



NCCN  
GUIDELINES  
FOR PATIENTS®

2023

# Stomach Cancer



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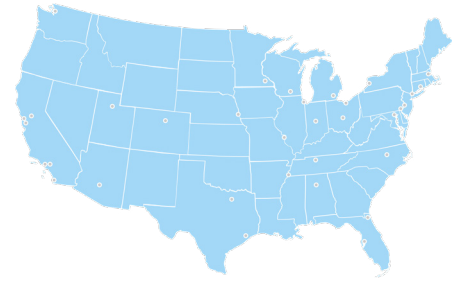
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## About the NCCN Guidelines for Patients®



Did you know that top cancer centers across the United States work together to improve cancer care? This alliance of leading cancer centers is called the National Comprehensive Cancer Network® (NCCN®).



Cancer care is always changing. NCCN develops evidence-based cancer care recommendations used by health care providers worldwide. These frequently updated recommendations are the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®). The NCCN Guidelines for Patients plainly explain these expert recommendations for people with cancer and caregivers.

**These NCCN Guidelines for Patients are based on the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Gastric Cancer, Version 1.2023 – March 10, 2023.**

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Debbie's Dream Foundation: Curing Stomach Cancer is a 501(c)(3) nonprofit organization dedicated to raising awareness about stomach cancer, advancing funding for research, and providing education and support internationally to patients, families, and caregivers. DDF seeks as its ultimate goal to make the cure for stomach cancer a reality. Our Vision is that stomach cancer will no longer be fatal. If not curable, it will be a manageable disease.



Hope For Stomach Cancer is a 501(c)(3) nonprofit organization that provides support, resources, and awareness to those affected by stomach cancer. Hope creates and facilitates programs through collaboration with other organizations that enable those affected by stomach cancer to take actionable steps to live the best possible life through each phase of the disease. We focus on serving the stomach cancer community, starting with the patient and their granular immediate needs.



November is Stomach Cancer Awareness Month, and No Stomach For Cancer's mission is to support research and advance awareness and education about stomach cancer, including Hereditary Diffuse Gastric Cancer (CDH1/CTNNA1 Gene Mutation), provides a support network for affected families, and supports research efforts for screening, early detection, treatment, and prevention of stomach cancer. For more information, to learn about volunteering and fundraising, please visit [www.NoStomachForCancer.org](http://www.NoStomachForCancer.org)

To make a gift or learn more visit online or email

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NCCN Foundation seeks to support the millions of patients and their families affected by a cancer diagnosis by funding and distributing NCCN Guidelines for Patients. NCCN Foundation is also committed to advancing cancer treatment by funding the nation's promising doctors at the center of innovation in cancer research. For more details and the full library of patient and caregiver resources, visit [NCCN.org/patients](https://www.nccn.org/patients).

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# 1

## Stomach cancer basics

- 5 The stomach
- 6 Parts of the stomach
- 7 Stomach wall
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- 9 How stomach cancer spreads
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**The stomach is a large, hollow organ that secretes enzymes and acid to aid in the digestion of food. It is part of the digestive system. The digestive system takes in food, breaks it down, absorbs the nutrients, and removes waste from the body.**

## The stomach

The stomach is a muscular, hollow organ located between the esophagus and the small intestine. It secretes enzymes and acid that convert what you eat and drink into a liquid called chyme. When empty, your stomach is about 10 to 12 inches in size.

The stomach is part of the digestive system. The digestive system takes in and breaks down food, absorbs nutrients, and removes waste from the body. It includes organs like your liver, gallbladder, stomach, pancreas, and intestines. The digestive or gastrointestinal (GI) tract is part of the digestive system. It includes the esophagus, stomach, small intestine, colon, and rectum.

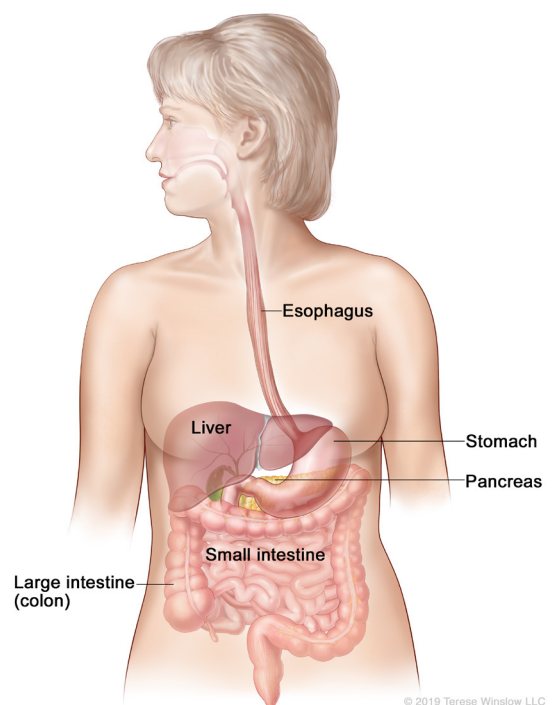
Food and drink enter the mouth and move through the esophagus into the stomach. Stomach contractions along with enzymes and acid break down food into chyme. From the stomach, chyme enters the small intestine where nutrients are absorbed into the bloodstream. Since only small amounts of chyme are released into the small

intestine at a time, the stomach also serves as a temporary holding chamber. The large intestine prepares unused food to be moved out of the body.

There is not much activity where the stomach connects to the esophagus and small intestine. However, the main body of the stomach is very active during digestion.

## The digestive system

**The digestive system takes in and breaks down food, absorbs nutrients, and removes waste from the body. It includes organs like your liver, gallbladder, stomach, pancreas, and intestines.**



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## Parts of the stomach

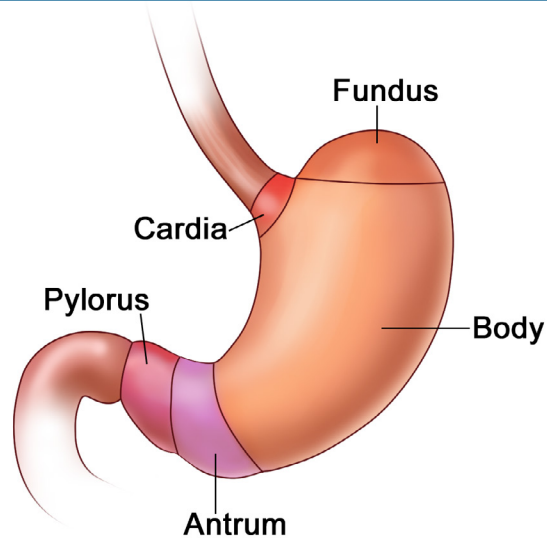
The parts of the stomach include:

- **Cardia** – the opening where the esophagus connects to the stomach.
- **Fundus** – the upper part of the stomach, which forms a bulge higher than the opening of the esophagus (farthest from the pylorus). It stores undigested food and gases released from digestion.
- **Body** – the main part of the stomach.
- **Antrum** – the lower portion of the stomach where food mixes with enzymes and acid.
- **Pylorus** – connects the stomach to the first part of the small intestine (duodenum). The pylorus is a valve that opens and closes during digestion. This allows partly digested food and other stomach contents to pass from the stomach to the small intestine.

The esophagus joins the stomach just below the diaphragm at the esophagogastric junction (EGJ). The diaphragm is the thin breathing muscle below the lungs and heart that separates the chest from the abdomen. The EGJ might be referred to as the gastroesophageal junction (GEJ).

### Parts of the stomach

The parts of the stomach include the cardia, the fundus, the body, the antrum, and the pylorus. The stomach is part of the digestive system. Many lymph nodes can be found along the lesser and greater curvatures of the stomach.



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## Stomach wall

The stomach is made up of several layers. The inner and outer layers are membranes. A membrane is a very thin layer that covers a surface. In between these membranes are layers of muscle and connective tissue.

The wall of the stomach is made of 5 main layers.

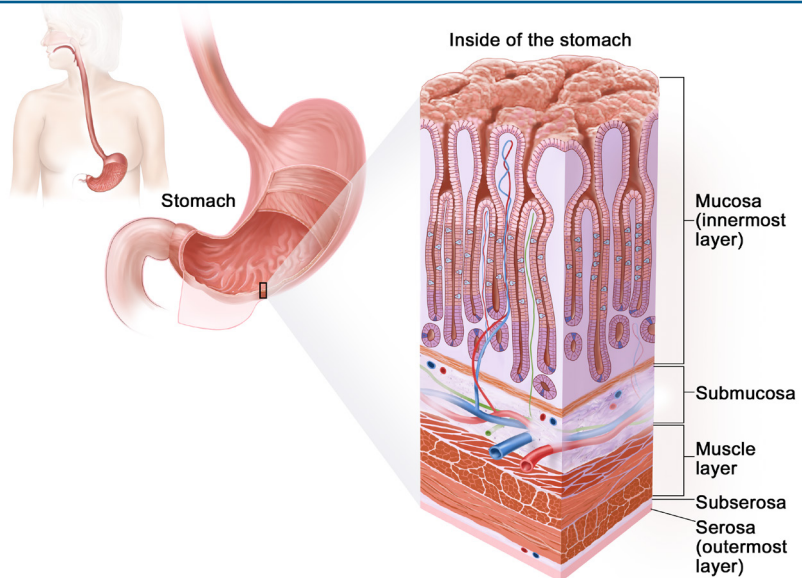
- **Mucosa** – Inner membrane that is in contact with food. It consists of 3 layers:
  - Surface epithelium – A thin, moist layer of cells that forms the interior stomach lining. Epithelium makes a sticky, thick liquid called mucus that protects the stomach.
  - Lamina propria – A type of connective tissue found under the epithelium membrane. Within and supported by the lamina propria are stomach glands formed by cells that have the functions of producing enzymes, acid, mucus, and hormones.

- Muscularis mucosae – A thin strip of muscle that separates the mucosa from the submucosa.

- **Submucosa** – A layer of connective tissue, blood vessels, and nerve cells. It also contains larger lymph vessels and channels.
- **Muscle** – A type of soft tissue that helps move food through the stomach. It is also called muscularis propria.
- **Subserosa** – A layer of connective tissue that supports the serosa.
- **Serosa** – An outer membrane that covers the stomach. The serosa is also called the serous membrane. This membrane allows the stomach to move smoothly against other organs.

### Layers of the stomach wall

The wall of the stomach is made up of 5 layers: mucosa, submucosa, muscle layer, subserosa, and serosa.



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## Stomach cancer

Most stomach (gastric) cancers start in the cells that line the inside of the stomach and make mucus. These are called adenocarcinomas. Almost all stomach cancers are adenocarcinomas. Adenocarcinomas of the stomach are the focus of this book.

There are 2 major types of stomach adenocarcinomas.

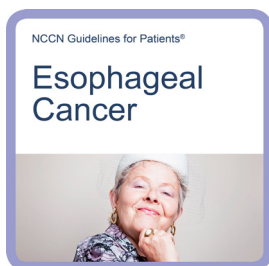
- ▶ **Intestinal** – Cells of the intestinal type stick together and form tube- and gland-shaped structures. This type is more likely to have mutations that can be treated with targeted therapy.
- ▶ **Diffuse** – Cells of the diffuse type don't stick together and appear scattered over a wide area that can't be easily seen on the surface. This type is less common.

Treatment is based on the type of stomach cancer and the location of the tumor.

### Esophageal cancer

Tumors that start in the cardia of the stomach and cross over into the area between the esophagus and stomach (esophagogastric junction) are treated as esophageal cancers.

More information on esophageal cancer is available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.



When my dad was told he had 6 months to live in 2013, we were devastated. But instead of giving in, we created a team of experts that helped us navigate through this terrible prognosis. Today, my dad is clinically cured. My advice to those newly diagnosed is to be your own advocate and find a support community. "

## How stomach cancer spreads

Stomach cancer starts in the innermost layer and grows outward through the layers of the stomach wall. Cancer can spread to nearby lymph nodes, veins, arteries, and organs such as the liver, pancreas, and spleen. It might also grow into nearby lymphatic or blood vessels, and from there spread to nearby lymph nodes or to other parts of the body. Stomach cancer can also grow inwards and form an ulcer or masses that can cause symptoms.

Stomach cancers tend to develop slowly over many years. Before cancer develops, pre-cancerous changes often occur in the inner lining (mucosa) of the stomach. Since these early changes rarely cause symptoms, they often go undetected.

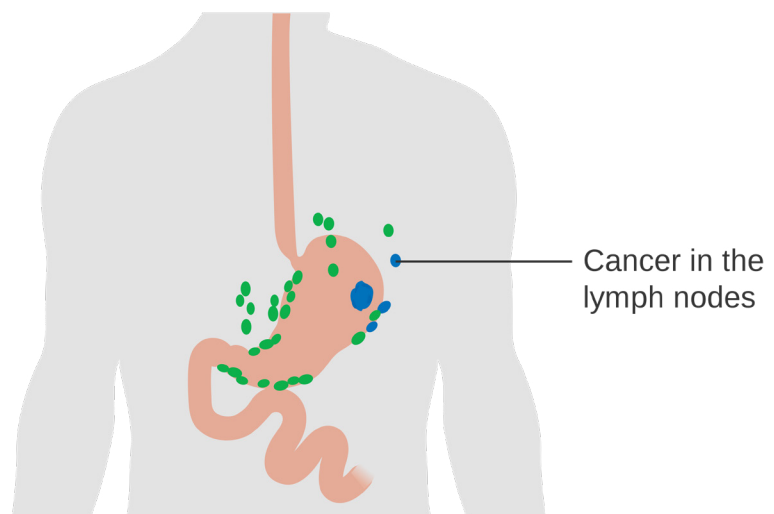
Those with stomach cancer can be grouped into 3 main categories, depending on how far the cancer has spread.

- **Early-stage stomach cancer** has not grown beyond the first layer (mucosa) of the stomach wall. The tumor is often small (2 centimeters or less) and is not in any lymph nodes.
- **Locoregional or locally advanced stomach cancer** has invaded other layers of the stomach wall and/or spread to the lymph nodes or organs near the stomach.
- **Metastatic stomach cancer** has spread to other parts of the body. The most common metastatic sites are the liver, abdominal lining (peritoneum), and distant lymph nodes. It may also spread to the lungs or bone.

### Cancer in regional lymph nodes

In locoregional or locally advanced stomach cancer, cancer may have spread to the lymph nodes near the stomach.

[https://commons.wikimedia.org/wiki/File:Diagram\\_showing\\_stomach\\_cancer\\_cells\\_in\\_the\\_lymph\\_nodes\\_CRUK\\_274.svg](https://commons.wikimedia.org/wiki/File:Diagram_showing_stomach_cancer_cells_in_the_lymph_nodes_CRUK_274.svg)



## Key points

- The stomach is part of the digestive system. The digestive system takes in and breaks down food, absorbs nutrients, and removes waste from the body.
- Most stomach (gastric) cancers start in cells that line the inside of the stomach wall and secrete mucus. These stomach cancers are called adenocarcinomas.
- The stomach wall is made up of 5 main layers: mucosa, submucosa, muscle, subserosa, and serosa. Cancer starts in the innermost layer and grows outward through the layers of the stomach wall.
- Stomach cancers tend to develop slowly over many years. Before cancer develops, pre-cancerous changes often occur in the inner lining (mucosa) of the stomach.
- Early-stage stomach cancer has not grown beyond the first layer (mucosa) of the stomach wall. The tumor is often small and is not in any lymph nodes.
- In locoregional or locally advanced stomach cancer, cancer has invaded the second layer (submucosa) of the stomach or beyond. Cancer might be found in nearby (regional) lymph nodes. Cancer can also grow inside the stomach and form an ulcer or mass.
- Cancer can spread to distant parts of the body through the blood or lymphatic system. This is called metastatic stomach cancer. A distant metastasis could be in the liver, abdominal lining, or distant lymph nodes.

# 2

## Testing for stomach cancer

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**Treatment planning starts with testing. This chapter presents an overview of the tests you might receive and what to expect.**

Testing takes time. It might take days or weeks before all test results come in.

## Test results

Results from imaging studies and biopsy (including biomarker tests) will be used to determine your treatment plan. Treatment will be based on these findings.

It is important you understand what these tests mean. Ask questions and keep copies of your test results. Online patient portals are a great way to access your test results.

Keep these things in mind:

- Choose a friend, family member, or peer who can drive you to appointments, provide meals, or offer emotional support during diagnosis and treatment.
- Bring someone with you to doctor visits, if possible.
- Write down questions and take notes during appointments. Don't be afraid to ask your care team questions. Get to know your care team and help them get to know you.
- Get copies of blood tests, imaging results, and reports about the specific type of cancer you have.
- Organize your papers. Create files for insurance forms, medical records, and test results. You can do the same on your computer.

- Keep a list of contact information for everyone on your care team. Add it to your phone. Hang the list on your refrigerator or keep it in a place where someone can access it in an emergency. Keep your primary care physician (PCP) informed of changes to this list. You are encouraged to keep your PCP in the loop. They are great partners in your care.
- In your contact list, include information on your exact type of cancer, as well as any treatments and the date each treatment started.

For possible tests, **see Guide 1**.

## General health tests

### Medical history

A medical history is a record of all health issues and treatments you have had in your life. Be prepared to list any illness or injury and when it happened. If there is a history of *H. pylori* (bacteria) infection and/or treatment, it is important to let the medical team know. Bring a list of old and new medicines and any over-the-counter (OTC) medicines, herbals, or supplements you take. Some supplements

interact and affect medicines that your care team may prescribe. Tell your care team about any symptoms you have. A medical history, sometimes called a health history, will help determine which treatment is best for you.

### Family history

Some cancers and other diseases can run in families. Your doctor will ask about the health history of family members who are blood relatives. This information is called a family history. Ask family members on both sides of

#### Guide 1

#### Possible tests and procedures

Medical history and physical exam (H&P). Screen for family history.

Upper GI endoscopy and biopsy

CT of chest, abdomen, and pelvis with oral and IV contrast

FDG PET/CT if no evidence of metastatic (M1) disease and if needed

Complete blood count (CBC) and comprehensive metabolic panel (CMP)

Endoscopic ultrasound (EUS) if early-stage disease suspected or if early versus locally advanced disease needs to be determined (preferred)

Endoscopic resection (ER) is essential for the accurate staging of early-stage cancers (T1a or T1b). Early-stage cancers can best be diagnosed by endoscopic resection.

Biopsy of metastatic disease as needed

Testing for MSI and MMR is recommended in all newly diagnosed patients

HER2 and PD-L1 testing if metastatic adenocarcinoma is documented or suspected

Nutrition assessment and counseling

*H. pylori* testing or screening as needed

Genetic testing as needed

your family about their health issues like heart disease, cancer, and diabetes, and at what age they were diagnosed. It's important to know the specific type of cancer or where the cancer started, if it is in multiple locations, and if they had genetic testing.

## Physical exam

During a physical exam, your health care provider may:

- Check your temperature, blood pressure, pulse, and breathing rate
- Check your height and weight
- Listen to your lungs and heart
- Look in your eyes, ears, nose, and throat
- Feel and apply pressure to parts of your body to see if organs are of normal size, are soft or hard, or cause pain when touched.
- Feel for enlarged lymph nodes in your neck, underarm, and groin.

## Nutrition assessment

You should meet with a nutritionist before starting treatment. A nutritionist or dietician can suggest the best foods and fluids for you. Stomach cancer can make you lose your appetite. You may also feel full after eating very little. These changes may have caused you to lose too much weight or make you feel weak and tired.

It is important that you receive adequate and sustained nutrition before you start treatment. You might receive food through a plastic tube that is placed through the skin of the abdomen into stomach or small intestine.



## Create a medical binder

A medical binder or notebook is a great way to organize all of your records in one place.

- ✓ Make copies of blood tests, imaging results, and reports about your health.
- ✓ Choose a binder that meets your needs. Consider a zipper pocket to include a pen, small calendar, and insurance cards.
- ✓ Create folders for insurance forms, test types (such as blood, imaging, pathology, radiology, and genetics), treatments, and procedures. Organize items in the folder by date.
- ✓ Use online patient portals to view your test results and other records. Download or print the records to add to your binder.
- ✓ Add a section for questions and to take notes.

Bring your medical binder to appointments. You never know when you might need it!

During and after treatment, your treatment team will monitor you for weight loss and other signs you aren't getting enough nutrition.



## Blood tests

Blood tests check for signs of disease and how well organs are working. They require a sample of your blood, which is removed through a needle placed into your vein. Some blood tests are described next.

### Complete blood count

A complete blood count (CBC) measures the levels of red blood cells (RBCs), white blood cells (WBCs), and platelets (PLTs) in your blood. Red blood cells carry oxygen throughout your body, white blood cells fight infection, and platelets control bleeding.

### Comprehensive metabolic panel

A comprehensive metabolic panel (CMP) measures 14 different substances in your blood. It is usually done on the plasma part of your blood. A CMP provides important information about how well your kidneys and liver are working, among other things.

### CA 19-9 and CEA

Cancer antigen 19-9 (CA 19-9) and carcinoembryonic antigen (CEA) are occasionally made by tumors and can be detected in the blood. These tumor markers may be followed if elevated at the time of diagnosis.

## Imaging tests

Imaging tests take pictures of the inside of your body. Imaging tests show the primary tumor, or where the cancer started, and look for cancer in other parts of your body.

A radiologist, an expert in interpreting imaging tests, will write a report and send this report to your health care provider (HCP). It is likely that the report will be sent directly to you through your patient portal or patient access system. You should discuss these results with your HCP.

You will not have all of these tests.

### CT scan

A computed tomography (CT or CAT) scan uses x-rays and computer technology to take pictures of the inside of the body. It takes many x-rays of the same body part from different angles. All the images are combined to make one detailed picture. A CT scan of your chest, abdomen, and/or pelvis may be one of the tests to look for cancer. Oral (by mouth) and intravenous (IV) contrast are often used together when testing for stomach cancer.

### Contrast material

Contrast material is used to improve the pictures of the inside of the body. Contrast materials are not dyes, but substances that help enhance and improve the images of several organs and structures in the body. It is used to make the pictures clearer. The contrast is not permanent and will leave the body in your urine immediately after the test. The types of contrast vary and are different for CT and magnetic resonance imaging (MRI).

Tell your care team if you have had allergic reactions to contrast in the past. This is

important. You might be given medicines to avoid the effects of those allergies. Contrast might not be used if you have a serious allergy or if your kidneys aren't working well.

### **PET scan**

A positron emission tomography (PET) scan uses a radioactive sugar molecule called a tracer. A tracer is a substance injected into a vein to see where cancer spots might be in the body and if they are using sugar produced by the body to grow. Cancer spots show up as bright areas on PET scans. However, not all tumors will appear on a PET scan and not all bright spots are cancer. It is normal for the brain, heart, kidneys, and bladder to be bright on the PET scan. Inflammation or infection can also show up as a bright spot. When a PET scan is combined with CT, it is called a PET/CT scan.

### **FDG PET/CT**

An FDG PET/CT uses a radiotracer called F-18 fluorodeoxyglucose (FDG). It is made

of fluoride and a simple form of sugar called glucose. You cannot eat or drink for at least 4 hours before the scan. This scan is most helpful when other imaging results are unclear. It may help find cancer in lymph nodes and distant sites. If it clearly shows cancer in the bone, a bone scan and sodium fluoride PET/CT may not be needed. FDG PET/CT can be done at the same time as a CT used for diagnosis.

### **Ultrasound**

An ultrasound (US) uses high-energy sound waves to form pictures of the inside of the body. This is similar to a sonogram used for pregnancy. A wand-like probe (transducer) will be held and moved on your skin using a gel. Ultrasound is painless and does not use x-rays, so it can be repeated as needed. Ultrasound is good at showing small areas of cancer that are near the skin. Sometimes, an ultrasound is used to guide a biopsy.

### **CT machine**

**A CT machine is large and has a tunnel in the middle. During the test, you will lie on the table that moves slowly through the tunnel.**



## Endoscopy procedures

Some imaging tests use a thin, tube-shaped tool called a scope that is inserted into the body to take pictures. One end of the scope has a small light and camera lens to see inside your body. The image is sent to a television or computer monitor. This will help guide your doctor in a biopsy, stent placement, or other tasks. The scope is guided into the body through a natural opening, such as the mouth, nose, or anus. It may also be inserted through a small surgical cut.

More than one type of scope may be used for imaging tests. The type of scope often used for stomach cancer is called an endoscope. An endoscope is often guided into the body through the mouth. Endoscopy is an important tool in the diagnosis, staging, treatment, and care of those with stomach cancer. Before an endoscopy, you will be given medicine to help you relax or sleep during the procedure.

### Endoscopic ultrasound

An ultrasound (US) uses high-energy sound waves to form pictures of the inside of the body. Endoscopic ultrasound (EUS) uses both imaging and an endoscope to see how deep the tumor has grown into the stomach wall. Signs of cancer within lymph nodes and other nearby organs can also be detected. An EUS is an important part of cancer diagnosis and staging.

You are most likely to have an endoscopic ultrasound if your care team suspects that the cancer hasn't grown far into the stomach wall (early-stage disease), or to determine whether the cancer is early stage or locally advanced.

### Upper GI endoscopy or EGD

In an upper gastrointestinal (GI) endoscopy or esophagogastroduodenoscopy (EGD), a device is guided down the throat into the esophagus, stomach, and upper parts of the small intestine (duodenum). An EGD is used to inspect the lining of these organs and to look for any signs of cancer or other abnormalities such as enlarged blood vessels or ulcers. An EGD can also be referred to as a duodenoscopy.

Your doctor will record where the tumor is in your stomach or esophagus. If the tumor is near the esophagus, the distance from the esophagogastric junction (EGJ) may also be recorded. The EGJ is a muscle found just beneath the diaphragm. After the endoscopy, your throat may feel sore and you may have some swelling.

### Laparoscopy

Laparoscopy (key-hole surgery) is a type of surgical procedure that allows your surgeon to see the inside of your abdomen. It uses a tool like an endoscope called a laparoscope. For this test, the laparoscope will be inserted through a tiny cut in your abdomen. Laparoscopy is done under general anesthesia. This is a controlled loss of wakefulness from drugs.

Laparoscopy may only be used in certain cases. It can be used to determine the stage of disease and rule out metastasis. It can detect cancer spread inside your abdomen that may have been missed on imaging scans. It can also be used to obtain biopsy samples. Sometimes, laparoscopy is used to determine if you are a candidate for surgery.

## H. pylori tests

Helicobacter pylori (*H. pylori*) is a type of bacteria that infects the digestive system. It puts a person at risk of developing stomach cancer. If *H. pylori* is suspected, then you might have testing. Testing for *H. pylori* can be done using a blood or breath test, using a stool (poop) sample, or during an endoscopy.

## Biopsy

A biopsy removes a sample of tissue or fluid during an endoscopy. Several samples may be taken from the tumor, wall of your stomach or esophagus, lymph nodes, or organs next to your stomach, such as your liver. The samples will be sent to a pathologist, an expert in examining cells under a microscope to find disease.

Other types of biopsies may include:

- **Fine-needle aspiration (FNA) or core biopsy (CB)** uses needles of

different sizes to remove a sample of tissue or fluid. An ultrasound (US) may guide the FNA for diagnosis.

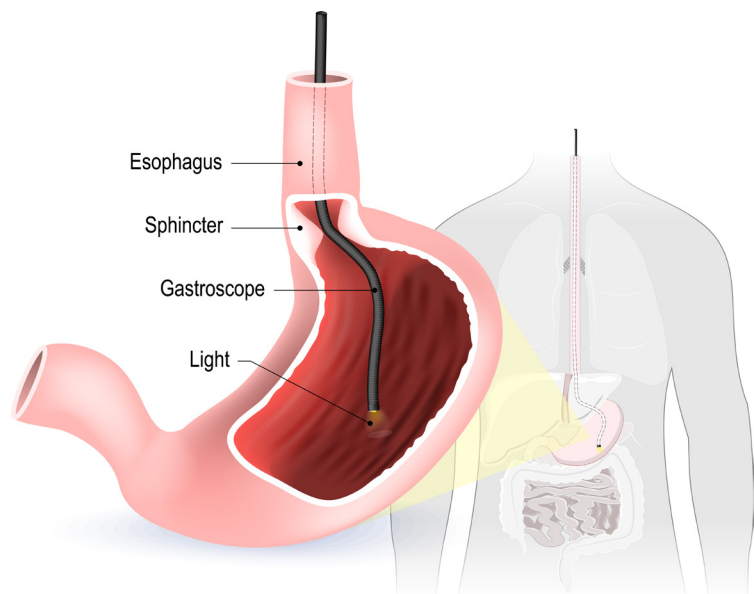
- **Brushings or washings** involve removing tumor or cell samples with a small brush at the end of an endoscope.
- **Fluid samples** from ascites (fluid in abdominal cavity) can be used to look for cancer cells (called paracentesis).
- **Liquid biopsy** uses a sample of blood for testing.

## Biopsy of metastases

A metastasis is the spread of cancer to an area of the body such as the lining of the abdomen (peritoneum) or liver. A biopsy of the metastasis may be needed to confirm the presence of cancer. If there is more than one metastasis, each site may be biopsied. The type of biopsy used depends on the location of the suspected metastases and other factors.

### Upper endoscopy

Upper endoscopy allows your doctor to see the inner wall of your stomach and esophagus. If ultrasound is used, your doctor will be able to see the deeper wall layers and nearby organs.



## Biopsy results

Histology is the study of the anatomy (structure) of cells, tissues, and organs under a microscope. It is used to make treatment decisions. Your pathology report will contain information about tumor histology. You may be recommended to have an open biopsy (surgery) to remove (excise) the tumor to confirm its histology. Talk to your health care provider for more information on next steps.

## Biomarker testing

A sample from a biopsy of your tumor may be tested to look for specific DNA (deoxyribonucleic acid) mutations/alterations, protein levels, or other molecular features. This information will be used to choose the best treatment for you. It is sometimes called molecular testing or tumor profiling, tumor sequencing, gene expression profiling, or genomic testing.

Biomarker testing includes tests of genes or their products (proteins). It identifies the presence or absence of mutations and certain proteins that might suggest needed treatment. Proteins are written like this: NTRK. Genes are written with italics like this: *NTRK*. Your treatment team will recommend the best types of biomarker testing for you.

Immunohistochemistry (IHC), fluorescence in situ hybridization (FISH), polymerase chain reaction (PCR), or next-generation sequencing (NGS) are types of tests used to look for biomarkers.

Testing for HER2 status, microsatellite (MS) status, programmed death ligand 1 (PD-L1) expression, and neurotrophic tropomyosin-related kinase (*NTRK*) gene fusions are important for the treatment and management

of metastatic stomach cancer. Biomarker testing continues to expand, so please ask your care team if additional tests are needed.

## HER2

Human epidermal growth factor receptor 2 (HER2) is a protein involved in normal cell growth. It is found on the surface of all cells. When amounts are high, it causes cells to grow and divide. This is called HER2-positive (HER2+), overexpression, or amplification.

There might be higher amounts of HER2 in your stomach cancer. If your tumor makes too much HER2, you might receive a targeted therapy called trastuzumab (Herceptin) or a biosimilar, or trastuzumab deruxtecan (Enhertu). A biosimilar is an almost identical version of a drug made by another company. It is used in the exact same way and at the same dose as the actual drug.

## MSI-H/dMMR mutation

Microsatellites are short, repeated strings of DNA. When errors or defects occur, they are fixed by mismatch repair (MMR) proteins. Some cancers have DNA mutations for changes that prevent these errors from being fixed. This is called microsatellite instability (MSI) or deficient mismatch repair (dMMR). When cancer cells have more than a normal number of microsatellites, it is called MSI-H (microsatellite instability-high). This is often due to dMMR genes.

Those with newly diagnosed stomach cancer should be tested for MMR or MSI.

## PD-L1 testing

Programmed death-ligand 1 (PD-L1) is an immune protein. If this protein is expressed on the surface of cancer cells, it can cause your immune cells to ignore the cancer and suppress the anti-tumor immune response. If your cancer expresses this protein, you might have treatment that combines chemotherapy and a checkpoint inhibitor therapy. This is designed to activate your immune system to better fight off the cancer cells.

## RET gene fusions

Rearranged during transfection (*RET*) gene mutation is related to cell growth (proliferation).

Selpercatinib (Retevmo) might be used to target unresectable or metastatic tumors with a *RET* fusion.

## Tumor mutational burden

When there are 10 or more mutations per million base pairs of tumor DNA, it is called tumor mutational burden-high (TMB-H). Metastatic or unresectable TMB cancers are often treated using immune checkpoint inhibitors that target the proteins called programmed death protein 1 (PD-1) and programmed death-ligand 1 (PD-L1).

## Tumor mutation testing

Tumor mutation testing or tumor genomic aberration testing uses a sample of your tumor or blood to see if the cancer cells have any specific DNA mutations. This is a different type of DNA testing than the genetic testing for mutations you may have inherited from your biological parents. In tumor mutation testing, only the tumor is tested and not the rest of your body. Tumor mutation testing is frequently done if a cancer is unresectable or metastatic.

Testing is done using a variety of methods such as fluorescence in situ hybridization (FISH), immunohistochemistry (IHC), next-generation sequencing (NGS), and/or polymerase chain reaction (PCR).

Certain mutations such as *NTRK*, *RET*, and *BRAF V600E* can be targeted with specific therapies.

## NTRK gene fusions

In a tumor with an *NTRK* gene fusion, a piece of the *NTRK* gene and a piece of another gene fuse or join. This activates the *NTRK* gene in a way that causes uncontrolled cell growth. Larotrectinib (Vitrakvi) and entrectinib (Rozlytrek) might be used to target advanced or metastatic cancer that is *NTRK* gene fusion-positive.

## BRAF V600E mutations

Mutations in the *BRAF* gene can cause normal cells to become cancerous. Dabrafenib (Tafinlar) and trametinib (Mekinist) might be used for tumors with *BRAF V600E* mutations.

## FISH

Fluorescence in situ hybridization (FISH) is a testing method that involves special dyes called probes that attach to pieces of DNA, the genetic material in a person's cells.

## Immunohistochemistry

Immunohistochemistry (IHC) is a special staining process that involves adding a chemical marker to cancer or immune cells. The cells are then studied using a microscope.

## Next-generation sequencing

Next-generation sequencing (NGS) is a high-throughput method used to determine the DNA sequence or gene changes of cancer cells in your tumor. This method would only be used if enough tumor tissue remains after other biomarker testing has been completed.

## PCR

A polymerase chain reaction (PCR) is a lab process that can make millions or billions of copies of your DNA (genetic information). PCR is very sensitive. It can find 1 abnormal cell among more than 100,000 normal cells. These copies called PCR product might be used for NGS.

## Tumor markers

Your blood or biopsy tissue may be tested for proteins. Examples of some tumor markers in stomach cancer include cancer antigen 19-9 (CA 19-9) and carcinoembryonic antigen (CEA). An increase in the level of certain tumor markers could mean that the cancer has grown or spread (progressed). However, not everyone has elevated levels of these markers and tumor markers alone are not a reliable method of detecting stomach cancer.

## Liquid biopsy

Some mutations can be found by testing circulating tumor DNA (ctDNA) in the blood. In a liquid biopsy, a sample of blood is taken to look for cancer cells or for pieces of DNA from tumor cells. Those who have metastatic or advanced stomach cancer and are unable to undergo a traditional biopsy might have a liquid biopsy. Sometimes, testing can quickly use up a tumor sample. In this case, a liquid biopsy might be an option.



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## Genetic risk testing

You might be thinking, "Why did I get cancer?" Most of the time, the answer is that one cell made a mistake when dividing and then a cancer formed. Some cells, however, have a predisposition or have something in their DNA (genetic material) that makes them more likely to develop cancer. Understanding whether you have a cancer predisposition condition can sometimes affect your cancer treatment, but more often, it can affect screening for other cancers. Therefore, identifying a cancer predisposition condition is important.

Genetic testing is done using blood or saliva (spitting into a cup). The goal is to look for gene mutations inherited from your biological parents called germline mutations. Some mutations can put you at risk for more than one type of cancer. You can pass these genes on to your children. Also, family members might carry these mutations. Tell your care team if there is a family history of cancer.

A genetic risk assessment will identify if you carry a cancer risk and if you may benefit from genetic testing, additional screening, or preventive interventions. Depending on the genetic risk assessment, you might undergo genetic testing and genetic counseling.

## Hereditary cancer predisposition syndromes

Certain genetic (inherited) syndromes may put someone at risk for developing stomach cancer. A syndrome is a group of signs or symptoms that occur together and suggest the presence of or risk for a disease.

Hereditary syndromes most closely related to stomach cancer include:

- Hereditary diffuse gastric cancer (HDGC)
- Lynch syndrome (LS)
- Juvenile polyposis syndrome (JPS)
- Peutz-Jeghers syndrome (PJS)
- Familial adenomatous polyposis (FAP) or attenuated FAP (AFAP)

## Performance status

Performance status (PS) is a person's general level of fitness and ability to perform daily tasks. Your state of general health will be rated using a PS scale called Eastern Cooperative Oncology Group (ECOG) or the Karnofsky Performance Score (KPS). PS is one factor taken into consideration when choosing a treatment plan. Your preferences about treatment are always important.



## ECOG PS

The ECOG PS scores range from 0 to 5.

- **PS 0** means the person is fully active.
- **PS 1** means the person is still able to perform light to moderate activity, but with some limitations.
- **PS 2** means the person is limited to the chair or bed less than half of the time and is still able to care for self.
- **PS 3** means the person is limited to the chair or bed more than half of the time.
- **PS 4** means the person is totally confined to the bed or chair and completely unable to care for self.
- **PS 5** means the person is not alive.

In stomach cancer, PS might be referred to as good or poor. Good PS is usually PS 0 or PS 1.

## Karnofsky PS

The KPS score ranges from 0 to 100.

- 10 to 49 means the person cannot care for themselves.
- 50 to 79 means the person cannot work and needs some help to take care of themselves.
- 80 to 100 means the person can carry out daily tasks.



## What is your family cancer health history?

Some cancers and other diseases run in families—those who are related to you through genes passed down from biological parent to child. This information is called a family health history. Ask blood relatives about their health issues like heart disease, cancer, and diabetes, and at what age they were diagnosed. For relatives who were diagnosed with cancer, ask them (or other relatives if they are no longer living) what type of cancer they had, if they died from the cancer, and at what age the cancer was diagnosed.

Start by asking your parents, siblings, and children. Next, talk to half-siblings, aunts and uncles, nieces and nephews, grandparents, and grandchildren.

Write down what you learn about your family history and share this information with your health care provider.

Some of the questions to ask include:

- ✓ How old were you when each of these diseases and health conditions was diagnosed?
- ✓ What is your family's ancestry – from what countries did your ancestors originate?

## Key points

- › Tests are used to find cancer, plan treatment, and check how well treatment is working.
- › A medical history and physical exam inform your doctor about your overall health.
- › Getting enough nutrition is important. You should meet with a nutritionist before starting treatment.
- › Blood tests check for signs of disease and how well organs are working.
- › Imaging tests take pictures of the inside of your body. Images can be made with scanning machines or scoping tools.
- › A biopsy removes a sample of tissue or fluid during an endoscopy.
- › A sample from a biopsy of your tumor may be tested to look for specific DNA (deoxyribonucleic acid) mutations, protein expression levels, or other molecular features. Some mutations and proteins can be targeted with specific therapies.
- › Genetic testing might be done to look for gene mutations inherited from your biological parents called germline mutations.
- › Results from imaging studies and biopsy will determine your treatment plan. Often, information is collected over time, even as treatment begins.
- › Online portals are a great way to access your test results.



From the moment you get a cancer diagnosis, you are thrust into a world of new terms, many of them vital to understanding what is happening to you. It's important to understand what biomarkers are, which ones are frequently found with gastric cancers, and even how these biomarkers can affect treatments. "

# 3

## Stomach cancer staging

26 How stomach cancer is staged

28 TNM scores

30 Key points

**Cancer staging is used to reflect prognosis and to guide treatment decisions. It describes the size and location of the tumor, if the tumor has grown through the layers of the stomach wall, and if cancer has spread to lymph nodes, organs, or other parts of the body.**

## How stomach cancer is staged

A cancer stage is a way to describe the extent of the cancer at the time you are first diagnosed. The American Joint Committee on Cancer (AJCC) created a staging system to determine how much cancer is in your body, where it is located, and what subtype you have. This is called staging.

Based on testing, your cancer will be assigned a stage. Staging helps to predict prognosis and is needed to make treatment decisions. A prognosis is the course your cancer will likely take. AJCC is just one type of staging system.

Information gathered during staging:

- **The extent (size) of the tumor (T):** How large is the cancer? Has it grown into nearby areas?
- **The spread to nearby lymph nodes (N):** Has the cancer spread to nearby lymph nodes? If so, how many? Where?

- **The spread (metastasis) to distant sites (M):** Has the cancer spread to distant organs such as the lungs or liver?
- **Human epidermal growth factor receptor 2 (HER2) status:** Does the cancer make too much of a protein called HER2?
- **Grade of the cancer (G):** How much do the cancer cells look like normal cells?
- **Biomarker testing:** Does the cancer have any genes, proteins, markers, or mutations that might suggest treatment?

Staging is based on a combination of information to reach a final numbered stage. Often, not all information is available at the initial evaluation. More information can be gathered as treatment begins. Doctors may explain your cancer stage in different ways than described next.

Staging includes:

- **Anatomic** – based on extent of cancer as defined by tumor size (T), lymph node status (N), and distant metastasis (M).
- **Prognostic** – includes anatomic TNM plus tumor grade and the status of the biomarkers such as human epidermal growth factor receptor 2 (HER2). The prognostic stage also includes the assumption that you are treated with the standard-of-care approaches.

Prognostic stages are divided into clinical and pathologic. Stomach cancer staging is often done twice, before and after surgery. Staging after surgery provides more specific and accurate details about the size of the cancer and lymph node status.

## Clinical stage

Clinical stage (c) is the rating given before any treatment. It is based on a physical exam, biopsy, and imaging tests. An example might look like cN2 or cM1. In stomach cancer, the clinical (before surgery) stage is based on the endoscopic ultrasound (EUS) and other imaging or biopsy results. These tests are done before any treatment as part of an initial diagnosis. Surgery is needed to know exactly how much cancer is in the body.

## Pathologic stage

Pathologic stage (p) or surgical stage is determined by examining tissue removed during surgery. An example might be pN2. If you are given drug therapy before surgery, then the stage might look like ypT3. The pathologic (after surgery) stage is based on information gained after surgery to remove all or part of the stomach and nearby lymph nodes. This gives a more accurate picture of how far the cancer has spread and is used to determine your treatment options after surgery. The removal of tumor tissue and nearby lymph nodes is an important part of pathologic staging.

## 5 layers of the stomach wall

**1. Mucosa** – Inner membrane that is in contact with food. Mucosa consists of 3 layers:

- **Surface epithelium** – A thin, moist layer of cells that forms the interior stomach lining.
- **Lamina propria** – A type of connective tissue found under the epithelium membrane. Within and supported by the lamina propria are stomach glands formed by cells that have the functions of producing enzymes, acid, mucus, and hormones.
- **Muscularis mucosae** – A thin strip of muscle that separates the mucosa from the submucosa.

**2. Submucosa** – A layer of connective tissue, blood vessels, and nerve cells.

**3. Muscle** – A type of soft tissue that helps move food through the stomach. Also called muscularis propria.

**4. Subserosa** – A layer of connective tissue that supports the serosa.

**5. Serosa** – An outer membrane that covers the stomach. The serosa is also called the serous membrane or visceral peritoneum.

## TNM scores

The tumor, node, metastasis (TNM) system is used to stage stomach cancer. In this system, the letters T, N, and M describe different areas of cancer growth. Based on cancer test results, your doctor will assign a score or number to each letter. The higher the number, the larger the tumor or the more the cancer has spread. These scores will be combined to assign the cancer a stage. A TNM example might look like this: T3N2M0 or T3, N2, M0.

- **T (tumor)** – Depth and spread of the main (primary) tumor in the stomach wall
- **N (node)** – If cancer has spread to nearby (regional) lymph nodes
- **M (metastasis)** – If cancer has spread to distant parts of the body or metastasized

### T = Tumor

A tumor can grow through the layers of the stomach wall and into nearby structures.

- **T0** – No tumor is found.
- **Tis** – Carcinoma *in situ* (cancer has not grown beyond the epithelium).
- **T1a** – Tumor invades the lamina propria or muscularis mucosae of the first layer of the stomach wall (the mucosa).
- **T1b** – Tumor invades the second layer of the stomach wall (the submucosa).
- **T2** – Tumor invades the third layer of the stomach wall (the muscle layer called muscularis propria).
- **T3** – Tumor penetrates the subserosa connective tissue between the third and outer layer of the stomach wall. It has not reached the serosa or nearby structures.

- **T4a** – Tumor invades the outer layer of the stomach wall (the serosa called the visceral peritoneum).
- **T4b** – Tumor has grown all the way through the stomach wall and into nearby structures, such as the diaphragm, liver, spleen, pancreas, adrenal gland, kidney, colon, small intestine, and abdominal wall.

Carcinoma *in situ* and T1a tumors are often considered early-stage cancer. This is cancer that has not grown beyond the first layer of the stomach wall. Stomach cancers are rarely found this early.

### N = Regional lymph node

There are hundreds of lymph nodes throughout your body. They work as filters to help fight infection and remove harmful things from your body. Regional lymph nodes are found near the stomach. Cancer found in a regional lymph node is called a lymph node metastasis. This is different than a distant metastasis, which is found far from the main tumor in the stomach.

Lymph drains from the stomach wall into lymphatic vessels in the mucosa and submucosa. From here it drains into lymph nodes outside the stomach. There are several groups of regional lymph nodes that drain the wall of the stomach. They include pyloric (pylorus area of stomach), perigastric, pericardiac at the esophagogastric junction, and lymph nodes near organs and arteries such as the pancreas, spleen (splenic), and liver (hepatic).

The largest group of stomach lymph nodes are the perigastric lymph nodes found along the lesser and greater curves of the stomach and in the omenta. The omentum is a fold of the thin tissue that lines the abdomen (peritoneum)

that surrounds the stomach and other organs in the abdomen.

The removal of lymph nodes is called lymph node or nodal dissection. At least 16 regional nodes should be removed and tested. However, the removal of more than 30 regional lymph nodes is advised.

- **N0** – There is no cancer in nearby lymph nodes.
- **N1** – 1 or 2 nearby nodes have cancer.
- **N2** – 3 to 6 nearby nodes have cancer.
- **N3a** – 7 to 15 nearby lymph nodes have cancer.
- **N3b** – 16 or more nearby lymph nodes have cancer.

## M = Metastasis

Cancer that has spread to distant parts of the body is shown as M1. The most common site for metastasis is the liver, abdominal lining, and distant lymph nodes.

## Grade

Grade describes how abnormal the tumor cells look under a microscope (called histology). Higher-grade cancers tend to grow and spread faster than lower-grade cancers. GX means the grade can't be determined, followed by G1, G2, and G3. Well differentiated (G1) means the cancer cells look similar to normal cells. Poorly differentiated (G3) means the cancer cells look very different compared to normal cells. G3 is the highest grade for stomach (gastric) cancers.

- **GX** – Grade cannot be determined
- **G1** – Well differentiated
- **G2** – Moderately differentiated

- **G3** – Poorly differentiated or undifferentiated

## Numbered stages

Numbered stages are based on TNM scores. Stages range from stage 0 to stage 4, with 4 being the most advanced. They might be written as stage 0, stage I, stage II, stage III, and stage IV.

Other terms might be used instead of numbered cancer stages. This book will use the following terms to describe stomach cancer:

- **Resectable** – Tumor can be removed completely with surgery.
- **Unresectable** – Tumor cannot be removed with surgery. It might involve nearby veins and arteries making it unsafe to remove.
- **Locoregional or locally advanced** – Tumor might be any size and could be in any layer of the stomach. Cancer might be in nearby lymph nodes, organs, and tissues.
- **Metastatic** – Cancer that has spread to other parts of the body, including distant lymph nodes. The most common sites are the liver, abdominal lining (peritoneum), and distant lymph nodes. It may also spread to the lung or bone.

## Key points

- Staging helps to predict prognosis and is needed to make treatment decisions. A prognosis is the course your cancer will likely take.
- The tumor, node, metastasis (TNM) system is used to stage stomach cancer.
- Stomach cancer staging is often done twice, before and after surgery.
- The clinical stage (c) of stomach cancer is based on the results of testing before any treatment. It is written as cTNM.
- The pathologic stage (p) of stomach cancer is based on the results of tissue examined during surgery. It is written as pTNM.
- Grade describes how abnormal the tumor cells look under a microscope (called histology).
- Regional lymph nodes are found near the stomach.
- Cancer that has spread to distant parts of the body is called metastatic cancer.

A pathology report will include abbreviations such as pN0, ypT2, or cN3. Ask your care team to explain what they mean.



# 4

## Treating stomach cancer

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**There is more than one treatment for stomach cancer. This chapter describes treatment options and what to expect. Together, you and your care team will choose a treatment plan that is best for you.**

## Care team

Treating stomach cancer takes a team approach. Treatment decisions should involve a multidisciplinary team (MDT). An MDT is a team of health care and psychosocial care professionals from different professional backgrounds who have knowledge (expertise) and experience in your type of cancer. This team is united in the planning and implementing of your treatment. Ask who will coordinate your care.

Some members of your care team will be with you throughout cancer treatment, while others will only be there for parts of it. Get to know your care team and help them get to know you.

Depending on your diagnosis, your team might include the following specialists:

- **A gastroenterologist** is an expert in diseases of the digestive tract.
- **A diagnostic radiologist** interprets the results of imaging tests.
- **An interventional radiologist** performs needle biopsies and endoscopies, and places intravenous (IV) ports for treatment.
- **A pathologist** analyzes the cells, tissues, and organs removed during a biopsy or surgery and provides cancer diagnosis, staging, and information about biomarker testing.
- **A surgical oncologist** performs operations to remove cancer.
- **A medical oncologist** treats cancer in adults using systemic therapy.
- **A radiation oncologist** prescribes and delivers radiation therapy to treat cancer.
- **An anesthesiologist** gives anesthesia, a medicine so you do not feel pain during surgery or procedures.
- **Residents and fellows** are doctors who are continuing their training, some to become specialists in a certain field of medicine.
- **Nurse practitioners (NPs) and physician assistants (PAs)** are health care providers. Some of your clinic visits may be done by a nurse practitioner or physician assistant.
- **Oncology nurses** provide your hands-on care, like giving systemic therapy, managing your care, answering questions, and helping you cope with side effects.
- **Oncology pharmacists** are experts in knowing how to use medicines to treat cancer and to manage symptoms and side effects.
- **Palliative care nurses, advanced practice providers (APPs), and physicians** help provide an extra layer of support with cancer-related care.

- **Radiation therapists** provide your hands-on delivery of radiotherapy treatments.
- **Nutritionists and dietitians** can provide guidance on what foods are most suitable for your condition.
- **Psychologists and psychiatrists** are mental health experts who can help manage issues such as depression, anxiety, or other mental health conditions that can affect how you think and feel.
- **Social workers** help people solve and cope with problems in their everyday lives. Clinical social workers also diagnose and treat mental, behavioral, and emotional issues. The anxiety a person feels when diagnosed with cancer might be managed by a social worker in some cancer centers. They, or other designated professionals, can help navigate the complexities of financial and insurance stresses.
- **A research team** helps to collect research data and coordinate care if you are in a clinical trial. Clinical trials help bring new therapies to patients and advance the treatment for everyone. Consider asking your care team about access to clinical trials.

Get to know your care team and help them get to know you.

You know your body better than anyone. Help other team members understand:

- How you feel
- What you need
- What is working and what is not

Keep a list of names and contact information for each member of your team. This will make it easier for you and anyone involved in your care to know whom to contact with questions or concerns.

## Surgery

Surgery is an operation or procedure to remove cancer from the body. Often, surgery is the main or primary treatment to remove the cancer from the stomach. This is only one part of a treatment plan. Surgery can also provide supportive care by easing pain or discomfort. This is called palliative surgery.

When preparing for surgery, seek the opinion of an experienced surgeon. The surgeon should be an expert in performing your type of surgery. Surgery for stomach cancer should be done at a high-volume center that does at least 15 to 20 stomach surgeries each year. Hospitals that perform many surgeries often have better results. You can ask for a referral to a hospital or cancer center that has experience in treating stomach cancer.

The removal of the cancer through surgery can be accomplished in different ways depending on the specific circumstances, such as the size and location of the tumor, and if there is cancer in any surrounding organs and tissues. Surgery is based on the safest and best way to remove the cancer.

### Open surgery

Open surgery or laparotomy removes tissue through one large surgical cut below your ribs. The large cut lets your surgeon directly view and access the tumor in your stomach to remove it. Open surgery may take several hours or longer. After the surgery, you will need to stay in the hospital for several days or longer to recover.

### If you smoke or vape, seek help to quit

A history of smoking or vaping nicotine increases your chances of developing lung and other cancers. Smoking and vaping can limit how well cancer treatment works and prevents wound healing. It also greatly increases your chances of having side effects during and after surgery. Cannabis use might also affect the amount of anesthesia used during surgery.

Nicotine is the chemical in tobacco that makes you want to keep smoking and vaping. Nicotine withdrawal is challenging for most people who smoke or vape. The stress of having cancer may make it even harder to quit. If you smoke or vape, ask your care team about counseling and medicines to help you quit.

For online support, try these websites:

- [SmokeFree.gov](https://www.smokefree.gov)
- [BeTobaccoFree.gov](https://www.betobaccofree.gov)
- [CDC.gov/tobacco](https://www.cdc.gov/tobacco)

## Minimally invasive surgery

Minimally invasive surgery (key-hole surgery) uses a few small incisions. Small tools are inserted through each incision to perform the surgery. One of the tools, called a laparoscope, is a long tube with a video camera at the end. The camera lets your surgeon see your stomach and other tissues inside your abdomen. Other tools are used to remove the tumor. Laparoscopic surgery can also be done using robotic arms to control the surgical tools. This is called robot-assisted laparoscopic surgery.

## Tumor resection

The removal of the tumor is called tumor resection. Imaging tests will be ordered to see if your cancer is resectable (can be removed completely by surgery) or unresectable (cannot be removed completely by surgery). Sometimes, imaging tests cannot clearly show one way or the other.

## Goal of surgery

The goal of surgery or tumor resection is to remove all of the cancer. To do so, the tumor is removed along with a rim of normal-looking tissue around its edge called the surgical margin. The surgical margin may look normal during surgery, but cancerous cells may be found when viewed under a microscope by a pathologist. A clear or negative margin (R0) is when no cancer cells are found in the tissue around the edge of the tumor. In a positive margin, cancer cells are found in normal-looking tissue around the tumor. If there is a positive margin, you may require another surgery to try to remove the remaining tumor cells. Surgery includes removal of lymph nodes.

You may receive treatment before surgery called neoadjuvant or preoperative therapy. Neoadjuvant therapy will help reduce the size of the tumor and the amount of cancer in the body.

## Surgical margins

The goal of surgery is a cancer-free surgical margin. After surgery, you may receive treatment such as radiation, chemoradiation, or systemic therapy to kill any remaining cancer cells.

- **In a clear or negative margin (R0),** no cancerous cells are found in the tissue around the edge of the tumor.
- **In an R1 resection,** the surgeon removes all the visible tumor, but the microscopic margins are still positive for tumor cells. This can happen despite best efforts.
- **In an R2 resection,** the surgeon is unable to remove all the visible tumor or there is metastatic disease.

Your surgeon will look carefully for cancer not only along the surgical margin, but in other nearby areas. Despite best efforts, it is not always possible to find all of the cancer. Sometimes, surgeons can't safely remove the tumor with a cancer-free margin.

An intraoperative pathology consultation is often used by surgeons. This includes inspecting the resected stomach for cancer location and distance to surgical margins, examining by microscope frozen sections of margins, and examining by microscope for possible intra-abdominal metastasis such as liver or peritoneal metastasis. Intraoperative pathology consultation serves an important role in guiding the surgery. For more

information about these results, ask your care team.

After surgery, you may receive treatment such as radiation or systemic therapy to kill any remaining cancer cells. You might have more than one surgery. You might also have a wound drain to prevent fluid from collecting in the body after surgery. These drains are usually removed a few days after surgery.

## Endoscopic resection

For early-stage stomach cancer, endoscopic mucosal resection (EMR) or endoscopic submucosal dissection (ESD) might be options. Early-stage stomach cancer has not grown beyond the first layer (mucosa) of the stomach wall. The tumor is often very small (2 centimeters or less) and is not in any lymph nodes.

### Endoscopic mucosal resection (EMR)

is a procedure to remove pre-cancerous, early-stage cancer or other abnormal tissues (lesions) from the stomach. During EMR, the endoscope is passed down your throat to reach the lesion or tumor in your stomach. The lesion can be removed through suction or cutting it away. Talk to your doctor to learn more.

### Endoscopic submucosal dissection (ESD)

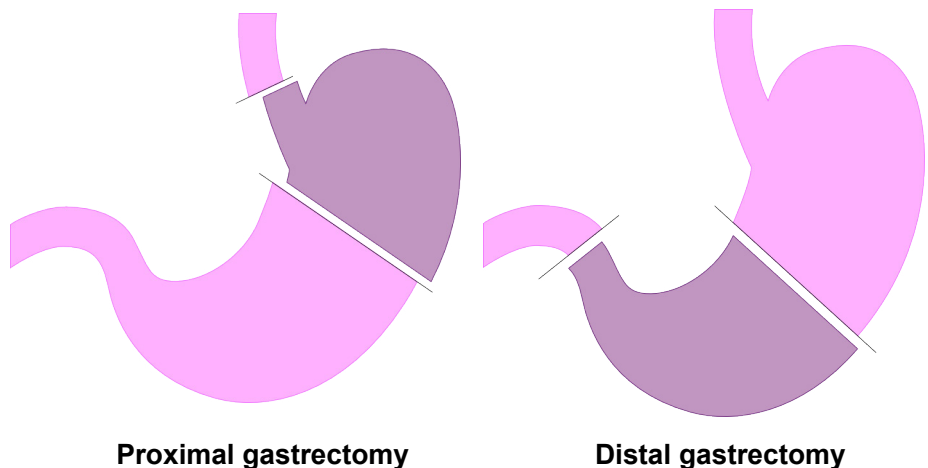
uses an endoscope to locate the tumor in the stomach wall. A tool is inserted through the endoscope that injects fluid between the tumor and layer of the stomach wall. Then a tool lifts and cuts away the tumor from the stomach wall.

## Partial gastrectomy

In a proximal gastrectomy, the top half of the stomach is removed. In a distal gastrectomy, the bottom half of the stomach is removed.

[https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Proximal\\_gastrectomy.png](https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Proximal_gastrectomy.png)

[https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Distal\\_gastrectomy.png](https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Distal_gastrectomy.png)



Proximal gastrectomy

Distal gastrectomy

## Gastrectomy

A gastrectomy removes all or part of the stomach. Surgery that removes part of the stomach is called gastric resection. Gastric resection should include the removal of regional lymph nodes (lymphadenectomy). A nutritionist or dietician provides guidance on what foods are most suitable for you before and after surgery.

There are different types of gastrectomy.

### Total gastrectomy

In a total gastrectomy, the whole stomach, nearby lymph nodes, and parts of your esophagus and small intestine are removed. The esophagus is reconnected to the small intestine. You will have a working digestive system that allows swallowing, eating, and digesting food, but in a much different way.

### Partial gastrectomy

In a partial or subtotal gastrectomy, the part of the stomach with cancer is removed along with nearby lymph nodes, and possibly parts of other organs near the tumor. In a proximal gastrectomy, the top half of the stomach is removed. In a distal gastrectomy, the bottom half of the stomach is removed.

### Esophagogastrectomy

In an esophagogastrectomy, the top part of the stomach and lower part of the esophagus are removed.

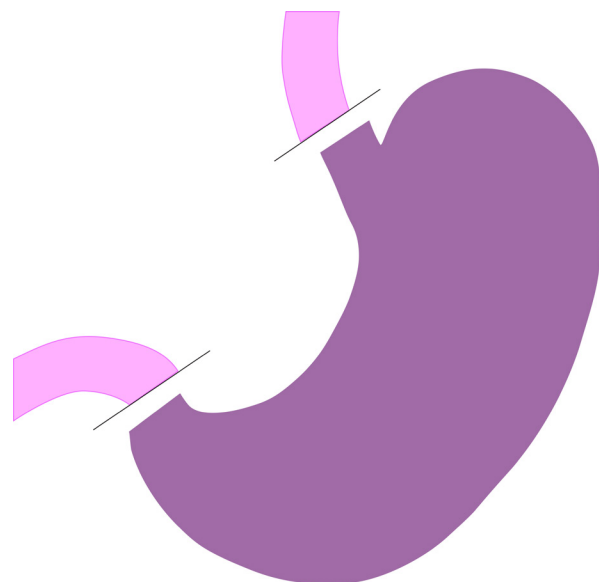
### Total gastrectomy

**In a total gastrectomy, the whole stomach and surrounding lymph nodes are removed. The esophagus is reattached to the middle part of the small intestine (jejunum).**

Adapted from:

[https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Proximal\\_gastrectomy.png](https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Proximal_gastrectomy.png)

[https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Distal\\_gastrectomy.png](https://commons.wikimedia.org/wiki/Category:Gastrectomy#/media/File:Distal_gastrectomy.png)



## Lymph node dissection

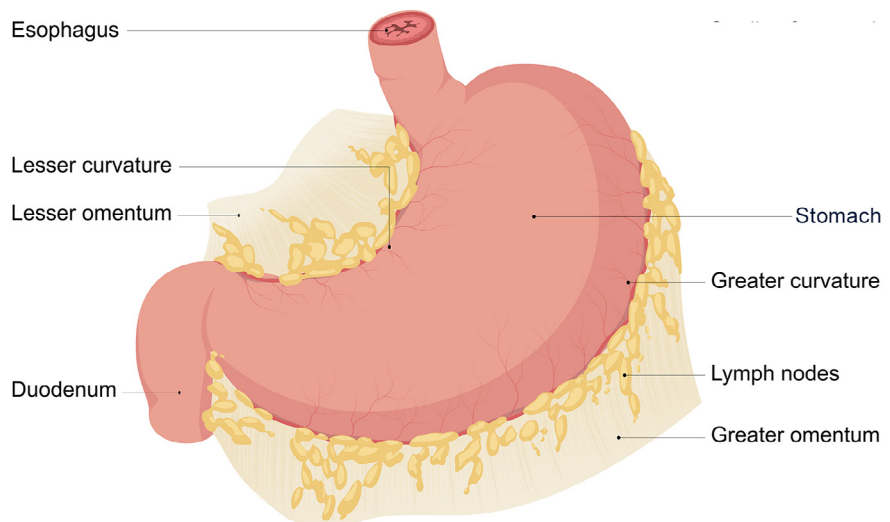
The removal of lymph nodes or groups of lymph nodes is called lymph node or nodal dissection. It might be referred to as a lymphadenectomy. Lymph node dissection may be classified as D0, D1, or D2 depending on the location of the tumor and the number of lymph nodes removed at the time of gastrectomy.

- **D0** is an incomplete resection of lymph nodes along the lesser and greater curvature of the stomach. This means some lymph nodes were removed, but not the minimum of 16.
- **D1** is the removal of at least 16 lymph nodes including the greater and lesser omenta. The omentum is a fold of the thin tissue that lines the abdomen (peritoneum). It surrounds the stomach and other organs in the abdomen. Several regional lymph nodes are found within the omenta.

- **D2** is the removal of at least 30 lymph nodes. This involves D1 dissection plus the removal of all the lymph nodes along the left gastric (stomach) artery, common hepatic (liver) artery, celiac artery, and splenic (spleen) artery. This requires an experienced surgeon. D2 dissections should be performed in centers experienced with this technique.

### Lymph nodes

**At least 16 regional nodes should be removed and tested for cancer. However, the removal of more than 30 regional lymph nodes is recommended.**





## Other procedures

### Gastrojejunostomy

A gastrojejunostomy is a surgery to reroute the path food takes from the stomach into the small intestine. The new path from the stomach will avoid (bypass) the blocked part of the duodenum. A gastrojejunostomy can be an open surgery or laparoscopic surgery. You might have a venting gastrostomy (gastrostomy tube or G-tube) and jejunostomy tube (J-tube) placement at the time of gastrojejunostomy.

### G-tube

A gastrostomy tube (G-tube) is a soft, plastic tube placed through the skin of the abdomen directly into the stomach. It allows air and fluid to leave the stomach and can be used to give medicines and fluids, including liquid food. Giving food through a gastrostomy tube is a type of enteral nutrition. It is also called a percutaneous endoscopic gastrostomy (PEG) tube.

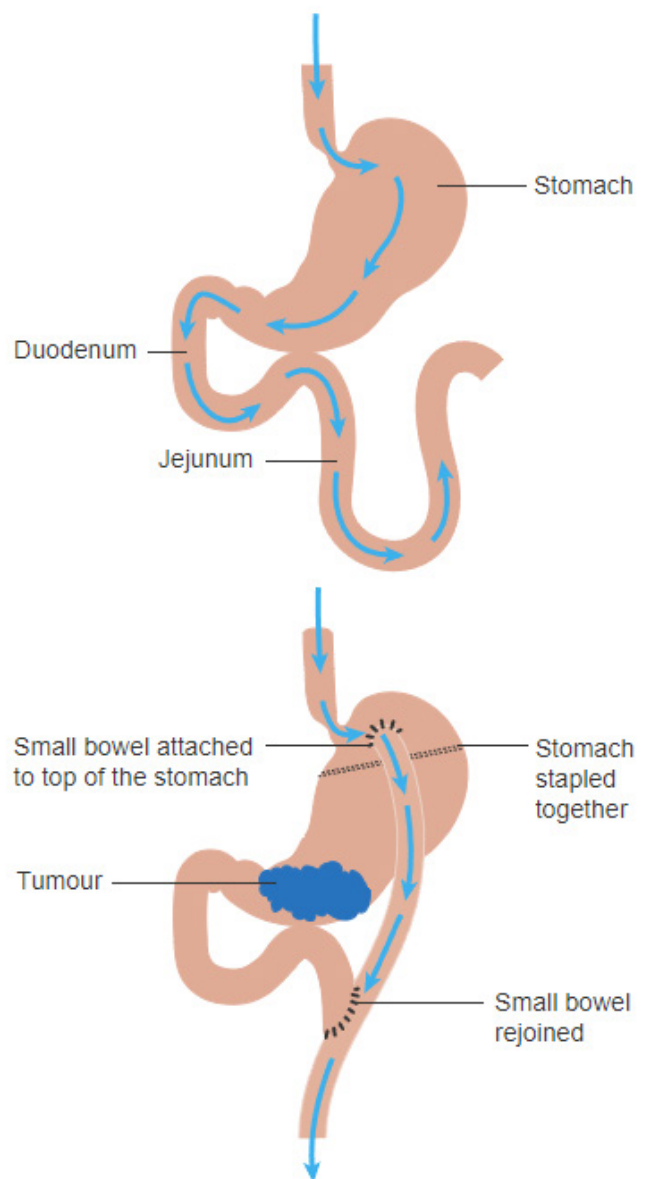
### J-tube

A jejunostomy tube (J-tube) is a soft, plastic tube placed through the skin of the abdomen into the midsection of the small intestine. The tube delivers food and medicine until you are healthy enough to eat by mouth. A J-tube is possible with a gastrojejunostomy. You will learn how to care for the J-tube and the skin where the tube enters the body.

### Gastrojejunostomy

**A tumor can block the esophagus or small intestine. Surgery that reroutes the path food takes from the stomach to the small intestine is called a gastrojejunostomy.**

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## Systemic therapy

Systemic therapy works throughout the body. Types include chemotherapy, chemoradiation, targeted therapy, and immunotherapy. Systemic therapy might be used alone or with other therapies. Goals of systemic therapy should be discussed before starting treatment. Your wishes about treatment are important. Make your wishes known.

- Systemic therapy or chemoradiation given before surgery is called **neoadjuvant or preoperative therapy**.
- Systemic therapy given before and after surgery is called **perioperative therapy**.
- Systemic therapy or radiation therapy given after surgery is called **adjuvant or postoperative therapy**.
- Systemic therapy given for advanced disease may be called **palliative therapy**.

## Chemotherapy

Chemotherapy kills fast-dividing cells throughout the body, including cancer cells and some normal cells. More than one chemotherapy may be used to treat stomach cancer. When only one drug is used, it's called a single agent. A combination or multi-agent regimen is the use of two or more chemotherapy drugs.

Some chemotherapy drugs are liquids that are infused into a vein or injected under the skin with a needle. Other chemotherapy drugs may be given as a pill that is swallowed.



### Warnings about supplements and drug interactions

You might be asked to stop taking or avoid certain herbal supplements when on a systemic therapy. Some supplements can affect the ability of a drug to do its job. This is called a drug interaction.

**It is critical to speak with your care team about any supplements you may be taking. Some examples include:**

- Turmeric
- Gingko biloba
- Green tea extract
- St. John's Wort
- Antioxidants

Certain medicines can also affect the ability of a drug to do its job. Antacids, heart or blood pressure medicine, and antidepressants are just some of the medicines that might interact with a systemic therapy. Therefore, it is very important to tell your care team about any medicines, vitamins, over-the-counter (OTC) drugs, herbals, or supplements you are taking.

**Bring a list with you to every visit.**

Some examples of chemotherapy drugs include the following:

- Capecitabine (Xeloda)
- Carboplatin
- Cisplatin
- Docetaxel (Taxotere)
- Fluorouracil
- Irinotecan (Camptosar)
- Oxaliplatin (Eloxatin)
- Paclitaxel

### Antibody drug conjugates

Antibody drug conjugates (ADCs) deliver cell-specific chemotherapy. They attach to a protein found on the outside of the cancer cell, then enter the cell. Once inside the cell, chemotherapy is released. An example is fam-trastuzumab deruxtecan-nxki (Enhertu), which attaches to HER2.

## Chemoradiation

Treatment that combines chemotherapy with radiation therapy is called chemoradiation. Chemotherapy may improve how well radiation works, and that is why they are sometimes used together. Chemoradiation may be used to control symptoms caused by a tumor or to shrink the tumor before surgery.

## Targeted therapy

Targeted therapy focuses on specific or unique features of cancer cells. Targeted therapies seek out how cancer cells grow, divide, and move in the body. These drugs stop or inhibit

the action of molecules that help cancer cells grow and/or survive.

Some examples of targeted therapies include:

- Trastuzumab (Herceptin) or substitutes (biosimilars)
- Ramucirumab (Cyramza)

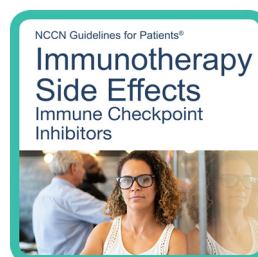
In some cases, the following targeted therapies might be used:

- Entrectinib (Rozlytrek)
- Dabrafenib (Tafinlar)
- Larotrectinib (Vitrakvi)
- Selpercatinib (Retevmo)
- Trametinib (Mekinist)

## Immunotherapy

Immunotherapy is a type of systemic treatment that tries to reactivate the immune system against tumor cells. The immune system has many on and off switches. Tumors take advantage of "off switches." Two leading off switches are PD-1 and CTLA-4. Immunotherapy can be given alone or with other types of treatment. Some immunotherapy examples are nivolumab (Opdivo), pembrolizumab (Keytruda), and dostarlimab-gxly (Jemperli).

More information on checkpoint inhibitors and immunotherapy side effects is available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.



## Radiation therapy

Radiation therapy (RT) or radiotherapy uses high-energy radiation from x-rays, photons, protons, electrons, and other sources to kill cancer cells and shrink tumors. RT can be given alone or with other treatments. Treatment may focus on individual tumors, a small area/region of the body, specific lymph nodes, or areas where there may be small, undetectable tumor deposits. RT is used to treat the tumor in the target areas. However, RT cannot be safely used to treat very large areas and does not substitute for systemic therapy that circulates everywhere in the body in the blood.

RT may be used as supportive care or palliative care to help ease pain or discomfort caused by cancer, or to control bleeding caused by a tumor. RT can also be given before or after surgery to treat or slow the growth of cancer, especially if the surgical margins have cancer cells.

Most types of radiation include short treatment sessions that are given in small doses, once a day over a few days to weeks. This keeps your internal organs safe while still killing tumor cells in the targeted area. For this reason, RT can treat areas that may not be possible to remove with surgery. Most of the time you will not feel the radiation treatment each day, but side effects might develop over the weeks of treatment. Ask your care team which radiation option(s) are best for you and what side effects and long-term effects to expect.

A four-dimensional (4D) CT scan might be used to plan RT. A 4D-CT records multiple images over time. It allows playback of the scan as a video, so that internal movement of your organs can be tracked and accounted for in targeting the RT.

## EBRT

External beam radiation therapy (EBRT) uses a machine outside of the body to aim radiation at the tumor(s) or areas of the body.

Common types of EBRT that may be used to treat your cancer include the following:

- **Three-dimensional conformal radiation therapy (3D-CRT)** uses computer software and CT images to aim beams that match the shape of the tumor and limit radiation exposure to normal body parts.
- **Intensity-modulated radiation therapy (IMRT)** uses small beams of different strengths to match the shape of the tumor and limit radiation exposure to normal body parts.
- **Proton radiotherapy** uses an atomic particle beam that generates x-rays inside your body to treat the tumor. In some cases, this technology may be recommended when it can be used to reduce risks to internal organs.
- **Stereotactic radiotherapy (SBRT)** uses precision, highly-focused radiation beams to give high doses of radiation often over 1 to 5 days to treat small, well-defined areas of tumor. This is not generally used to treat tumors in the stomach itself since the high dose may cause injury. However, SBRT may be used for stomach cancer that has spread to other areas of the body.

## Clinical trials

A clinical trial is a type of medical research study. After being developed and tested in a laboratory, potential new ways of treating

cancer need to be studied in people. If found to be safe and effective in a clinical trial, a drug, device, or treatment approach may be approved by the U.S. Food and Drug Administration (FDA).

Everyone with cancer should carefully consider all of the treatment options available for their cancer type, including standard treatments and clinical trials. Talk to your doctor about whether a clinical trial may make sense for you.

## Phases

Most cancer clinical trials focus on treatment. Treatment trials are done in phases.

- **Phase I** trials study the dose, safety, and side effects of an investigational drug or treatment approach. They also look for early signs that the drug or approach is helpful.
- **Phase II** trials study how well the drug or approach works against a specific type of cancer.
- **Phase III** trials test the drug or approach against a standard treatment. If the results are good, it may be approved by the FDA.
- **Phase IV** trials study the long-term safety and benefit of an FDA-approved treatment.

## Who can enroll?

Every clinical trial has rules for joining, called eligibility criteria. The rules may be about age, cancer type and stage, treatment history, or general health. These requirements ensure that participants are alike in specific ways and that the trial is as safe as possible for the participants.



## Finding a clinical trial

### In the United States

**NCCN Cancer Centers**  
[NCCN.org/cancercenters](https://www.nccn.org/cancercenters)

**The National Cancer Institute (NCI)**  
[cancer.gov/about-cancer/treatment/clinical-trials/search](https://www.cancer.gov/about-cancer/treatment/clinical-trials/search)

### Worldwide

**The U.S. National Library of Medicine (NLM)**  
[clinicaltrials.gov](https://clinicaltrials.gov)

### Need help finding a clinical trial?

**NCI's Cancer Information Service (CIS)**  
1.800.4.CANCER (1.800.422.6237)  
[cancer.gov/contact](https://www.cancer.gov/contact)

## Informed consent

Clinical trials are managed by a group of experts called a research team. The research team will review the study with you in detail, including its purpose and the risks and benefits of joining. All of this information is also provided in an informed consent form. Read the form carefully and ask questions before signing it. Take time to discuss with family, friends, or others whom you trust. Keep in mind that you can leave and seek treatment outside of the clinical trial at any time.

## Start the conversation

Don't wait for your doctor to bring up clinical trials. Start the conversation and learn about all of your treatment options. If you find a study for which you may be eligible, ask your treatment team if you meet the requirements. If you have already started standard treatment, you may not be eligible for certain clinical trials. Try not to be discouraged if you cannot join. New clinical trials are always becoming available.

## Frequently asked questions

There are many myths and misconceptions surrounding clinical trials. The possible benefits and risks are not well understood by many with cancer.

### Will I get a placebo?

Placebos (inactive versions of real medicines) are almost never used alone in cancer clinical trials. It is common to receive either a placebo with a standard treatment, or a new drug with a standard treatment. You will be informed, verbally and in writing, if a placebo is part of a clinical trial before you enroll.

### Do I have to pay to be in a clinical trial?

Rarely. It depends on the study, your health insurance, and the state in which you live. In general, procedures, drugs, or tests that are considered standard of care will be billed to you or your insurance, whereas those considered research are covered by the trial sponsor. Your treatment team and the research team can help determine if you are responsible for any costs.

**Standard of care is the best-known way to treat particular disease based on past clinical trials. There may be more than one treatment regimen that is considered standard of care. Ask your care team what treatment options are available and if a clinical trail might be right for you.**



## Supportive care

Supportive care will be specific to your needs. Supportive care is health care given to prevent, reduce, and relieve suffering, and to improve quality of life. Supportive care might include pain relief, palliative care, emotional or spiritual support, financial aid, or family counseling. Tell your care team how you are feeling and about any side effects so they can be managed. Best supportive care, supportive care, and palliative care are often used interchangeably.

It is very important to take care of yourself by eating well, drinking plenty of fluids, exercising, and doing things that make you feel energized. Strength is needed to sustain you during treatment.

### Side effects

All cancer treatments can cause unwanted health issues called side effects. Side effects depend on many factors. These factors include the drug type and dose, length of treatment, and the person. Some side effects may be harmful to your health. Others may just be unpleasant. Treatment can cause several side effects. Some are very serious.

Ask for a complete list of side effects of your treatments. Also, tell your treatment team about any new or worsening symptoms. There may be ways to help you feel better. There are also ways to prevent some side effects. You will be monitored closely for side effects.

### Late effects

Late effects are side effects that occur months or years after a disease is diagnosed or after treatment has ended. Late effects may be caused by cancer or cancer treatment. They may include physical, mental, and social

It is important to tell your care team about all side effects so they can be managed.

problems, and second cancers. The sooner late effects are treated the better. Ask your care team about what late effects could occur. This will help you know what to look for.

### Survivorship

A person is a cancer survivor from the time of diagnosis until the end of life. When treatment leads to remission (or no evidence of disease), you will need follow-up or survivorship care for late effects. During survivorship care you will still have a care team, but it will look different. Seek out peer support groups, whether online or in person.

## Side effects

### Bleeding

Bleeding is common in those with stomach cancer. It may be caused by the tumor or a result of treatment. An endoscopic treatment, radiation therapy (if not done before), and an angiography with embolization might be used to treat (stop) bleeding.

An angiography might be done when a blood vessel has narrowed or suddenly becomes blocked and does not allow blood to flow. In an angiography, a catheter (thin plastic tube) is inserted into an artery through a small incision in the skin and guided to the area with the use of x-rays. A contrast material is injected through the tube and x-ray images produce a picture of the blood vessel called an angiogram.

Embolization is the process of blocking blood flow through a blood vessel. This is performed by placing various materials through the angiography catheter while it is inside the blood vessel. The material can be a coil, small beads, or liquid medicine that causes the blood to clot and blocks its flow.

### Blocked esophagus

A tumor may block the esophagus, the esophagogastric junction (EGJ), or the stomach cardia. An esophageal stent is a tube that widens the esophagus so food can pass into the stomach.

### Blocked stomach

A tumor may block food from passing out of your stomach through the first part of the small intestine (duodenum). This blockage can cause pain, vomiting, weight

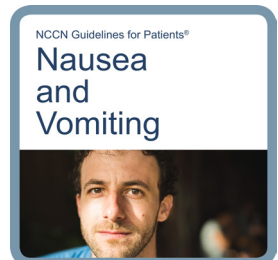
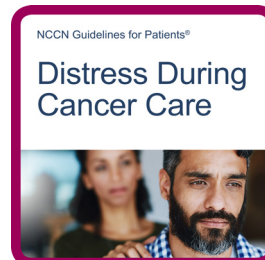
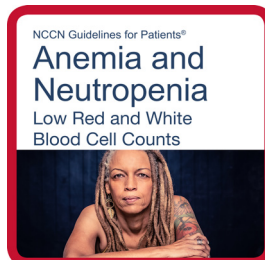
loss, and other problems. Treatments for a blocked stomach include a stent (enteral), a percutaneous endoscopic gastrostomy (PEG) tube, a stomach-duodenum bypass (gastrojejunostomy), systemic therapy, or radiation therapy.

A stent is a metal or plastic tube that expands. It is placed in the stomach to keep your stomach open so food can pass through. A PEG tube is inserted through a cut in the abdomen and placed in the stomach. Food is given through this tube. A gastrojejunostomy is a surgery to reroute the path food takes from the stomach into the small intestine. The new path from the stomach will avoid (bypass) the blocked part of the duodenum. This surgery may also be done as a preventive measure if there is a high risk that your stomach may become blocked.

### Blood clots

Cancer or cancer treatment can cause blood clots to form. This can block blood flow and oxygen in the body. Blood clots can break loose and travel to other parts of the body causing stroke or other health issues. Venous thromboembolism (VTE) refers to blood clots in the veins.

**More information on supportive care is available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.**





## Diarrhea

Diarrhea is frequent and watery bowel movements. Your care team will tell you how to manage diarrhea. It is important to drink lots of fluids.

## Difficulty eating

Sometimes side effects from surgery, cancer, or its treatment might cause you to feel not hungry or sick to your stomach (nauseated). You might have a sore mouth. Healthy eating is important during treatment. It includes eating a balanced diet, eating the right amount of food, and drinking enough fluids. A registered dietitian who is an expert in nutrition and food can help. Speak to your care team if you have trouble eating or maintaining weight.

## Distress

Depression, anxiety, and sleeping issues are common and are a normal part of cancer diagnosis. Talk to your care team and with those whom you feel most comfortable about how you are feeling. There are services, people, and medicine that can help you. Support and counseling services are available.

## Fatigue

Fatigue is extreme tiredness and inability to function due to lack of energy. Fatigue may be caused by cancer or it may be a side effect of treatment. Let your care team know how you are feeling and if fatigue is getting in the way of doing the things you enjoy. Eating a balanced diet, exercise, yoga, acupuncture, and massage therapy can help. You might be referred to a nutritionist or dietitian to help with fatigue.

## Low blood cell counts

Some cancer treatments can cause low blood cell counts.

- **Anemia** is a condition where your body does not have enough healthy blood cells, resulting in less oxygen being carried to your cells. You might tire easily if you are anemic.
- **Neutropenia** is a decrease in neutrophils, a type of white blood cell. This puts you at risk for infection.
- **Thrombocytopenia** is a condition where there are not enough platelets found in the blood. This puts you at risk for bleeding.

## Nausea and vomiting

Nausea and vomiting are common side effects of treatment. You will be given medicine to prevent nausea and vomiting.

## Neuropathy

Neuropathy is a nerve problem that causes pain, numbness, tingling, swelling, or muscle weakness in different parts of the body. It usually begins in the hands or feet and gets worse over time. Neuropathy may be caused by cancer or cancer treatment. Most of the time, neuropathy goes away after treatment.

## Pain

Tell your care team about any pain or discomfort. You might meet with a palliative care specialist or with a pain specialist to manage pain.

Pain is common in those with a tumor causing a blockage or for metastatic stomach cancer. Severe abdominal pain can occur when the

tumor grows into nearby nerves or presses against other organs. This pain is treated with around-the-clock medicine such as morphine or other opioids (narcotics). Sometimes, non-narcotic medicines are used to treat pain.

Some people may benefit from palliative radiation therapy, with or without systemic therapy, to help relieve the pain. During this treatment, a radiation beam is focused on the tumor.

## Key points

- Surgery is a main or primary treatment for stomach cancer. A gastrectomy removes all or part of the stomach.
  - A resectable tumor can be removed with surgery. An unresectable tumor cannot be removed with surgery.
  - You can live without a stomach. You will have a working digestive system that allows swallowing, eating, and digesting food, but in a much different way.
  - Systemic therapy works throughout the body. It includes chemotherapy, chemoradiation, targeted therapy, and immunotherapy.
  - Radiation therapy (RT) uses high-energy radiation from x-rays, protons, photons, and other sources to kill cancer cells and shrink tumors.
  - A clinical trial is a type of research that studies a treatment to see how safe it is and how well it works.
  - Supportive care is health care that relieves symptoms caused by cancer or its treatment and improves quality of life. Supportive care is always given.
- All cancer treatments can cause unwanted health issues called side effects. It is important for you to tell your care team about all your side effects so they can be managed.
  - Eating a balanced diet, drinking enough fluids, exercise, yoga, acupuncture, and massage therapy can help manage side effects.
  - Pain may be treated with medication, or radiation with or without systemic therapy. Keeping a pain diary might help you manage pain.
  - A registered dietitian who is an expert in nutrition and food can help if it is hard for you to eat or digest food.
  - If you smoke or vape, it is important to quit for the best treatment results.

### Did you know?

The terms “chemotherapy” and “systemic therapy” are often used interchangeably, but they are not the same. Systemic therapy works throughout the body and includes chemotherapy, targeted therapy, immunotherapy, endocrine therapy, and others.

# 5

## Early-stage disease

50 Treatment

50 Follow-up care

51 Key points

**Early-stage stomach cancer has not grown beyond the first layer of the stomach wall. Treatment is an endoscopic resection or surgery. Together, you and your care team will choose a treatment plan that is best for you.**

Carcinoma *in situ* (Tis) and T1a tumors are often considered early-stage cancer. This includes pre-cancer and cancer that has not grown beyond the lamina propria or muscularis mucosae of the first layer of the stomach wall (the mucosa).

## Treatment

Treatment for early-stage stomach cancer is an endoscopic resection or surgery.

### No surgery

Surgery is not for everyone. You must be healthy enough for surgery and not have other serious health issues. An endoscopic resection (ER) is an option instead of surgery. In this procedure, an endoscope is passed down your throat to remove the lesion or tumor in your stomach. After an ER, you will enter surveillance where you will be monitored for the return of cancer called recurrence.

### Surgery

Surgery to remove the tumor might be option if you are healthy enough for major surgery. A sample of your tumor removed during surgery will be tested and staged. This is called the

pathologic stage. If tests confirm the cancer is in the early stage, then you will enter surveillance where you will be monitored for the return of cancer.

## Follow-up care

After treatment, you will receive follow-up care. It is important to keep any follow-up doctor visits and imaging test appointments.

### Tis

If your carcinoma *in situ* (Tis) was successfully treated with an endoscopic resection, then follow-up care might include:

- Medical history and physical exam every 3 to 6 months for 1 to 2 years, then every 6 to 12 months for 3 to 5 years
- Complete blood count (CBC) and chemistry profile, as needed
- Upper GI endoscopy (EGD) every 6 months for 1 year, then annually for 3 years
- Routine imaging (CT scan of chest/abdomen/pelvis with oral and IV contrast) as needed based on symptoms and concern for recurrence

### pT1a

A T1a tumor has not grown beyond the lamina propria or muscularis mucosae of the first layer of the stomach wall (the mucosa).

If your T1a was successfully treated with an endoscopic resection or surgery, then follow-up care might include:

- Medical history and physical exam every 3 to 6 months for 1 to 2 years, then every 6 to 12 months for 3 to 5 years

- CBC and chemistry profile, as needed
- For those treated by endoscopic resection, upper GI endoscopy (EGD) every 6 months for 1 year, then once a year for up to 5 years. Thereafter, as needed based on symptoms and/or test results
- For those treated by surgery, EGD as needed
- CT scan of chest/abdomen/pelvis with oral and IV contrast, as needed
- Monitoring for nutritional deficiency (such as low levels of B12 and iron), as needed

## Key points

- Carcinoma *in situ* (Tis) is cancer that has not grown beyond the epithelium.
- A T1a tumor has not grown beyond the lamina propria or muscularis mucosae.
- The epithelium is part of the first layer of the stomach wall called the mucosa.
- Surgery is not for everyone. You must be healthy enough for surgery and not have other serious health issues. Your wishes are also important.
- An endoscopic resection (ER) is an option instead of surgery.
- After treatment with an ER or surgery, you will receive follow-up care. It is important to keep any follow-up doctor visits and imaging test appointments.



### **We want your feedback!**

**Our goal is to provide helpful and easy-to-understand information on cancer.**

**Take our survey to let us know what we got right and what we could do better.**

[NCCN.org/patients/feedback](https://www.nccn.org/patients/feedback)

# 6

## Locoregional disease

53 Surgery

54 After surgery

55 No surgery

56 Follow-up care

56 Key points

**In locoregional stomach cancer, the tumor has invaded the second layer of the stomach wall and/or spread to the lymph nodes or organs near the stomach.**

**Locoregional or locally advanced disease has not spread to distant sites in the body. Together, you and your care team will choose a treatment plan that is best for you.**

Before treatment, you might have a laparoscopy to look for cancer in the abdominal lining (peritoneum) and take biopsy samples.

## Surgery

Surgery to remove the tumor might be an option. Ask what might be removed during surgery, how to prepare for surgery, and what to expect during recovery.

### cT1b

A clinical stage T1b (cT1b) tumor has invaded the second layer of the stomach wall (the submucosa). Treatment is surgery to remove the tumor.

### cT2 or higher

A cT2 tumor has invaded the third layer of the stomach wall (the muscle layer called muscularis propria). Cancer may be in the lymph nodes. You will need a laparoscopy before starting therapy. You will receive chemotherapy or chemoradiation before surgery.

For chemotherapy and chemoradiation therapy options, **see Guide 2**.

### Guide 2

#### Before surgery options

<b>Chemotherapy</b>	<ul style="list-style-type: none"> <li>• Fluorouracil, leucovorin, oxaliplatin, and docetaxel (FLOT) (preferred)</li> <li>• Fluoropyrimidine and oxaliplatin (preferred)</li> <li>• Fluorouracil and cisplatin</li> </ul>
<b>Chemoradiation</b>	<ul style="list-style-type: none"> <li>• Paclitaxel and carboplatin</li> <li>• Fluorouracil and oxaliplatin</li> <li>• Fluorouracil and cisplatin</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine)</li> </ul>

## After surgery

A sample of your tumor and lymph nodes removed during surgery will be tested and staged. Find out if you are having a D1 or D2 lymph node dissection. Staging after information gained during surgery is the pathologic stage (p). Treatment is based on the pTNM score and if you had chemotherapy or chemoradiation before surgery.

### R0

In a clear or negative margin (R0), no cancerous cells are found in the tissue around the edge of the tumor (resection margins). Cancer may be in regional lymph nodes.

If you received preoperative chemoradiation, then you will enter surveillance and be monitored for recurrence or progression. If you received chemotherapy before surgery, then you will have more chemotherapy.

If you had surgery only, then next steps are based on how far the tumor has grown into the wall of the stomach and if there was any cancer in regional lymph nodes.

- For a pT1 or pT2 tumor with no cancer in lymph nodes (N0), you will enter surveillance. This monitors for the return of cancer.
- For some with a pT2 tumor and no cancer in lymph nodes (N0) or tumors with less than a D2 dissection, treatment will be fluoropyrimidine (fluorouracil or capecitabine) before and after fluoropyrimidine-based chemoradiation.
- For those who have undergone a D2 lymph node dissection, treatment will be chemotherapy. Preferred agents are capecitabine with oxaliplatin or fluorouracil with oxaliplatin.

## Order of treatments

Most people with cancer will receive more than one type of treatment. Below is an overview of the order of treatments.

- ✓ **Preoperative or neoadjuvant (before) therapy** is given to shrink the tumor before a primary treatment such as surgery.
- ✓ **Perioperative therapy** is systemic therapy, such as chemotherapy, given before and after surgery.
- ✓ **Primary treatment** is the main treatment given to rid the body of cancer.
- ✓ **Postoperative or adjuvant (after) therapy** is given after primary treatment to rid the body of any cancer cells left behind from surgery. It is also used when the risk of cancer returning (recurrence) is felt to be high.
- ✓ **First-line therapy** is the first set of systemic (drug) treatment given.
- ✓ **Second-line therapy** is the next set of treatment given if cancer progresses during or after systemic therapy.

Talk to your care team about your treatment plan and what it means for your stage and type of cancer.



## R1

In an R1 positive margin, the surgeon removes all the visible tumor, but the microscopic margins are still positive for tumor cells. Despite best efforts this can happen. Treatment is fluoropyrimidine-based chemoradiation if you did not have it before. You might have another surgery.

## R2

In an R2 positive margin, the surgeon is unable to remove all the visible tumor or there is metastatic disease (M1). Treatment is fluoropyrimidine-based chemoradiation only if you did not have it before surgery. Palliative care is also an option. Palliative care aims to manage symptoms, improve quality of life, and extend life. More information on palliative care can be found in the next chapter.

## No surgery

Surgery is not for everyone. If you are not having surgery, then treatment will focus on palliative management. This is care given to manage symptoms, improve quality of life, and extend life. Your wishes about treatment are always important. More information on palliative care can be found in the next chapter.

## Unresectable

Not all tumors can be removed with surgery. An unresectable tumor cannot be removed completely with surgery. Unresectable cancer might be treated first with chemoradiation or systemic therapy. This is sometimes called neoadjuvant or preoperative therapy. The goal is to try to shrink the tumor to make it easier to remove during surgery. Neoadjuvant therapy might cause an unresectable tumor to become resectable.

After neoadjuvant treatment, you will have imaging and blood tests to restage the

**Your preferences about treatment are always important. Talk to your care team and make your wishes known.**



cancer. If the tumor is now resectable and can be removed, then surgery is the preferred treatment, when possible. If the tumor remains unresectable, then treatment will focus on palliative management found in the next chapter.

## Follow-up care

If your tumor was treated with surgery, then follow-up care might include:

- Medical history and physical exam every 3 to 6 months for 1 to 2 years, then every 6 to 12 months for 3 to 5 years
- Complete blood count (CBC) and chemistry profile, as needed
- Upper GI endoscopy (EGD), as needed
- CT scan of chest/abdomen/pelvis with oral and IV contrast and/or an FDG PET/CT
- Monitor for nutritional deficiency (such as low levels of B12 and iron), as needed

## Key points

- In locoregional or locally advanced disease, the tumor may be any size and cancer may be in lymph nodes and nearby organs.
- In locoregional or locally advanced stomach cancer, the tumor has grown beyond the first layer of the stomach wall and/or spread to nearby lymph nodes or organs.
- Locoregional stomach cancer is not metastatic disease.
- Surgery is not for everyone. If surgery is not an option, then treatment will focus on palliative care. Your wishes are always important.
- Palliative care is given to manage symptoms, improve quality of life, and extend life.
- Not all tumors can be removed with surgery. This is an unresectable tumor. Unresectable cancer might be treated with chemoradiation or systemic therapy. If the tumor shrinks, then surgery might be possible.
- You will have follow-up care after surgery to monitor for cancer recurrence.

# 7

## Recurrence and metastatic disease

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58 Palliative care

61 Key points

**This chapter discusses treatment options for recurrence and metastatic disease. Recurrence is the return of cancer. Stomach cancer that has spread to distant sites in the body is called metastatic disease. Together, you and your doctor will choose a treatment plan that is best for you.**

## Overview

When cancer returns near the stomach, it is called locoregional recurrence. Surgery might be an option for those with a locoregional resectable tumor. Palliative care is also an option. Stomach cancer that has spread to distant sites in the body is called metastatic disease. It might be referred to as stage 4 cancer. The goal of treatment is to reduce the amount of cancer, called cancer burden, and to prevent the further spread of cancer.

For unresectable locoregional recurrence or metastatic disease, treatment will focus on palliative care. Options are based on your performance status (PS). PS is a person's general level of fitness and ability to perform daily tasks.

## Palliative care

Treatment for recurrence and metastatic disease is referred to as palliative management. It is care to manage symptoms, improve quality of life, and extend life. It might include chemoradiation, systemic therapy, or best supportive care. Your wishes about treatment are always important. You might have tumor testing, if not done before.

### Best supportive care

Best supportive care includes treatment for bleeding, blockages, pain, nausea, and vomiting. Best supportive care, supportive care, and palliative care are often used interchangeably.

### Systemic therapy

First-line therapies are given first. Options are based on the systemic therapy you had before and your PS. A biosimilar might be used in place of trastuzumab. A biosimilar is almost an identical drug made by another company. It is used in the exact same way and at the same dose as trastuzumab. Ask your care team why one therapy might be chosen over another. The reason might be related to tumor mutations, cost, toxicity, or availability. Your wishes are always important.

First-line systemic therapy options can be found in **Guide 3**.

<b>Guide 3</b>	
<b>First-line therapy options</b>	
<b>Preferred options</b>	<p>For HER2 overexpression positive tumors:</p> <ul style="list-style-type: none"> <li>• Fluoropyrimidine (fluorouracil or capecitabine), oxaliplatin, and trastuzumab</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine), oxaliplatin, trastuzumab, and pembrolizumab</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine), cisplatin, and trastuzumab</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine), cisplatin, trastuzumab, and pembrolizumab</li> </ul> <hr/> <p>For HER2 overexpression negative tumors:</p> <ul style="list-style-type: none"> <li>• Fluoropyrimidine (fluorouracil or capecitabine), oxaliplatin, and nivolumab</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine) and oxaliplatin</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine) and cisplatin</li> </ul>
<b>Other recommended</b>	<ul style="list-style-type: none"> <li>• Fluorouracil and irinotecan</li> <li>• Paclitaxel with or without cisplatin or carboplatin</li> <li>• Docetaxel with or without cisplatin</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine)</li> <li>• Docetaxel, cisplatin or oxaliplatin, and fluorouracil</li> <li>• Docetaxel, carboplatin, and fluorouracil</li> </ul>
<b>Used in some cases</b>	<p>For HER2 overexpression negative tumors:</p> <ul style="list-style-type: none"> <li>• Fluoropyrimidine (fluorouracil or capecitabine), oxaliplatin, and nivolumab</li> </ul>
<b>Notes</b>	<ul style="list-style-type: none"> <li>• An FDA-approved biosimilar might be used for trastuzumab.</li> <li>• Leucovorin might be added to fluorouracil-based regimens.</li> </ul>

Next-line systemic therapy options can be found in **Guide 4**.

<b>Guide 4</b> <b>Next-line therapy options</b>	
<b>Preferred options</b>	<ul style="list-style-type: none"> <li>• Ramucirumab and paclitaxel</li> <li>• Fam-trastuzumab deruxtecan-nxki for HER2 overexpression positive adenocarcinoma</li> <li>• Docetaxel</li> <li>• Paclitaxel</li> <li>• Irinotecan</li> <li>• Fluorouracil and irinotecan</li> <li>• Trifluridine and tipiracil for third-line or later therapy</li> </ul>
<b>Other recommended</b>	<ul style="list-style-type: none"> <li>• Ramucirumab</li> <li>• Irinotecan and cisplatin</li> <li>• Fluorouracil, irinotecan, and ramucirumab</li> <li>• Fluoropyrimidine (fluorouracil or capecitabine)</li> <li>• Irinotecan and ramucirumab</li> <li>• Docetaxel and irinotecan</li> </ul>
<b>Used in some cases</b>	<ul style="list-style-type: none"> <li>• Entrectinib or larotrectinib for <i>NTRK</i> gene fusion-positive tumors</li> <li>• Pembrolizumab for MSI-H or dMMR tumors</li> <li>• Pembrolizumab for TMB-high tumors (10 or more mutations per megabase)</li> <li>• Dostarlimab-gxly for MSI-H or dMMR tumors</li> <li>• Dabrafenib and trametinib for <i>BRAF</i> V600E mutated tumors</li> <li>• Selpercatinib for <i>RET</i> gene fusion-positive tumors</li> </ul>
<b>Notes</b>	<ul style="list-style-type: none"> <li>• Leucovorin might be added to fluorouracil-based regimens.</li> </ul>

## Key points

- When cancer returns near the stomach, it is called locoregional recurrence.
- Stomach cancer that has spread to distant sites in the body is called metastatic disease.
- Surgery might be an option for those with a locoregional resectable tumor.
- For unresectable locoregional recurrence, metastatic disease, or those who aren't having surgery, then treatment will focus on palliative management. This is care to manage symptoms, improve quality of life, and extend life.
- Options for managing recurrence and metastatic disease are based on your performance status (PS). PS is a person's general level of fitness and ability to perform daily tasks.
- Best supportive care is an option for anyone. Chemoradiation or systemic therapy may be an option if your PS is good or high.
- First-line therapies are given first. Options are based on the systemic therapy you had before and your PS.

### Keep a pain diary

A pain diary is a written record that helps you keep track of when you have pain, how bad it is, what causes it, and what makes it better or worse. Use a pain diary to discuss your pain with your care team. You might be referred to a specialist for pain management.

Include in your pain diary:

- ✓ The time and dose of all medicines
- ✓ When pain starts and ends or lessens
- ✓ Where you feel pain
- ✓ A description of your pain. Is it throbbing, sharp, tingling, shooting, or burning? Is it constant, or does it come and go?
- ✓ Does the pain change at different times of day? When?
- ✓ Does the pain get worse before or after meals? Does certain food or drink make it better?
- ✓ Does the pain get better or worse with activity? What kind of activity?
- ✓ Does the pain keep you from falling asleep at night? Does pain wake you up in the night?
- ✓ A rating of your pain from 0 (no pain) to 10 (worst pain you have ever felt)
- ✓ Does pain get in the way of you doing the things you enjoy?

# 8

## After treatment

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**After treatment, you will be monitored for any new or ongoing health concerns. It is important to keep any follow-up health care provider visits and imaging test appointments. Maintain your weight, eat a mostly plant-based diet, exercise, limit alcohol use, and if you smoke or vape, seek help to quit.**

## Monitoring

In addition to monitoring for the possible return of cancer called recurrence, you should seek good routine medical care, including regular visits for preventive care and cancer screening. Routine stomach cancer-specific tests such as imaging, endoscopy, or tumor tests are not recommended after 5 years. It is important to keep any follow-up health care provider visits and imaging test appointments.

## Cancer screenings

Schedule cancer screenings and vaccinations as recommended by your health care provider (HCP) based on your age, risk, and other factors. See your HCP regularly for checkups and cancer screenings, which may include screenings for skin, breast, prostate, colorectal, and other types of cancer.

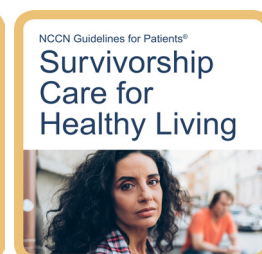
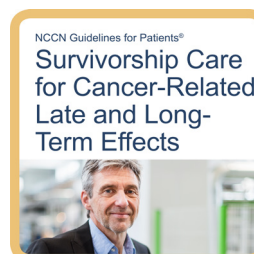
## Survivorship

A person is a cancer survivor from the time of diagnosis until the end of life. When treatment leads to remission (or no evidence of disease), you will need follow-up or survivorship care for late effects. During survivorship care you will still have a care team, but it will look different. Seek out peer support groups, whether online or in person.

In general:

- Maintain a healthy weight for your body throughout life.
- Adopt a physically active lifestyle and avoid inactivity. The goal is at least 30 minutes of moderate-intensity activity most days of the week.
- Eat a mostly plant-based diet.
- Limit alcohol use.
- If you smoke or vape, seek help to quit.

More information on survivorship is available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.



## Long-term side effects

Stomach cancer survivors are monitored for long-term side effects. Side effects can be managed. Talk to your health care provider about how you are feeling.

### Blind loop syndrome

Blind loop syndrome is a bacterial overgrowth in the small intestine. After a total gastrectomy, food doesn't follow the normal digestion route and bypasses a section of your intestine. This can cause an infection. One of the main symptoms of blind loop syndrome is unexplained weight loss. To help prevent blind loop syndrome, eat a diet high in protein and low in carbohydrates.

### Bone health

You will be screened regularly for low bone density. You may receive medicine to manage low bone density. In addition, your HCP may consider vitamin D testing as needed. Talk to your HCP before taking any over-the-counter (OTC) supplements, vitamins, or medicines.

### Diarrhea

Diarrhea is frequent and watery bowel movements. Your care team will tell you how to manage diarrhea and may recommend medicines to stop the diarrhea. It is important to drink lots of fluids. Changes to your diet might help.

### Dumping syndrome

Dumping syndrome occurs when food empties into the small intestine too quickly. This may happen within 30 minutes after eating a meal (early dumping syndrome) or within 2 to 3 hours of eating (late dumping syndrome).

Symptoms of early dumping syndrome include palpitations, diarrhea, nausea, and cramps. Late dumping syndrome tends to cause dizziness, hunger, cold sweats, and faintness.

To help manage the symptoms of dumping syndrome:

- Eat often throughout the day
- Avoid drinking fluids with meals
- Eat a diet high in protein and fiber and low in simple carbohydrates and sugars

### Fatigue

Fatigue is extreme tiredness and inability to function due to lack of energy. Let your care team know how you are feeling and if fatigue is getting in the way of doing the things you enjoy. Eating a balanced diet, exercise, yoga, acupuncture, and massage therapy can help. You might be referred to a nutritionist or dietitian to help with fatigue.

### Fullness after meals and eating issues

Eat small portions and eat more often to cope with feeling full after meals. Also, avoid drinking fluids with meals. Continue to drink fluids in between meals.

## Indigestion

Indigestion is a general term that describes discomfort in your upper abdomen. Indigestion is also called dyspepsia or an upset stomach.

To prevent indigestion:

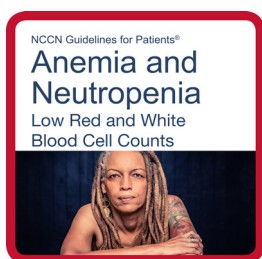
- Avoid foods that increase acid production such as citrus juices, tomato sauces, and spicy foods.
- Avoid foods that lower gastroesophageal sphincter tone such as caffeine, peppermint, and chocolate.

## Low iron

You will be monitored for low levels of iron called iron deficiency. A CBC and iron levels should be done at least once a year. You may be given iron supplements, if needed. Certain iron supplements will need to be avoided. Ask your health care provider for more information.

Low iron levels can cause too few healthy red blood cells in the body called anemia.

More information on Anemia and Neutropenia is available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.



## Low vitamin B12

Those who had a distal gastrectomy will be monitored for low levels of vitamin B12 called vitamin B12 deficiency. This vitamin is needed to make red blood cells, which carry oxygen to all parts of your body. A complete blood count (CBC) and B12 levels should be done every 3 months for up to 3 years, then every 6 months for up to 5 years, and once a year after 5 years. You may be given vitamin B12 supplements, if needed.

## Neuropathy

Neuropathy is a nerve issue that causes pain, numbness, tingling, swelling, or muscle weakness in different parts of the body. It usually begins in the hands or feet and gets worse over time. Neuropathy caused by chemotherapy is called chemotherapy-induced neuropathy. You might be referred to occupational, rehabilitation, and/or physical therapy.

## Weight loss

After a gastrectomy, your weight will be monitored for changes. Healthy eating is important after treatment. It includes eating a balanced diet, eating the right amount of food, and drinking enough fluids. Eat often and avoid fluids with meals. A registered dietitian who is an expert in nutrition and food can help if you have trouble eating or maintaining weight.

## Key points

- Surgery to remove all or part of your stomach can cause health problems. Your health will be monitored.
- A nutritionist or dietician provides guidance on what foods are best for your condition.
- Continue to see your primary health care provider on a regular basis and have preventive cancer screenings as recommended by your health care provider.
- Maintain a healthy body weight and active lifestyle.
- Eat often throughout the day.
- Avoid drinking fluids with meals.
- Eat a mostly plant-based diet that is high in protein and fiber and low in simple carbohydrates and sugars.
- Limit alcohol use.
- If you smoke or vape, seek help to quit.



### **Let us know what you think!**

**Please take a moment to complete an online survey about the NCCN Guidelines for Patients.**

[NCCN.org/patients/response](https://www.nccn.org/patients/response)

# 9

## Making treatment decisions

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- 68 Questions to ask
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**It's important to be comfortable with the cancer treatment you choose. This choice starts with having an open and honest conversation with your care team.**

## It's your choice

In shared decision-making, you and your care team share information, discuss the options, and agree on a treatment plan. It starts with an open and honest conversation between you and your care team.

Treatment decisions are very personal. What is important to you may not be important to someone else.

Some things that may play a role in your decision-making:

- What you want and how that might differ from what others want
- Your religious and spiritual beliefs
- Your feelings about certain treatments
- Your feelings about pain or side effects
- Cost of treatment, travel to treatment centers, and time away from school or work
- Quality of life and length of life
- How active you are and the activities that are important to you

Think about what you want from treatment. Discuss openly the risks and benefits of specific treatments and procedures. Weigh options and share concerns with your care

team. If you take the time to build a relationship with your care team, it will help you feel supported when considering options and making treatment decisions.

## Second opinion

It is normal to want to start treatment as soon as possible. While cancer can't be ignored, there is time to have another doctor review your test results and suggest a treatment plan. This is called getting a second opinion, and it's a normal part of cancer care. Even doctors get second opinions!

Things you can do to prepare:

- Check with your insurance company about its rules on second opinions. There may be out-of-pocket costs to see doctors who are not part of your insurance plan.
- Make plans to have copies of all your records sent to the doctor you will see for your second opinion.

## Support groups

Many people diagnosed with cancer find support groups to be helpful. Support groups often include people at different stages of treatment. Some people may be newly diagnosed, while others may be finished with treatment. If your hospital or community doesn't have support groups for people with cancer, check out the websites listed in this book.

## Questions to ask

Possible questions to ask your care team are listed on the following pages. Feel free to use these questions or come up with your own. Be clear about your goals for treatment and find out what to expect from treatment.

























## Resources

**Cancer Hope Network**

[cancerhopenetwork.org](https://cancerhopenetwork.org)

**Debbie's Dream Foundation: Curing Stomach Cancer**

[DebbiesDream.org](https://DebbiesDream.org)

**Hope for Stomach Cancer**

[Stocan.org](https://Stocan.org)

**MedlinePlus**

[medlineplus.gov/stomachcancer.html](https://medlineplus.gov/stomachcancer.html)

**National Cancer Institute (NCI)**

[cancer.gov/types/stomach](https://cancer.gov/types/stomach)

**No Stomach for Cancer**

[Nostomachforcancer.org](https://Nostomachforcancer.org)

**Triage Cancer**

[triagecancer.org](https://triagecancer.org)



## Words to know

### **abdomen**

The belly area between the chest and pelvis.

### **adenocarcinoma**

A cancer that starts in the mucus-making cells of the body.

### **ascites**

Abnormal buildup of fluid in the abdomen.

### **biopsy**

A procedure that removes fluid or tissue samples to be tested for a disease.

### **biosimilar**

A drug that is very much like one that has been approved by the U.S. Food and Drug Administration (FDA). It must be used in the exact same way and at the same dose as the other drug.

### **cancer stage**

A rating of the growth and spread of cancer.

### **chemoradiation**

Treatment that combines chemotherapy with radiation therapy.

### **chemotherapy**

Drugs that kill fast-dividing cells throughout the body, including cancer cells and some normal cells.

### **clinical stage (c)**

Rating the extent of a tumor based on tests before treatment.

### **clinical trial**

Research on a test or treatment to assess its safety or how well it works.

### **computed tomography (CT)**

A test that combines many x-rays to make pictures of the inside of the body.

### **contrast**

A substance put into your body to make clearer pictures during imaging tests.

### **deoxyribonucleic acid (DNA)**

A chain of chemicals in cells that contains coded instructions for making and controlling cells.

### **digestive system**

A set of organs that breaks down food for the body to use.

### **digestive tract**

A set of tube-shaped organs that breaks down food for the body to use. Part of the digestive system.

### **duodenum**

First part of the small intestine.

### **early stage**

Cancer that has had little or no growth into nearby tissues.

### **Eastern Cooperative Oncology Group (ECOG) Performance Scale**

A rating scale of one's ability to do daily activities.

### **endoscope**

A thin, long tube fitted with tools that is guided down the mouth.

### **endoscopic mucosal resection (EMR)**

Removal of early tumors with a snare that has been guided down the throat.

**endoscopic resection (ER)**

Treatment that removes early tumors with a tool guided down the throat.

**endoscopic submucosal dissection (ESD)**

Removal of early tumors with a special knife that has been guided down the throat.

**endoscopic ultrasound (EUS)**

A device guided down your throat to make pictures using sound waves.

**epithelium**

Cells that line the stomach wall.

**esophagogastric junction (EGJ)**

The area where the esophagus and stomach join.

**esophagogastroduodenoscopy (EGD)**

Use of a thin tool guided down the throat into the esophagus and stomach. Also called an upper GI endoscopy.

**esophagus**

The tube-shaped organ between the throat and stomach.

**external beam radiation therapy (EBRT)**

Radiation therapy received from a machine outside the body.

**fine-needle aspiration (FNA)**

Removal of a tissue sample with a thin needle.

**gastrectomy**

A surgery that removes some or all of the stomach.

**gastroenterologist**

A doctor who's an expert in digestive diseases. This system contains organs that break down food for the body to use.

**gastrointestinal (GI) tract**

The group of organs through which food passes after being eaten. Also called digestive tract.

**gene**

Coded instructions in cells for making new cells and controlling how cells behave.

**genetic counseling**

Expert guidance on the chance for a disease that is passed down in families.

**hereditary**

Passed down from biological parent to child through coded information in cells.

**histology**

The structure of cells, tissue, and organs as viewed under a microscope.

**human epidermal growth factor receptor 2 (HER2)**

A protein on the surface of a cell that sends signals for the cell to grow.

**jejunostomy tube (J-tube)**

A feeding tube that is inserted through a cut into the intestine.

**imaging**

A test that makes pictures (images) of the insides of the body.

**immune system**

The body's natural defense against infection and disease.

**immunotherapy**

A treatment with drugs that help the body find and destroy cancer cells.

**infection**

An illness caused by germs.

**interventional radiologist**

A doctor who is an expert in imaging tests and using image-guided tools to perform minimally invasive techniques to diagnose or treat disease.

**intestine**

The organ that food passes through after leaving the stomach.

**intravenous (IV)**

A method of giving drugs by a needle or tube inserted into a vein.

**Karnofsky Performance Status (KPS)**

A rating scale of one's ability to do daily activities.

**lamina propria**

Connective tissue within the mucosa of the stomach wall.

**laparoscopy**

Use of a thin tool inserted through a cut made into the belly area.

**lymph**

A clear fluid containing white blood cells.

**lymph node**

A small group of disease-fighting cells located throughout the body.

**lymph node dissection**

A type of surgery that removes some disease-fighting structures called lymph nodes.

**magnetic resonance imaging (MRI)**

A test that uses radio waves and powerful magnets to make pictures of the insides of the body.

**medical oncologist**

A doctor who's an expert in cancer drugs.

**metastasis**

The spread of cancer cells from the first (primary) tumor to a new site.

**microsatellite instability (MSI)**

Errors made in small, repeated DNA parts during the copy process because of an abnormal repair system.

**microsatellite instability-high (MSI-H)**

Mutations in 30% or more microsatellites.

**millimeters (mm)**

A unit of length measuring one thousandth of a meter.

**minimally invasive procedure**

A procedure that uses small incisions or a tool placed into the opening of the body to reduce damage to body tissue.

**mucosa**

The first, inner layer of the stomach wall.

**mucus**

A sticky, thick liquid that moisturizes or lubricates.

**muscularis mucosae**

A thin layer of muscle separating the mucosa from the submucosa of the stomach wall.

**muscularis propria**

The third layer of the stomach wall made mostly of muscle.

**mutation**

An abnormal change.

**pathologic stage (p)**

A rating of the extent of cancer based on microscopic review after treatment.

**pathologist**

A doctor who's an expert in examining tissue and cells to find disease.

**pelvis**

The area of the body between the hip bones.

**peritoneum**

The tissue that lines the abdominal wall and covers most of the organs in the abdomen (visceral peritoneum). Also called serosa.

**positron emission tomography (PET)**

A test that uses radioactive material to see the shape and function of body parts.

**primary treatment**

The main treatment used to rid the body of cancer.

**prognosis**

The likely course and outcome of a disease based on tests.

**radiation oncologist**

A doctor who's an expert in radiation treatment.

**radiation therapy**

A treatment that uses high-energy rays.

**radiologist**

A doctor who is an expert in imaging tests.

**recurrence**

The return of cancer after a cancer-free period.

**resectable**

Cancer that can be removed with surgery.

**risk factor**

Something that increases the chance of getting a disease.

**serosa**

The outer lining of organs within the abdominal cavity, including the stomach. Also called visceral peritoneum.

**side effect**

An unhealthy or unpleasant physical or emotional response to treatment.

**small intestine**

The digestive organ that absorbs nutrients from eaten food.

**standard of care**

The best-known way to treat a particular disease based on past clinical trials. There may be more than one treatment regimen that is considered standard of care

**submucosa**

The second layer of the stomach wall made mostly of connective tissue.

**subserosa**

A thin layer of connective tissue within the wall of the stomach.

**subtype**

A smaller group within a type of cancer that is based on certain cell features.

**supportive care**

Health care that includes symptom relief but not cancer treatment. Also called palliative care or best supportive care.

**surgical margin**

The normal-looking tissue around the edge of a tumor that is removed during surgery.

**surgical oncologist**

A surgeon who's an expert in performing surgical procedures in patients with cancer.

**targeted therapy**

Drugs that stop the growth process specific to cancer cells.

**tumor**

An abnormal mass of cells.

**tumor marker**

A substance found in body tissue or fluid that may be a sign of cancer.

**ultrasound (US)**

A test that uses sound waves to take pictures of the insides of the body.

**unresectable**

Cancer that can't be removed by surgery.

**upper endoscopy**

Use of a thin tool guided down the throat into the esophagus and stomach. Also called esophagogastroduodenoscopy (EGD).

**visceral peritoneum**

The lining (serosa) that surrounds the internal organs in the abdomen.

**widespread metastatic disease**

The spread of cancer from the first tumor to many new sites in the body.

# NCCN Contributors

This patient guide is based on the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Gastric Cancer Version 1.2023. It was adapted, reviewed, and published with help from the following people:

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Women's Cancer Center

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University of Michigan Rogel Cancer Center

Farhood Farjah, MD  
Fred Hutchinson Cancer Center

Hans Gerdes, MD  
Memorial Sloan Kettering Cancer Center

Michael Gibson, MD, PhD  
Vanderbilt-Ingram Cancer Center

Patrick Grierson, MD, PhD  
Siteman Cancer Center at Barnes-  
Jewish Hospital and Washington  
University School of Medicine

Wayne L. Hofstetter, MD  
The University of Texas  
MD Anderson Cancer Center

David H. Ilson, MD, PhD  
Memorial Sloan Kettering Cancer Center

Shadia Jalal, MD  
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Comprehensive Cancer Center

Rajesh N. Keswani, MD  
Robert H. Lurie Comprehensive Cancer  
Center of Northwestern University

Sunnie Kim, MD  
University of Colorado Cancer Center

\*Lawrence R. Kleinberg, MD  
The Sidney Kimmel Comprehensive  
Cancer Center at Johns Hopkins

Samuel Klempner, MD  
Massachusetts General Hospital  
Cancer Center

Jill Lacy, MD  
Yale Cancer Center/Smilow Cancer Hospital

Frank Licciardi  
Patient Advocate

Quan P. Ly, MD  
Fred & Pamela Buffett Cancer Center

Kristina A. Matkowskyj, MD, PhD  
University of Wisconsin  
Carbone Cancer Center

Michael McNamara, MD  
Case Comprehensive Cancer Center/  
University Hospitals Seidman Cancer  
Center and Cleveland Clinic Taussig  
Cancer Institute

Aaron Miller, MD, PhD  
UC San Diego Moores Cancer Center

Sarbajit Mukherjee, MD, MS  
Roswell Park Comprehensive  
Cancer Center

Mary F. Mulcahy, MD  
Robert H. Lurie Comprehensive Cancer  
Center of Northwestern University

Darryl Outlaw, MD  
O'Neal Comprehensive  
Cancer Center at UAB

Kyle A. Perry, MD  
The Ohio State University  
Comprehensive Cancer Center -  
James Cancer Hospital and  
Solove Research Institute

\*Jose Pimiento, MD  
Moffitt Cancer Center

George A. Poultsides, MD, MS  
Stanford Cancer Institute

Scott Reznik, MD  
UT Southwestern Simmons  
Comprehensive Cancer Center

Robert E. Roses, MD  
Abramson Cancer Center  
at the University of Pennsylvania

Vivian E. Strong, MD  
Memorial Sloan Kettering  
Cancer Center

Stacey Su, MD  
Fox Chase Cancer Center

Hanlin L. Wang, MD, PhD  
UCLA Jonsson  
Comprehensive Cancer Center

Georgia Wiesner, MD/Liaison  
Vanderbilt-Ingram Cancer Center

Christopher G. Willett, MD  
Duke Cancer Institute

Danny Yakoub, MD, PhD  
St. Jude Children's Research  
Hospital/The University of  
Tennessee Health Science Center

Harry Yoon, MD  
Mayo Clinic Comprehensive Cancer Center

## NCCN

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\* Reviewed this patient guide. For disclosures, visit [NCCN.org/disclosures](https://www.nccn.org/disclosures).



# NCCN Cancer Centers

**Abramson Cancer Center**  
at the University of Pennsylvania  
Philadelphia, Pennsylvania  
800.789.7366 • [penmedicine.org/cancer](http://penmedicine.org/cancer)

**Case Comprehensive Cancer Center/  
University Hospitals Seidman Cancer Center and  
Cleveland Clinic Taussig Cancer Institute**  
Cleveland, Ohio  
UH Seidman Cancer Center  
800.641.2422 • [uhhospitals.org/services/cancer-services](http://uhhospitals.org/services/cancer-services)  
CC Taussig Cancer Institute  
866.223.8100 • [my.clevelandclinic.org/departments/cancer](http://my.clevelandclinic.org/departments/cancer)  
Case CCC  
216.844.8797 • [case.edu/cancer](http://case.edu/cancer)

**City of Hope National Medical Center**  
Duarte, California  
800.826.4673 • [cityofhope.org](http://cityofhope.org)

**Dana-Farber/Brigham and Women's Cancer Center |  
Massachusetts General Hospital Cancer Center**  
Boston, Massachusetts  
617.732.5500 • [youhaveus.org](http://youhaveus.org)  
617.726.5130 • [massgeneral.org/cancer-center](http://massgeneral.org/cancer-center)

**Duke Cancer Institute**  
Durham, North Carolina  
888.275.3853 • [dukecancerinstitute.org](http://dukecancerinstitute.org)

**Fox Chase Cancer Center**  
Philadelphia, Pennsylvania  
888.369.2427 • [foxchase.org](http://foxchase.org)

**Fred & Pamela Buffett Cancer Center**  
Omaha, Nebraska  
402.559.5600 • [unmc.edu/cancercenter](http://unmc.edu/cancercenter)

**Fred Hutchinson Cancer Center**  
Seattle, Washington  
206.667.5000 • [fredhutch.org](http://fredhutch.org)

**Huntsman Cancer Institute at the University of Utah**  
Salt Lake City, Utah  
800.824.2073 • [huntsmanccancer.org](http://huntsmanccancer.org)

**Indiana University Melvin and Bren Simon  
Comprehensive Cancer Center**  
Indianapolis, Indiana  
888.600.4822 • [www.cancer.iu.edu](http://www.cancer.iu.edu)

**Mayo Clinic Comprehensive Cancer Center**  
Phoenix/Scottsdale, Arizona  
Jacksonville, Florida  
Rochester, Minnesota  
480.301.8000 • Arizona  
904.953.0853 • Florida  
507.538.3270 • Minnesota  
[mayoclinic.org/cancercenter](http://mayoclinic.org/cancercenter)

**Memorial Sloan Kettering Cancer Center**  
New York, New York  
800.525.2225 • [mskcc.org](http://mskcc.org)

**Moffitt Cancer Center**  
Tampa, Florida  
888.663.3488 • [moffitt.org](http://moffitt.org)

**O'Neal Comprehensive Cancer Center at UAB**  
Birmingham, Alabama  
800.822.0933 • [uab.edu/onealcancercenter](http://uab.edu/onealcancercenter)

**Robert H. Lurie Comprehensive Cancer Center  
of Northwestern University**  
Chicago, Illinois  
866.587.4322 • [cancer.northwestern.edu](http://cancer.northwestern.edu)

**Roswell Park Comprehensive Cancer Center**  
Buffalo, New York  
877.275.7724 • [roswellpark.org](http://roswellpark.org)

**Siteman Cancer Center at Barnes-Jewish Hospital  
and Washington University School of Medicine**  
St. Louis, Missouri  
800.600.3606 • [siteman.wustl.edu](http://siteman.wustl.edu)

**St. Jude Children's Research Hospital/  
The University of Tennessee Health Science Center**  
Memphis, Tennessee  
866.278.5833 • [stjude.org](http://stjude.org)  
901.448.5500 • [uthsc.edu](http://uthsc.edu)

**Stanford Cancer Institute**  
Stanford, California  
877.668.7535 • [cancer.stanford.edu](http://cancer.stanford.edu)

**The Ohio State University Comprehensive Cancer Center -  
James Cancer Hospital and Solove Research Institute**  
Columbus, Ohio  
800.293.5066 • [cancer.osu.edu](http://cancer.osu.edu)

**The Sidney Kimmel Comprehensive  
Cancer Center at Johns Hopkins**  
Baltimore, Maryland  
410.955.8964  
[www.hopkinskimmelcancercenter.org](http://www.hopkinskimmelcancercenter.org)

**The UChicago Medicine Comprehensive Cancer Center**  
Chicago, Illinois  
773.702.1000 • [uchicagomedicine.org/cancer](http://uchicagomedicine.org/cancer)

**The University of Texas MD Anderson Cancer Center**  
Houston, Texas  
844.269.5922 • [mdanderson.org](http://mdanderson.org)

**UC Davis Comprehensive Cancer Center**  
Sacramento, California  
916.734.5959 • 800.770.9261  
[health.ucdavis.edu/cancer](http://health.ucdavis.edu/cancer)

**UC San Diego Moores Cancer Center**  
La Jolla, California  
858.822.6100 • [cancer.ucsd.edu](http://cancer.ucsd.edu)

**UCLA Jonsson Comprehensive Cancer Center**  
Los Angeles, California  
310.825.5268 • [cancer.ucla.edu](http://cancer.ucla.edu)

UCSF Helen Diller Family  
Comprehensive Cancer Center  
San Francisco, California  
800.689.8273 • [cancer.ucsf.edu](http://cancer.ucsf.edu)

University of Colorado Cancer Center  
Aurora, Colorado  
720.848.0300 • [coloradocancercenter.org](http://coloradocancercenter.org)

University of Michigan Rogel Cancer Center  
Ann Arbor, Michigan  
800.865.1125 • [rogelcancercenter.org](http://rogelcancercenter.org)

University of Wisconsin Carbone Cancer Center  
Madison, Wisconsin  
608.265.1700 • [uwhealth.org/cancer](http://uwhealth.org/cancer)

UT Southwestern Simmons  
Comprehensive Cancer Center  
Dallas, Texas  
214.648.3111 • [utsouthwestern.edu/simmons](http://utsouthwestern.edu/simmons)

Vanderbilt-Ingram Cancer Center  
Nashville, Tennessee  
877.936.8422 • [vicc.org](http://vicc.org)

Yale Cancer Center/Smilow Cancer Hospital  
New Haven, Connecticut  
855.4.SMILOW • [yalecancercenter.org](http://yalecancercenter.org)

# Notes

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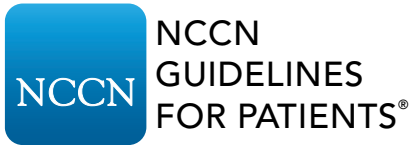
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