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2022

# Colon Cancer

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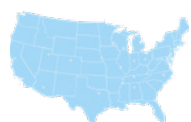


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## Contents

6	Colon cancer basics
14	Treatment planning
23	Overview of treatments
35	Non-metastatic colon cancer
43	Metastatic colon cancer
53	Survivorship
58	Making treatment decisions
66	Words to know
69	NCCN Contributors
70	NCCN Cancer Centers
72	Index

# 1

## Colon cancer basics

- 
- 7 The colon

---

  - 9 Colon polyps

---

  - 9 Staging

---

  - 13 Key points





Colon cancer is a common and highly treatable cancer. Advances in screening and treatment have led to better outcomes for patients. This chapter provides some basic information about colon cancer that will help prepare you for treatment.

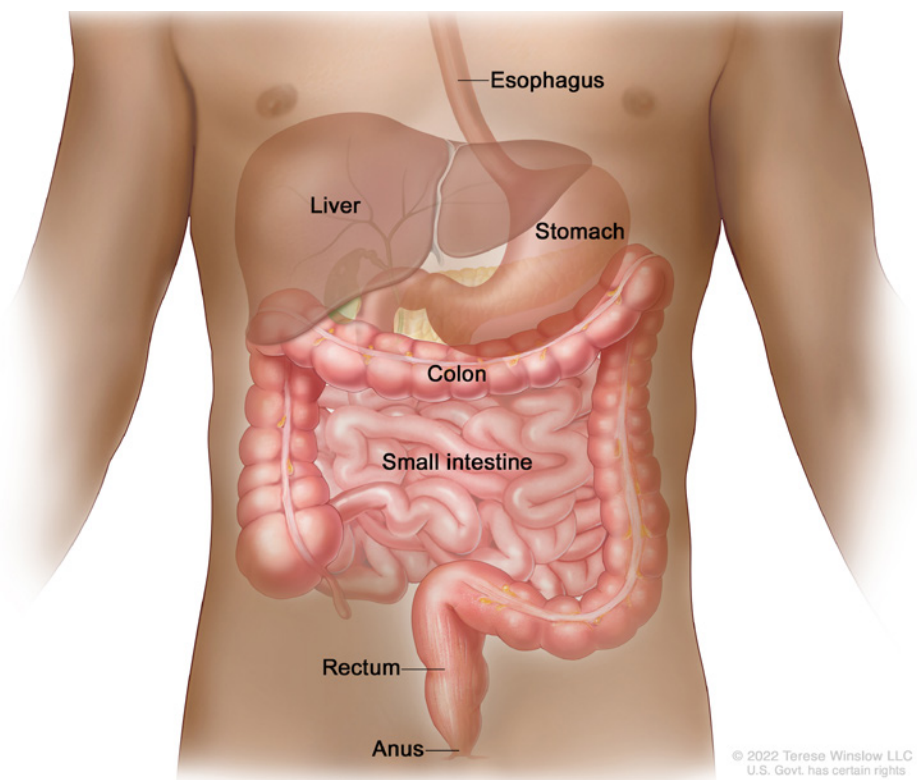
## The colon

The colon is the longest part of the large intestine, also known as the large bowel. The large bowel is a long tube-shaped organ that forms the last part of the digestive system. The digestive system breaks down food for the body to use.

After being swallowed, food passes through the esophagus and into the stomach, where it is turned into a liquid. From the stomach, food enters the small intestine. Here food is broken down into very small parts to allow nutrients to be absorbed into the bloodstream. Partly digested food then moves into the colon.

### The colon

The colon is the first and longest part of the large bowel. The colon absorbs water from unused food, turning it into stool. Stool is held in the last section of the large bowel, called the rectum, until it exits the body through the anus.



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The colon is the first and longest section of the large bowel. It is almost 5 feet long and has four parts: the ascending, transverse, descending, and sigmoid colon.

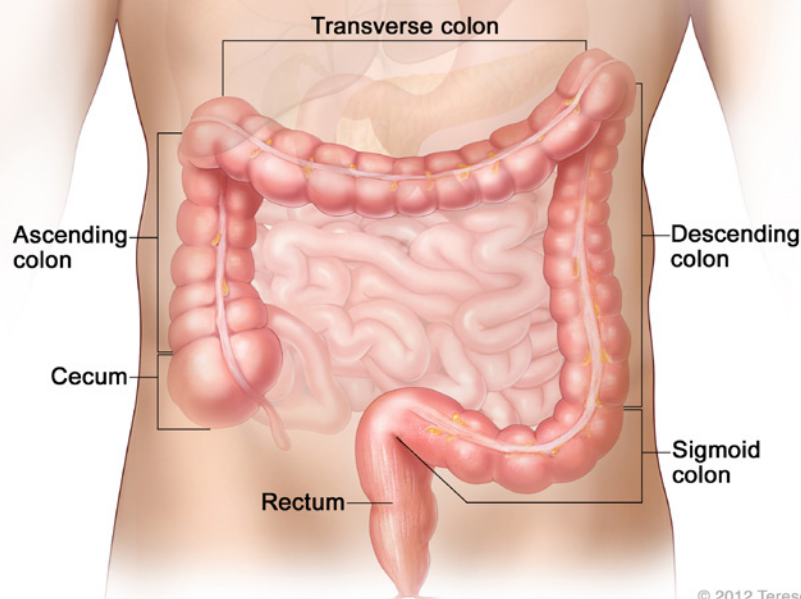
The first part of the colon is called the cecum. This pouch is about the size of a small orange. Sticking out from the cecum is a skinny tube called the appendix. It is closed at one end, and is about the size of a finger.

In the colon, water is absorbed from unused food, changing it from a liquid to a solid. This solid, unused food is called feces or stool. Stool then moves into the last section of the large bowel, called the rectum. Stool is held

in the rectum until it exits the body through an opening called the anus.

### Parts of the colon

The colon is the longest part of the large bowel. It is almost 5 feet long and has four sections: the ascending, transverse, descending, and sigmoid colon.



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## Colon polyps

A polyp is an overgrowth of cells on the inner lining of the colon wall. There are different types of polyps. Some types are more likely to turn into cancer than others. The most common type is called an adenoma. Adenomas are considered pre-cancerous. While it may take many years, adenomas can become invasive colon cancer. Cancer that forms in an adenoma is known as an adenocarcinoma. Adenocarcinoma is the most common type of colon cancer. Polyps that rarely turn into cancer include hyperplastic and inflammatory polyps.

Removing polyps can prevent cancer before it starts. Polyps can also be tested to make sure that cancer has not already started to develop. While most polyps do not become cancer, almost all colon cancers start in a polyp. Most polyps can be removed during a colonoscopy using a minor surgical procedure called a polypectomy. More information on colon polyps is provided in *Part 4: Non-metastatic cancer*.

## Staging

The cancer stage describes the extent of cancer in the body. It is used to plan which tests may be needed and which treatments are best for you. Having a general idea of the structure of the colon wall is helpful for understanding how colon cancer is staged.

The colon wall is made of layers of tissue. Cancer starts in the innermost layer that comes in contact with food. This layer is called the mucosa. The next layer is the submucosa. It is made of connective tissue and contains mucus glands, blood and lymph vessels, and nerves. The submucosa is followed by a layer of muscle called the muscularis propria. The outer, fourth layer is called serosa (or adventitia).

If left untreated, cancer cells grow through the layers of the colon wall, towards the inside of the abdomen. The cancer can then invade structures or organs outside of the colon. Cancer cells can also break off from the colon tumor and travel through lymph or blood to nearby lymph nodes.

The American Joint Committee on Cancer (AJCC) tumor, node, metastasis (TNM) system is used to stage colon cancer. In the AJCC system, the following key pieces of information about the cancer are used to give it a stage:

- **T:** How far the tumor has grown into or through the colon wall
- **N:** Whether any lymph nodes have cancer
- **M:** Whether the cancer has spread to areas or organs outside the colon (metastasized)

The T, N, and M scores are combined to assign the cancer a stage. There are 5 stages

of colon cancer. They are numbered 0, I (1), II (2), III (3), or IV (4). The stages are explained below.

### Stage 0

There are abnormal cells on the innermost layer of the colon wall. These abnormal cells may become cancer and spread into deeper layers of the colon wall. Stage 0 colon cancer is also called carcinoma in situ of the colon.

### Stage I

The cancer has grown into either the second or third layer of the colon wall. There is no cancer in nearby lymph nodes or in areas outside the colon.

### Stage II

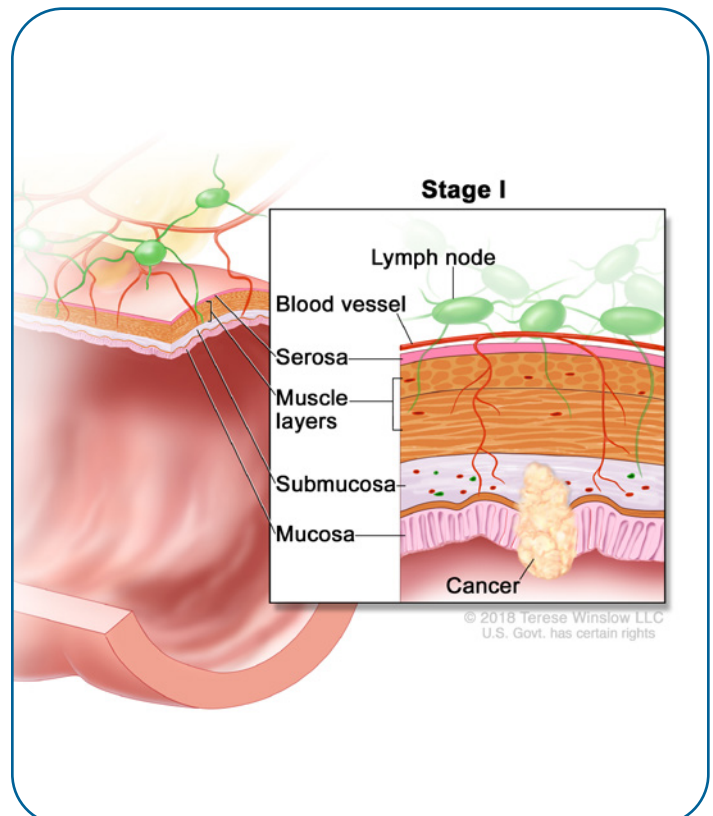
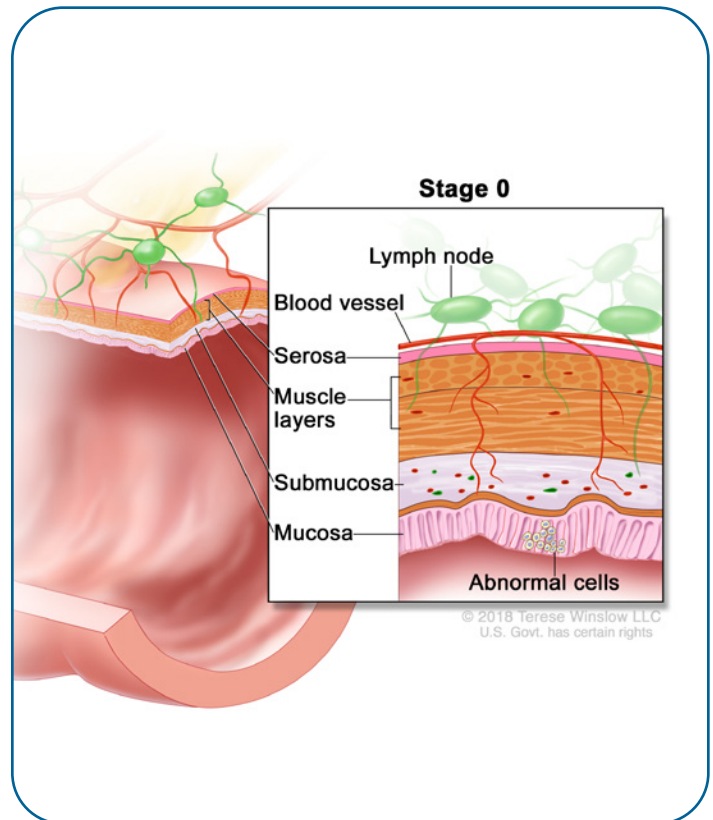
The cancer has grown into, or beyond, the fourth layer of the colon wall. There is no cancer in nearby lymph nodes or in areas outside the colon.

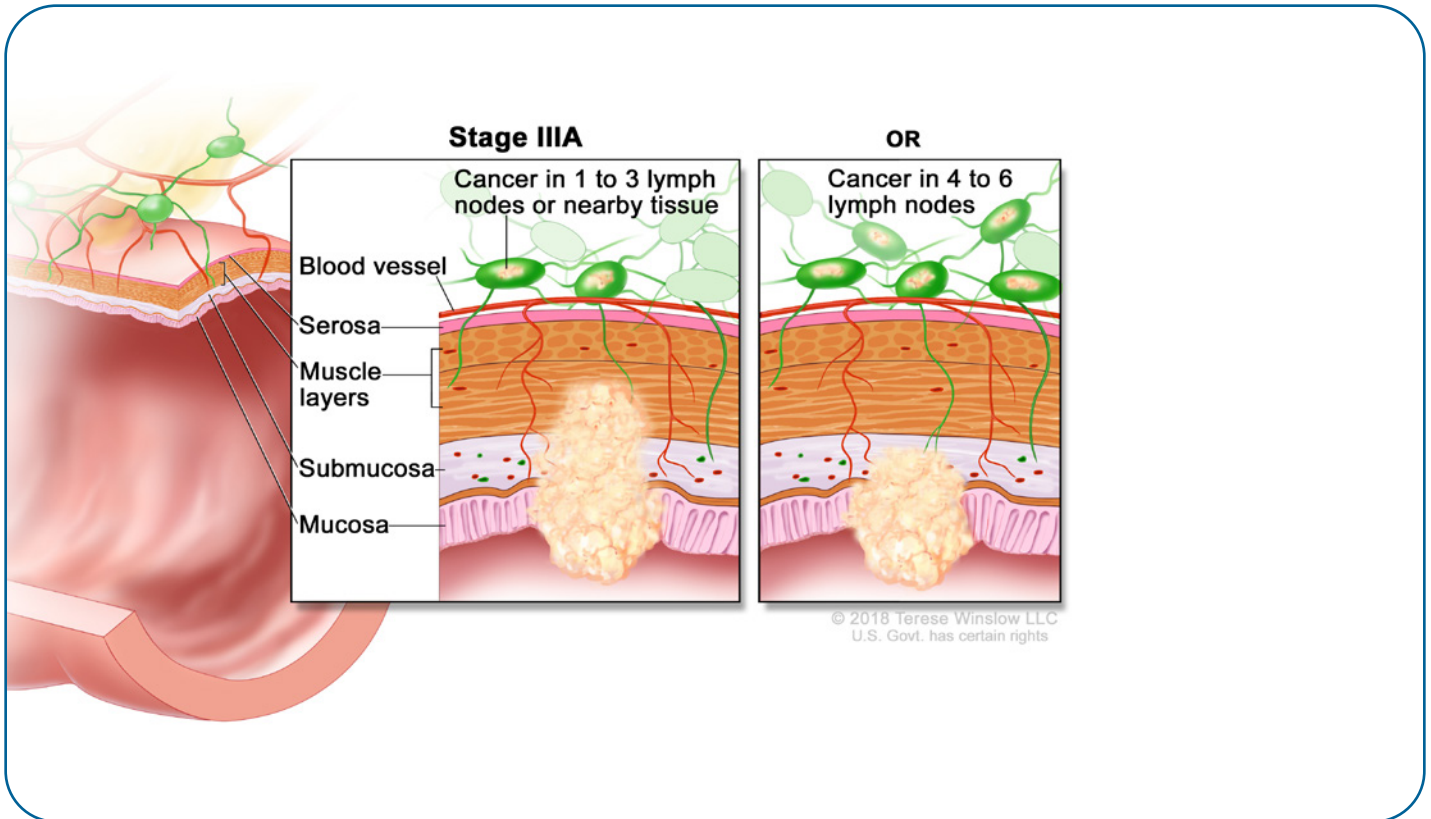
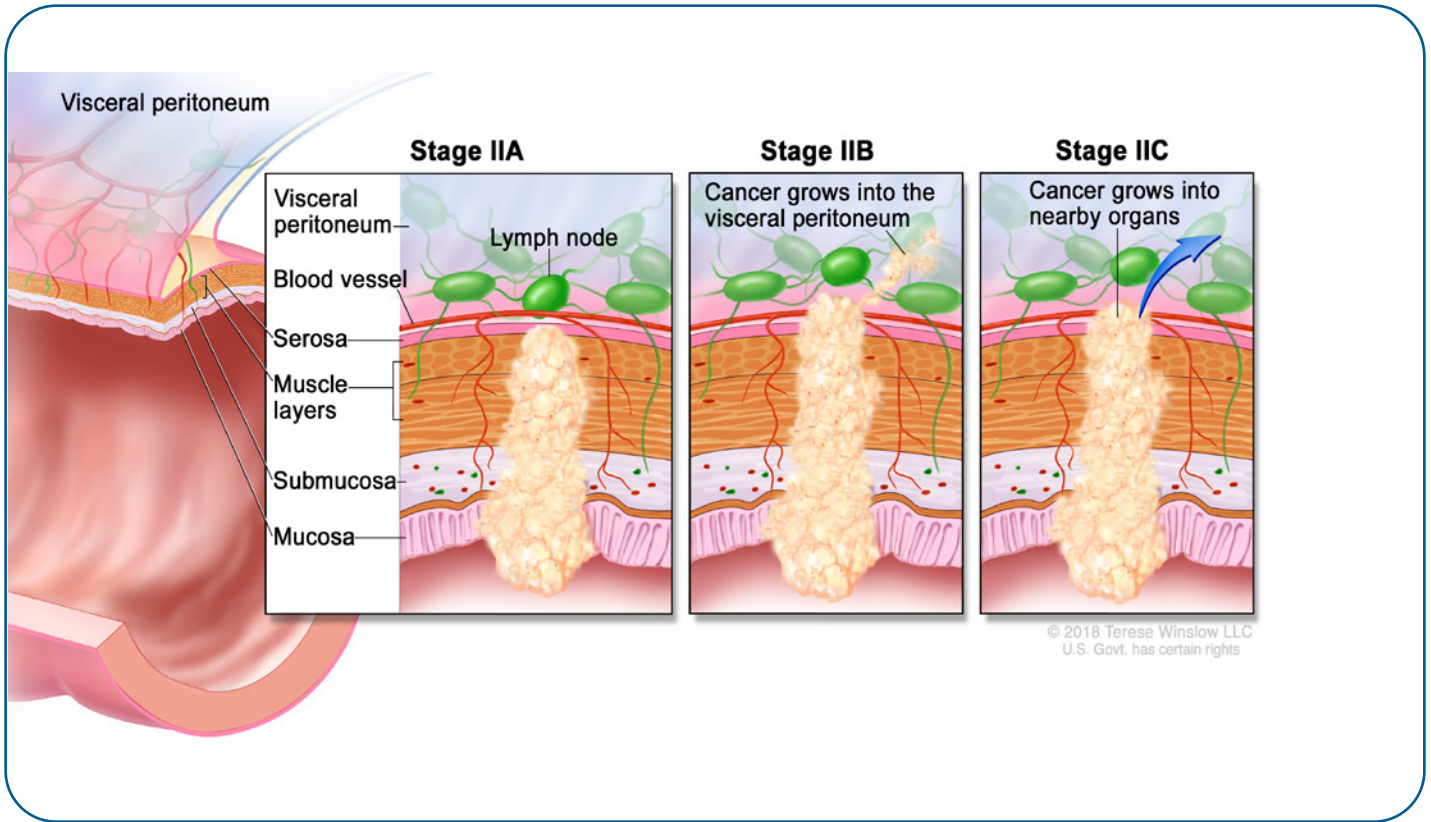
### Stage III

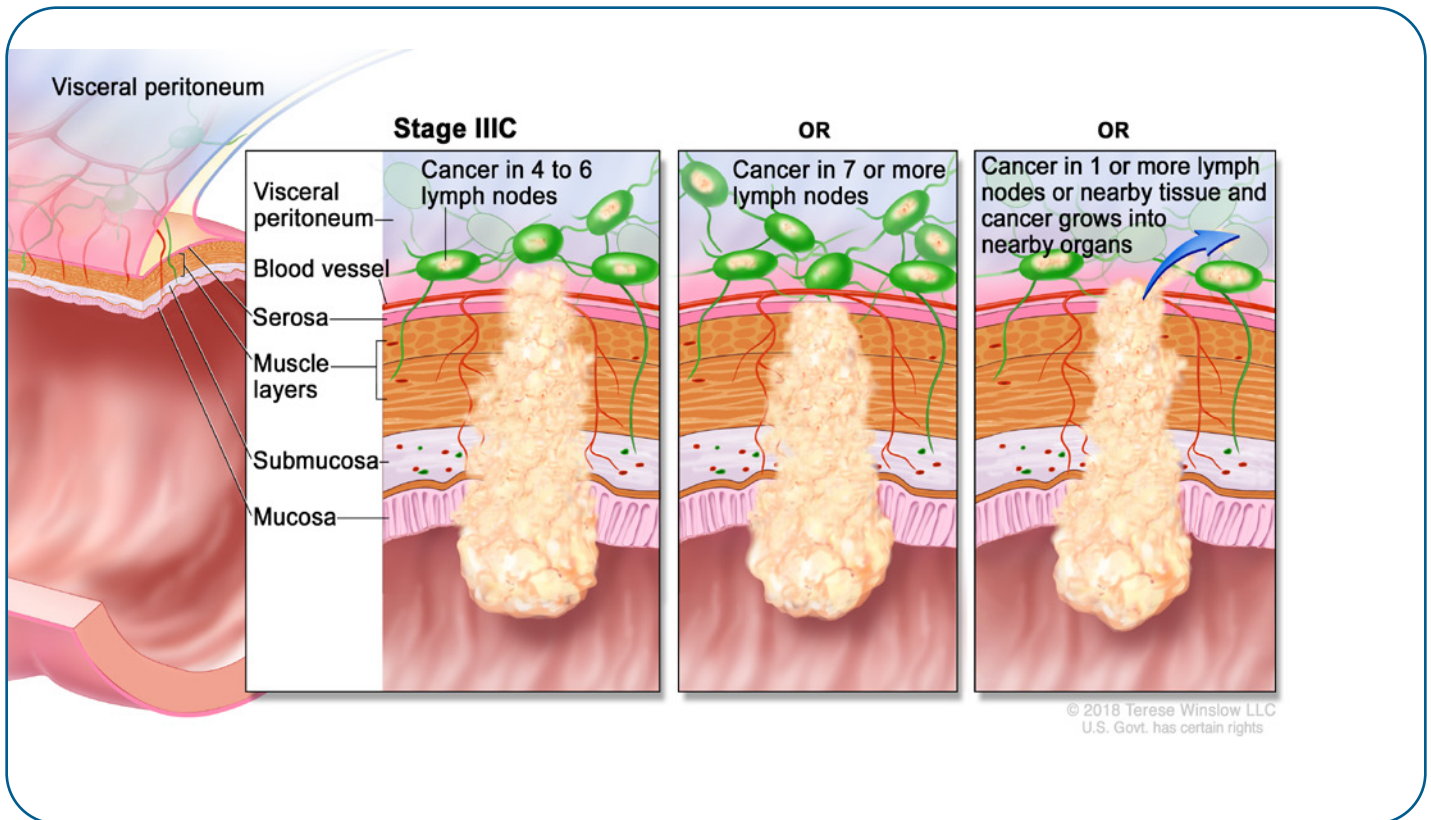
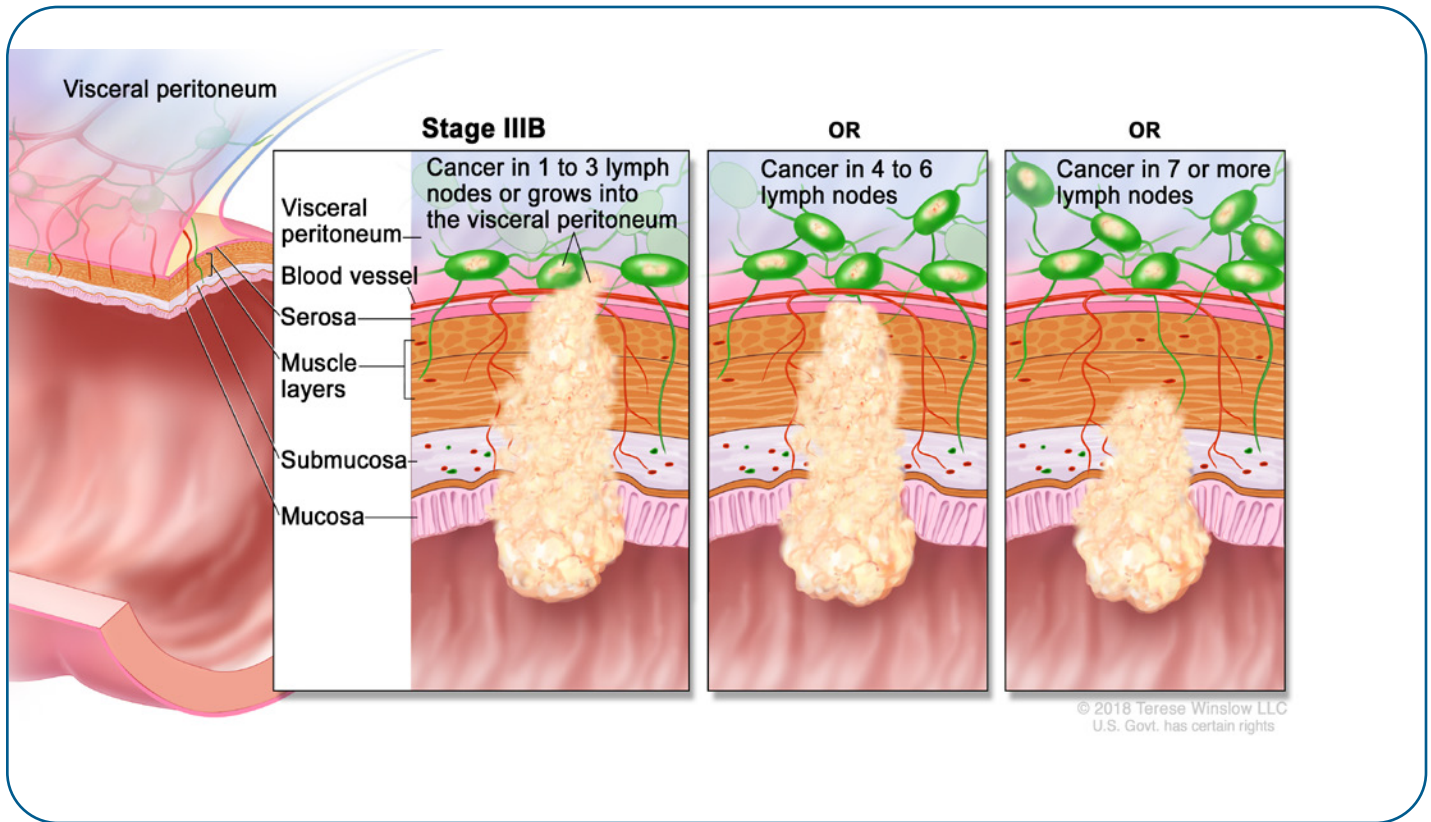
The cancer has spread from the colon to nearby lymph nodes or there are tumor deposits. Tumor deposits are small tumors in the fat around the colon.

### Stage IV

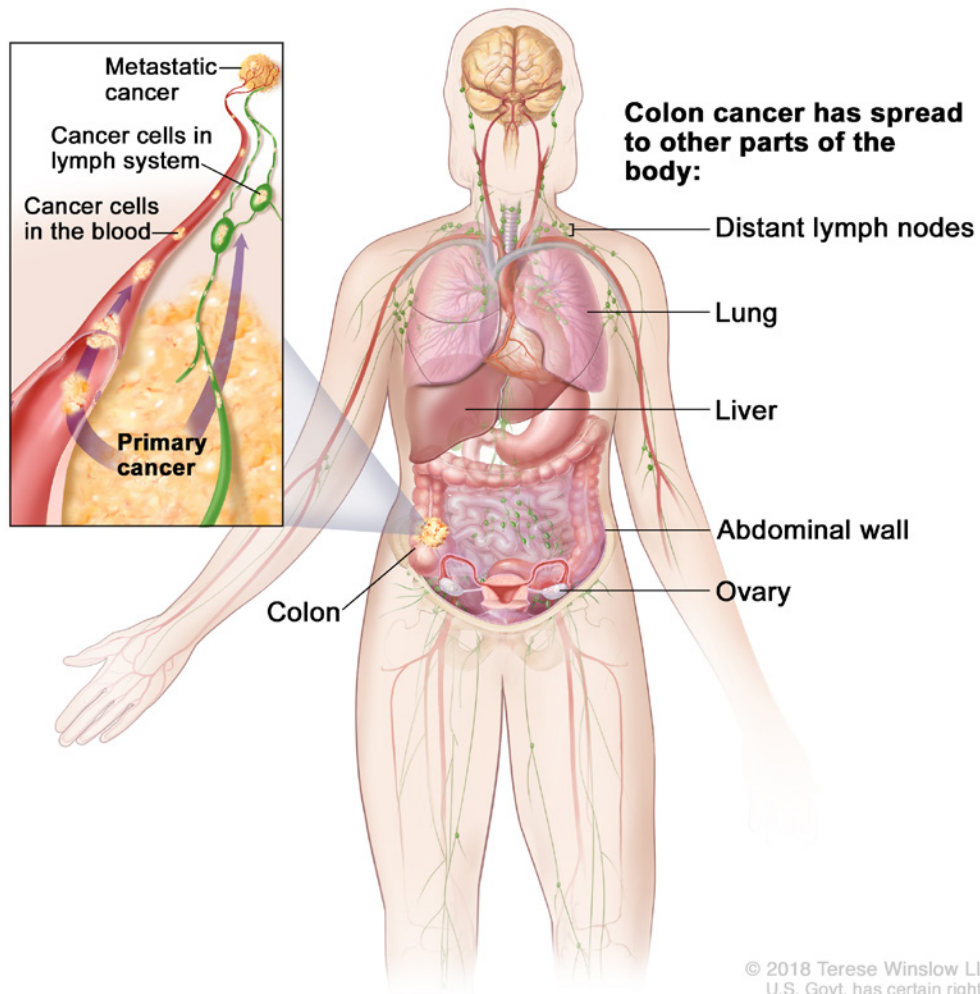
The cancer has spread to areas outside the colon and nearby lymph nodes. Colon cancer spreads most often to the liver and/or lungs.







### Stage IV



## Key points

- The colon is the first and longest part of the large bowel.
- The colon has four parts: the ascending, transverse, descending, and sigmoid colon.
- Most colon cancers start in polyps called adenomas.
- If left untreated, cancer grows through the colon wall towards the inside of the abdomen.
- Cancer cells can spread to other body parts through lymph or blood. This is called metastasis.
- The stage is an assessment of the extent of cancer in the body.

# 2

## Treatment planning

- **15 Health history**

---
- 16 Colonoscopy**

---
- 17 Biopsy**

---
- 18 Blood tests**

---
- 18 Imaging tests**

---
- 20 Biomarker testing**

---
- 21 Fertility and family planning**

---
- 22 Key points**





Your doctors will make a treatment plan just for you. First, they need to gather information about your unique cancer and your general health. This chapter discusses testing and other steps needed to create your treatment plan.

## Health history

Your personal health history includes any health events and medicines you've taken in your life. It helps your doctors decide which treatments may be best for you. Colon cancer and other diseases can run in families. For this reason, your doctor will also ask about your family health history. It is helpful to know who in your family has had what diseases and at what ages. Your doctor may ask about the health of your siblings, your parents and their siblings, and your grandparents and their siblings.

### Inherited cancer syndromes

Colon cancer most often occurs for unknown reasons. Some people, however, are more likely to get colon cancer than the average person. This is because a mutation in their DNA was passed down to them, causing a disorder that increases the risk of colon cancer. This is called an inherited cancer syndrome. Most colon cancers associated with an inherited cancer syndrome are due to either Lynch syndrome or familial adenomatous polyposis (FAP). Both are uncommon in people with colon cancer. There are several other inherited syndromes that are even less common.

If your doctor thinks you might have an inherited syndrome, you will be referred to a genetic counselor. A genetic counselor can talk with you and sometimes your family members about getting tested for syndromes related to colon cancer. To be tested, you must provide a sample of blood or saliva. A pathologist tests the sample for changes (mutations) in genes that cause these syndromes. It is important to meet with a genetic counselor before having any genetic testing.

### Lynch syndrome

People born with Lynch syndrome are at high risk of developing colon cancer and some other cancers, particularly endometrial and ovarian cancers. This syndrome is caused by inherited mutations of genes that fix damaged DNA. These are called mismatch repair (MMR) genes. NCCN experts recommend testing everyone with colon cancer for problems with the MMR genes. This helps determine who should be tested for Lynch syndrome. Only about 5 out of every 100 people with colon cancer have Lynch syndrome. Sometimes Lynch syndrome is referred to as hereditary non-polyposis colon cancer (HNPCC), but they are not exactly the same. Specific family history criteria must be met in order for a diagnosis of HNPCC to be made.

### Familial adenomatous polyposis

FAP is a rare inherited syndrome. It can cause hundreds to thousands of polyps to form in the colon and rectum. The polyps start as benign (non-cancerous) growths, but over time they can turn into colon cancer. Cancer is likely to develop by age 50 in people with classic FAP. A milder form called attenuated FAP causes fewer polyps and usually starts later in life. Only about 1 in 100 people with colon cancer have FAP.

## Colonoscopy

A colonoscopy is a procedure that allows your doctor to examine your colon for polyps and lesions that may be cancerous. A colonoscope is the device used for the test. Part of it looks like a thin tube. It has a light and camera. This part will be inserted into your anus and gently guided through the large bowel until it reaches the cecum.

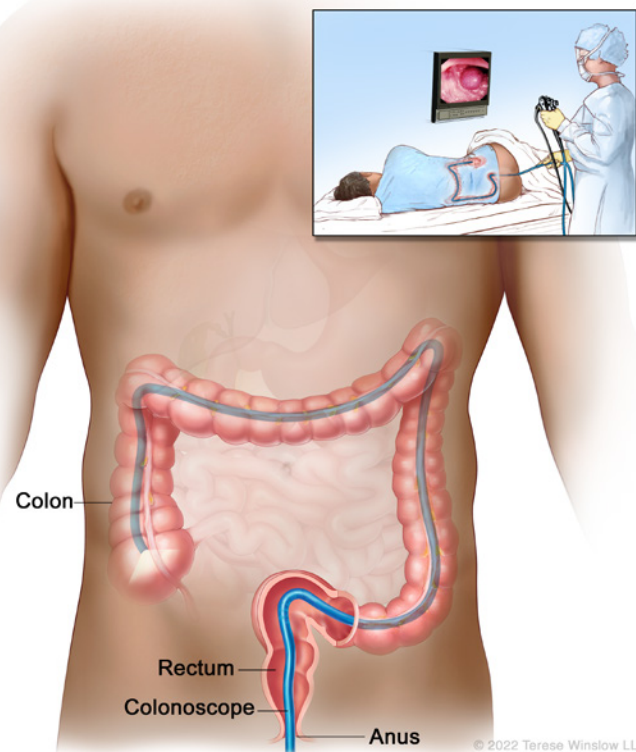
You may be put on a liquid diet for 1 to 3 days before the test. You may also take a laxative or an enema the night before. This will clean out your bowel. Right before the test, you may be given a sedative to lessen any pain. You will likely wear a hospital gown. The test will be performed while you lie on your side.

To see better, gas may be pumped into your bowel to make it bigger. You may be asked to shift a little to help your doctor guide the device. A picture of your colon will be viewed by your doctor on a screen. If a polyp is found, a cutting tool will be inserted through the tube to remove it. This is known as a polypectomy.

A colonoscopy takes about 30 to 60 minutes. Afterward, you may stay for another hour for any drugs that were used to wear off. However, you'll still need someone to drive you home. The next day, you will likely feel normal. Contact your doctor if you have severe pain, vomiting, bloody stool, or weakness.

### Colonoscopy

**A colonoscopy is a procedure that allows your doctor to see and remove any abnormal tissue from the colon. A thin device is inserted through the anus, up the rectum, and into the colon. The device has a light, a camera, and a cutting tool.**



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## Biopsy

A biopsy involves removing small pieces of tissue from the colon. A biopsy of a polyp or of suspected colon cancer is usually done during a colonoscopy. The samples are sent to a pathologist for testing.

If the cancer is suspected to have spread to areas outside the colon, such as the liver or lungs, a needle may be used to do the biopsy. In this case, a computed tomography (CT) scan or ultrasound may be used to help guide the needle into the tumor in order to remove the tissue sample. You might hear this referred to as a fine-needle aspiration (FNA).

Each time tissue is removed from the body and tested for cancer, the findings are detailed in a document called a pathology report. One key finding included in the report is the cancer grade, which is different than the cancer stage.

The cancer grade is a score of how fast the cancer is expected to grow and spread. It is based on how abnormal the cancer cells look when viewed under a microscope. Higher scores mean that the cancer is likely to grow and spread quickly. There are 5 possible grades:

- **G3** means that the cancer cells barely look like healthy cells. Also called poorly differentiated or high grade.
  - **G4** means that the cancer cells are very abnormal looking. These are the highest grade and typically grow and spread faster than lower grade tumors. Also called undifferentiated or high grade.
- Review your pathology report(s) with your doctor. Ask questions if you don't understand. This information can be complex. It is also a good idea to get a copy of your pathology report(s) and take notes.
- **GX** means that the grade cannot be determined.
  - **G1** means that the cancer cells look similar to healthy cells. Also called well differentiated or low grade.
  - **G2** means that the cancer cells are somewhat different than healthy cells. Also called moderately differentiated or intermediate grade.

## Blood tests

Blood tests are used to look for signs of disease. A needle will be inserted into your vein to remove a sample of blood. The needle may bruise your skin. You may feel dizzy from the blood draw. Your blood sample will be sent to a lab for testing.

### Complete blood count

A complete blood count (CBC) measures the number of blood cells in a blood sample. It includes numbers of white blood cells, red blood cells, and platelets. White blood cells help the body fight infection. Red blood cells carry oxygen throughout the body. Platelets help wounds heal by forming blood clots. Cancer and other health problems can cause low or high blood cell counts.

### Chemistry profile

Also known as a comprehensive metabolic panel (CMP), this test measures the level of certain substances in the blood, such as metabolites, electrolytes, and proteins. The levels of these substances provide information about how well your kidneys, liver, and other organs are working.

### CEA blood test

Carcinoembryonic antigen (CEA) is a protein found in blood. It is considered a tumor marker. The level of CEA is often higher-than-normal in people with colon cancer, especially if the cancer has spread to other organs. Pregnant females and people who smoke may have higher CEA levels. Monitoring CEA can be helpful even when the cancer is only in the colon and the level is normal, because the level will rise if the cancer later spreads to other organs. However, monitoring CEA is not

helpful for some people, even if the cancer has spread.

## Imaging tests

Imaging tests make pictures of areas inside the body. They can show areas of cancer. This information helps your doctors stage the cancer and plan treatment.

A radiologist is a doctor who is an expert in interpreting these images. Your radiologist will convey the imaging results to your cancer doctor (oncologist). This information helps plan the next steps of care.

Your treatment team will tell you how to prepare for these tests. You may need to stop taking some medicines and stop eating and drinking for a few hours before the scan. Tell your team if you get nervous in tight spaces. You may be given a type of medicine called a sedative to help you relax.

### Computed tomography (CT)

CT takes many pictures of areas inside the body using x-rays. A computer combines the x-rays to make one detailed picture. The picture is saved for later viewing by a radiologist. CT is the main imaging test used to learn the extent of colon cancer in the body. It can show areas of cancer in nearby and distant sites.

A substance called contrast will be used to make the pictures clearer. It will be injected into your vein and mixed with a liquid to drink. The contrast may cause you to feel flushed or get hives. Some people have an allergic

reaction to contrast. Tell your doctor if you've had problems with contrast in the past.

During the scan you will lie face-up on a table that moves through a tunnel-like machine. You will be alone during the scan, but a technician will be nearby. You will be able to hear and talk to the technician at all times. You may hear buzzing or clicking during the scan.

### PET

In select cases CT may be combined with positron emission tomography (PET). PET/CT is not often used for colon cancer. It may be used to help determine if surgery is an option for metastatic disease, or in the rare event that you cannot have contrast for CT or magnetic resonance imaging (MRI). PET involves first injecting a radioactive drug (a "sugar tracer") into the body. The radiotracer is detected with a special camera during the scan. Cancer cells

appear brighter than normal cells because they use sugar more quickly.

### MRI

MRI uses a magnetic field and radio waves to make pictures. It is not often used to plan treatment for colon cancer. Your doctor may order an MRI if the CT scan was unclear. MRI is most often used to get a better look at the liver or rectum if needed. Contrast should be used.

Getting an MRI is much like getting a CT scan. In some cases, the area of the body being imaged is placed within a narrowed coil device. The coil device looks like a brace. It covers your body from below your chest to the top of your legs. It sends and receives radio waves. Straps may be used to help you stay in place. An MRI may cause your body to feel a bit warm. If MRI is being used to better see

### CT scan

**CT with contrast is the main imaging test used to determine the extent of colon cancer in the body. CT takes many pictures of the inside of the body using x-rays. A computer combines the x-rays to make one detailed picture.**



cancer near the rectum, an enema may be needed. Or, a gel may be inserted into the rectum beforehand.

## Biomarker testing

Biomarkers are specific features of cancer cells. Biomarkers can include proteins made in response to the cancer and changes (mutations) in the DNA of the cancer cells.

Biomarker testing is used to learn whether your cancer has any targetable changes to help guide your treatment. If it does, targeted therapy or immunotherapy may be a treatment option if needed. The results of biomarker testing can also be used to determine whether you meet the criteria for joining certain clinical trials. Testing for biomarker mutations involves analyzing a piece of tumor tissue or a sample of blood in a lab.

Other names for biomarker testing include molecular testing, genomic testing, tumor gene testing, next-generation sequencing, and mutation testing. Biomarkers used for colon cancer treatment planning are described next.

### For everyone with colon cancer

#### MMR/MSI testing

In normal cells, a process called mismatch repair (MMR) fixes errors (mutations) that happen when DNA divides and makes a copy of itself. If a cell's MMR system isn't working right, errors build up and cause the DNA to become unstable. This is called microsatellite instability (MSI).

There are two kinds of lab tests for this biomarker. Depending on the method used, an abnormal result is called either microsatellite instability high (MSI-H) or mismatch repair deficient (dMMR). Tumors that **are not** MSI-H/dMMR are referred to as microsatellite stable (MSS) or mismatch repair proficient (pMMR).

**MMR or MSI testing is recommended for everyone diagnosed with colon cancer.** If the cancer is dMMR/MSI-H, you will also be tested for Lynch syndrome.

### For metastatic colon cancer

If colon cancer has spread to other parts of the body, such as the liver or lungs, testing for the tumor biomarkers described next is recommended. Testing for these biomarkers may be performed individually, or as part of a larger panel (group). Testing for many biomarkers at one time is called next-generation sequencing (NGS). NGS can find other, rare gene mutations for which targeted treatments may be available.

#### *KRAS* and *NRAS* mutations

*RAS* is a family of genes that includes the *HRAS*, *KRAS*, and *NRAS* genes. Some colon cancers have mutations in the *KRAS* or *NRAS* genes. Genes work as instruction manuals for making important proteins. As a result, the proteins these genes make are overactive and can tell the cancer to grow.

#### *BRAF* mutation

Fewer than 10 out of 100 colon cancers have a mutation called *BRAF* V600E. This mutation may cause cancer cells to grow and spread quickly. If your cancer has this mutation, treatments that target abnormal *BRAF* may be helpful.

### HER2 amplification

HER2 is a protein involved in normal cell growth. Having too much HER2 can cause cancer cells to grow and spread quickly. Only about 3 to 5 out of 100 people with colon cancer have too much HER2. HER2 testing is recommended for everyone with metastatic colon cancer unless there is a known *RAS* or *BRAF* mutation. It can help your doctor determine whether systemic therapies that target HER2 may help you.

## Fertility and family planning

For unknown reasons, colon cancer is being diagnosed more often in young adults. Some cancer treatments can cause or contribute to infertility. Infertility is the inability to have children. If you want the option of having children after treatment or are unsure, tell your doctors. There are ways for people with cancer to be able to have children after treatment. This is called fertility preservation.

If you are of childbearing age, your doctor will discuss any fertility-related risks of your treatment plan with you. You may be referred for counseling about fertility preservation options. Some of these options are described below.

### Sperm banking

Sperm banking stores semen for later use by freezing it in liquid nitrogen. The medical term for this is semen cryopreservation.

### Egg freezing

Like sperm banking, unfertilized eggs can be removed, frozen, and stored for later

use. The medical term for this is oocyte cryopreservation.

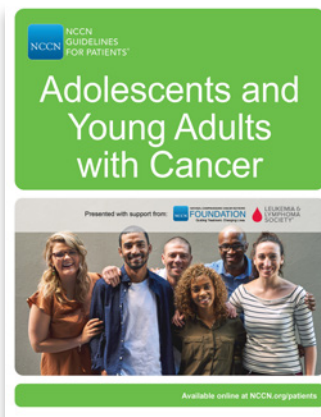
### Ovarian tissue banking

This method involves removing part or all of an ovary and freezing the part that contains the eggs. The frozen tissue that contains the eggs can later be unfrozen and put back in the body.

### Ovarian transposition

This procedure moves one or both ovaries and fallopian tubes out of the range of the radiation beam. The medical term for this procedure is oophoropexy.

For more information on fertility and family planning, see the *NCCN Guidelines for Patients: Adolescents and Young Adults with Cancer* at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines).



## Key points

### Health history

- Inherited syndromes related to colon cancer include Lynch syndrome and FAP.
- Everyone with colon cancer should be asked about their family health history.

### Blood tests

- A complete blood count, chemistry profile, and carcinoembryonic antigen (CEA) test are recommended as part of initial testing.

### Imaging

- CT with contrast is the primary imaging test used to determine the extent of colon cancer in the body.

### Biomarker testing

- Biomarker testing is used to learn whether your cancer has any targetable changes to help guide your treatment.
- MMR or MSI testing is recommended for everyone diagnosed with colon cancer.
- Testing for *KRAS/NRAS* and *BRAF* mutations is recommended for everyone with metastatic colon cancer.
- HER2 testing is also recommended for everyone with metastatic colon cancer unless there is a known *RAS* or *BRAF* mutation.

### Fertility and family planning

- Young adults diagnosed with colon cancer should be counseled about fertility-

related risks of treatment and options for preserving fertility.



### 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)



# 3

## Overview of treatments

- 24 Colon surgery
- 26 Systemic therapy
- 28 Local therapies for metastases
- 32 Clinical trials
- 34 Key points



This chapter describes the treatments for colon cancer. If it is an option, surgery is the preferred and most effective treatment. Chemotherapy may be given after surgery, or in place of surgery if the cancer cannot be resected (removed by surgery).

## Colon surgery

Another name for surgery that removes tissue, or all or part of an organ, is resection. Cancer that can be removed completely by resection is called resectable.

You may have more than one type of surgery. Surgery to remove liver or lung metastases is described in the “Local therapies for metastases” section on page 28. Your

treatment team will tell you how to prepare for and what to expect during surgery. You may need to stop taking some medicines to reduce the risk of severe bleeding. Eating less, changing to a liquid diet, or using enemas or laxatives will empty your colon for surgery. Right before surgery, you will be given general anesthesia.

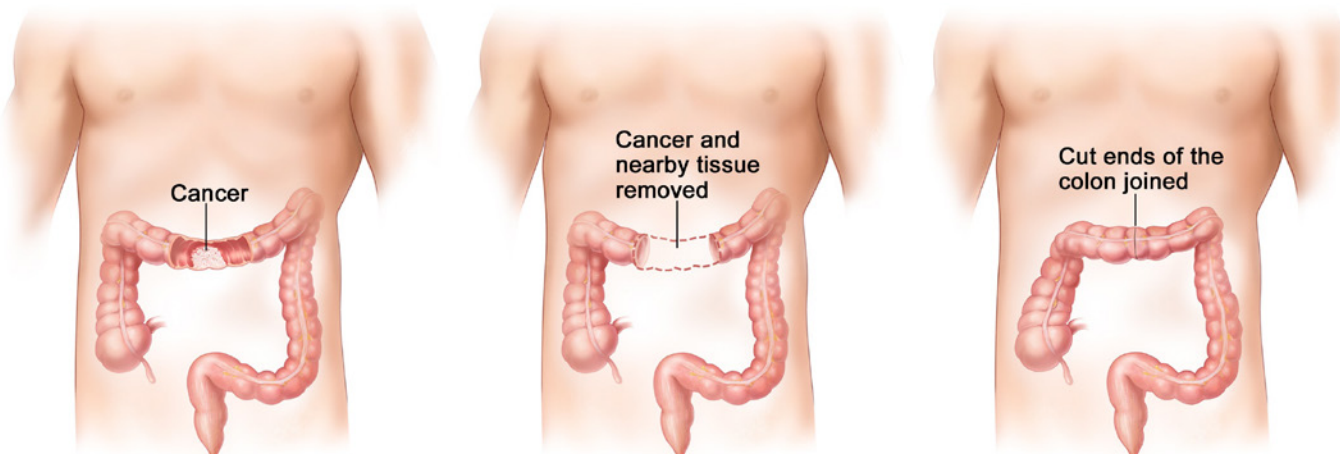
### Colectomy

A colectomy is a surgery that removes the part of the colon with cancer. After the cancerous part is removed, the two healthy ends of the remaining colon are reconnected. They are either sewn or stapled together.

Lymph nodes near the tumor are also removed during colectomy. Lymph node removal is called lymphadenectomy. At least 12 lymph nodes near the tumor should be removed and

## Colectomy

**Surgery for colon cancer is called colectomy. It involves removing the cancerous part of the colon. The two healthy ends of the remaining colon are then attached to each other.**



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tested for cancer. Any abnormal-looking nodes will also be removed.

A colectomy can be done in two ways. The open method removes cancerous tissue through a large cut in your abdomen. The minimally invasive method involves making a few small cuts. Tools are inserted through the cuts to see and remove part of your colon.

A colectomy can take 1 to 4 hours to complete. You may stay in the hospital for several days to recover. After surgery, you will be told what you can and cannot eat to prevent discomfort and help healing.

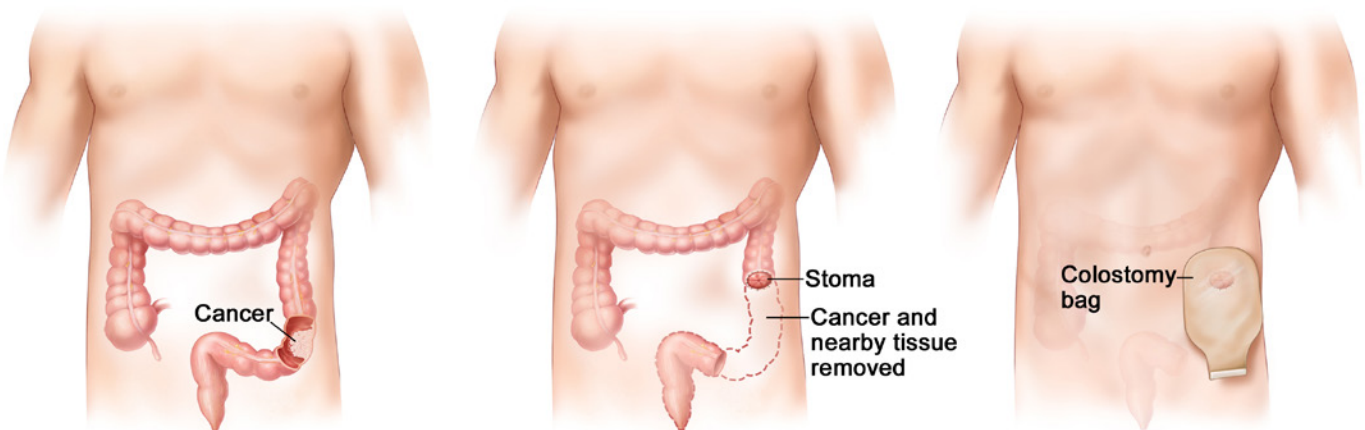
### Colostomy

At the time of colectomy, some people may also have a procedure called a colostomy. This is done in cases where it may not be safe to reconnect the remaining sections of colon.

In a colostomy, the remaining upper part of the colon is attached to an opening on the surface of the abdomen. This opening is called a stoma. Stool exits the body through the stoma and goes into a bag attached to the skin. This is typically only needed for a short time. For colon cancer surgery, it is rare for a colostomy not to be reversed with another operation. Colostomy is also known as diversion because it diverts (redirects) the flow of stool.

### Colostomy

**If the two healthy ends of the remaining colon cannot be safely reconnected after the cancer is removed, a colostomy may be performed. A colostomy connects a part of the colon to the outside of the abdomen. This creates an opening in your abdomen that allows stool to pass through. For colon cancer surgery, it is rare for a colostomy not to be reversed with another operation.**



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### Side effects of surgery

Surgery causes pain, swelling, and scars. Pain and swelling often fade away in the weeks following surgery. Scars from surgery do not go away completely. As with any surgery, there is also a chance of complications. These include major blood loss, infection, heart attack, and blood clots. There can also be injury to nearby organs. Your surgical team will design care to try to prevent these risks.

There are short- and long-term side effects specific to colectomy. In the days or weeks following colon resection, food, digested debris, or stool may leak out where the colon was reconnected. This is known as anastomotic leak. It can cause pain, fever, and life-threatening infection.

Colectomy can also cause a change in bowel habits. You may experience changes in the frequency or urgency of your bowel movements.

It is common for scar tissue to form after abdominal surgery. In some cases, however, there is so much scar tissue that the bowel becomes obstructed (blocked). In rare cases, the bowel may become tightly wrapped around an area of scar tissue. This is an emergency that requires surgery.

A possible long-term effect of colon surgery is hernia. Hernia refers to organs pushing through tissues or muscles weakened by surgery.

Not all complications and side effects of surgery are listed here. Ask your treatment team for a complete list of common and rare side effects.

## Systemic therapy

Systemic therapy is the use of medicine to kill cancer cells. The medicine(s) travel in the bloodstream to reach cells throughout the body. Systemic therapy can kill healthy cells in addition to cancer cells. The damage to healthy cells can cause harsh side effects, such as hair loss, cracked skin, and mouth sores. Most commonly, systemic therapy is given intravenously. This means the medicine is slowly infused into the bloodstream through a vein.

Types of systemic therapy include chemotherapy, targeted therapy, and immunotherapy. If systemic therapy is planned, the regimen(s) given depends (in part) on:

- Whether the cancer has spread beyond the colon
- Whether surgery is possible or planned
- Whether the cancer has any biomarkers (see page 20 for more information)
- Your general health

General information on the main types of systemic therapy is provided next. Specific recommendations for the use of systemic therapy are provided later in this guide.

If systemic therapy is planned, ask your treatment team for a full list of common and rare side effects of each drug you are receiving.

### Chemotherapy

Chemotherapy is given in cycles of treatment days followed by days of rest. This allows your body to recover between cycles. Cycles vary in length depending on which drugs are used.

Chemotherapy regimens often used to treat colon cancer are listed in [Guide 1](#).

The side effects of chemotherapy depend on many things (drug type, dosage, length of treatment) and are different for everyone. Common side effects include nausea, loss of appetite, diarrhea, hair loss, and mouth sores.

Some regimens are considered “intensive.” This means they may be harsh on the body. FOLFOX, CAPEOX, FOLFIRI, and FOLFIRINOX are intensive regimens. Any chemotherapy regimen that has “OX” in the name means the regimen includes oxaliplatin. Oxaliplatin can cause nerve damage to your fingers and toes. Symptoms include numbness, cramping, tingling, or pain in these areas.

Any chemotherapy regimen that has “IRI” in the name means it contains irinotecan. Irinotecan tends to cause abdominal cramping, nausea, diarrhea, and hair loss. It does not have the effects on nerves seen with oxaliplatin.

If regimens containing oxaliplatin and/or irinotecan are expected to be too harsh, your doctor may recommend 5-fluorouracil (5-FU)/leucovorin or capecitabine alone. However, these regimens can also cause potentially harsh side effects. Capecitabine can cause a side effect known as hand-foot syndrome. Symptoms include redness, swelling, and pain on the palms of the hands, bottoms of feet, or both. Sometimes blisters appear. Your dose of capecitabine may be changed at the earliest signs of hand-foot syndrome.

### Targeted therapy and immunotherapy

Unlike chemotherapy, targeted therapy and immunotherapy are most effective at treating cancers with specific features, called biomarkers. These newer types of systemic therapy may be treatment options for patients with advanced colon cancer.

Targeted therapies can target and attack specific receptors found on cancer cells. One type stops the growth of new blood vessels into colon tumors. Without the blood they need to grow, cancer cells “starve” and die. A second type stops the cancer cells from

#### Guide 1 Combination chemotherapy regimens

<b>FOLFOX</b>	<b>FOL</b> = Leucovorin calcium <b>F</b> = Fluorouracil <b>OX</b> = Oxaliplatin
<b>CAPEOX</b>	<b>CAPE</b> = Capecitabine <b>OX</b> = Oxaliplatin
<b>FOLFIRI</b>	<b>FOL</b> = Leucovorin calcium <b>F</b> = Fluorouracil <b>IRI</b> = Irinotecan
<b>FOLFIRINOX</b>	<b>FOL</b> = Leucovorin calcium <b>F</b> = Fluorouracil <b>IRI</b> = Irinotecan <b>OX</b> = Oxaliplatin
<b>5-FU/LV</b>	<b>FU</b> = Fluorouracil <b>LV</b> = Leucovorin calcium

receiving signals to grow. Other types work in more than one way. A targeted therapy known as a biologic may be added to chemotherapy to treat advanced colon cancer.

The immune system is your body's natural defense against infection and disease. Immunotherapy increases the activity of your immune system, improving your body's ability to find and destroy cancer cells. Immune checkpoint inhibitors are a type of immunotherapy used to treat colon cancer.

For more information on the side effects of immune checkpoint inhibitors, see the *NCCN Guidelines for Patients: Immunotherapy Side Effects: Immune Checkpoint Inhibitors* at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines).



## Local therapies for metastases

Treatment options for metastatic colon cancer may include local therapies. Local therapies are treatments that target metastatic tumors directly. Some may be used in place of or in addition to surgery.

Several of the local therapies described next are performed by an interventional oncologist/radiologist. Interventional oncology/radiology is a medical specialty that uses imaging techniques to deliver minimally invasive cancer treatments. Computed tomography (CT), ultrasound, magnetic resonance imaging (MRI), and positron emission tomography (PET)/CT are imaging techniques that may be used. The use of imaging during the procedure allows the doctor to precisely target the tumor(s). Interventional oncology/radiology treatments are also known as image-guided therapies.

### Resection

Surgery, also called resection, is often the preferred way to remove colon cancer that has spread to the liver or lungs. Resection removes the cancerous part of the liver or lung(s). Another name for surgery to remove a metastasis is metastasectomy.

If the metastatic tumors are small, image-guided ablation (described on the next page), may be offered instead of surgery in some cases. It may have similar results, but with fewer complications and a shorter recovery time.

If resection is possible but is not expected to completely remove the metastases, combined treatment with both surgery and ablation may be an option.

Resection may not be possible because you have risk factors or certain health conditions. In this case, ablation or other local therapies described on the next pages may be an option for treating metastases.

A team of experts can determine the best local therapy for your metastatic tumor(s).

#### Portal vein embolization

If your doctor thinks your liver will be too small after a liver resection, you may need to have it enlarged. This is done using a minimally invasive procedure called portal vein embolization (PVE). An interventional radiologist uses a catheter inserted into certain veins in the liver. This blocks the blood vessel to the liver tumor, causing the healthy part of the liver to grow larger.

#### Image-guided ablation

Image-guided ablation destroys small liver or lung tumors with little harm to nearby tissue. It may be performed by either an interventional radiologist or a surgeon. Ablation may be used in addition to surgery. Or, it may be used by itself for small tumors that can be completely destroyed. Ablation will only be used if all visible areas of cancer can be destroyed. In some cases, ablation can be done as an outpatient in the interventional radiology department in a single session.

At this time, the most commonly used ablative therapies are radiofrequency (RFA) and microwave ablation. These methods kill cancer cells using heat. The delivery of cold energy (cryoablation) is also used, mostly for lung tumors. Less common ablative methods include irreversible electroporation, also known as “nanoknife,” and laser ablation.

All ablative therapies are delivered using a specialized needle called a “probe” or “electrode” placed directly into or next to the target tumor. All types of ablation kill cancer cells by delivering targeted energy into the tumor while sparing or minimizing damage to normal tissues.

#### Liver-directed therapies

If the cancer has spread only (or mainly) to the liver, treatment with intra-arterial liver-directed therapies may be an option. This type of local therapy will be considered for liver tumors that:

- Did not (or no longer) improve with chemotherapy, and
- Cannot be resected or ablated.

Intra-arterial therapies treat liver tumors with chemotherapy beads (chemoembolization) or radioactive spheres (radioembolization). If radiation spheres are used, it is known as selective internal radiation therapy (SIRT) or transarterial hepatic radioembolization (TARE). These procedures are performed by interventional oncologists/radiologists.

A catheter is inserted into an artery in your leg or wrist and guided to the liver tumor(s). Once in place, the spheres or beads are injected into the blood vessel leading to the tumor. The spheres or beads collect inside the tumor and deliver radiation or chemotherapy, causing the cancer cells to die. The chemotherapy beads can also work to stop the blood supply to the tumor and starve the tumor. The chemotherapy or radiation further damage the cancer cells and cause the tumor to shrink. When embolization with chemotherapy is not an option, bland embolization with small beads

may be used. This involves physically blocking the blood supply to the tumor.

Another intra-arterial liver-directed therapy is hepatic arterial infusion chemotherapy (HAIC). While chemotherapy is traditionally given intravenously to reach cells throughout the body, HAIC is given directly to the liver to treat metastases. HAIC is often given in addition to standard intravenous chemotherapy. Using a port or pump that is usually placed during surgery to remove liver tumors, the drugs are funneled directly into the artery leading to the liver. HAIC should only be performed by medical oncologists at treatment centers with extensive experience in this method.

### Radiation therapy

Radiation therapy uses high-energy rays to kill cancer cells. While it is most often used to treat tumors in the liver and/or lungs, it may also be used with chemotherapy to treat cancer in the colon that cannot be removed with surgery.

The type of radiation therapy used most often to treat metastatic colon cancer is **stereotactic body radiation therapy (SBRT)**. SBRT is a highly specialized type of external beam radiation therapy (EBRT). External means that the radiation beams come from a large machine outside the body. The radiation passes through skin and other tissue to reach the tumor.

In SBRT, treatment is typically delivered in 5 or fewer sessions, called fractions. High doses of radiation are delivered to a metastatic

### Stereotactic body radiation therapy (SBRT)

**SBRT may be used to treat colon cancer that has spread to the liver, lungs, or bone. High doses of radiation are delivered to a metastatic site or sites using very precise beams. Treatment is typically given in 5 or fewer sessions.**





site or sites using very precise beams. The treatment setup for SBRT is often more complex than typical external radiation therapy. This is because higher doses of radiation are delivered. SBRT may be used to treat colon cancer that has spread to the liver, lungs, or bone.

Other types of EBRT include three-dimensional conformal radiation therapy (3D-CRT) and intensity-modulated radiation therapy (IMRT). All types are conformal, which means that the radiation beams are shaped to the cancer site. This helps minimize damage to healthy tissue. The type used depends on the location and size of the tumor(s) and other factors.

#### If radiation therapy is planned

A planning session is needed before treatment begins. This is called simulation. After being guided into the treatment position, pictures of the cancer sites are made with an imaging test. Using the pictures, the radiation team plans the best radiation dose and number of treatments.

During treatment, you will lie on a table as you did for simulation. Devices may be used to keep you from moving. This helps to target the tumor. Radiation beams are aimed with help from ink marks on your skin or marker seeds in the tumor.

You will be alone in the treatment room. A technician will operate the machine from a nearby room and will be able to see, hear, and speak with you at all times. As treatment is given, you may hear noises. You will not see, hear, or feel the radiation. One session can take less than 10 minutes.

Side effects of radiation therapy include:

- Feeling tired and worn out
- Hair loss in the treated area
- Changes to urination and bowel movements
- Diarrhea
- Nausea and vomiting

Late side effects can include infertility, lung scarring, heart disease, and second cancers. Not all side effects are listed here. Ask your treatment team for a full list.

## Clinical trials

A clinical trial is a type of medical research study. After being developed and tested in a laboratory, potential new ways of fighting 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 safety and side effects of an investigational drug or treatment approach.
- **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



## 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)

that participants are alike in specific ways and that the trial is as safe as possible for the participants.

### 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 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 that you may be eligible for, ask your treatment team if you meet the requirements. 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.

#### Are clinical trials free?

There is no fee to enroll in a clinical trial. The study sponsor pays for research-related costs, including the study drug. You may, however, have costs indirectly related to the trial, such as the cost of transportation or child care due to extra appointments. During the trial, you will continue to receive standard cancer care.

This care is billed to—and often covered by—insurance. You are responsible for copays and any costs for this care that are not covered by your insurance.

## Key points

### Colon surgery

- A colectomy is surgery that removes part of the colon. Nearby lymph nodes are also removed and tested for cancer.
- If the remaining ends of the colon cannot be safely reconnected during colectomy, a colostomy may be performed.
- A colostomy involves attaching the remaining upper part of the colon to an opening (stoma) on the abdomen. It is usually temporary.

### Systemic therapy

- Systemic therapy is the use of medicine to kill cancer cells throughout the body.
- Types of systemic therapy include chemotherapy, targeted therapy, and immunotherapy.
- Chemotherapy regimens often used to treat colon cancer include FOLFOX, CAPEOX, FOLFIRI, FOLFIRINOX, and 5-FU/LV.

### Local therapies for metastases

- Local therapies are treatments that target metastatic tumors directly. Some may be used in place of or in addition to surgery.
- Local therapies include resection, image-guided ablation, stereotactic body radiation therapy (SBRT), and intra-arterial liver-directed therapies.

### Clinical trials

- Clinical trials give people access to investigational treatments that may, in time, be approved by the U.S. Food and Drug Administration (FDA).

# 4

## Non-metastatic colon cancer

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36 Cancerous polyps

---

37 If surgery is needed

---

41 Surveillance

---

42 Key points



This chapter explains treatment for colon cancer that has not spread to areas far from the colon.

Colon cancer often forms in polyps on the lining of the colon. It can also take the form of lesions on the inside of the colon.

## Cancerous polyps

A polyp is an overgrowth of cells on the inner lining of the colon wall. The most common type is called an adenoma. Adenomas are

considered pre-cancerous. While it may take many years, adenomas can become invasive colon cancer. Cancer that forms in an adenoma is known as an adenocarcinoma.

The two main shapes of polyps are sessile and pedunculated. Pedunculated polyps are shaped like mushrooms and stick out from the colon wall. They have a stalk and round top. Sessile polyps are flatter and do not have a stalk.

A polyp in which cancer has just started to grow is called a malignant (cancerous) polyp. Most polyps can be removed during a

### Pedunculated polyp

**Pedunculated polyps have a stalk and are mushroom-like in appearance.**



### Sessile polyp

**Sessile polyps do not have a stalk and lie flatter against the lining of the colon wall.**



colonoscopy, using a minor surgical procedure called a polypectomy. In some cases, no further treatment is needed after a polypectomy.

In other cases, surgery (resection) of a bigger piece of the colon is needed. This depends on:

- The size and shape of the polyp (pedunculated or sessile),
- The polypectomy results, and
- The results of testing the removed tissue.

Before deciding whether resection is needed after a polypectomy, your doctor will review the results of testing with you and discuss your options.

### Good polypectomy results

No further treatment is needed for a cancerous **pedunculated** polyp that was fully removed in one piece and found to be low-risk based on testing.

Cancerous **sessile** polyps, however, are more likely to return after polypectomy. They also tend to have other poor treatment outcomes. For this reason, colectomy (surgery) is a recommended treatment option for sessile polyps—even those with good results of polypectomy and testing. See page 24 for information on colectomy. Observation is also an option for sessile polyps. If surgery is planned, see “Chemotherapy after surgery” on page 39 for next steps.

### Other polypectomy results

If the polyp is not removed in one piece, or testing of the removed polyp finds high-risk features, surgery may be needed. If high-risk

features are found, more tests to determine the extent of the cancer are recommended. This includes blood tests and a computed tomography (CT) scan of the chest, abdomen, and pelvis. If testing finds that surgery is needed, surgery (colectomy) is recommended. Chemotherapy may be given after surgery. See “Chemotherapy after surgery” on page 39 for next steps.

## If surgery is needed

If the cancer is not found early enough to be removed by polypectomy, surgery (colectomy) is needed. Surgery is only an option if the colon tumor can be completely removed. If you are not a candidate for surgery, see page 40.

The true extent of the cancer cannot be known until after surgery. It can be estimated, however, based on the results of testing. Testing before surgery includes:

- Colonoscopy
- Biopsy and testing of removed tissue
- Mismatch repair (MMR) or microsatellite instability (MSI) testing
- Blood tests including complete blood count (CBC), chemistry profile, and carcinoembryonic antigen (CEA) level
- CT scan of the chest, abdomen, and pelvis with contrast
- Additional imaging tests as needed

More information on these tests can be found in *Part 2: Treatment planning* on page 14.

In some cases, chemotherapy or immunotherapy is given before surgery. The goal is to shrink the colon tumor so it can be fully removed during surgery. Systemic therapy may be given before surgery if:

- The tumor has grown through the colon wall and invaded nearby structures
- There are many or very large lymph nodes suspected to be cancerous.

Chemotherapy regimens commonly used before surgery include FOLFOX and CAPEOX. If the tumor is MMR deficient or MSI-high (dMMR/MSI-H), immunotherapy with one of the following may be an option:

- Nivolumab (Opdivo) with or without ipilimumab (Yervoy)
- Pembrolizumab (Keytruda)

The tissue removed during surgery is sent to a pathologist. The pathologist assesses how far the cancer has grown within the colon wall and tests the removed lymph nodes for cancer. Based on the results of testing, the cancer stage is assigned. The stage helps determine whether chemotherapy is needed after surgery. See “Chemotherapy after surgery” on the next page.

### **If the bowel is blocked**

In rare cases, a tumor may grow so large that it blocks the flow of stool. There are several ways to deal with a blockage. One option is a colectomy that also unblocks the bowel. This is known as a one-stage colectomy.

Another option is colectomy with colostomy. In a colostomy, the remaining upper part of the colon is attached to an opening on the surface

of the abdomen. This opening is called a stoma. Stool exits the body through the stoma and goes into a bag attached to the skin. This is typically only needed for a short time. Colostomy is also known as diversion because it diverts (redirects) the flow of stool. See page 25 for an illustration of colostomy.

Another possibility is that a colostomy may be done first, followed by a second surgery to remove the cancer. Lastly, a mesh metal tube called a stent may be placed first, followed by a second surgery to remove the cancer. The stent keeps the colon open, allowing gas and stool to pass.



### Chemotherapy after surgery

Chemotherapy may be given after surgery. The goal is to kill cancer cells that may remain in the body. Decisions about chemotherapy are guided in large part by the cancer stage.

#### Stage I

Observation (no chemotherapy) is recommended after surgery for all stage I colon cancers.

#### Stage II

Observation is recommended after surgery for most low-risk stage II cancers, especially MSI-H/dMMR tumors. Whether chemotherapy is needed after surgery is less clear for stage II cancers that **are not** MSI-H/dMMR. These are called microsatellite stable (MSS) or mismatch repair proficient (pMMR) tumors. MSS/pMMR cancers can be observed or treated with chemotherapy. To help guide decision-making,

your doctor will consider the risk of the cancer returning after treatment (recurrence). This risk is based on findings during surgery and analysis of the removed tissue.

If chemotherapy is planned, recommended regimens for both high- and low-risk stage II colon cancer include capecitabine and 5-fluorouracil (5-FU)/leucovorin. FOLFOX and CAPEOX are recommended options for high-risk disease. [See Guide 2.](#)

#### Stage III

Chemotherapy is recommended after surgery for all stage III colon cancers. Recommended regimens include CAPEOX, FOLFOX, capecitabine, and 5-FU. Chemotherapy after surgery is typically given for 3 to 6 months. The length of treatment depends on the regimen and the risk of recurrence. [See Guide 2.](#)

## Guide 2

### Treatment after surgery for stage II and III cancers

Stage II	MSI-H/dMMR	Observation (no chemotherapy)
	MSS/pMMR	Observation OR chemotherapy with one of the following: <ul style="list-style-type: none"> <li>• Capecitabine (6 months) (for low or high risk of recurrence)</li> <li>• 5-FU/leucovorin (6 months) (for low or high risk of recurrence)</li> <li>• FOLFOX (6 months) (only for high risk of recurrence)</li> <li>• CAPEOX (3 months) (only for high risk of recurrence)</li> </ul>
Stage III	Chemotherapy with one of the following: <ul style="list-style-type: none"> <li>• CAPEOX (3 months if low risk of recurrence; 3–6 months if high risk of recurrence)</li> <li>• FOLFOX (3–6 months if low risk of recurrence; 6 months if high risk of recurrence)</li> <li>• Capecitabine (6 months)</li> <li>• 5-FU (6 months)</li> </ul>	

**If surgery is not an option**

Surgery may not be possible because of the location of the tumor or because of other health issues. In this case, treatment options include systemic therapy and chemoradiation. Chemoradiation involves treatment with both chemotherapy and radiation therapy.

If systemic therapy is planned, there are a number of possible regimens that may be used. The choice of regimen depends on whether the tumor has any biomarkers and how well you are expected to tolerate certain systemic therapies. See page 20 for more information on biomarkers.

If chemoradiation is planned, chemotherapy medicines recommended for use with radiation include 5-FU and capecitabine. 5-FU is given by infusion; capecitabine is taken by mouth. If you are unable to tolerate either of these, a third option for use with radiation is bolus 5-FU/leucovorin. Bolus refers to the use of a single dose given over a short period of time.

After treatment with systemic therapy or chemoradiation, the size of the tumor will be checked to see if it is resectable (able to be removed with surgery). If the tumor does not become resectable, systemic therapy is continued.

If the tumor becomes resectable, surgery is recommended. After surgery, chemotherapy is recommended to kill any remaining cancer cells. Currently recommended regimens for use after surgery include FOLFOX, CAPEOX, capecitabine, and 5-FU/leucovorin. After chemotherapy, surveillance begins.

**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)

## Surveillance

Follow-up testing is started when there are no signs of cancer after treatment. It is helpful for finding new cancer growth early.

### Stage I

A colonoscopy is recommended 1 year after surgery for stage I colon cancer. If results are normal, the next colonoscopy should be in 3 years, and then every 5 years. If an advanced adenoma is found, your next colonoscopy will be needed within 1 year. Advanced adenomas include polyps with a ruffled structure (villous), a polyp larger than 1 cm, or a polyp with pre-cancerous cells (high-grade dysplasia).

If you don't have any symptoms, other testing is not needed on a regular basis. Imaging tests may be ordered if your doctor thinks the cancer may have come back or spread.

### Stages II and III

In addition to colonoscopy, surveillance for stages II and III colon cancer includes physical exams, CEA blood tests, and CT scans. Rising CEA levels may be a sign that colon cancer has returned. CT scans can find metastases, should any develop. The recommended schedule for surveillance testing is shown in [Guide 3](#).

In addition to surveillance testing, a range of other care is important for cancer survivors. See *Part 6: Survivorship* on page 53 for more information.

### Guide 3

#### Surveillance for stage II and stage III colon cancer

<b>Medical history and physical exam</b>	Every 3–6 months for first 2 years, then every 6 months for 3 more years
<b>CEA blood test</b>	Every 3–6 months for first 2 years, then every 6 months for 3 more years
<b>CT of chest, abdomen, and pelvis</b>	Every 6–12 months for 5 years
<b>Colonoscopy</b>	<p><b>No total colonoscopy at diagnosis:</b> 3 to 6 months after surgery</p> <p><b>Total colonoscopy at diagnosis:</b> 1 year after surgery</p> <p>If no advanced adenoma, repeat in 3 years, then every 5 years</p> <p>If advanced adenoma, repeat in 1 year</p>

## Key points

### Cancerous polyps

- No further treatment is needed for a malignant pedunculated polyp that was removed in one piece and found to be low risk based on testing.
- Malignant sessile polyps are more likely to return after polypectomy than pedunculated polyps. Surgery and observation are options for sessile polyps.

### If surgery is needed

- Colectomy is needed for cancer that is not found early enough to be removed by polypectomy. If surgery is not possible, systemic therapy and chemoradiation are options.
- Chemotherapy or immunotherapy may be given before surgery for a tumor that has invaded nearby organs or structures, or if there are many lymph nodes with cancer.
- Observation is recommended after surgery for all stage I cancers and most low-risk stage II cancers, especially MSI-H/dMMR tumors.
- After surgery, stage II cancers that are not MSI-H/dMMR can be observed or treated with chemotherapy. The risk of recurrence based on the results of surgery and testing will be considered.
- Chemotherapy is recommended after surgery for all stage III colon cancers.

### Surveillance

- Colonoscopies are used to monitor for the return of stage I colon cancer. Your doctor may also recommend physical exams and CEA blood tests.
- Surveillance for stages II and III colon cancer includes physical exams, CEA blood tests, colonoscopies, and CT scans.

# 5

## Metastatic colon cancer

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44 Stage IV colon cancer

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50 Metastasis at recurrence

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52 Key points



Colon cancer spreads most often to the liver, sometimes to the lungs, and less often to the abdomen or other areas. Cancer may have already spread by the time it is diagnosed. This is stage IV colon cancer. More commonly, metastases develop after treatment for non-metastatic colon cancer.

About half of people with colon cancer will develop metastases. Most will be liver metastases that cannot be removed with surgery. This section covers both stage IV colon cancer and metastasis after treatment. Although both are considered metastatic cancer, there are some differences in treatment.

## Stage IV colon cancer

If there is cancer in areas far from the colon when you are first diagnosed, the cancer is stage IV. Testing for suspected (or known) stage IV colon cancer includes:

- Biopsy
- Colonoscopy
- Computed tomography (CT) of the chest, abdomen, and pelvis
- Other imaging as needed to help determine if you can have surgery
- Blood tests including complete blood count (CBC), chemistry profile, and carcinoembryonic antigen (CEA) level
- Biomarker testing

The presence of biomarkers helps guide treatment for metastatic colon cancer. Everyone with metastatic colon cancer should have their tumor tested for the biomarkers listed below.

- *RAS* and *BRAF* mutations
- HER2 amplification (not needed if there is a *RAS* or *BRAF* mutation)
- Mismatch repair deficiency (dMMR)/microsatellite instability-high (MSI-H) (if not already performed)

Testing for these biomarkers may be performed individually, or as part of a larger panel (group). Testing for many biomarkers at one time is called next-generation sequencing (NGS). NGS can find other, rare gene mutations for which targeted treatments may be available.

See *Part 2: Treatment planning* for more information on recommended testing.

### Cancer in the liver and/or lungs

When possible, surgery (resection) is the preferred way to treat colon cancer that has spread to the liver or lungs. In some patients with small tumors, image-guided ablation may be offered instead of surgery. It may have similar results but fewer complications.

When surgery is not expected to completely remove the metastases, combination treatment with ablation may be an option. For patients unable to undergo resection due to other health conditions, treatment with ablation or other local therapies may be possible. See page 28 for information on local therapies for metastases.

To learn if surgery or treatment with local therapies is an option, your case should be evaluated by a multidisciplinary team of experts. The team should include a surgeon experienced in removing liver and lung tumors and an interventional oncologist/radiologist with expertise in image-guided therapies such as ablation or hepatic arterial liver-directed therapies. If you can have surgery first, see “Upfront surgery is possible” on page 46.

If liver and lung tumors cannot be removed with surgery and/or ablation, radiation therapy may be considered. If treatment with these local therapies is not possible, stage IV colon cancer is treated with systemic therapy. Systemic therapy given first is called first-line therapy.

#### First-line systemic therapy

One of the following chemotherapy regimens is usually given first:

- FOLFIRI
- FOLFOX
- CAPEOX
- FOLFIRINOX

A targeted therapy known as a biologic may also be included in the regimen. Biologics include:

- Bevacizumab (Avastin)
- Panitumumab (Vectibix)
- Cetuximab (Erbix)

Panitumumab and cetuximab are only used for tumors in the left side of the colon that have normal *RAS* and *BRAF* genes.

For MSI-H or dMMR tumors, immunotherapy may also be an option for first-line therapy. There is less research available on this option. If your cancer has this biomarker, talk to your doctor about immunotherapy versus chemotherapy. Immunotherapies recommended at this time include pembrolizumab (Keytruda) and nivolumab (Opdivo). Nivolumab may be given with another immunotherapy called ipilimumab (Yervoy).

Although uncommon, systemic therapy may shrink the tumors enough to be removed with surgery and/or local therapies. If this occurs, surgery is recommended. The colon tumor and the metastases may be removed during the same procedure or in 2 separate surgeries. After surgery, most people will have more systemic therapy. In some cases, observation or a short course of chemotherapy may be possible. After any systemic therapy given after surgery, surveillance begins. See page 49.

If the tumors do not become resectable during first-line therapy, systemic therapy is typically continued. The goal is to slow the growth and spread of the cancer. In select cases treatment with local therapies may be possible. If one systemic therapy regimen does not work or stops working, there are other options. These are called second- and third-line regimens. Some of the options depend on what treatment you've already had. See the next page for more information.

### Second-line therapy and beyond

If the cancer progresses, the regimen you receive for second-line therapy may be different from what you had before. The choice of regimen will depend on:

- prior systemic therapy received
- how well you are expected to tolerate certain systemic therapies
- whether the tumor has any biomarkers.

Options for MSI-H or dMMR tumors may include:

- Pembrolizumab (Keytruda)
- Nivolumab (Opdivo) with or without ipilimumab (Yervoy)
- Dostarlimab-gxly (Jemperli)

Options for HER2-positive cancers include:

- Trastuzumab (Herceptin) with either pertuzumab (Perjeta) or lapatinib (Tykerb)
- Fam-trastuzumab deruxtecan-nxki (Enhertu)

If the cancer progresses again, third-line systemic therapy options may include:

- Chemotherapy with trifluridine and tipiracil (Lonsurf)
- Targeted therapy with regorafenib (Stivarga)

Both are tablets taken by mouth. The targeted therapy bevacizumab may be given with Lonsurf.

### Upfront surgery is possible

If all areas of cancer can be completely removed using surgery and/or other local therapies, this is recommended for stage IV colon cancer. All of the options that include surgery also involve systemic therapy. Chemotherapy regimens often used are listed below. The choice of regimen depends on whether chemotherapy is given before or after surgery and other factors.

- FOLFOX
- CAPEOX
- FOLFIRI
- FOLFIRINOX
- Capecitabine
- 5-FU/leucovorin

The treatment options are described next and listed in [Guide 4](#) on the next page.

**Option 1:** This option starts with surgery to remove the colon tumor and the liver or lung tumors. The surgeries may be done at the same time or in two procedures. While surgery is preferred to remove the metastases, other local therapies may be helpful if there are only a few small metastases. Local therapies include ablation and stereotactic body radiation therapy (SBRT).

The next phase of this treatment option is chemotherapy. The goal is to kill any cancer cells that may remain in the body. After chemotherapy, surveillance begins.



**Option 2:** This option starts with chemotherapy. Benefits of chemotherapy before surgery can include:

- You may receive early treatment of possible cancer not yet found
- Knowing your response to chemotherapy early can help with treatment planning
- If the cancer grows during chemotherapy, you can avoid local treatment

Disadvantages of chemotherapy before surgery can include:

- The cancer does not respond to treatment and grows
- The cancer responds to treatment but shrinks so much that it is undetectable, and therefore cannot be removed with surgery

- Surgery can no longer be performed because of liver injury caused by side effects

After 2 to 3 months of chemotherapy, the next step is surgery and/or treatment with local therapies. The colon tumor and the metastases may be removed in one surgery or in two separate surgeries. The next phase of this treatment option is more chemotherapy. After chemotherapy, surveillance begins.

**Option 3:** This option starts with surgery to remove the colon tumor (colectomy), followed by 2 to 3 months of chemotherapy. Removing the metastases with surgery and/or local therapies follows chemotherapy. The next phase of this treatment option is more chemotherapy. After chemotherapy, surveillance begins.

## Guide 4

### Treatment options involving surgery for stage IV colon cancer

<b>Option 1</b>	Surgery and/or local therapy → Chemotherapy
<b>Option 2</b>	Chemotherapy → Surgery → Chemotherapy
<b>Option 3</b>	Colon surgery → Chemotherapy → Metastasectomy → Chemotherapy
<b>Option 4</b>	Immunotherapy → Surgery <b>Note:</b> This option is only for dMMR/MSI-H tumors

**Option 4:** For MSI-H/dMMR tumors, your treatment options may include immunotherapy (instead of chemotherapy) before surgery. There is not as much research available on this option. If your cancer is MSI-H or dMMR, talk to your doctor about immunotherapy versus chemotherapy before surgery. Following immunotherapy, the colon tumor and metastases are removed, either at the same time or in separate surgeries. Local therapies may also be used to destroy metastases. After chemotherapy, surveillance begins.

### Cancer in the abdomen

About 17 out of 100 people with metastatic colon cancer will also form tumors in the peritoneum. The peritoneum is the thin layer of tissue that lines the abdomen and covers most of the abdominal organs. The goal of treatment in most cases is to relieve or prevent symptoms. The main treatment is systemic therapy.

Tumors growing in or around the bowel can cause a blockage. If the bowel is blocked, stool cannot move and leave the body. If the cancer is not blocking the bowel, systemic therapy is recommended. The regimen you receive will depend on whether the tumor has any biomarkers and how well you are expected to tolerate certain systemic therapies.

If the cancer is (or is expected to) block the bowel, you will need care to unblock the bowel before starting systemic therapy. This can be done using one of several surgical techniques, or with a mesh metal tube called a stent.

### Cytoreductive surgery and HIPEC

Colon cancer that spreads to the abdominal cavity can be difficult to treat. In some cases, cytoreductive surgery and/or hyperthermic

intraperitoneal chemotherapy (HIPEC) may be treatment options.

Cytoreductive surgery involves surgically removing all visible tumors. If the tumor cannot be separated from the surface of an organ, the organ may also need to be removed. In HIPEC, a heated chemotherapy solution is put directly into the abdominal cavity through small tubes called catheters. The chemotherapy solution kills remaining microscopic cancer cells without killing healthy cells.

Research is needed on whether the benefits of cytoreductive surgery and HIPEC outweigh the potential harms. The use of HIPEC in particular is very controversial. NCCN experts recommend that these methods only be considered for patients with minimal metastases that can be completely removed with surgery. These procedures should only be carried out at cancer centers experienced in these methods.

**Surveillance**

Surveillance for stage IV colon cancer includes:

- Colonoscopies
- Physical exams
- CEA blood tests
- CT scans

Rising CEA levels may be a sign that colon cancer has returned. CT scans can help find new metastases. The recommended schedule for surveillance testing is shown in [Guide 5](#).

In addition to surveillance testing, a range of other care is important for cancer survivors. See *Part 6: Survivorship* for more information.

### Guide 5 Surveillance for stage IV colon cancer

<b>Medical history and physical exam</b>	Every 3–6 months for first 2 years, then every 6 months for 3 more years
<b>CEA blood test</b>	Every 3–6 months for first 2 years, then every 6 months for 3 more years
<b>CT of chest, abdomen, and pelvis</b>	Every 3–6 months for first 2 years, then every 6–12 months for 3 more years
<b>Colonoscopy</b>	<p><b>You did not have a total colonoscopy at diagnosis:</b> Colonoscopy recommended 3 to 6 months after surgery</p> <p><b>You had a total colonoscopy at diagnosis:</b> Colonoscopy recommended 1 year after surgery</p> <ul style="list-style-type: none"> <li>• If no advanced adenoma, repeat in 3 years, then every 5 years</li> <li>• If advanced adenoma, repeat in 1 year</li> </ul>

## Metastasis at recurrence

Cancer may return after initial treatment of non-metastatic disease and spread to the liver, lungs, or other areas. This is called a distant recurrence. Treatment with surgery and/or local therapies is recommended if all of the tumors can be totally removed. However, this is uncommon. You may have a PET/CT scan to help determine whether surgery is possible.

### Systemic therapy

Like stage IV colon cancer, distant recurrences are usually treated with systemic therapy. Your options may be slightly different, however. It is likely that you received oxaliplatin-based chemotherapy as part of initial treatment. CAPEOX and FOLFOX are oxaliplatin-based regimens. Oxaliplatin can cause serious nerve damage and should not be given too often. For

this reason, if you've had recent treatment with FOLFOX or CAPEOX, you should not have more chemotherapy that includes oxaliplatin. The recommended options for systemic therapy are shown in [Guide 6](#).

If you have not had recent treatment with FOLFOX or CAPEOX, your options for systemic therapy depend on prior chemotherapy received, whether the tumor has any biomarkers, and how well you are expected to tolerate certain systemic therapies. If one regimen stops working, there are other options that may work for you. These are called second- and third-line regimens.

Systemic therapy may shrink the tumors to a size small enough to be removed with surgery. If your doctors think that surgery might be possible, the size of the tumors will be checked

## Guide 6

### Systemic therapy for distant recurrence – recent treatment with FOLFOX or CAPEOX

Type of systemic therapy	Regimens
<b>Chemotherapy</b>	<ul style="list-style-type: none"> <li>• FOLFIRI with or without a biologic</li> <li>• Irinotecan with or without a biologic</li> </ul> <p>Biologics include bevacizumab, ziv-aflibercept, ramucirumab, cetuximab,* and panitumumab*</p> <p>*For cancers without <i>RAS</i> or <i>BRAF</i> mutations</p>
<b>Immunotherapy</b> (dMMR/MSI-H tumors only)	<ul style="list-style-type: none"> <li>• Pembrolizumab (Keytruda)</li> <li>• Nivolumab (Opdivo) with or without ipilimumab (Yervoy)</li> </ul>
<b>Targeted therapy</b> ( <i>BRAF</i> V600E positive tumors)	<ul style="list-style-type: none"> <li>• Encorafenib (Braftovi) + cetuximab (Erbix) or panitumumab (Vectibix)</li> </ul>

about every 2 months during systemic therapy. If the cancer does not become resectable, systemic therapy is typically continued. The goal is to slow the growth and spread of the cancer.

If the cancer becomes resectable, surgery is recommended. After surgery, most people will have more systemic therapy. Observation may be an option in some cases. If systemic therapy is planned, the regimen may be different from what you had before surgery. When there are no signs of cancer, you can resume surveillance.

### Surgical treatment options

There are 2 options that include surgery for treating distant recurrences of colon cancer. Surgery is only an option if all of the tumors can be totally removed. The treatment pathways also include chemotherapy, either before or after surgery.

#### Surgery first

This option starts with surgery to remove the liver or lung tumors. Local therapies such as ablation or SBRT may be appropriate instead of surgery if there are a limited number of small metastases.

If you have not had any previous systemic therapy, the next step is chemotherapy with one of the following regimens:

- FOLFOX
- CAPEOX
- Capecitabine
- 5-FU/leucovorin

**If you are being treated with bevacizumab (Avastin), it should be stopped 6 weeks before surgery. It increases the risk of stroke and bleeding, especially in adults over 65 years of age. Bevacizumab can be restarted 6 to 8 weeks after surgery. Otherwise, it can slow healing.**

If you have received treatment with chemotherapy before, options include more chemotherapy and observation. If prior chemotherapy included oxaliplatin, observation is recommended. When there are no signs of cancer, you can resume follow-up care and surveillance.

#### Chemotherapy first

This option starts with chemotherapy to shrink the metastases. Regimens recommended at this time include FOLFOX, CAPEOX, capecitabine, and 5-FU/leucovorin. After 2 to 3 months of chemotherapy, the next step is surgery to remove the metastases. Local therapies such as ablation or SBRT may be appropriate instead of surgery if there are a limited number of small metastases.

More chemotherapy usually follows surgery. However, observation will be an option for some people. The chemotherapy regimens recommended for use before surgery are also recommended after surgery. When there are no signs of cancer, you can resume surveillance.

## Key points

- Metastasis refers to the spread of cancer cells to distant areas.
- Colon cancer spreads most often to the liver, sometimes to the lungs, and less often to the abdomen or other areas.
- If metastases are present at the time of diagnosis, it is stage IV colon cancer.
- Most commonly, metastases develop after treatment for non-metastatic colon cancer. This is called distant recurrence.
- Surgery is preferred for removing liver or lung tumors, but is not often an option.
- Local therapies such as ablation and SBRT may be used in addition to or in place of surgery if all areas of cancer can be removed.
- Metastatic colon cancer that cannot be removed with surgery and/or local therapies is treated with systemic therapy.
- The presence of biomarkers helps guide treatment for metastatic colon cancer.
- Testing for *RAS* and *BRAF* mutations, HER2 amplification, and dMMR/MSI-H is recommended.

Supportive care is available for everyone with cancer. It isn't meant to treat the cancer, but rather to help with symptoms and make you more comfortable.

# 6

## Survivorship

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54 Your primary care doctor

---

55 Help with side effects

---

56 Healthy habits

---

57 More information

---

57 Key points



Survivorship focuses on the physical, emotional, and financial issues unique to cancer survivors. Managing the long-term side effects of cancer and its treatment, staying connected with your primary care doctor, and living a healthy lifestyle are important parts of survivorship.

Colon cancer survivors may experience both short- and long-term health effects of cancer and its treatment. The effects depend in part on the treatment(s) received. Surgery, systemic therapy (chemotherapy, targeted therapy, and immunotherapy), and radiation therapy all have unique potential side effects.

Staying connected with your primary care doctor and adopting healthy habits may help prevent or offset these effects. It can also help lower the risk of getting other types of cancer.

Cancer survivors face a unique financial burden. Paying for doctor visits, tests, and treatments can become unmanageable, especially for those with little or no health insurance. You may also have costs not directly related to treatment, such as travel expenses and the cost of childcare or missed work.

The term financial toxicity is used to describe the problems patients face related to the cost of medical care. Financial toxicity can affect your quality of life and access to needed health care. If you need help paying for your cancer care, financial assistance may be available. Talk with a patient navigator, your treatment team's social worker, and your hospital's financial services department. Several of the

resources listed on page 64 contain helpful information on paying for cancer care.

## Your primary care doctor

After finishing cancer treatment, your primary care doctor will play an important role in your care. Your oncologist (cancer doctor) and primary care physician (PCP) should work together to make sure you get the follow-up care you need. Your oncologist will develop a written survivorship care plan that includes:

- A summary of your cancer treatment history
- A description of the late- and long-term side effects you could have
- Recommendations for monitoring for the return of cancer
- Information on when your care will be transferred to your PCP
- Clear roles and responsibilities for both your cancer doctor and your PCP
- Recommendations on your overall health and well-being



## Help with side effects

### Diarrhea or incontinence

Colon surgery can cause changes to your bowel habits. You may experience changes in the frequency or urgency of your bowel movements. Diarrhea refers to having frequent and watery bowel movements. Incontinence is the inability to control urination (urinary incontinence) or bowel movements (fecal incontinence). The following may help with these side effects:

- Anti-diarrhea medicines
- Changing your diet
- Strengthening your pelvic floor
- Wearing protective undergarments

### Nerve damage

The chemotherapy drug oxaliplatin can cause nerve damage to your fingers and toes. Symptoms include numbness, cramping, tingling, or pain in these areas. Acupuncture and/or heat may help. If you have painful nerve damage, a drug called duloxetine (Cymbalta) may help.

### Ostomy care

If you have an ostomy, you may want to join an ostomy support group. Another option is to see a health care provider that specializes in ostomy care, such as an ostomy nurse. People with ostomies can still live very active lifestyles. However, it's a good idea to talk to an ostomy professional before doing any intense physical activity.

Experts recommend eating a healthy diet, especially one that includes a lot of plant-based foods (vegetables, fruits, and whole grains).



## Healthy habits

Monitoring for the return of cancer is important after finishing treatment. But, it is also important to keep up with other aspects of your health. Steps you can take to help prevent other health issues and to improve your quality of life are described next.

### Cancer screening

Get screened for other types of cancer, such as breast, prostate, and skin cancer. Your primary care doctor can tell you what cancer screening tests you should have based on your age and risk level.

### Other health care

Get other recommended health care for your age, such as blood pressure screening, hepatitis C screening, and immunizations (like the flu shot).

### Diet and exercise

Leading a healthy lifestyle includes maintaining a healthy body weight. Try to exercise at a moderate intensity for at least 150 minutes per week. Talk to your doctor before starting a new exercise regimen.

Eat a healthy diet with lots of plant-based foods. A low glycemic load (GL) diet may help prevent the return of colon cancer. Low GL foods cause a slower and smaller rise in blood sugar levels compared to other carbohydrate-containing foods. Talk to your doctor about a low glycemic load diet.

Alcohol may increase the risk of certain cancers. Drink little to no alcohol.

### Aspirin

Talk to your doctor about taking aspirin every day to help prevent the return of colorectal cancers.

### Quit smoking

If you are a smoker, quit! Your doctor will be able to provide (or refer you for) counseling on how to stop smoking.



**share with us.**

### Take our [survey](#)

And help make the  
**NCCN Guidelines for Patients**  
better for everyone!

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

## More information

For more information on cancer survivorship, the following are available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines):

- *Survivorship Care for Healthy Living*
- *Survivorship Care for Cancer-Related Late and Long-Term Effects*



These resources address many topics relevant to cancer survivors, including:

- Anxiety, depression, and distress
- Cognitive dysfunction
- Fatigue
- Pain
- Sexual problems
- Sleep disorders
- Healthy lifestyles
- Immunizations
- Employment, insurance, and disability concerns

## Key points

- Survivorship focuses on the physical, emotional, and financial issues unique to cancer survivors.
- Your cancer doctor and primary care doctor should work together to make sure you get the follow-up care you need.
- A survivorship care plan is helpful in transitioning your care to your primary care doctor.
- Healthy habits, including exercising and eating right, play an important role in helping to prevent other diseases and second cancers.

# 7

## Making treatment decisions

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59 It's your choice

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59 Questions to ask

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64 Resources



It's important to be comfortable with the cancer treatment you choose. This choice starts with having an open and honest conversation with your doctor.

## It's your choice

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

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 like surgery or chemotherapy
- Your feelings about pain or side effects such as nausea and vomiting
- Cost of treatment, travel to treatment centers, and time away from 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 doctor. If you take the time to build a relationship with

your doctor, 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. 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 doctors are listed on the following pages. Feel free to use these or come up with your own. Be clear about your goals for treatment and find out what to expect from treatment. Use a notebook to record answers to your questions and keep track of all of your records.











## Resources

### American Cancer Society

[cancer.org/cancer/colon-rectal-cancer.html](https://cancer.org/cancer/colon-rectal-cancer.html)

### Anal Cancer Foundation

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

### Bowel Cancer UK

[bowelcanceruk.org.uk](https://bowelcanceruk.org.uk)

### Cancer.Net

[cancer.net/cancer-types/colorectal-cancer](https://cancer.net/cancer-types/colorectal-cancer)

### CancerCare

[Cancercare.org](https://cancercare.org)

### Cancer Hope Network

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

### Cancer Support Community

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

### Colon Cancer Coalition

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

### Colon Cancer Foundation

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

### Colon Club

[Colonclub.com](https://Colonclub.com)

### Colontown

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

### Colorectal Cancer Alliance

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

### Colorectal Cancer Canada

[colorectalcancercanada.com](https://colorectalcancercanada.com)

### Fight Colorectal Cancer

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

### Global Colon Cancer Association

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

### HPV Cancers Alliance

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

### Love Your Buns

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

### Meredith's Miracles

[merediths-miracles.org](https://merediths-miracles.org)

### National Cancer Institute (NCI)

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

### National Coalition for Cancer Survivorship

[canceradvocacy.org/toolbox](https://canceradvocacy.org/toolbox)

### PAN Foundation

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

### U.S. National Library of Medicine Clinical Trials Database

[clinicaltrials.gov](https://clinicaltrials.gov)



## Words to know

### **abdomen**

The belly area between the chest and pelvis.

### **ablation**

A type of local therapy used to destroy tumors in the liver or lungs. Also called image-guided ablation.

### **adenocarcinoma**

Cancer in cells that line organs and make fluids or hormones. The most common type of colon cancer.

### **adenoma**

The most common type of polyp and is the most likely to form cancer cells. Also called adenomatous polyps.

### **anus**

The opening at the end of the large bowel that allows stool to pass out of the body.

### **biomarkers**

Specific features of cancer cells. Biomarkers can include proteins made in response to the cancer and changes (mutations) in the DNA of the cancer cells.

### **biopsy**

Removal of small amounts of tissue or fluid to be tested for disease.

### **cancer grade**

How closely the cancer cells look like normal cells when viewed under a microscope.

### **cancer stage**

Rating of the growth and spread of tumors.

### **carcinoembryonic antigen (CEA)**

A protein that gets released by some tumors and can be detected in blood as a tumor marker.

### **carcinoma in situ**

Abnormal cells on the innermost layer of the colon wall. These cells may become cancer and spread into deeper layers of the colon wall.

### **catheter**

A flexible tube inserted in the body to give treatment or drain fluid from the body.

### **clinical trial**

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

### **colectomy**

Surgery to remove a part of the colon.

### **colon**

The first and longest section of the large bowel. Unused food is turned into stool in the colon.

### **colonoscope**

A thin, long tube with a light and camera used to see the colon.

### **colonoscopy**

Insertion of a thin tool into the colon to view or remove tissue.

### **colostomy**

Surgery to connect a part of the colon to the outside of the abdomen and that allows stool to drain into a bag.

### **complete blood count (CBC)**

A test of the number of blood cells.

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

A test that uses x-rays from many angles to make a picture of the inside of the body.

### **contrast**

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

**embolization**

Blockage of blood flow to a tumor with beads that emit either chemotherapy or radiation.

**enema**

Injection of liquid into the rectum to clear the bowel.

**esophagus**

The tube-shaped digestive organ between the mouth and stomach.

**external beam radiation therapy (EBRT)**

Treatment with high-energy rays received from a machine outside the body.

**familial adenomatous polyposis (FAP)**

An inherited medical condition that increases the risk of colon cancer.

**infusion**

A method of giving drugs slowly through a needle into a vein.

**intensity-modulated radiation therapy (IMRT)**

Radiation therapy that uses small beams of different strengths based on the thickness of the tissue.

**interventional oncology/radiology**

A medical specialty that uses imaging techniques to deliver minimally invasive cancer treatments.

**intraoperative radiation therapy (IORT)**

Radiation therapy that is given inside the body at the end of an operation.

**invasive cancer**

Cancer cells have grown into the second layer of the colon wall.

**large intestine (bowel)**

A long tube-shaped organ that forms the last part of the digestive system. Includes the colon, rectum, and anus.

**laxative**

Drugs used to clean out the intestines.

**lymph**

A clear fluid containing white blood cells.

**lymph node**

Small groups of special disease-fighting cells located throughout the body.

**lymphadenectomy**

Surgery to remove lymph nodes.

**magnetic resonance imaging (MRI)**

A test that uses a magnetic field and radio waves to make pictures of the insides of the body.

**metastasectomy**

Surgery to remove cancer that has spread far from the first tumor.

**metastasis**

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

**microsatellite instability-high/mismatch repair deficient (MSI-H/dMMR)**

A biomarker (feature) of some colon cancers that is used to guide treatment. Everyone with colon cancer should be tested for this biomarker.

**mucosa**

The innermost layer of the colon wall that comes into contact with food.

**muscularis propria**

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

**mutation**

An abnormal change in the instructions (DNA) within cells for making and controlling cells.

**needle biopsy**

Removal of tissue or fluid samples from the body with a needle.

**observation**

A period of testing for cancer growth.

**pathologist**

A doctor who specializes in testing cells and tissue to find disease.

**pedunculated polyp**

A polyp shaped like a mushroom with a stalk.

**pelvis**

The area between the hip bones.

**polyp**

An overgrowth of cells on the inner lining of the colon wall.

**portal vein embolization**

The blood vessel to the liver tumor is blocked causing the healthy part of the liver to grow larger.

**positron emission tomography (PET)**

Use of radioactive material to see the shape and function of body parts, and at times, highlight certain tumors within the body.

**primary tumor**

The first mass of cancer cells in the body.

**progression**

The growth or spread of cancer after being tested or treated.

**radiologist**

A doctor that specializes in interpreting imaging tests.

**rectum**

The last part of the large bowel. Stool is held here until it leaves the body.

**recurrence**

The return of cancer after a cancer-free period.

**serosa**

The outer layer of the colon wall.

**sessile polyp**

A polyp that is flat.

**stereotactic body radiation therapy (SBRT)**

A highly specialized type of radiation therapy. May be used to treat colon cancer that has spread to the liver, lungs, or bone.

**stool**

Unused food passed out of the body; also called feces.

**submucosa**

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

**supportive care**

Treatment for the symptoms or health conditions caused by cancer or cancer treatment.

**surgical margin**

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

**three-dimensional conformal radiation therapy (3D-CRT)**

Radiation therapy that uses beams that match the shape of the tumor.

**tumor biomarker testing**

Testing tumor tissue to look for targetable features called biomarkers.

**tumor deposit**

The presence of tiny tumors where the lymph drains from the tumor.

# NCCN Contributors

This patient guide is based on the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Colon Cancer, Version 1.2022 – February 25, 2022. It was adapted, reviewed, and published with help from the following people:

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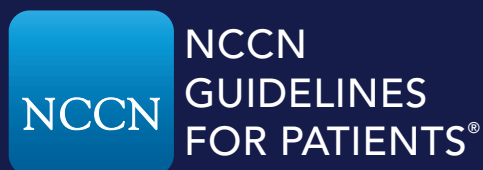




# Index

- ablation** 28–29, 34, 44–46, 51–52, 66
- acupuncture** 55
- aspirin** 56
- BRAF*** 20–22, 44–45, 50, 52
- cancer staging** 9–13
- carcinoembryonic antigen (CEA)** 18, 22, 37, 41–42, 44, 49, 66
- carcinoma in situ** 10, 66
- clinical trial** 20, 32–33, 60, 62
- colectomy** 24–26, 34, 37–38, 42, 47, 61, 66
- colonoscopy** 9, 16–17, 37, 41, 44, 49, 66
- colostomy** 25, 34, 38, 61
- familial adenomatous polyposis (FAP)** 15, 22, 67
- fertility** 21–22
- HER2** 20–22, 44, 46, 52
- hereditary non-polyposis colon cancer (HNPCC)** 15
- HIPEC** 48
- immunotherapy** 20, 22, 26–28, 34, 38, 42, 45, 47–48, 50, 54
- KRAS/NRAS*** 20, 22, 44, 45, 50, 52
- lymphadenectomy** 24, 67
- Lynch syndrome** 15, 20, 22
- metastasectomy** 47, 67
- microsatellite instability-high/mismatch repair deficient (MSI-H/dMMR)** 20, 22, 37–39, 42, 44–48, 50, 52, 67
- next-generation sequencing (NGS)** 20, 44
- polypectomy** 9, 37, 42, 67
- stereotactic body radiation therapy (SBRT)** 30–31, 34, 46, 51–52, 68
- supportive care** 52
- surveillance** 41–42, 45–49, 51
- survivorship** 53–57





# Colon Cancer

## 2022

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