormalities found.

Neurotransmitter Metabolism Markers

5-Hydroxyindoleacetate (H)

Causes/Explanation

Increased breakdown of serotonin. Urinary 5-HIA levels stem largely from synthesis of serotonin in the GI tract. Serotonin's primary function in the gut relates to regulation of motility, which is why urinary 5-HIA has been used as an aid in the diagnosis of coeliac disease. Because of the magnitude of total body serotonin synthesis, increased rates of serotonin turnover indicated by elevated urinary 5-HIA can lead to depletion of the essential amino acid precursor, L-tryptophan. A very high 5-HIA result calls attention to potential deficiency of tryptophan. Plasma amino acid analysis provides a useful, direct measure of this amino acid.

Symptoms or Conditions

Because of its role in intestinal motility, high levels of serotonin sometimes result in symptoms of diarrhea(1). Studies have shown 5-HIA to be a reliable marker of inflammation of the appendix(2). Individuals with carcinoid tumors typically exhibit very high levels of 5-HIA (3)

Treatment

Consider use of supplemental tryptophan if presenting symptoms coincide with tryptophan deficiency.

Notes

Serotonin metabolites excreted in urine originate mainly from peripheral sources, and only a small amount originates from the CNS (4). Use of serotonin re-uptake inhibitors (SSRI's) however, can result in elevated 5-HIA levels. Increased conversion of tryptophan to 5-HIA diverts metabolism of tryptophan away from niacin production in the liver. Thus, increased production of 5-HIA can negatively affect niacin status(3).

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References

1. Crowell MD, et al. Enterochromaffin cells and 5-HT signaling in the pathophysiology of disorders of gastrointestinal function. Current Opinion in Investigational Drugs. 2004; 5(1): 55-60. 2. Bolandparvaz S, et al. Urinary 5-hydroxy indole acetic acid as a test for early diagnosis of acute appendicitis. Clinical Biochemistry 2004; 37: 985-989. 3. Shah GM, et al. Biochemical assessment of niacin deficiency among carcinoid cancer patients. American Journal of Gastroenterology. 2005; 100: 2307-2314. 4.Aizenstein ML, Korf J. On the elimination of centrally formed 5-hydroxyindoleacetic acid by cerebrospinal fluid and urine. Journal of Neurochemistry 1979;32:1227-1233.

Detoxification Indicators

Sulfate (H)

Causes/Explanation

High pyroglutamate is indicative of impaired glutathione recycling due to limited supply of precursor amino acids, cysteine and/or glycine. High sulfate is due either to high dietary intake of sulfur (either in the form of inorganic or organic) or up-regulated phase II sulfate detoxification (1). Sulfur in urine originates either from inorganic sources in the diet (i.e. sulfiting agents used widely as food additives) or organic sources derived from sulfur amino acids. High levels due to up-regulated sulfate detoxification indicate that the patient is under some form of oxidative or toxic stress placing demands on phase II sulfate conjugation. High levels of urinary sulfate occur in the acute stages of oxidative stress, however in chronic cases of oxidative stress, sulfur levels eventually become depleted, leading to low urinary levels.

Food Sources

Food additives in the form of sulfiting agents occur in foods such as processed meats, wines and beers, dried fruit and vegetables, fruit squashes, sea foods and biscuits. All sulfur containing protein foods.

Symptoms or Conditions

Sulfiting agents are known to trigger asthma and other allergic reactions in susceptible persons.

Treatment

N-acetylcysteine or inorganic sulfate to support increased phase II sulfation.

Reference

1. Magee EA, et al. Contribution of dietary protein and inorganic sulfur to urinary sulfate: toward a biomarker of inorganic sulfur intake. American Journal of Clinical Nutrition. 2004; 80: 137-142.

Bacterial - general

Interpretive Overview

Analytes 35 to 40

These markers have recently been found to derive largely from the action of colonic bacteria on dietary polyphenolic compounds. As such, individuals with a balanced gut flora and diet will normally exhibit backgrounds levels of the compounds. Low or undetectable levels is a potential sign that the patient may have been on recent medication that has wiped out certain bacterial strains or similarly that the patient has an imbalance between ‘good’ and ‘bad’ bacterial species. Generally speaking, high levels signal overgrowth of pathogenic bacterial species.

Notes

Given compounds 35 to 40 are derived from dietary polyphenolic compounds, high-normal levels of single analytes may arise due to high dietary polyphenolic intake. However, as the number of high analytes increases, so to does the likelihood that the elevations are mediated by overgrowth of pathogenic bacterial species. In the absence of recent recent broad spectrum antibiotic therapy, low levels can signal low dietary polyphenol intake. In such cases, increased fruit and vegetable consumption may be advisable.

Reference

1. Rechner AR, et al. The metabolic fate of dietary polyphenols in humans. Free Radical Biology & Medicine. 2002; 33(2): 220-235. 2. Deprez S, et al. Polymeric proanthocyanidins are catabolized by human colonic microflora into low-molecular-weight phenolic acids. Journal of Nutrition. 2000; 130: 2733-2738.

Yeast / Fungal

No significant abnormalities found.

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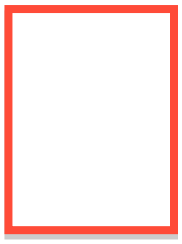

Further Reading

For an in-depth explanation of all the markers reported on these and other Metametrix tests, refer to the book entitled, "Laboratory Evaluations in Molecular Medicine - Nutrients, Toxicants, and Cell Regulators", written by J. Alexander Bralley and Richard S. Lord, CEO and Director of Science & Educations at Metametrix respectively.

NB: the interpretations, explanations and treatment recommendations provided above are done so purely on the basis of Diagnostic Insight's expertise. They are not intended to provide a definitive interpretation or diagnosis or treatment recommendation for disease states. Report compiled by Diagnostic Insight Pty Limited.