

Organix Dysbiosis Interpretation Guide

Organic acids are byproducts of cellular or microbial metabolism. They provide markers for a wide range of uses; for the purpose of this handout, we will be focusing on them as markers for microbial overgrowth only.

Organic acid production occurs in the terminal ileum or ascending colon, so this test cannot tell us if production is in the small or large intestine. As a result, it cannot be used to diagnose SIBO, but it may provide supporting evidence when breath test results are equivocal.

Organic acid tests are best used in conjunction with other tests due to a number of reasons:

- Less supporting research than breath or stool tests.
- Variation in results (most often due to diet).
- Some uncertainty on the optimal ranges.

Geneva and Great Plains Laboratory are the two primary labs for organic acids testing. This handout focuses on the Geneva Organix test.

SPECIFIC MARKERS

Benzoate

- Produced by bacterial metabolism of dietary polyphenols.
 - If elevated with no other markers, may just indicate high dietary intake of polyphenols.
- Elevation can be a marker of bacterial overgrowth or impaired Phase 2 detox capacity due to glycine and/or pantothenic acid insufficiency.
- Often elevated in conjunction with hippurate, which is a normal byproduct of benzoate metabolism.

Phenylacetate (PAA)

- Byproduct of intestinal action on polyphenols, tyrosine, or phenylalanine.
 - Normally present in low concentrations.
- Accumulation in phenylketonuria (PKU), an inherited disorder that leads to accumulated PAA levels.
 - Can lead to neurotoxicity and brain damage.
- In most patients there is slight elevation, which is indicative of microbial overgrowth.
 - High levels should be referred to an inherited disease specialist.

Phenylpropionate (PPA)

- Byproduct of intestinal action on polyphenols and phenylalanine.
- Metabolized by medium-chain acyl-CoA dehydrogenase (MCAD) and normally not in urine.

- Very high levels indicate MCAD deficiency.
- Signs and symptoms (vomiting, lethargy, hypoglycemia) occur early in childhood.
- Mild elevation is a sign of microbial overgrowth.
 - Refer out for very high levels.

P-hydroxybenzoate

- From bacterial metabolism of polyphenols and tyrosine.
- Elevations indicate microbial overgrowth, especially E. coli.

P-hydroxyphenylacetate

- From bacterial metabolism of tyrosine.
- Useful in detecting small bowel disease caused by overgrowth of anaerobes.
- Very high in patients with cystic fibrosis or other conditions that impair amino acid absorption.

Indican

- From bacterial metabolism of tryptophan.
- Elevations indicative of bacterial overgrowth in upper small bowel.
 - A rare marker that tells you where overgrowth is occurring.
- Can help differentiate pancreatic insufficiency from biliary stasis as a cause of steatorrhea (fatty stools).
 - High indican → pancreatic insufficiency
 - Normal indican → biliary stasis
- Can also signify low stomach acid since incomplete protein digestion can cause elevations.

Tricarballic acid

- Produced by aerobic bacteria.
- Extremely high affinity for magnesium, preventing Mg absorption.
 - Need Mg in addition to gut treatment when elevated.

D-lactate

- Major metabolic byproduct of beneficial bacteria species in the gut like Lactobacillus acidophilus.
 - Different isomer of lactic acid than the ones produced during exercise.
- Elevated in cases of carbohydrate malabsorption, which allows L. acidophilus to flourish.
- Lactobacillus species are common in probiotics; best to avoid these when D-lactate is elevated.
 - Red flag for SIBO if patient gets worse with these probiotics.
- Symptoms include GI distress and neurological and cognitive symptoms.

3,4-Dihydroxyphenylpropionate (3,4-DHPP)

- Produced by Clostridia species and elevated in overgrowth.
- Can lead to increased dopamine due to inhibited dopamine metabolism/breakdown.
 - Potential neurologic effects.

D-arabinitol

- Metabolite of most pathogenic candida species.
 - One of the most sensitive markers for invasive candidiasis.
- A better indicator for fungal overgrowth than blood cultures.