Hydrogen Breath Test and Intestinal Fatty Acid Binding Protein As Diagnostic Tools in Gastroenterology

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The human gastrointestinal (GI) tract, which is involved in digestion and absorption of food, consists of mouth, esophagus, stomach, small intestine, large intestine and anus. The small intestine is made up of three regions: duodenum, jejunum and ileum. The large intestine starts with cecum, followed colon and rectum. An ileocaecal valve resides at the junction between ileum and cecum, which minimizes the reflux of colonic contents. This protects the small intestine from bacterial overgrowth.

For diagnosis and monitoring in GI tract, more studies regarding simple and operable diagnostic tools or indicators are required. Therefore, we performed studies of the lactulose hydrogen breath tests in irritable bowel syndrome (IBS) and intestinal fatty acid binding protein (I-FABP).

Lactulose hydrogen breath test is an easy and noninvasive tool for diagnosis of small intestinal bacterial overgrowth (SIBO) and estimation of orocecal transit time (OCTT). In normal conditions, intestinal microbes are located in the large intestine, but sometimes they overgrow to the small intestine. The bacterial overgrowth is often linked to GI diseases. OCTT is the time that food transits from mouth to the large intestine and this can be used as an index for intestinal motility. Lactulose is a non-absorbable and safe sugar for humans. Intestinal microbes located in large intestine can ferment the unabsorbed sugar and produce hydrogen molecules. Then, the hydrogen can be detected in breath.

IBS is a very common intestinal disorder and the main syndrome of IBS is frequently abdominal pain. There are three major subtypes in IBS: IBS-D (diarrhea), IBS-C (constipation) and IBS-M (mixed bowel habits). This study, based on 731 IBS patients and 40 healthy controls shows a shorter OCTT in IBS than healthy people, but there is no obvious correlation between OCTT and IBS subtypes. This suggests more rapid upper GI transit could propel unabsorbed nutrients to the colon regardless of IBS subtypes. Besides, the prevalence of SIBO in patients for IBS is much higher than healthy people. A high hydrogen output and an early rise of hydrogen value after lactulose ingestion often occurs in people with SIBO. An analysis of antibiotics treatments also supports this conclusion.

I-FABP is a potential biomarker for intestinal injury. There is a small amount of I-FABP in the blood of healthy people, but the concentration rises rapidly in response to acute intestinal ischaemia and inflammation. The enzyme-linked immunosorbent assay (ELISA) is a simple technique for rapid analyte detection based on the principle of immunoassay with an enzyme. In our studies, we found that I-FABP concentration in serum is higher than in plasma. I-FABP concentration increased in acute colitis, celiac disease and polycystic ovary syndrome compared with healthy people. The result indicates the possibility that I-FABP is able to act as an intestinal damage marker or a monitor for healing of intestinal cells.

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