

## Intestinal Permeability Assessment

### Why is this test important?

A leaky gut constitutes the link between gut imbalances and systemic illness. This test can provide therapeutic direction to address systemic symptoms.

A healthy body requires a proper balance of assimilation of critical nutrients and exclusion of toxic substances. This test provides this information.

Any irritation to the gut lining can contribute to increased permeability. Irritation results from inflammation, imbalances of intestinal organisms, food allergies, maldigestion, and exposure to non-steroidal anti-inflammatories, alcohol and pro-oxidants. This test can pinpoint underlying irritation.

This test is a sensitive and accurate method for evaluating the effects of celiac disease, or gluten-sensitive enteropathy.

This test is an accurate predictor of relapse in patients with Crohn's disease who are asymptomatic and in remission.

### What does this test involve?

Following an overnight fast, the patient collects a urine sample and then drinks a premeasured challenge drink containing lactulose and mannitol (two nonmetabolized sugar molecules). A second urine sample is later drawn from a six-hour collection.

The report includes lactulose percent recovery, mannitol percent recovery and a lactulose/mannitol ratio.

### What does this test measure?

Chronic irritation to the gut lining leads to maldigestion and malabsorption of critical nutrients. Deficiencies result in a wide array of systemic problems.

Chronic "leaky gut" can lead to an increased burden on hepatic detoxification systems.

This can deplete important nutrient co-factors and increase toxic reactions.

Increased passage of undigested food particles leads to the development of food allergies.

The passage of certain gut antigens has been associated with autoimmune disorders such as rheumatoid arthritis, ankylosing spondylitis, thyroid disease, and myasthenia gravis.

Chronically impaired permeability affects the bowel's barrier and immune function, leaving the body more susceptible to toxic substances and bacterial translocation.

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GUIDELINES

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# Intestinal Permeability

| Analyte   | Result                                                                                                                          | Suspect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Consider                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Lactulose | <p>Normal with elevated Lactulose/Mannitol ratio</p> <p>OR</p> <p>Elevated with elevated or normal Lactulose/Mannitol ratio</p> | <p>Increased intestinal permeability/"leaky gut"</p> <p>Possible causes:</p> <ol style="list-style-type: none"> <li>1) Exposure to toxic substances (drugs such as NSAIDS and alcohol, chemical exposure)</li> <li>2) Food allergy/intolerance</li> <li>3) Intestinal dysbiosis</li> <li>4) Parasite, yeast, viral, or bacterial infection</li> <li>5) Maldigestion (includes hypochlorhydria, pancreatic insufficiency, and disaccharidase insufficiencies)</li> <li>6) Bacterial overgrowth of the small bowel</li> <li>7) Prolonged fasting/nutrient insufficiencies</li> <li>8) Inflammatory bowel disease, e.g. Crohn's disease</li> <li>9) Insufficient mucosal glycocalyx and/or sIgA</li> </ol> | <p>Consider "4 R" approach to GI health:</p> <ol style="list-style-type: none"> <li>1) Remove mucosal irritants such as allergenic foods, alcohol, gluten (if sensitive), NSAIDS: <ul style="list-style-type: none"> <li>• Consider elimination diet</li> <li>• Remove possible pathogens (bacteria, yeast, parasites)</li> <li>• Consider Comprehensive Digestive Stool Analysis (CDSA) or Comprehensive Parasitology, Bacterial Overgrowth of the Small Intestine Breath Test</li> <li>• Reduce sugar, refined carbohydrates, saturated fat, red meat (meat can induce bacterial enzyme activity)</li> <li>• Restore proper transit time <ul style="list-style-type: none"> <li>–Increase dietary fiber (esp. insoluble) and water</li> </ul> </li> </ul> </li> <li>2) Replace agents for digestive support: <ul style="list-style-type: none"> <li>• Consider pancreatic or plant enzymes, bile salts, betaine HCl, digestive herbs, or disaccharidases (e.g. lactase) where needed</li> <li>• Consider CDSA, Lactose Intolerance Breath Test (or other disaccharide) to rule out disaccharidase deficiency</li> </ul> </li> <li>3) Reinoculate with friendly bacteria, if low: <ul style="list-style-type: none"> <li>• Consider CDSA, Microbiology, or Comprehensive Parasitology to rule out gut flora insufficiencies</li> <li>• Consider probiotic supplementation, including <i>Lactobacilli</i> and <i>Bifidobacteria</i></li> <li>• Consider fructooligosaccharides and inulin to enhance growth of friendly flora</li> </ul> </li> <li>4) Repair mucosal lining: <ul style="list-style-type: none"> <li>• Consider L-glutamine, EFAs, zinc, pantothenic acid, vitamins C, E, and A, beta carotene, N-acetyl glucosamine, gamma oryzanol, glycerrhiza, aloe vera</li> <li>• Consider antioxidants such as vitamins C, E and A, selenium, carotenoids, glutathione, N-acetyl cysteine, pycnogenol and flavonoids</li> <li>• Consider Saccharomyces boulardii, whey globulin concentrate, or bovine colostrum to improve local immunity</li> <li>• Consider ginkgo biloba to enhance circulation to intestinal epithelium</li> <li>• Consider evaluation of overall nutritional status</li> </ul> </li> </ol> |

| Analyte  | Result                                                            | Suspect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Consider                 |
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| Mannitol | <p>Depressed with elevated or normal Lactulose/Mannitol ratio</p> | <p>Intestinal malabsorption often secondary to mucosal irritation and blunting of the microvilli</p> <p>Increased intestinal permeability/"leaky gut"</p> <p>Possible causes:</p> <ol style="list-style-type: none"> <li>1) Gluten sensitivity/Celiac disease</li> <li>2) Inflammatory bowel disease</li> <li>3) Maldigestion (includes hypochlorhydria, pancreatic insufficiency, and disaccharidase insufficiencies)</li> <li>4) Significant parasite, yeast, viral, or bacterial infection</li> <li>5) Bacterial overgrowth of the small bowel</li> <li>6) Chemotherapy-induced mucosal damage</li> <li>7) Insufficient mucosal glycocalyx and/or sIgA</li> <li>8) Nutrient insufficiencies</li> </ol> | <p>See actions above</p> |

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