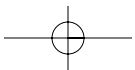
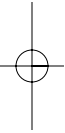
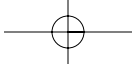


P A R T O N E

*Understanding  
Your  
Digestive  
System*



## CHAPTER 1

# How Your Gut Works

It is important to have a basic understanding of digestion in order to develop gut-friendly food choices and eating behaviors. Many people think that the process of digestion doesn't begin until food gets into the stomach. It may surprise you to know that digestion begins as soon as the food enters your mouth, and actually even before you start to eat.

Researchers have shown that the taste, texture, smell, and appearance of food may affect the body's ability to absorb nutrients. At the beginning of a meal, even before you start to eat, the brain sends signals to the digestive tract. In the mouth, this results in the secretion of saliva. In the stomach, gastric juices are secreted. In the small intestine, digestive enzymes are released as is the flow of pancreatic juices. If you don't like the way a food looks, smells, or tastes, the body may secrete fewer digestive juices, and the body's ability to move food through the digestive tract may be slower than it would normally be.

To help your body get the maximum benefit from the foods you eat, practice these good eating habits:

- While eating, try to focus on the food, not the TV, computer, or newspaper.

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- Take small bites.
- Chew well—don't bite off more than you can chew!
- Eat slowly.
- If you can, sit when you eat, and relax.
- Offer appropriately sized portions to children with digestive disorders.
- If you wear dentures, make sure they fit well, so you can chew foods thoroughly.

### Bottom Line

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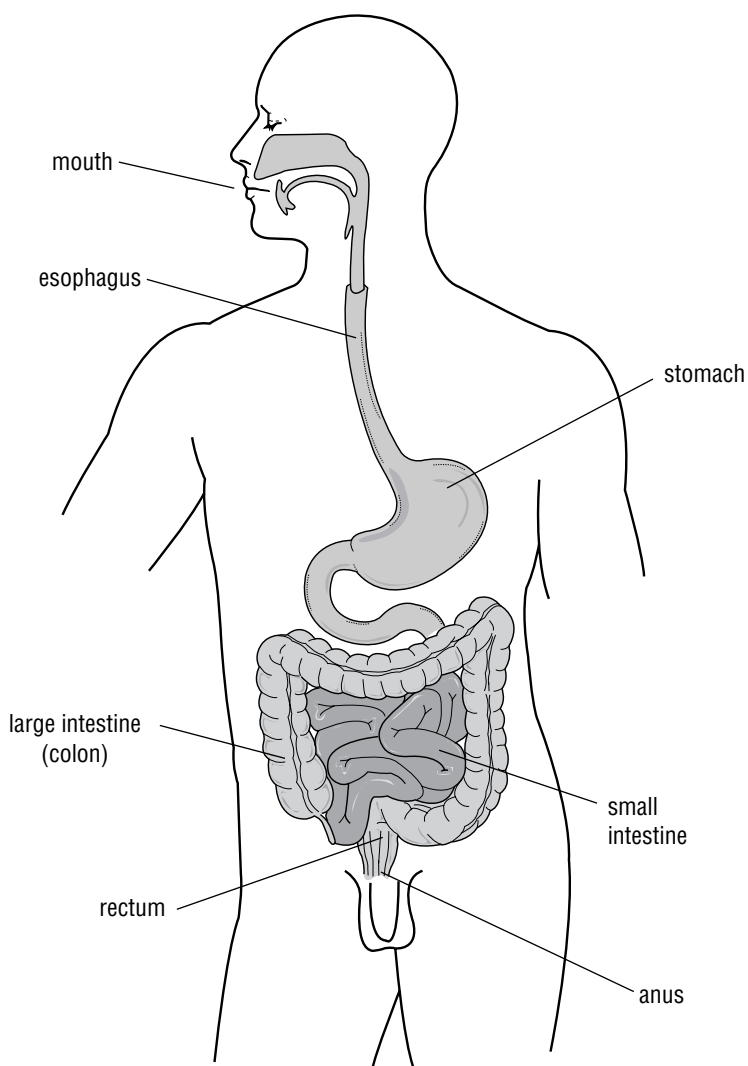
If you want to digest foods well, they should look good, smell good, and taste good. In addition to food choices, good eating habits can add to the enjoyment of a meal.

## IN THE MOUTH

What happens to that turkey sandwich you have for lunch? The digestion that occurs in the mouth is both mechanical and chemical. Your teeth and tongue are involved in mechanical digestion, helping you to grind and mix the food to make it easier to swallow. Saliva secreted from salivary glands provides the chemical digestion, which helps to break down foods in the mouth. Three types of saliva are produced in response to different types of foods:

- Salty and bitter foods trigger the production of *salivary amylase*, an enzyme that breaks down starchy foods into sugar. Ever wonder why a piece of bread gets sweeter the longer you chew it? Amylase is the reason.
- Sour foods and fatty foods stimulate production of a type of saliva that makes it easier to swallow larger foods, such as meat.
- Sweets, fruits and vegetables stimulate the production of a type of saliva that dilutes sugar.

The following illustration shows the different parts of the body that are involved in the digestive process. We'll continue to explain how food moves through your system in the pages that follow.



**Figure 1.1** – The digestive system

## IN THE ESOPHAGUS

After you chew, then swallow, your food, the next stop is the esophagus. This is a ten-inch tube that connects the throat to the stomach and basically acts as a chute to move food from the mouth to the stomach. Muscles in the esophagus move according to a process known as *peristalsis*, contracting and relaxing to push food through.

At the end of the esophagus is the lower esophageal sphincter. This valve is usually closed, but when food comes into contact with it, the valve opens to let the food into the stomach. People who have problems with heartburn or reflux need to pay attention to eating habits and food choices to prevent this sphincter from opening when it shouldn't. If this happens, acid from the stomach can flow up into the esophagus, causing the sensation of heartburn. (For more information on heartburn, refer to chapter 5.)

## IN THE STOMACH

If you have ever said, "My eyes are larger than my stomach!" you haven't been able to finish your food because you have felt full. Although the stomach can hold quite a lot (up to one gallon of food and liquid combined when fully stretched), there is an upper limit of comfort. The stomach basically acts like a mixer, breaking food into smaller pieces and adding digestive juices to allow for easier absorption. Muscles of the stomach contract to blend food, while the gastric juices and enzymes that are produced in the stomach further break down food. This mixture is then pushed through the end of the stomach to the pyloric valve, which is located at the duodenum, or top of the small intestine. This valve allows only one teaspoon of food at a time to enter the duodenum. Full emptying of the stomach can take anywhere from two hours for a regular-size meal to four hours for a high-fat meal, such as fried chicken or a pepperoni pizza.

## IN THE SMALL INTESTINE

The small intestine is where most of the digestion of food occurs. Whole foods are broken down into nutrients: protein, carbohydrate, and fat. The digestive juices secreted from the small intestine are assisted by:

- Digestive enzymes secreted from the pancreas, which break the food down into protein, carbohydrate, and fat.
- Bile, a solution produced by the liver that helps digest fat.
- A more concentrated form of bile, which is stored in the gallbladder and released into the small intestine when you eat fat-containing foods.

The carbohydrate, protein, and fat are then further broken down to metabolites, byproducts of digestion, which can be absorbed through the intestine into the blood stream to the liver cells. There, they can be used for various body functions. Water, vitamins, and minerals from food are also absorbed here. In fact, the majority of nutrient absorption takes place in the upper portion of the small intestine.

To illustrate this process, the turkey sandwich with mayonnaise that you had for lunch might become the following:

<b>Food</b>	<b>Nutrient</b>	<b>Metabolites</b>
Bread	carbohydrate	→ saccharides → glucose (energy)
Turkey	protein	→ amino acids
Mayonnaise	fat	→ triglycerides → fatty acids + glycerol

In the small intestine, digestion occurs slowly, with a little bit of food at a time. Food moves through to the second part of the small intestine, the jejunum, and through to the ileum, which absorbs vitamin B<sub>12</sub> and also bile acids from the liver and gallbladder. This

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movement and digestion of food in the small intestine can last from thirty minutes to three hours.

## **IN THE LARGE INTESTINE**

The large intestine, or colon, is the waste removal system for the body. The remaining components of digestion—water, fiber, sodium, and potassium—that have not been used by the body enter the colon through the ileocecal valve. Water is removed through absorption. The leftover components, or stool (fiber, bacteria, and dead cells from the lining of the digestive tract), moves through the colon by muscular contractions to the anus, or rectum, where it will be eliminated through the anal sphincter. This process can take from twelve to twenty-four hours.

The process of digestion involves the entire digestive tract from mouth to anus. What you eat, and how much, can shorten or lengthen the time it takes for food to pass through your body. Now we will learn what happens when things go wrong with various parts of the digestive process, and more important, what you can do to have optimal digestion.