

Smoking and the Digestive System

Smoking affects the entire body, increasing the risk of many life-threatening diseases—including lung cancer, emphysema, and heart disease. Smoking also contributes to many cancers and diseases of the digestive system. Estimates show that about one-fifth of all adults smoke,¹ and each year at least 443,000 Americans die from diseases caused by cigarette smoking.²

What is the digestive system?

The digestive system is made up of the gastrointestinal (GI) tract—also called the digestive tract—and the liver, pancreas, and gallbladder. The GI tract is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. The hollow organs that make up the GI tract are the mouth, esophagus, stomach, small intestine, large intestine—which includes the colon and rectum—and anus. Food enters the mouth and passes to the anus through the hollow organs of the GI tract. The liver, pancreas, and gallbladder are the solid organs of the digestive system. The digestive system helps the body digest food, which includes breaking food down into nutrients the body needs. Nutrients are substances the body uses for energy, growth, and cell repair.


Does smoking increase the risk of cancers of the digestive system?

Smoking has been found to increase the risk of cancers of the³

- mouth
- esophagus
- stomach
- pancreas

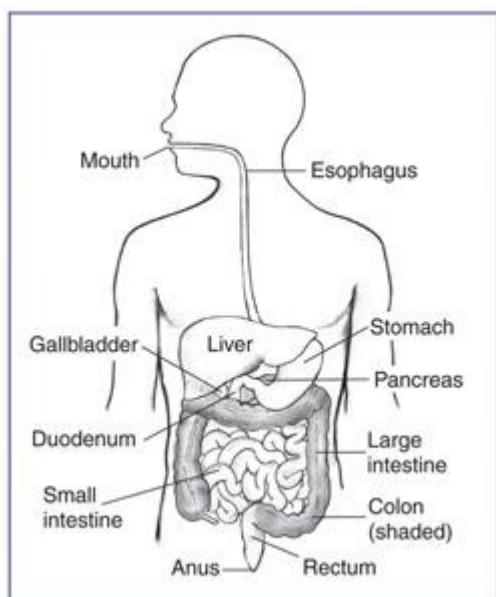
Research suggests that smoking may also increase the risk of cancers of the^{3, 4, 5}

- liver
- colon
- rectum

More information about the link between smoking and cancers of the digestive system can be found on the National Cancer Institute website at www.cancer.gov NIH .

What are the other harmful effects of smoking on the digestive system?

Smoking contributes to many common disorders of the digestive system, such as heartburn and gastroesophageal reflux disease (GERD), peptic ulcers, and some liver diseases. Smoking increases the risk of Crohn's disease, colon polyps, and pancreatitis, and it may increase the risk of gallstones.



The digestive system

How does smoking affect heartburn and GERD?

Smoking increases the risk of heartburn and GERD.⁶ Heartburn is a painful, burning feeling in the chest caused by reflux, or stomach contents flowing back into the esophagus—the organ that connects the mouth to the stomach. Smoking weakens the lower esophageal sphincter, the muscle between the esophagus and stomach that keeps stomach contents from flowing back into the esophagus. The stomach is naturally protected from the acids it makes to help break down food. However, the esophagus is not protected from the acids. When the lower esophageal sphincter weakens, stomach contents may reflux into the esophagus, causing heartburn and possibly damaging the lining of the esophagus.

GERD is persistent reflux that occurs more than twice a week. Chronic, or long lasting, GERD can lead to serious health problems such as bleeding ulcers in the esophagus, narrowing of the esophagus that causes food to get stuck, and changes in esophageal cells that can lead to cancer.

How does smoking affect peptic ulcers?

Smoking increases the risk of peptic ulcers.⁷ Peptic ulcers are sores on the inside lining of the stomach or duodenum, the first part of the small intestine. The two most common causes of peptic ulcers are infection with a bacterium called *Helicobacter pylori* (*H. pylori*) and long-term use of nonsteroidal anti-inflammatory drugs such as aspirin and ibuprofen.

Researchers are studying how smoking contributes to peptic ulcers. Studies suggest that smoking increases the risk of *H. pylori* infection, slows the healing of peptic ulcers, and increases the likelihood that peptic ulcers will recur. The stomach and duodenum contain acids, enzymes, and other substances that help digest food. However, these substances may also harm the lining of these organs. Smoking has not been shown to increase acid production. However, smoking does increase the production of other substances that may harm the lining, such as pepsin, an enzyme made in the stomach that breaks down proteins. Smoking also decreases factors that protect or heal the lining, including

- blood flow to the lining
- secretion of mucus, a clear liquid that protects the lining from acid
- production of sodium bicarbonate—a saltlike substance that neutralizes acid—by the pancreas

The increase in substances that may harm the lining and decrease in factors that protect or heal the lining may lead to peptic ulcers.

How does smoking affect liver disease?

Smoking may worsen some liver diseases, including

- primary biliary cirrhosis, a chronic liver disease that slowly destroys the bile ducts in the liver⁸
- nonalcoholic fatty liver disease (NAFLD), a condition in which fat builds up in the liver^{9, 10}

Researchers are still studying how smoking affects primary biliary cirrhosis, NAFLD, and other liver diseases.

Liver diseases may progress to cirrhosis, a condition in which the liver slowly deteriorates and malfunctions due to chronic injury. Scar tissue then replaces healthy liver tissue, partially blocking the flow of blood through the liver and impairing liver functions.

The liver is the largest organ in the digestive system. The liver carries out many functions, such as making important blood proteins and bile, changing food into energy, and filtering alcohol and poisons from the blood. Research has shown that smoking harms the liver's ability to process medications, alcohol, and other toxins and remove them from the body. In some cases, smoking may affect the dose of medication needed to treat an illness.

How does smoking affect Crohn's disease?

Current and former smokers have a higher risk of developing Crohn's disease than people who have never smoked.¹¹

Crohn's disease is an inflammatory bowel disease that causes irritation in the GI tract. The disease, which typically causes pain and diarrhea, most often affects the lower part of the small intestine; however, it can occur anywhere in the GI tract. The severity of symptoms varies from person to person, and the symptoms come and go. Crohn's disease may lead to complications such as blockages of the intestine and ulcers that tunnel through the affected area into surrounding tissues. Medications may control symptoms. However, many people with Crohn's disease require surgery to remove the affected portion of the intestine.

Among people with Crohn's disease, people who smoke are more likely to¹¹

- have more severe symptoms, more frequent symptoms, and more complications
- need more medications to control their symptoms
- require surgery
- have symptoms recur after surgery

The effects of smoking are more pronounced in women with Crohn's disease than in men with the disease.¹¹

Researchers are studying why smoking increases the risk of Crohn's disease and makes the disease worse. Some researchers believe smoking might lower the intestines' defenses, decrease blood flow to the intestines, or cause immune system changes that result in inflammation. In people who inherit genes that make them susceptible to developing Crohn's disease, smoking may affect how some of these genes work.

How does smoking affect colon polyps?

People who smoke are more likely to develop colon polyps.¹² Colon polyps are growths on the inside surface of the colon or rectum. Some polyps are benign, or noncancerous, while some are cancerous or may become cancerous.

Among people who develop colon polyps, those who smoke have polyps that are larger, more numerous, and more likely to recur.¹²

How does smoking affect pancreatitis?

Smoking increases the risk of developing pancreatitis.¹³ Pancreatitis is inflammation of the pancreas, which is located behind the stomach and close to the duodenum. The pancreas secretes

digestive enzymes that usually do not become active until they reach the small intestine. When the pancreas is inflamed, the digestive enzymes attack the tissues of the pancreas.

How does smoking affect gallstones?

Some studies have shown that smoking may increase the risk of developing gallstones. However, research results are not consistent and more study is needed.

Gallstones are small, hard particles that develop in the gallbladder, the organ that stores bile made by the liver. Gallstones can move into the ducts that carry digestive enzymes from the gallbladder, liver, and pancreas to the duodenum, causing inflammation, infection, and abdominal pain.

Can the damage to the digestive system from smoking be reversed?

Quitting smoking can reverse some of the effects of smoking on the digestive system. For example, the balance between factors that harm and protect the stomach and duodenum lining returns to normal within a few hours of a person quitting smoking. The effects of smoking on how the liver handles medications also disappear when a person stops smoking. However, people who stop smoking continue to have a higher risk of some digestive diseases, such as colon polyps and pancreatitis, than people who have never smoked.^{12, 13}

Quitting smoking can improve the symptoms of some digestive diseases or keep them from getting worse. For example, people with Crohn's disease who quit smoking have less severe symptoms than smokers with the disease.¹¹

Eating, Diet, and Nutrition

Eating, diet, and nutrition can play a role in causing, preventing, and treating some of the diseases and disorders of the digestive system that are affected by smoking, including heartburn and GERD, liver diseases, Crohn's disease, colon polyps, pancreatitis, and gallstones. More information about eating, diet, and nutrition and these conditions can be found on the [Digestive Diseases A-Z](#) list.

Points to Remember

- Smoking has been found to increase the risk of cancers of the mouth, esophagus, stomach, and pancreas. Research suggests that smoking may also increase the risk of cancers of the liver, colon, and rectum.
- Smoking increases the risk of heartburn and gastroesophageal reflux disease (GERD).
- Smoking increases the risk of peptic ulcers.
- Smoking may worsen some liver diseases, including primary biliary cirrhosis and nonalcoholic fatty liver disease (NAFLD).

- Current and former smokers have a higher risk of developing Crohn's disease than people who have never smoked.
- People who smoke are more likely to develop colon polyps.
- Smoking increases the risk of developing pancreatitis.
- Some studies have shown that smoking may increase the risk of developing gallstones. However, research results are not consistent and more study is needed.
- Quitting smoking can reverse some of the effects of smoking on the digestive system.


References

- [1] Centers for Disease Control and Prevention. Cigarette smoking among adults and trends in smoking cessation—United States, 2008. *Morbidity and Mortality Weekly Report*. 2009;58(44):1227–1232.
- [2] Centers for Disease Control and Prevention. Smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 2000–2004. *Morbidity and Mortality Weekly Report*. 2008;57(45):1226–1228.
- [3] The Health Consequences of Smoking: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004.
- [4] Lee YA, Cohet C, Yang Y, Stayner L, Hashibe M, Straif K. Meta-analysis of epidemiologic studies on cigarette smoking and liver cancer. *International Journal of Epidemiology*. 2009;38(6):1497–1511.
- [5] Hannan LM, Jacobs EJ, Thun MJ. The association between cigarette smoking and risk of colorectal cancer in a large prospective cohort from the United States. *Cancer Epidemiology, Biomarkers, and Prevention*. 2009;18(12):3362–3367.
- [6] Festi D, Scaioli E, Baldi F, et al. Body weight, lifestyle, dietary habits, and gastroesophageal reflux disease. *World Journal of Gastroenterology*. 2009;15(14):1690–1701.
- [7] Garrow D, Delegge MH. Risk factors for gastrointestinal ulcer disease in the U.S. population. *Digestive Diseases and Sciences*. 2010;55(1):66–72.
- [8] Prince MI, Ducker SJ, James OFW. Case-control studies of risk factors for primary biliary cirrhosis in two United Kingdom populations. *Gut*. 2010;59(4):508–512.
- [9] Azzalini L, Ferrer E, Ramalho LN, et al. Cigarette smoking exacerbates nonalcoholic fatty liver disease in obese rats. *Hepatology*. 2010;51(5):1567–1576.
- [10] Zein CO, Unalp A, Colvin R, Liu YC, McCullough AJ. Smoking and severity of hepatic fibrosis in nonalcoholic fatty liver disease. *Journal of Hepatology*. 2011;54(4):753–759.
- [11] Lakatos PL. Environmental factors affecting inflammatory bowel disease: have we made progress? *Digestive Diseases*. 2009;27(3):215–225.
- [12] Grahn SW, Varma MG. Factors that increase risk of colon polyps. *Clinics in Colon and Rectal Surgery*. 2008;21(4):247–255.
- [13] Tolstrup JS, Kristiansen L, Becker U, Grønbaek M. Smoking and risk of acute and chronic pancreatitis among women and men: a population-based cohort study. *Archives of Internal Medicine*. 2009;169(6):603–609.

Clinical Trials


The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and other components of the National Institutes of Health (NIH) conduct and support research into many diseases and conditions.

What are clinical trials, and are they right for you?

Clinical trials are part of clinical research and at the heart of all medical advances. Clinical trials look at new ways to prevent, detect, or treat disease. Researchers also use clinical trials to look at other aspects of care, such as improving the quality of life for people with chronic illnesses. [Find out if clinical trials are right for you](#) [NIH](#) .

What clinical trials are open?

Clinical trials that are currently open and are recruiting can be viewed at www.ClinicalTrials.gov [NIH](#) .

This information may contain content about medications and, when taken as prescribed, the conditions they treat. When prepared, this content included the most current information available. For updates or for questions about any medications, contact the U.S. Food and Drug Administration toll-free at 1-888-INFO-FDA (1-888-463-6332) or visit www.fda.gov . Consult your health care provider for more information.

September 2013

Share     

Alternate Versions

- [PDF Version](#) (281 KB) 

This content is provided as a service of the [National Institute of Diabetes and Digestive and Kidney Diseases](#) (NIDDK), part of the National Institutes of Health. The NIDDK translates and disseminates research findings through its clearinghouses and education programs to increase knowledge and understanding about health and disease among patients, health professionals, and the public. Content produced by the NIDDK is carefully reviewed by NIDDK scientists and other experts.

The NIDDK would like to thank:


Brooks D. Cash, M.D., F.A.C.P., F.A.C.G., National Naval Medical Center

Contact Us

The National Institute of Diabetes and Digestive and Kidney Diseases
Health Information Center

 **Phone:** 1-800-860-8747

 **Email:** healthinfo@niddk.nih.gov

 **TTY:** 1-866-569-1162

 **Hours:** 8:30 a.m. to 5 p.m. eastern time, M-F