Functional Diagnostics

Intestinal Permeability Analysis

Patient Name : SAMPLE

Lab No.
Sex / Age
IC No.
Your Ref. No.
Patient Tel
Date Receive / Report
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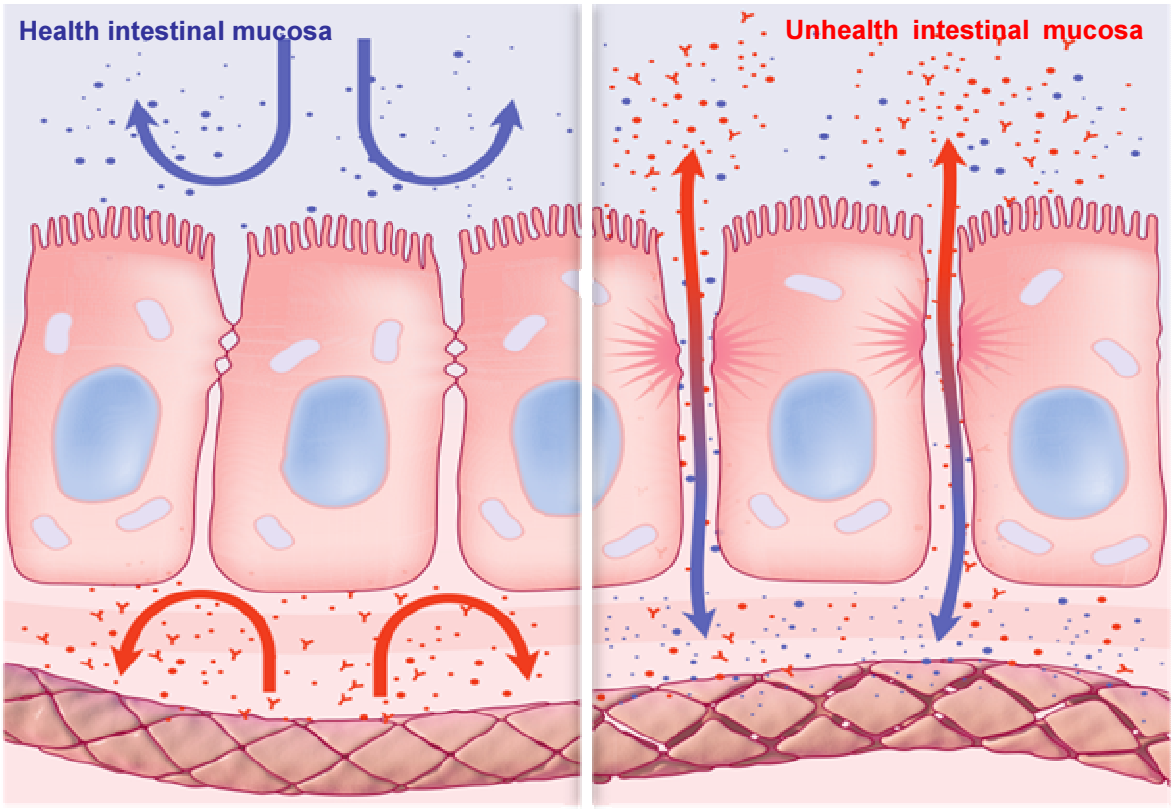
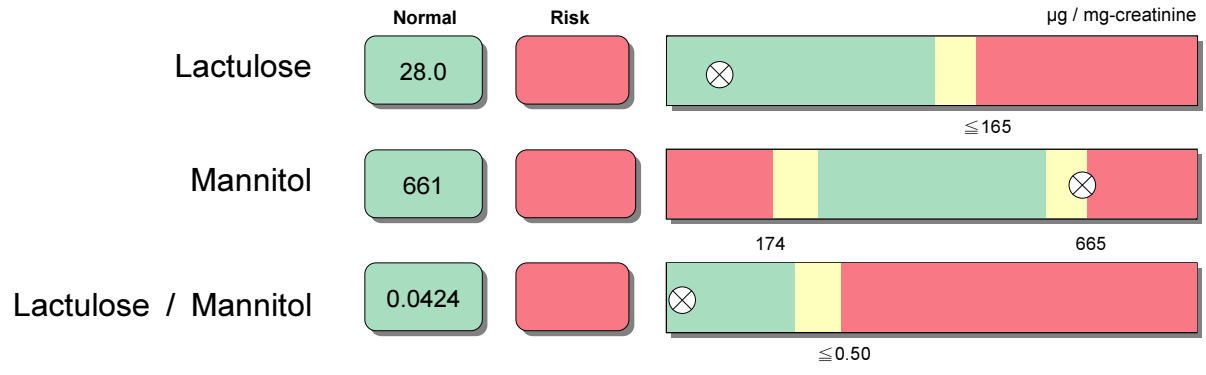
Intestinal Permeability Analysis



Red：Nutrients, Protein and Immunoglobulin etc.
Blue: Undigested protein, Bacterial, Fungus and Toxins etc.



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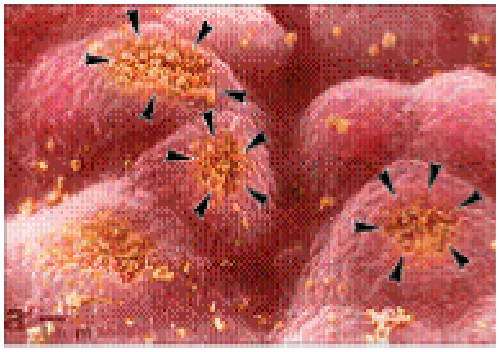
Overview

The small intestine has the paradoxical dual function of being a digestive/ absorptive organ as well as a barrier to permeation of toxic compounds and macromolecules. Either one of these functions may be disrupted by various mechanisms, resulting in local as well as systemic problems.

Defect in barrier functions



The distal intestine contains numerous dietary and bacterial products with toxic properties. These include viable bacteria, bacterial cell wall polymers, chemotactic peptides, bacterial antigens capable of inducing antibodies which cross-react with host antibodies, and bacterial and dietary antigens which can form systemic immune complexes. Abnormalities of the immune or mechanical barriers lead to enhanced uptake of inflammatory luminal macromolecules and pathogenic bacteria. With clinical intestinal injury, mucosal absorption of normally-excluded substances increases dramatically.

Intestinal inflammation enhances the uptake and systemic distribution of potentially injurious macromolecules. Peters and Bjarnson, in an excellent review of the uses of permeability testing, noted: “Measurement of intestinal permeability will play an increasing role in clinical investigation and monitoring of intestinal disease.”

Clinical significance

Increased permeability of the intestinal mucosal barrier appears to correlate with a number of frequently seen clinical disorders, while decreased permeability appears as a fundamental cause of malnutrition, malabsorption and failure to thrive. Increased permeability is seen in disorders such as:

- Inflammatory bowel disease
- Crohn’s disease
- Inflammatory joint disease
- Food allergy
- Coeliac disease
- Rheumatoid arthritis
- Ankylosing spondylitis
- Reiter’s syndrome
- Chronic dermatological conditions
- Schizophrenia
- Allergic disorders

Interpretation

Low levels of mannitol and lactulose indicate malabsorption. Elevated levels of lactulose and mannitol are indicative of general increased permeability and “leaky gut” phenomena. Permeability to lactulose can increase, indicative of “leaky gut,” while permeability to mannitol may decrease, indicative of malabsorption of small molecules. The lactulose/mannitol ratio is a useful parameter. An elevated ratio indicates that the effective pore size of the gut mucosa has increased, allowing access (to the body) of larger, possibly antigenic molecules.

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Other tests to consider

The intestinal Permeability test is particularly useful in combination with **Comprehensive Digestive Stool Analysis** and **Chronic Food Allergy Profile**. These studies provide strong evidence as to initiating processes which affect intestinal permeability. The **Liver Detoxification Profile** can be an important area to investigate as well, with impaired intestinal permeability causing increased demands on the liver's detoxification capacity.

Clinical therapeutics

There are a number of therapeutic substances, some of which are listed below, that can be used to normalize intestinal permeability. In determining which substance to use, it is helpful to understand the proposed mechanism of action.

To provide nutritional support:

1. Glutamine and L-arginine, single amino acids, have been shown to both prevent and reverse intestinal mucosal damage from various insults. Glutamine is the principle fuel used by the upper intestinal tract. It has also been shown to decrease bacterial translocation after intestinal insult.
2. Butyric acid, a short chain fatty acid manufactured in the lower intestines as a byproduct of bacterial fermentation of fiber, is the main energy source for lower intestine and colon epithelial cells.
   It has been shown to be involved in the repair and regeneration of damaged cells.
3. Some intestinal mucosal damage is due to oxygen-derived free radicals, potentiated by vasoconstriction. Administration of free radical scavengers has been suggested as being beneficial. Some common natural ones include vitamin E, beta-carotene, ascorbic acid, zinc, selenium and superoxide dismutase.
4. Agents that help stimulate protective mucus secretion appear to be beneficial.

To lower toxic load:

1. Bentonite clay, a colloidal aluminum silicate, is a well-known intestinal adsorbent which absorbs numerous toxins, endotoxins and bacteria.
   Its value in permeability alterations may result from lowering the toxin load in the lumen, thus facilitating repair.
2. Lactobacillus has been shown to provide protection against increased permeability by enhancing antigen-specific immune defense.
3. HCI and digestive enzymes such as plant enzymes, pepsin and pancreatin might help to lessen the antigenic and the macromolecule load being presented to the intestinal mucosa.

To counter inflammation:

1. Cromolyn sodium inhibits the release of mediators from sensitized mast cells.
   It has been used in many clinical trials to reduce the increased permeability caused by oral ingestion of a food allergen. Quercitin, a natural bioflavonoid, is molecularly similar and also stabilizes mast cells.
2. Gingko biloba extract has been shown to prevent the action of various mediators of ischemic mucosal damage.
   It protects the intestinal mucosa by reducing neutrophil infiltration and lipid peroxidation.
3. Prostaglandin E2 and E1 (Misoprostol) has intestinal mucosal protective and trophic properties.