Digestive Health and Transit Time

What We Know

› Bowel transit time is the time required for food to move from the mouth to the end of the digestive tract (anus)\(^2\). The digestive system includes the digestive tract (gastrointestinal tract), liver, pancreas, and gallbladder\(^{10}\). The digestive tract consists of the mouth, esophagus, stomach, small intestine (the longest part of the digestive system, with three distinct areas: duodenum, ileum, and jejunum), and large intestine\(^9\). In digestion food is broken down in multiple steps through a process of mechanical and enzymatic actions so that it can be absorbed by the body for use

• Digestion begins in the mouth, where food is chewed (masticated) and molded into soft homogeneous boluses so that it can move into the esophagus, where the next step of digestion occurs\(^1\)

• The esophagus is a muscular tube or canal that connects the throat (pharynx) to the stomach. The esophagus has two sphincters: the upper esophageal sphincter, which prevents food from entering the windpipe (trachea), and the lower esophageal sphincter, which prevents the contents of the stomach from re-entering the esophagus. As food leaves the esophagus, it enters the stomach, a closed chamber in which mixing and digesting occurs\(^1\)

• Once food passes through the pylorus, the lower sphincter of the stomach, it enters the small intestine, the longest part of the gastrointestinal tract (about 20 feet long) with the largest surface area, where nutrient absorption begins\(^3,9,10\). Food passes through the small intestine through a series of movements of the muscles (peristalsis) of the organ so that nutrients can be absorbed and delivered to parts of the body\(^4,10\)

• The remaining parts of food that cannot be digested enter the large intestine (colon), where they are combined with water and any remaining nutrients. These remaining undigested parts are then stored in the rectum until they are eliminated from the body as stool\(^10\)

› There are a number of factors that affect bowel health, habits, and transit time, such as medication, stress, physical activity, the amount and type of food eaten, fluid intake, hormones, and other environmental factors\(^{13}\)

• Optimal bowel transit time varies: it ranges from 40 to 60 hours in healthy individuals, although bowel transit time ≥48 hours is considered to be a slowed transit time\(^{4}\).

Dietary fiber of all types tends to normalize transit time\(^4\)

– Dietary fiber, which primarily comes from plant sources, is carbohydrates and lignin that are not digested or absorbed in the upper portion of the gastrointestinal tract\(^{13,15}\)

– In the upper gastrointestinal tract, most of the action of dietary fiber can be attributed to luminal bulking, increased luminal viscosity, and binding to other nutrients\(^2\)

– Dietary fiber tends to increase the weight and volume of stool due to the fact that it holds water and is partially fermented in the large intestine; fermentation increases the amount of bacteria in the stool, which contributes to stool weight and volume\(^{13}\)

– In some cases, dietary fiber actually increases transit time in the upper GI tract because it reduces the rate of digestion\(^1\). Whole grains, such as cereal fiber, increase intestinal
transit time. Whole grains contain all three parts of the grain (i.e., the endosperm, germ, and bran), are fermentable, and are resistant to digestive enzymes, so they are able to reach the colon undigested.

- The physical form of food, whether liquid or solid, influences transit time and the absorption of nutrients in the intestine. Food in solid form requires more time to process than liquids since it must be broken down by enzymes to be small enough to pass through the pylorus.

Colon transit time appears to be a significant indicator of digestive health. In a study examining colonic transit time and gastrointestinal bacteria through urine and fecal samples from 98 adults in Denmark, researchers found that longer transit time through the colon led to more harmful bacteria being produced and a shift in colonic metabolism from carbohydrate fermentation to protein catabolism. When colonic transit time was shorter, the metabolites produced were associated with increased renewal of the colon wall. The authors suggest that high gastrointestinal tract richness alone, meaning a high amount of gut microorganisms, does not imply a healthy gut microbial system but that colonic transit time may also be a key factor in digestive health.

- Fecal weight and transit time are important indicators of intestinal and digestive health. Dietary fiber in fruit tends to be more fermentable and soluble than vegetable and cereal fibers, so vegetable and cereal fibers have a greater impact on fecal weight and transit time.

The recommended amount of dietary fiber is 14g/1,000 kcals or about 25 g/day for women and 38 g/day for men ages 19–50. Dietary fiber can be divided into two categories: soluble and insoluble fiber. Soluble fiber attracts water, forms a gel during digestion, and slows digestion, whereas insoluble fiber passes through the digestive tract primarily undigested, speeds the passage of food through the stomach and intestines, and provides bulk to the stool. The Institute of Medicine classifies fiber as dietary or functional fiber. Dietary fiber is considered to be endogenous to food whereas functional fiber is exogenous and is extracted from food or synthesized. Endogenous refers to the fact that the fiber originates naturally from within the food and exogenous means that the fiber was extracted from another source or synthesized and added to the food.

- Sources of soluble fiber include oats, barley, nuts, seeds, beans, lentils, peas, and some fruits and vegetables. Sources of insoluble fiber include wheat bran, vegetables, and whole grains.

What We Can Do

- Learn about digestive health and bowel transit time so you can accurately assess your patients’ personal characteristics and health education needs; share this information with your colleagues.

Educate patients on ways to improve their digestive health and transit time, such as:

- Increasing dietary fiber sources to the recommended daily amount by incorporating into their diet whole grains such as oats, barley, and rye, wheat bran, and a variety of fruits, vegetables, beans, and legumes.

- Including daily activity and exercise on a regular basis.

- Obtaining adequate fluid intake by consuming enough fluid to represent about half of the body weight in pounds (e.g., a 140-pound person should consume about 70 ounces of fluid per day).

- Minimizing or eliminating the use of laxatives, which can reduce colon muscle tone.

- Establishing a regular schedule for eating meals.

- Avoiding excessive protein intake, which may contribute to slower digestion.

Related Guidelines

Dietary Guidelines for Americans, Appendix 13, Food Sources of Dietary Fiber.
References


