SCFAs and n-Butyrate

What benefits do SCFAs provide?
Short-chain fatty acids (SCFAs) are produced by the anaerobic bacterial fermentation of primarily non-absorbed dietary fiber. They serve several important functions:
- Provide energy for the colonocytes and exert a trophic effect on the intestinal lining
- Act as anti-diarrheal agents by removing sodium and water from the colon
- Improve colonic blood flow
- Deter the colonization of pathogens in the bowel
- Provide 5%-30% of systemic daily energy requirements
- Reduce ammonia uptake from the intestine

How does n-butyrate reduce the risk of colon cancer?
Butyrate is the preferred substrate for colonocytes, assisting in the maintenance of colonic integrity. Butyrate helps prevent colon cancer by stimulating healthy cellular growth, reducing DNA damage, indirectly inhibiting the conversion of primary to secondary bile acids, and reducing the exposure of the colonic mucosa to ammonia.

What is butyrate’s role in Inflammatory Bowel Disease?
- Because of its trophic effect on the colonic epithelium, butyrate protects against ulcerative colitis (UC)
- In Crohn’s disease, butyrate decreases TNF-a production and lipopolysaccharide-induced NFkappaB activity in intestinal cells (key factors in its pathogenesis)

Do SCFAs play a role in Irritable Bowel Syndrome (IBS)?
Patients with Irritable Bowel Syndrome (especially diarrhea-predominant) tend to have lower total SCFAs.

Are there problems associated with high levels of SCFAs?
Occasionally elevated levels of n-butyrate in patients with UC may indicate impaired transport of n-butyrate into the cell or a defective metabolism within the cell, or may result from bacterial fermentation of blood within the colon. Increased levels of SCFAs may also indicate:
- Malabsorption
- Rapid transit time
- Small bowel bacterial overgrowth

What are SCFAs and n-Butyrate?
SCFAs are produced through the fermentation of non-absorbed fibers. In addition to providing energy for the colonocytes and exerting a trophic effect on the intestinal lining, SCFAs have a number of other positive benefits in the gut.

Turn-around Time 14 days
How can low levels of total SCFAs or n-butyrate be increased?

- Dietary fiber
- Larch arabinogalactan (Larix sp.)
- Normalization of pH—in vitro SCFA production is high in the pH 5-9 range
- Normalization of transit time—Chronically slow transit time can lead to bacterial overgrowth of the small intestine and high SCFAs; very short transit time can also lead to high SCFAs.
- Probiotics and prebiotics—Lactobacillus produces lactic acid that acts as a substrate for other gut bacteria that ferment it to SCFAs
- Butyric acid (oral or rectal)

Are some dietary fibers more effective than others?

In general, the more slowly fermented forms of fiber tend to maintain low pH and raise SCFAs (especially butyrate) along the entire length of the bowel. They are also more effective at raising n-butyrate levels by shifting much of the fermentation to the distal colon.

Soluble non-starch polysaccharides, such as oat bran and guar gum, are rapidly fermented and have less effect on pH and SCFA production in the distal colon.

What further testing might be indicated?

- Bacterial Overgrowth of the Small Intestine Breath Test—Consider when total SCFAs and n-butyrate levels are elevated with the presence of gas, bloating, or chronic bowel stasis (e.g., slow transit time).

How do I order this test?

For CDSA 2.0 test kits, Interpretive Guidelines or information, please use our secure web contact center at www.gsdl.com/billing.

References