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National Comprehensive Cancer Network®

NCCN Guidelines for Patients®

Version 1.2016

Colon Cancer

Presented with support from FIGHT COLORECTAL CANCER

Available online at NCCN.org/patients

Colon Cancer

Learning that you have colon cancer can be overwhelming. The goal of this book is to help you get the best care. It presents which cancer tests and treatments are recommended by experts in colon cancer.

The National Comprehensive Cancer Network® (NCCN®) is a not-for-profit alliance of 27 of the world's leading cancer centers. Experts from NCCN have written treatment guidelines for doctors who treat colon cancer. These treatment guidelines suggest what the best practice is for cancer care. The information in this patient book is based on the guidelines written for doctors.

This book focuses on the treatment of colon cancer. Key points of this book are summarized in the related **NCCN Quick Guide™**. NCCN also offers patient resources on ovarian cancer, sarcoma, lymphomas, and other cancer types. Visit **NCCN.org/patients** for the full library of patient books, summaries, and other resources.

Credits

NCCN aims to improve the care given to patients with cancer. NCCN staff work with experts to create helpful programs and resources for many stakeholders. Stakeholders include health providers, patients, businesses, and others. One resource is the series of books for patients called the NCCN Guidelines for Patients®. Each book presents the best practice for a type of cancer. The patient books are based on clinical practice guidelines written for cancer doctors. These guidelines are called the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®). Clinical practice guidelines list the best health care options for groups of patients. Many doctors use them to help plan cancer treatment for their patients.

Panels of experts create the NCCN Guidelines®. Most of the experts are from NCCN Member Institutions. Panelists may include surgeons, radiation oncologists, medical oncologists, and patient advocates. Recommendations in the NCCN Guidelines are based on clinical trials and the experience of the panelists. The NCCN Guidelines are updated at least once a year. When funded, the patient books are updated to reflect the most recent version of the NCCN Guidelines for doctors. For more information about the NCCN Guidelines, visit **NCCN.org/clinical.asp**.

NCCN staff involved in developing the NCCN Guidelines for Patients include:

Dorothy A. Shead, MS
Director, Patient and Clinical Information Operations

Laura J. Hanisch, PsyD
Medical Writer/Patient Information Specialist

Lacey Marlow
Associate Medical Writer

Rachael Clarke
Guidelines Data and Layout Coordinator

Susan Kidney
Graphic Design Specialist

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FIGHT COLORECTAL CANCER

As an organization dedicated to helping patients, caregivers and those impacted by colorectal cancer find trusted resources and information they need to make informed decisions about their health, we are proud to support this comprehensive resource. **FightColorectalCancer.org**

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THE COLON CANCER ALLIANCE

The Colon Cancer Alliance is pleased to endorse the NCCN Guidelines for Colon Cancer as a resourceful tool to help knock colon cancer out of the top three cancer killers. **ccalliance.org**

Supported by NCCN Foundation®

NCCN Foundation supports the mission of the National Comprehensive Cancer Network® (NCCN®) to improve the care of patients with cancer. One of its aims is to raise funds to create a library of books for patients. Learn more about the NCCN Foundation at **NCCN.org/foundation**.

National Comprehensive Cancer Network (NCCN)
275 Commerce Drive • Suite 300
Fort Washington, PA 19034
215.690.0300

Contents

Colon Cancer

How to use this book

Who should read this book?

This book is about treatment for adenocarcinoma of the colon. It does not discuss rectal cancer. Patients and those who support them—caregivers, family, and friends—may find this book helpful. It may help you discuss and decide with your doctors what care is best.

Where should I start reading?

Starting with Part 1 may be helpful. It explains what colon cancer is. It also explains how colon cancer is found and cancer stages. It is important to know the stage of the cancer. Your cancer treatment will be partly based on the cancer stage. Tests that help doctors plan treatment are described in Part 2.

An overview of treatments for colon cancer is presented in Part 3. Knowing what a treatment is will help you understand your options. Treatment options are presented in Parts 4 through 6.

Part 4 presents treatment options for colon cancer that hasn't spread far. Read Part 5 to learn the treatment options for colon cancer that has spread to the liver or lungs. Part 6 lists treatment options for advanced colon cancers including those that can't be treated with surgery. Tips for making treatment decisions are presented in Part 7.

Does the whole book apply to me?

This book includes information for many situations. Your treatment team can help. They can point out what information applies to you. They can also give you more information. As you read through this book, you may find it helpful to make a list of questions to ask your doctors.

The recommendations in this book are based on science and the experience of NCCN experts. However, these recommendations may not be right for you. Your doctors may suggest other tests and treatments based on your health and other factors. If other recommendations are given, feel free to ask your treatment team questions.

Making sense of medical terms

In this book, many medical words are included. These are words that you will likely hear from your treatment team. Most of these words may be new to you, and it may be a lot to learn.

Don't be discouraged as you read. Keep reading and review the information. Don't be shy to ask your treatment team to explain a word or phrase that you do not understand.

Words that you may not know are defined in the text or in the *Dictionary*. Words in the *Dictionary* are underlined when first used on a page.

Acronyms are also defined when first used and in the *Glossary*. *Acronyms* are short words formed from the first letters of several words. One example is DNA for **d**eoxyribo**n**ucleic **a**cid.

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1

Colon cancer basics

1 Colon cancer basics

Learning that you have cancer can be overwhelming. This chapter briefly describes what colon cancer is. These basics may help you cope and better understand Parts 2 through 8.

The colon

The digestive system breaks down food for the body to use. After being swallowed, food moves through four organs known as the digestive tract as shown in **Figure 1**. First, food passes through the esophagus and into the stomach. The stomach turns solid food into a liquid. From the stomach, food enters the small intestine where food is broken down into very small parts and nutrients are absorbed into the bloodstream.

After the small intestine, food moves into the large intestine. The large intestine changes unused food from a liquid into a solid by absorbing water. This solid, unused food is called feces or stool. The large intestine also expels stool from the body. The colon is part of the large intestine. It is almost 5 feet long. Its four parts are the ascending, transverse, descending, and sigmoid colon.

The wall of the colon has four main layers as shown in **Figure 2**. The inner layer that has contact with stool is called the mucosa. The mucosa is made of three sublayers—the epithelium, lamina propria, and muscularis mucosae. The epithelium absorbs water from stool and makes mucus. Mucus is a sticky, thick

Figure 1. The digestive tract

The digestive tract consists of 4 main parts. The esophagus moves food from your throat to your stomach. In the stomach, food is turned into a liquid. Nutrients from the liquid are absorbed into your body within the small intestine. The large intestine absorbs liquid from and pushes unused food out of the body.

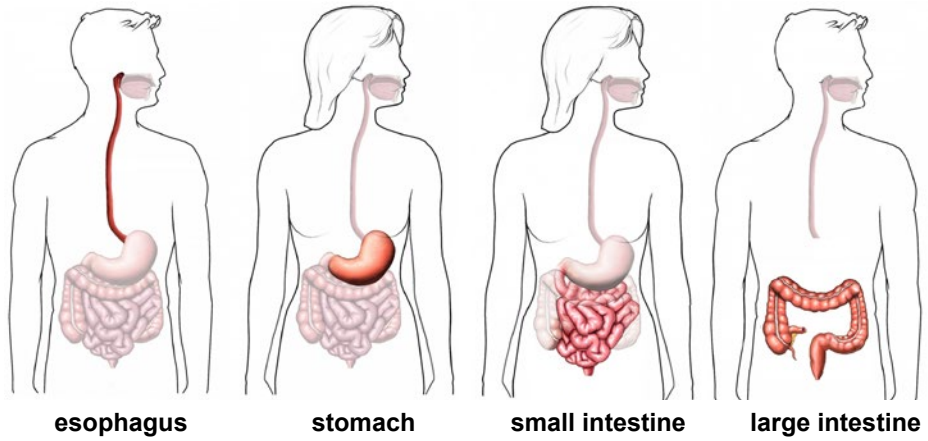
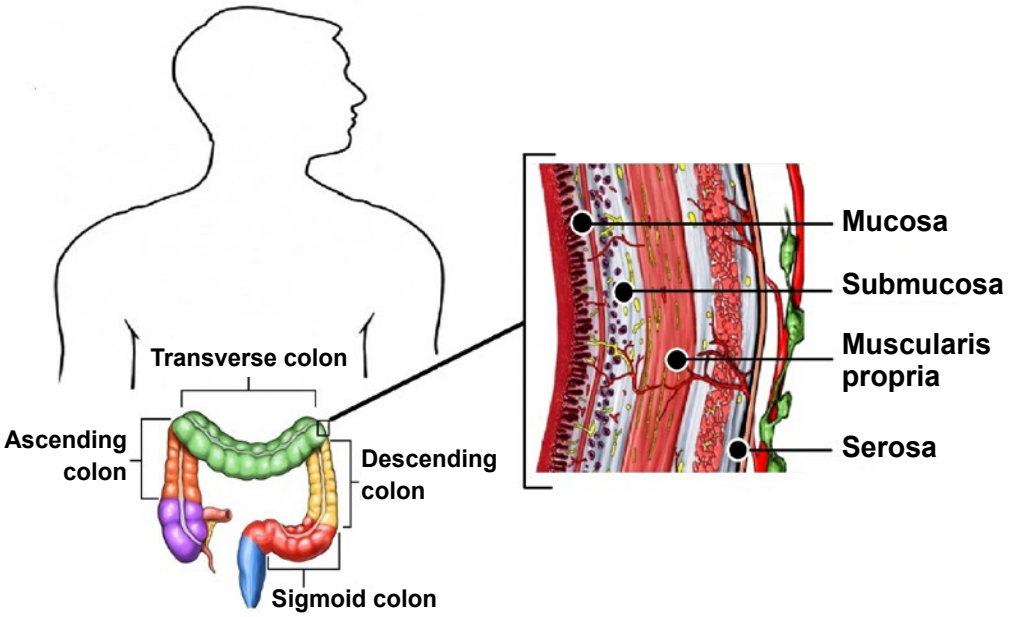


Figure 2. The colon

The colon is part of the large intestine. It is almost 5 feet long. It has four sections—the ascending, transverse, descending, and sigmoid colon. Its wall has four main layers—the mucosa, submucosa, muscularis propria, and serosa or adventitia.



liquid that protects the colon and helps move stool through the colon. The lamina propria is a thin layer of connective tissue. The muscularis mucosae is a thin strip of muscle.

The second layer of the colon wall is called the submucosa. It consists of connective tissue, blood and lymph vessels, and nerve cells. Lymph is a clear fluid that gives cells water and food. It also has white blood cells that fight germs. Blood and lymph drain from colon tissue into vessels that are in the submucosa and then travel to other sites.

The third layer of the colon wall is called the muscularis propria. It is mostly made of muscle fibers. These muscles help move stool through the colon.

The fourth layer is the outer most part of the colon wall. It consists either of adventitia or serosa. Adventitia is connective tissue that binds the colon to other structures. The serosa, also called the visceral peritoneum, is a membrane. It has a thin layer of connective tissue, called the subserosa, which is covered by a single row of cells that make lubricating fluid. This fluid allows the colon to move smoothly against other organs.

Colon cancer

Cancer is a disease of cells. Almost all colon cancers are adenocarcinomas. Adenocarcinomas are cancers of cells that line glands and, in the case of colon cancer, make mucus. Adenocarcinomas of the colon are the focus of this book.

Inside of cells are coded instructions for building new cells and controlling how cells behave. These instructions are called genes. Genes are a part of DNA (**d**eoxyribo**n**ucleic **a**cid), which is grouped together into bundles called chromosomes. **See Figure 3**. Abnormal changes (mutations) in genes cause normal cells to become cancer cells. Researchers are still trying to learn what causes genes to mutate and cause cancer.

Cancer cells don't behave like normal cells in three key ways. First, mutations in genes cause normal cells to grow more quickly and live longer. Normal cells grow and then divide to form new cells when needed. They also die when old or damaged as shown in **Figure 4**. In contrast, cancer cells make new cells that aren't needed and don't die quickly when old or damaged. Over time, colon cancer cells form a mass called the primary tumor.

The second way cancer cells differ from normal cells is that they can grow into surrounding tissues. If not treated, the primary tumor can extend beyond the walls of the colon and into nearby structures. Colon cancers that haven't grown into the second layer of the colon wall are called "noninvasive cancers." Colon cancers that have grown into the second layer are called "invasive cancers."

Third, unlike normal cells, cancer cells can leave the colon and form tumors in other parts of the body. This process is called metastasis. In this process, cancer cells break away from the tumor and merge with blood or lymph. Then, the cancer cells travel in blood

or lymph through vessels to other sites. The first sites are nearby lymph nodes. Common distant sites include your liver and lungs. Once cancer cells are in other sites, they can form secondary tumors and may cause major health problems.

Figure 3.
Genetic material in cells

Most human cells contain the "blueprint of life"—the plan by which our bodies are made and work. The plan is found inside of chromosomes, which are long strands of DNA that are tightly wrapped around proteins. Genes are small pieces of DNA that contain instructions for building new cells and controlling how cells behave. Humans have about 24,000 genes.

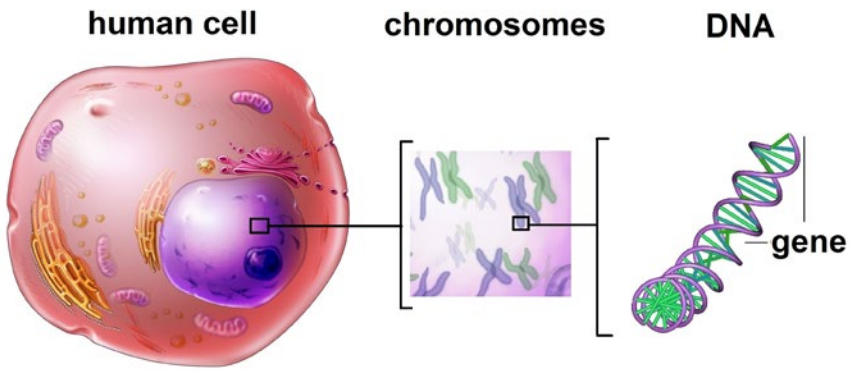
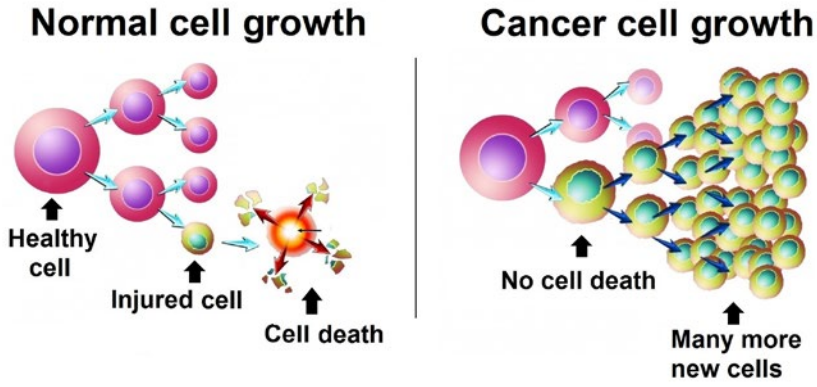


Figure 4.
Normal cell growth vs. cancer cell growth

Normal cells increase in number when they are needed and die when old or damaged. In contrast, cancer cells quickly make new cells and live longer because of abnormal changes in genes.



Diagnosis

Cancer screening is ongoing testing to assess for cancer before it causes symptoms. Some colon cancers are found during cancer screening. Other colon cancers are found because of symptoms.

A common symptom of colon cancer is stool that is black, bloody, or both. Other common symptoms are pain in the belly area and low red blood cell counts (anemia). If you have these symptoms, it doesn't mean that you have colon cancer. They are also caused by other health conditions.

If you are in a screening program or have certain symptoms, your doctor will look for signs of colon cancer during a procedure called a colonoscopy. He or she will insert a thin tool into your anus and guide it to your colon. A light and camera on the tool allows your doctor to see. A colonoscopy is described in more detail in Part 2.

Polyps

Colon cancer often starts in a polyp. As shown in **Figure 5**, a polyp is an overgrowth of cells from the epithelium of the colon wall. Not all polyps are the same. They all grow from the mucosa, but they differ in size, shape, and how their cells look. The chance of cancer forming in polyps differs by the type of polyp. There are three types of colon polyps.

- Adenomatous polyps, or adenomas, have cells that don't look like normal colon cells. They are the most common type of polyp. Most do not become cancer, but most polyps with cancer started as adenomas.
- Hyperplastic polyps have cells that grow fast. They are often found in the last part of the colon and in the rectum. They rarely become cancer.
- Inflammatory polyps often grow after a flare-up of an inflammatory bowel disease. They can have any shape. The chance of them becoming cancer is low.

Sessile polyps are flat polyps that grow flush along the colon wall and do not have a stalk. Sometimes, they can be hard to spot. Pedunculated polyps are shaped like mushrooms. They have a stalk and round top. Serrated is a term for any polyp that has a saw-tooth pattern. Sessile serrated adenomas are rare but have been linked to cancer.

Pathology review

Samples of colon tissue must be removed from your body and be tested to confirm (diagnose) cancer. A biopsy is a procedure that removes fluid or tissue samples for testing. Polyps can be removed during a colonoscopy. This minor surgery is called an endoscopic polypectomy. The removed polyp(s) will be sent to a pathologist for review. A pathologist is a doctor who's an expert in testing cells to find disease.

The pathologist will study the parts of the cells with a microscope to classify any disease. This is called histologic typing. When cancer is found, he or she will do other tests to learn more about the cancer.

All lab results are included in a pathology report that gets sent to your doctors. The pathology report will state what type of colon cancer you have. The pathology report may also state how far the cancer has grown into the colon wall if the biopsy removed enough of the colon wall.

It's a good idea to ask for a copy of your pathology report. Also ask your treatment team any questions about the test results. These reports are used to plan treatment.

Figure 5. Colon polyp

A colon polyp is an overgrowth of cells that line the inner surface of the colon wall. Colon cancer often starts in a polyp. However, most polyps do not become cancer. To confirm if cancer is present, a tissue sample must be removed and tested. Tissue samples are removed with a tube-shaped tool that is inserted into the colon.

Cancer stages

A cancer stage is a rating by your doctors of the extent of the cancer. It is used to plan which tests may be needed and which treatments are best for you. The AJCC (**A**merican **J**oint **C**ommittee on **C**ancer) staging system is used to stage colon cancer.

In the AJCC system, the letters T, N, and M describe the areas of cancer growth. The **T** score tells how far the primary tumor has grown within the colon wall and beyond. The **N** score reflects how many nearby lymph nodes have cancer and if there are small secondary tumors within the colon called tumor deposits. The **M** category tells you if the cancer has spread to distant sites. Distant sites include the liver, lungs, ovaries, distant lymph nodes, parietal peritoneum, and other organs. The parietal peritoneum is a thin layer of tissue that covers the abdominal wall.

Colon cancer has 5 stages ranging from 0 to IV. The stages are based on the T, N, and M scores. Cancer stages for colon cancer are defined as:

Stage 0

- These cancers are also called carcinoma in situ of the colon. The cancer has not grown beyond the first layer of the colon wall. It is a noninvasive cancer. Additional treatment may not needed if all the cancer was removed during the endoscopic polypectomy.

Stage I

- The cancer has grown into either the second or third layer of the colon wall. There is no cancer in nearby or distant sites.

Stage II

- The cancer has grown into the fourth layer of or outside the colon wall. There is no cancer in nearby or distant sites.

Stage III

- The cancer has spread from the colon to nearby lymph nodes or there are tumor deposits.

Stage IV

- The colon cancer has spread to distant organs.

Rating of the cancer stage is often done twice. The first rating is based on tests before treatment and is called the clinical stage. Exactly how far the cancer has spread and how many lymph nodes have cancer may not be known until after surgery. Thus, your doctors will rate the cancer again after surgery. This rating is called the pathologic stage.

My notes

Review

- The colon absorbs water from unused food in the body.
- The wall of the colon has four layers.
- Colon cancer often starts in cells that line the inside of the colon wall and make mucus.
- Cancer cells form a tumor since they don't grow and die as normal cells do.
- Cancer cells can spread to other body parts through lymph or blood.
- To diagnose colon cancer, a sample of colon tissue must be removed and assessed by a pathologist.
- The cancer stage is a rating by doctors of the extent of cancer.

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2 Treatment planning

2 Treatment planning

Doctors plan treatment with many sources of information. These sources include tests of your health and the cancer. Part 2 describes who should receive which tests before treatment. Some tests are used to confirm the clinical stage of the cancer. Others are used to know which treatments would work best.

Medical history

Your medical history includes any health events and medicines you've taken in your life. It helps your doctors know if you can have surgery. It also helps doctors assess if chemotherapy will do you more good than harm.

Colon cancer and other health conditions can run in families. Thus, your doctor will ask about the medical history of your blood relatives. It's important to know who in your family has had what diseases and at what ages the diseases started. You doctor may ask about the health of your siblings, your parents and their siblings, and your grandparents and their siblings.

Colon cancer often occurs for unknown reasons. But some people have syndromes that increase their chances of getting colon cancer. A syndrome is a group of signs or symptoms that occur together and suggest the presence of or risk for a disease. Some syndromes that increase the risk for colon cancer are passed down from parents to child (inherited).

Lynch syndrome is an inherited syndrome. It's also called HNPCC (**h**ereditary non-**p**olyposis **c**olon **c**ancer). It's the most common type of inherited syndrome to cause colon cancer. It also increases the risk for other types of cancer. Even so, only 3 to 5 out of every 100 people with colon cancer have Lynch syndrome. Read the section, *Cancer cell tests*, to learn more.

FAP (**f**amilial **a**denomatous **p**olyposis) is a rare inherited syndrome that often leads to colon cancer. However, only 1 out of 100 people with colon cancer have FAP. FAP starts with hundreds of polyps forming in the colon and rectum. You are likely to have cancer by age 50 if you have classic FAP. In attenuated FAP, the start of the disease is later in life and fewer than 100 polyps develop.

If your doctors think you have an inherited syndrome, you may be referred to a genetic counselor. A genetic counselor can talk with you about getting tested for syndromes related to colon cancer. To be tested, you must provide a sample of blood. Using the sample, a pathologist can test your genes for abnormal changes that cause these syndromes.

A medical history is one of the tests needed for treatment planning. See **Guide 1** for a complete list of tests that is recommended prior to treatment. Some tests are for anyone with colon cancer while others are for a select group.

Guide 1. Health tests before cancer treatment

Test name	Who should get this test?
• Medical history	All people with colon cancer
• Physical exam	All people with colon cancer
• Total colonoscopy	All people with colon cancer
• Complete blood count	All people with stage II, III, or IV colon cancer
• Carcinoembryonic antigen	All people with stage II, III, or IV colon cancer
• CT with contrast	All people with stage II, III, or IV colon cancer
• MRI with contrast + CT without contrast	Some people who have unclear CT results or who are unable to take CT contrast
• PET/CT	Some people with metastatic colon cancer who may be treated with surgery
• Needle biopsy	Some people with metastatic colon cancer
• RAS test	All people with metastatic colon cancer
• BRAF test	All people with metastatic colon cancer
• MMR or MSI test	All people with colon cancer

Physical exam

Doctors often perform a physical exam along with taking a medical history. A physical exam is a study of your body for signs of disease. During this exam, your doctor will listen to your lungs, heart, and gut. Your doctor will also look at and feel parts of your body. This is done to see if organs are of normal size, are soft or hard, or cause pain when touched. Cancer and other health conditions can cause organs to become enlarged and hard.

Total colonoscopy

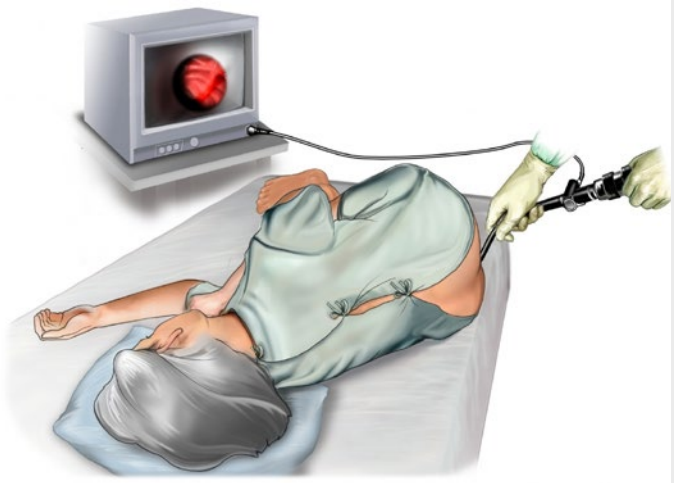
During a total colonoscopy, your doctor will look inside your entire large intestine for polyps and other diseases. To prepare for this test, your doctor may place you on a liquid diet for 1 to 3 days. You may also be given a laxative or an enema to clean out your intestine the night before the test. Right before the test, you may be given a sedative to lessen any pain. You will be asked to wear a hospital gown and lie on your side during the test as shown in **Figure 6**.

A colonoscope will be inserted into your anus and gently guided through your large intestine. To see better, gas may be pumped into your intestine to make it bigger. You may be asked to shift a little during the test to help your doctor guide the colonoscope. The picture from the colonoscope will be viewed by your doctor on a screen. If a polyp is found, a cutting tool will be used to remove it.

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. If you have severe pain, bloody stool, or weakness, contact your doctor.

Figure 6. Total colonoscopy

Your entire colon should be examined if you have colon cancer. A total colonoscopy is a procedure that allows your doctor to look for and remove any tissue that looks abnormal. It involves inserting a thin device into your body that has a light, camera, and cutting tool.



Blood tests

Blood tests are used to look for signs of disease. For a blood test, a needle will be inserted into your vein to remove a sample of blood. The needle may bruise your skin and you may feel dizzy from the blood draw. Your blood sample will then be sent to a lab where a pathologist will test it.

Complete blood count

A CBC (**c**omplete **b**lood **c**ount) measures the number of blood cells in a blood sample. It includes numbers of white blood cells, red blood cells, and platelets. Cancer and other health problems can cause low or high counts.

Chemistry profile

Another blood test is a chemistry profile. When colon cancer spreads, it can cause high or low levels of chemicals in the blood. One example is a high CEA (**c**arcino**e**mbryonic **a**ntigen) level. CEA is normally low in healthy adults unless a woman is pregnant. High CEA levels suggest the cancer has spread far.

Imaging tests

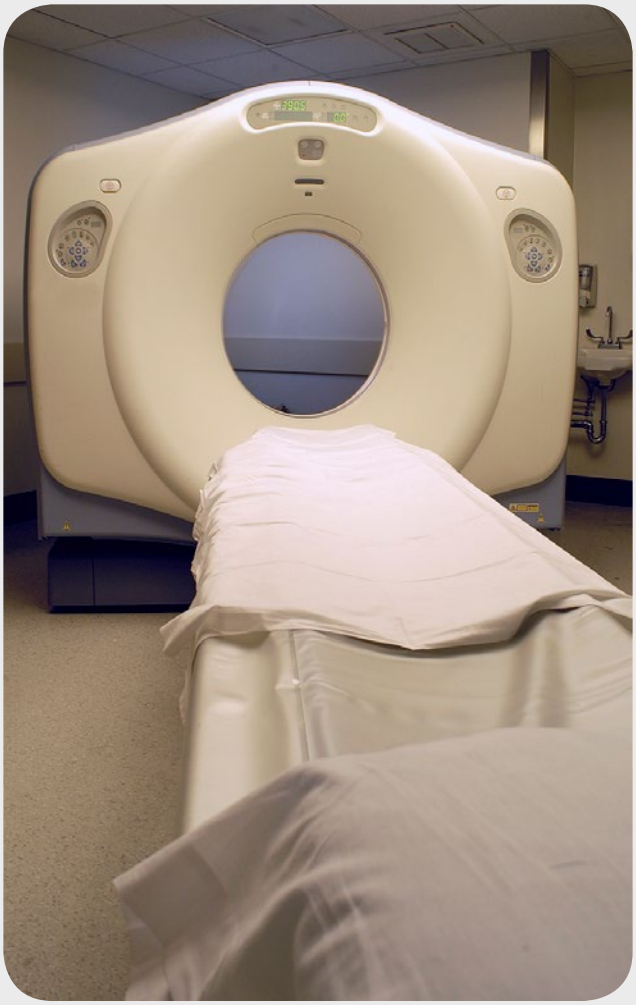
Imaging tests make pictures (images) of the insides of your body. They can show which sites have cancer. This information helps your doctors stage the cancer and plan treatment.

Figure 7 shows one type of imaging machine. Imaging machines are large. You will likely be lying down during testing. At least part of your body will be in the machine.

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 doctors if you get nervous when in small spaces. You may be given a sedative to help you relax.

Figure 7. CT machine

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



CT with contrast

CT (**c**omputed **t**omography) takes many x-rays from different angles to make detailed pictures. A CT scan of your chest, abdomen, and pelvis is advised if the cancer has spread beyond the second layer of the colon wall. Pictures from these areas will help inform your doctor if the cancer has spread to nearby or distant sites.

A contrast dye should be used to make the pictures clearer. The dye will be injected into your vein and you will also need to drink barium. The contrast may cause you to feel flushed or get hives. Rarely, serious allergic reactions occur. Tell your doctor and the technicians if you have had bad reactions in the past.

During the scan, you will need to lie face up on a table that moves through the imaging machine. As the machine takes pictures, you may hear buzzing, clicking, or whirring sounds. You will be alone, but a technician will operate the machine in a nearby room. He or she will be able to see, hear, and speak with you at all times. One scan is completed in about 30 seconds. A computer combines all the x-rays to make detailed pictures.

You will likely be able to resume your activities right away unless you took a sedative. You may not learn of the results for a few days since a radiologist needs to see the pictures. A radiologist is a doctor who's an expert in reading the images.

MRI

MRI (**m**agnetic **r**esonance imaging) is an imaging test that 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 or you can't have CT contrast. In these cases, MRI with contrast of your abdomen and pelvis and CT without contrast of your chest are advised.

For MRI, a coil device will be placed around your body that extends from below your chest to the top of your legs. The device sends and receives radio waves. It's important to lie still during the test, so straps may be used to help you stay in place. You may be given a sedative beforehand if you feel nervous.

During MRI, you will be inside the MRI machine. The machine makes loud noises but you can wear earplugs. After MRI, you will be able to resume your activities right away unless you took a sedative. MRI may cause your body to feel a bit warm.

PET/CT

Sometimes CT is combined with PET (**p**ositron **e**mission **t**omography). When used to together, they are called a PET/CT scan. PET/CT scan is not often used to plan treatment for colon cancer.

There are two reasons why you may have a PET/CT scan. After finding metastases, your doctor may order a PET/CT scan to know how big the tumor is. A PET/CT scan can also find metastases other than in the liver that would make surgery not possible.

PET/CT may be done with one or two machines depending on the cancer center. For PET, a sugar radiotracer will first be injected into your 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. PET can show even small amounts of cancer because the images are based on the cells' use of sugar (cell metabolism).

Needle biopsy

Samples of tissue or fluid can sometimes be removed from the body with a needle. This procedure is called a needle biopsy. The methods of obtaining samples with a needle differ based on the body site. If your doctor suspects metastases, a needle biopsy may be done. The samples will be sent to a pathologist for cancer testing.

Cancer cell tests

Not all colon cancer cells are alike. Cancer cells can differ by which genes have mutations. Some gene mutations are known to have an effect on cancer treatment. Biomarker (or molecular) testing includes tests of genes or their products (proteins). Biomarker testing that is advised for colon cancer is described next.

RAS mutation

RAS is a family of proteins found in cells. Some colon cancers have abnormal genes that control the RAS proteins. As a result, the RAS proteins made by the abnormal genes are overactive and promote cancer cell growth. Some treatments for metastatic colon cancer do not work if the genes that control KRAS and NRAS—members of the RAS family—are abnormal. Thus, testing for mutations in the *KRAS* and *NRAS* genes is advised for metastatic disease.

BRAF mutation

Another mutation known to affect some colon cancer treatments is the *BRAF V600E* mutation. The protein made by the *BRAF* gene is involved with signals within cells that trigger cell growth. About 5 to 9 out of every 100 colon cancers have a mutated *BRAF* gene. Testing for the *BRAF V600E* mutation is advised for metastatic disease.

MMR and MSI

Normal MMR (**m**is**m**atch **r**epair) proteins correct DNA errors that occur when copies of DNA are being made. In some people with colon cancer, the genes that encode MMR proteins have mutations and one or more of the MMR proteins are absent. As a result, DNA errors aren't corrected and the number of gene mutations increases. Doctors call this dMMR (**d**efective **m**is**m**atch **r**epair).

The DNA errors caused by dMMR often occur in microsatellites. Microsatellites are a tiny part of the DNA code that is repeated many times in a row. **See Figure 8**. Due to dMMR, microsatellites may be shorter or longer than normal. This is called MSI (**m**icro**s**atellite **i**nstability).

Loss of MMR proteins and MSI are features of Lynch syndrome. One or both features is present in over 90 of every 100 Lynch syndrome-related cancers (>90%). However, these features can still occur in the absence of Lynch syndrome. These features are found in about 15 out of every 100 colon cancers (15%) without Lynch syndrome.

Testing for loss of MMR proteins or MSI is advised for all people with colon cancer. These features may affect your treatment plan. Additionally, you should be screened for Lynch syndrome if you are:

1) 70 years of age or younger; or

2) Older than 70 years and any of the following describe you:

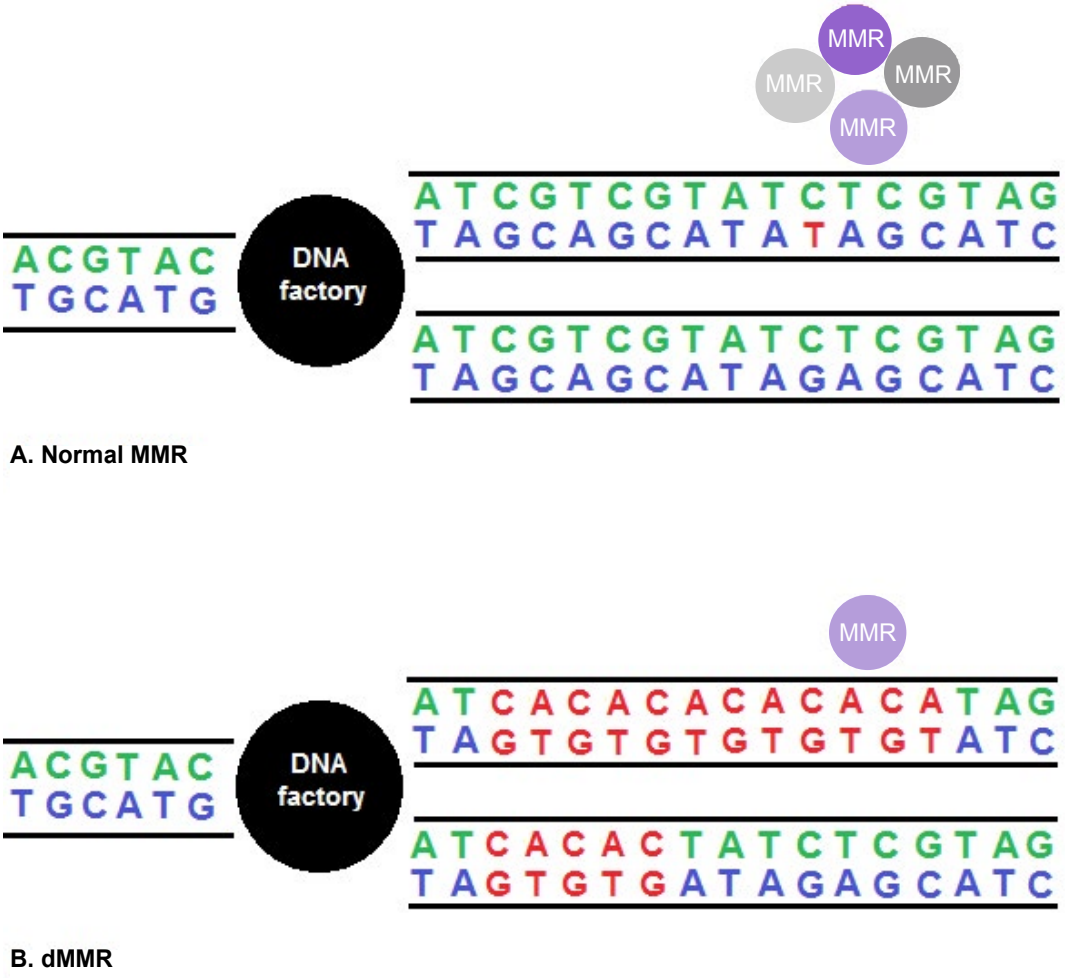
   - Have had colon or rectal cancer before the age of 50 years,
   - Have had colon or rectal cancer with loss of MMR proteins or MSI before the age of 60 years,
   - Have had more than one cancer that is related to Lynch syndrome—colon, rectal, endometrial, small bowel, ureter, and renal pelvis cancer,
   - Have a parent, sibling, or child who has had 1) colon or rectal cancer; 2) at least one other cancer related to Lynch syndrome; and 3) one of these cancers occurred before the age of 50 years, or
   - Have two or more of these relatives—grandparent, parent, sibling, half-sibling, child, grandchild, aunt, uncle, nephew, or niece—who have had a cancer related to Lynch syndrome.

PCR (**p**olymerase **c**hain **r**eaction) is a test that can assess for MSI. The test consists of a process in which millions of copies of a DNA part are made. The copies will be examined for 5 MSI markers. Tumors can be rated as MSS (**m**icro**s**atellite-**s**table), MSI-L (**m**icro**s**atellite **i**nstability-**l**ow), and MSI-H (**m**icro**s**atellite **i**nstability-**h**igh). MSI-H is defined as the presence of 2 or more MSI markers. MSI-H suggests dMMR but more testing is needed to confirm.

An IHC (**i**mmuno**h**isto**c**hemistry) panel is used to assess MMR proteins. It involves applying a chemical marker to cells then looking at them with a microscope. There are four types of MMR proteins—MLH1, MSH2, MSH6, and PMS2. If all are present, it is unlikely that any *MMR* gene is mutated.

If the MLH1 protein is missing, more testing should follow. The cancer may be tested for a *BRAF V600E* mutation or a modified *MLH1* gene. If a *BRAF* mutation or modified gene is present, you don't have Lynch syndrome. If not present or the other MMR proteins are missing, the cancer will be tested for MMR gene mutations to confirm Lynch syndrome.

Figure 8. MMR system



A. The four types of MMR proteins are present to correct DNA errors when copies of DNA are being made. An error has been made in the C-G pair. G has been replaced by T.

B. The MMR system is deficient. Some MMR proteins are missing. A DNA microsatellite has been shortened in the bottom DNA copy.

Review

- A medical history is a report of all health events in your lifetime. It will include questions about your family's health to help assess if you have a syndrome related to colon cancer. Such syndromes include Lynch syndrome and FAP.
- Your doctor will examine your body for signs of disease. He or she will touch parts of your body to see if anything feels abnormal.
- Blood tests may be done to look for signs of cancer spread to distant sites.
- Imaging tests allow your doctor to see how far the cancer has spread without cutting into your body.
- A needle biopsy may be done to test for cancer in distant sites.
- Cells from the tumor may undergo molecular testing for mutated genes, MSI, or missing MMR proteins.

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3

Overview of cancer treatments

3 Overview of cancer treatments

In Part 3, the main treatment types for colon cancer are briefly described. Knowing what a treatment is will help you understand your treatment options listed in Parts 4 through 6. There is more than one treatment for colon cancer. Not every person will receive every treatment described in this chapter.

Surgery

Colectomy

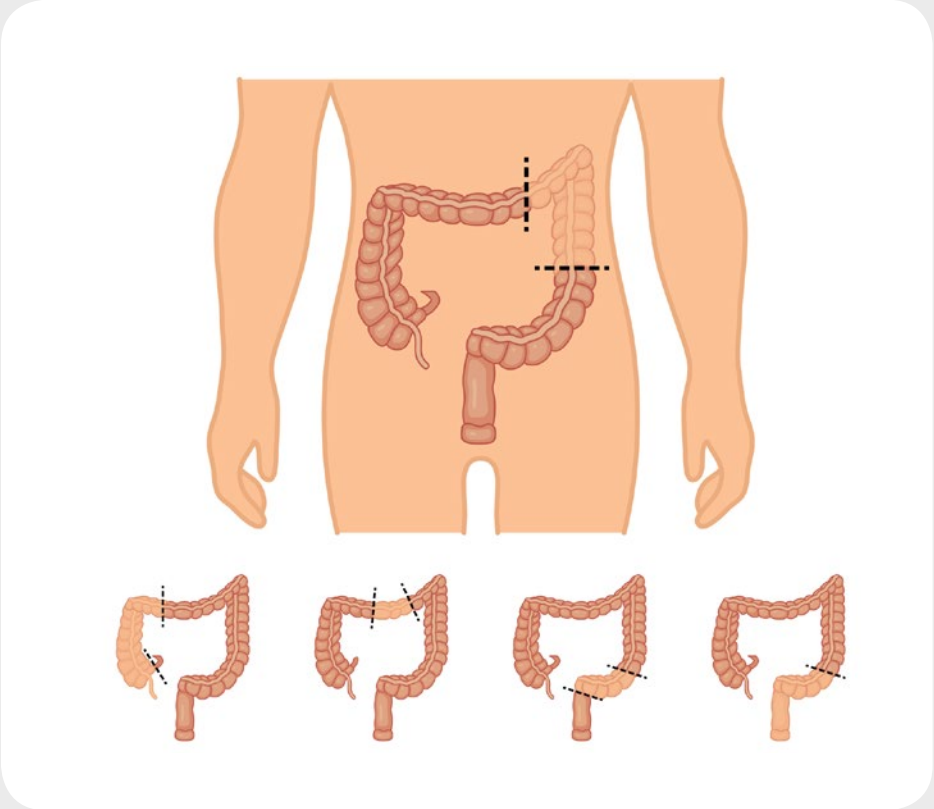
Some colon cancers grow beyond the polyp and into the colon wall. In many of these cases, treatment consists of surgery. A colectomy is a surgery that removes the part of the colon with cancer. **See Figure 9**. After the part is removed, the two ends of the remaining colon are sewn or stapled back together.

Before surgery, the cancer site may be marked with a tattoo. The tattoo allows your surgeon to find the cancer site after the polyp has been removed. Marking isn't always needed. For example, marking isn't done if the cancer site can be easily found.

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.

Figure 9. Colectomy

Many colon cancers are removed with a surgery called colectomy. This surgery removes the part of the colon that has cancer. Afterward, the two ends of the remaining colon are sewn or stapled back together.



A colectomy can be done with an open method and sometimes a minimally invasive method. The open method removes 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.

To aid healing, you may have a colostomy, although most patients do not need it. A colostomy connects a part of the colon to the outside of the abdomen. Stool can pass through the opening in your abdomen. If a colostomy is done, it is usually for a short period of time. It is rare for a colostomy not to be removed.

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 can't eat to prevent discomfort and help healing.

Lymphadenectomy

The surgery to remove lymph nodes is called a lymphadenectomy. A lymphadenectomy should be done during a colectomy. At least 12 nearby lymph nodes should be removed and tested for cancer. All abnormal-looking nodes should be removed, too.

Metastasectomy

Surgery to remove a metastasis is called a metastasectomy. Not all metastatic disease can be treated with surgery. The methods of surgery for metastasectomy vary based on where the cancer has spread.

Chemotherapy

Chemotherapy, or "chemo," includes drugs that disrupt the life cycle of cancer cells. Some chemotherapy drugs kill cancer cells by damaging their DNA or by disrupting the making of DNA. Other drugs interfere with cell parts that are needed for making new cells. Thus, no new cells are made to replace dying cells. Chemotherapy can affect both cancer and normal cells.

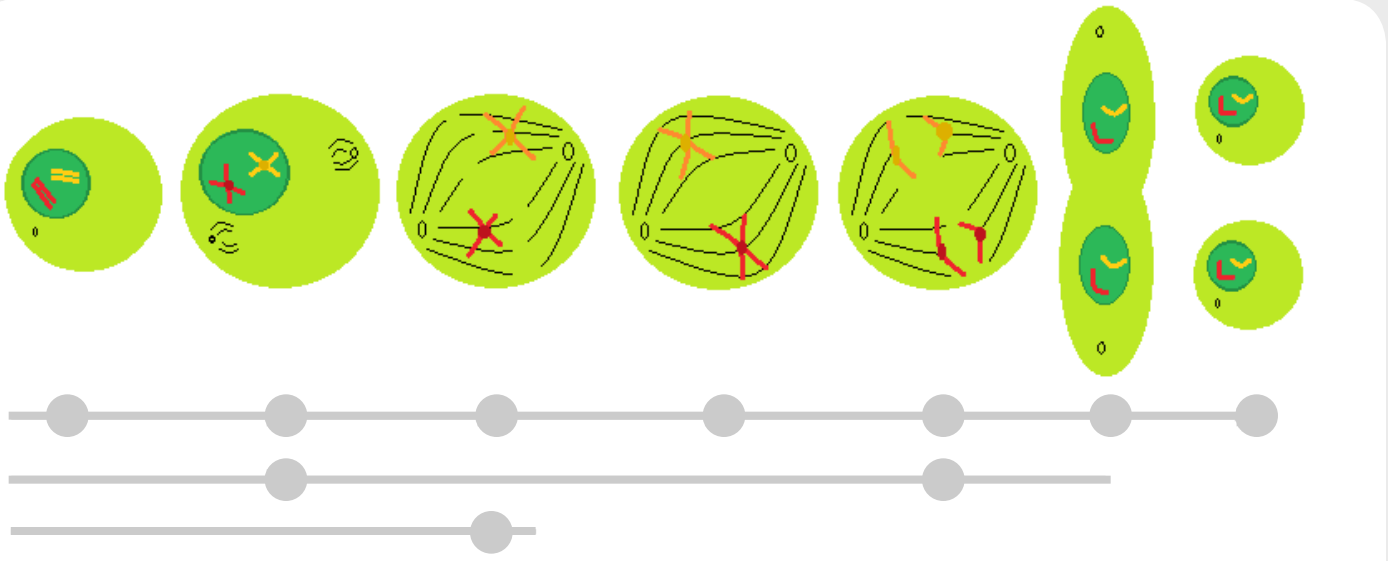
As shown in **Figure 10**, some chemotherapy drugs work when cells are in an active growth phase. During the active growth phase, cells grow and divide to form a new cell. Chemotherapy drugs that disrupt the growth phase work well for cancer cells that are growing and dividing quickly. Other chemotherapy drugs work in any growth or resting phase.

Chemotherapy regimens used for colon cancer are listed in **Guide 2**. Sometimes, only one drug is used. Other times, more than one drug is used because drugs differ in the way they work. A combination regimen is the use of two or more chemotherapy drugs.

Most chemotherapy drugs for colon cancer are liquids that are injected into your body. Only capecitabine and trifluridine/tipiracil are in pill form. A slow injection is called infusion. Bolus injections are fast. By any

Figure 10. Chemotherapy and the cell cycle

A cell goes through many changes to divide into two cells. Science has grouped these changes into 7 main phases. There may be another phase of rest, too. Some chemotherapy drugs work in any phase. Other chemotherapy drugs work in one or two growth phases.



Chemotherapy may work in some or all phases of cell division

method, the drugs travel in your bloodstream to treat cancer throughout your body. Doctors use the term "systemic" when talking about a cancer treatment for the whole body.

Chemotherapy is almost always injected into a vein within your arm. HAI (**h**epatic **a**rterial **i**nfusion) is chemotherapy given through a port or pump within the artery supplying blood to the liver. It has been used following metastasectomy to treat colon cancer in the liver. If a pump is used, it is placed within the artery during the metastasectomy. HAI is an option for some people. NCCN experts advise that HAI should only be done at treatment centers with much experience in this method.

Chemotherapy is given in cycles of treatment days followed by days of rest. The cycles vary in length depending on which drugs are used. Common cycles are 14 or 21 days long. Giving chemotherapy in cycles gives your body a chance to recover after receiving chemotherapy. If you will have chemotherapy, ask your doctor how many cycles will be given and how many days of treatment there are within a cycle.

Guide 2. Chemotherapy for colon cancer

Single agent or combination	Generic (chemical) name	Brand name (sold as)
5-FU/LV	5-FU = fluorouracil	–
	LV = leucovorin*	–
Capecitabine alone	Capecitabine	Xeloda®
CapeOX	Cape = capecitabine	Xeloda®
	OX = oxaliplatin	Eloxatin®
FOLFOX	FOL = leucovorin*	–
	F = fluorouracil	–
	OX = oxaliplatin	Eloxatin®
FOLFOXIRI	FOL = leucovorin*	–
	F = fluorouracil	–
	OX = oxaliplatin	Eloxatin®
	IRI = irinotecan	Camptosar®
Irinotecan	Irinotecan	Camptosar®
Trifluridine + tipiracil	Trifluridine + tipiracil	Lonsurf®

* Levoleucovorin can be used instead of leucovorin.

Side effects of chemotherapy

Side effects of chemotherapy depend on many factors. These factors include the drug type, amount taken, length of treatment, and the person. Some people have many side effects. Others have few. Some side effects can be very serious while others can be unpleasant but not serious. Most side effects appear shortly after treatment starts and will stop after treatment. However, other side effects are long-term or may appear years later.

In general, most side effects are caused by the death of fast-growing cells. These cells are found in the blood, gut, hair follicles, and mouth. Thus, common side effects of chemotherapy include low blood cell counts, not feeling hungry, nausea, vomiting, diarrhea, hair loss, and mouth sores.

Oxaliplatin causes a very unique side effect. It can cause a short-lived and sometimes painful sensitivity in areas exposed to cold. Examples of areas exposed to cold are your mouth when drinking cold liquids and your fingers when holding a cold object. If more oxaliplatin is used over time, loss of sensation and tingling in fingers and toes can occur, which sometimes takes months or years to resolve. You might end up having a permanent loss of sensation in your feet after long-term oxaliplatin-based treatment (sensory neuropathy).

Not all side effects of chemotherapy are listed here. Please ask your treatment team for a complete list of common and rare side effects. If a side effect bothers you, tell your treatment team. There may be ways to help you feel better. There are also ways to prevent some side effects.

Targeted therapy

Targeted therapy is a class of drugs that stops the action of molecules that help cancer cells grow. It is less likely to harm normal cells than chemotherapy. Targeted therapy for colon cancer targets either the VEGF (**v**ascular **e**ndothelial **g**rowth **f**actor) or EGFR (**e**pidermal **g**rowth **f**actor **r**eceptor) pathway.

Targeted therapy used for colon cancer is listed in **Guide 3.** These treatments are briefly described next. Some side effects are listed. Ask your treatment team for a full list of common and rare side effects. In Parts 4 through 6, information on who should receive these drugs is provided.

VEGF pathway

Cancer cells need the food and oxygen in blood to grow. Cancer cells get blood from blood vessels that have grown into the tumor. VEGF is one of the molecules that triggers the growth of these blood vessels.

VEGF is made by cancer cells. It travels from cancer cells to endothelial cells, which form blood vessels. VEGF attaches to surface receptors on the outside of endothelial cells. Surface receptors are proteins within cell membranes that extend from the inside to the outside of cells. Attachment of VEGF to receptors triggers growth signals. There are four medicines used to block the growth signals caused by VEGF.

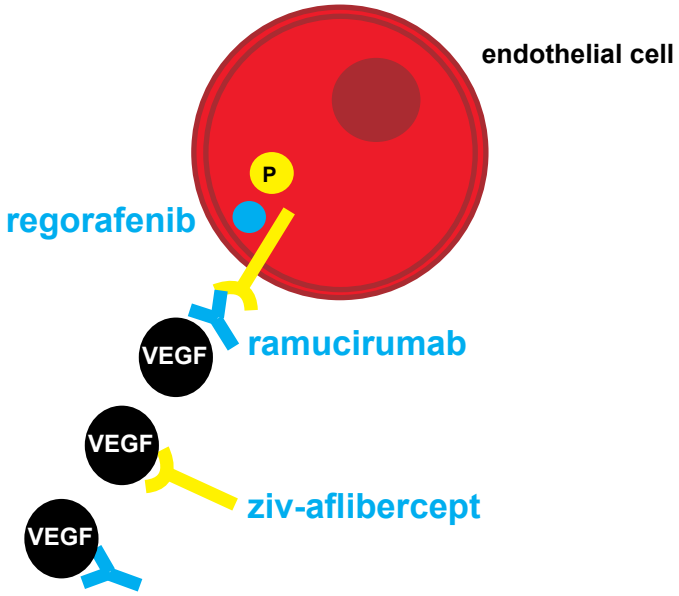
Bevacizumab

Bevacizumab attaches to VEGF before it attaches to receptors on endothelial cells. **See Figure 11**. As a result, VEGF can't attach to receptors. No growth signals caused by VEGF are started.

Bevacizumab is sold as Avastin®. It is given by infusion. It takes about 90 minutes to get the first dose and 30 minutes for later doses. Bevacizumab is always given with chemotherapy. It is given every two or three weeks depending on the chemotherapy.

Figure 11.
VEGF targeted therapy

Cancer cells need blood to grow. They send VEGF to endothelial cells to start the growth of blood vessels. Regorafenib stops growth signals within endothelial cells. Ramucirumab blocks VEGF from attaching to receptors. Ziv-aflibercept traps VEGF by being a receptor decoy. Bevacizumab disables VEGF from attaching to receptors.



Guide 3. Targeted therapy for colon cancer

Generic (chemical) name	Brand name (sold as)
Bevacizumab	Avastin®
Cetuximab	Erbitux®
Panitumumab	Vectibix®
Ramucirumab	Cyramza®
Regorafenib	Stivarga®
Ziv-aflibercept	Zaltrap®

Common side effects of bevacizumab are high blood pressure, diarrhea, and feeling tired and weak. You might also have nosebleeds, shortness of breath, nausea, and vomiting. Rare but serious side effects include stroke, heart attack, kidney damage, holes in the intestine, and bleeding within the body.

Ramucirumab

Ramucirumab attaches to VEGF receptors on the outside of endothelial cells. This blocks VEGF from attaching. No growth signals caused by VEGF are started.

Ramucirumab is sold as Cyramza®. It is given by infusion. It takes 60 minutes to receive the full dose. Ramucirumab is always given with chemotherapy. It is given every two weeks on the first day of chemotherapy.

Common side effects of ramucirumab are high blood pressure and diarrhea. Serious side effects include bleeding, blood clots, holes in the gut, abnormal passage between body parts, and slow wound healing.

Regorafenib

Regorafenib attaches to VEGF receptors on the inside of endothelial cells. This blocks growth signals from the receptor. Regorafenib may also attach to surface receptors within cancer cells and stop growth signals.

Regorafenib is sold as Stivarga®. It is made as a pill that is taken once a day. However, it is taken in cycles consisting of treatment days followed by a period of no treatment. The cycle for regorafenib consists of 3 weeks of treatment then 1 week of no treatment. The cycle is then repeated.

Common side effects of regorafenib include feeling tired or week, fever, and diarrhea. Your hands and feet may become red and have pain. This is called hand-foot skin reaction. It is important to remove calluses on hands and feet before starting regorafenib.

Rare but serious side effects of regorafenib include severe liver damage, heart attack, and blindness.

Ziv-aflibercept

Ziv-aflibercept works by acting as a decoy. VEGF thinks ziv-aflibercept is a surface receptor and attaches to it. Thus, ziv-aflibercept traps VEGF so it is unable to bind to the real receptor—hence its other name, VEGF-trap. By trapping VEGF, growth signals caused by VEGF within endothelial cells won't be started.

Ziv-aflibercept is sold as Zaltrap®. It is given by infusion in about 1 hour every two weeks. Ziv-aflibercept is always given with chemotherapy.

Common side effects include diarrhea, mouth sores, high blood pressure, feeling tired, voice changes, and nose bleeds. You may also experience blood clots, urinary tract infection, and darkening of the skin. Rare but serious side effects include stroke, holes in the intestine, bleeding in the brain or lungs, and kidney damage.

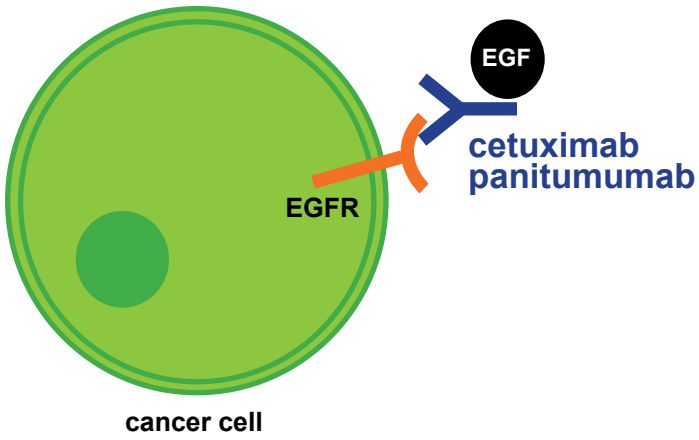
EGFR pathway

Cell growth is started by growth signals. EGFR is one of the surface receptors in colon cancer cells that can trigger growth signals. When EGF (**e**pidermal **g**rowth **f**actor) attaches to EGFR, the chemical pathway that sends growth signals is turned on.

Some people with colon cancer have abnormal changes in their gene that controls EGFRs. These changes cause the cancer cells to have too many EGFRs. For a small group of people, the EGFRs may be overactive. With too many or overactive EGFRs, new cancer cells form quickly. There are two medicines used to block the growth signals from EGFRs. **See Figure 12**. These medicines don't work if the cancer cells have mutations in *KRAS* or *NRAS* genes.

Figure 12.
EGFR targeted therapy

Some colon cancers consist of cells with too many or overactive EGFRs. EGFRs trigger growth signals with cancer cells. Cetuximab and panitumumab block EGF from attaching to EGFR and turning it on.



Cetuximab

Cetuximab treats colon cancer by attaching to the ends of EGFRs that are outside of the cell. Thus, EGF is blocked from attaching and triggering growth signals. Cetuximab attracts immune cells that help to kill the cancer cells.

Cetuximab is sold as Erbitux®. It is given by infusion, usually once a week or every other week. It may take 2 hours to receive the first dose, but later doses will take only 1 hour. Cetuximab may be given with or without chemotherapy.

Some people have an infusion reaction to cetuximab. Symptoms of a reaction include chills and fever. If you have a reaction, you will be given cetuximab more slowly.

Besides a reaction, common side effects of cetuximab include an acne-like rash, infections, mouth sores, and feeling tired and weak. Other possible side effects are nausea, diarrhea, trouble sleeping, swelling of feet, and lower blood magnesium levels. Rare but serious side effects include heart, lung, eye, or kidney damage.

Panitumumab

Panitumumab is the same type of drug as cetuximab. However, it does somewhat differ from cetuximab in its structure. It works much like cetuximab by attaching to EGFRs and attracting immune cells.

Panitumumab is sold as Vectibix®. It is given by IV infusion over 1 hour every other week. It may be given with or without chemotherapy.

Panitumumab rarely causes infusional reactions. Common side effects include skin rash, diarrhea, feeling tired, constipation, and lower blood magnesium levels. Rare but serious side effects include lung and eye damage and blood clots in the lungs.

Radiation therapy

Radiation therapy is a cancer treatment that uses high-energy rays. The rays damage DNA. This either kills the cancer cells or stops new cancer cells from being made. Radiation therapy is not often used to treat colon cancer. You may receive radiation therapy as part of a clinical trial. Otherwise, Parts 4 and 5 explain when radiation therapy is an option.

External radiation

Most often, EBRT (**e**xternal **b**eam **r**adiation **t**herapy) is the method used to treat colon cancer. This method delivers radiation from outside your body using a large machine. **See Figure 13**. The radiation passes through your skin and other tissue to reach the tumor.

EBRT should be given with a technique called conformal radiation therapy. This technique molds the radiation beams to the shape of the tumor so healthy tissue around the tumor is spared. However, some healthy tissue still gets radiated. The types of conformal radiation include:

- 3D-CRT (**t**hree-**d**imensional **c**onformal **r**adiation **t**herapy) uses a photon beam that matches the shape of the tumor. Treatment is completed in about 6 weeks.

- IMRT (**i**ntensity-**m**odulated **r**adiation **t**herapy) is a more precise from of 3D-CRT. The radiation beam is divided into smaller beams, and the strength of each beam can vary. Treatment is completed in about 6 weeks. IMRT should be used only for a second treatment with radiation or for cancer in an uncommon site.

- SBRT (**s**tereotactic **b**ody **r**adiation **t**herapy) treats cancer with very precise, high-dose photon beams. Receiving SBRT is much like other conformal techniques except treatment is finished in about 5 visits. At this time, SBRT should only be used to treat colon cancer in the liver or lungs.

Figure 13.
External beam radiation therapy

Radiation therapy is often delivered from a large machine. The rays pass through skin and travel to the tumor. Healthy tissue is protected using modern types of treatment.

Clinac 2100 C by Zubro available at commons.wikimedia.org/wiki/File:Clinac_2100_C.JPG released under GFDL and CC-BY-SA.

Treatment planning with a simulation session is needed. During simulation, pictures of the tumor will be taken with an imaging test. Pictures are taken after your body is moved into the position needed for treatment.

Using the pictures, your treatment team will plan the best radiation dose, number and shape of radiation beams, and number of treatment sessions. Beams are shaped with computer software and hardware added to the radiation machine. Radiation beams are aimed at the tumor with help from ink marks on the skin or marker seeds in the tumor.

During treatment, you will lie on a table in the same position as done for simulation. Devices may be used to keep you from moving so that the radiation targets the tumor. You will be alone while the technician operates the machine from a nearby room. He or she will be able to see, hear, and speak with you. As treatment is given, you may hear noises. One session can take less than 10 minutes.

Intraoperative radiation

IORT (**i**ntra**o**perative **r**adiation **t**herapy) is a technique that delivers radiation inside your body at the time of an operation. Different methods can be used to deliver radiation. However, treatment usually involves a device that will be placed inside the space where the tumor used to be. IORT kills remaining cancer cells in the tissue that was near the tumor.

IORT is a one-time treatment that is given while you are still asleep. It can deliver a radiation dose similar to EBRT or deliver extra radiation called a boost. IORT uses radiation made of electrons. Electrons do not travel far and are less likely to harm the tissue beneath the treatment site.

Brachytherapy

Some cancer centers do not have an IORT machine. In this case, a boost of radiation can be given with EBRT or brachytherapy. Brachytherapy delivers radiation through radioactive objects that are placed within the space where the tumor used to be. The objects remain in your body for a short period of time following surgery. Brachytherapy is rarely used for colon cancer.

Side effects of radiation

Most side effects of radiation depend on the method used. Side effects also depend on where the treatment was given. However, many people feel tired (fatigue) no matter the radiation method or site.

When EBRT is used, skin damage is also common right after treatment. Your skin will heal shortly after treatment ends. You may also have short-term hair loss, but only where treated. Chest radiation can cause a dry cough or a sensation of a lump when you swallow. Radiation near your belly can cause nausea and maybe vomiting, and when given between your hip bones, frequent bowel movements. Your stool may be loose (diarrhea) and you may have cramps or pain in your abdomen.

IORT and brachytherapy can cause side effects like EBRT. You may feel nauseous and may vomit. Frequent bowel movements and urination may occur.

Late side effects of radiation can happen. Again, the effects depend on the treatment site. Examples include lung scarring, heart disease, infertility, and second cancers.

Not all side effects of radiation are listed here. Please ask your treatment team for a complete list of common and rare side effects. If a side effect bothers you, tell your treatment team. There may be ways to help you feel better. There are also ways to prevent some side effects.

Ablation

Ablation destroys small tumors with little harm to nearby tissue. It isn't used often for colon cancer. Doctors sometimes consider its use for metastases. Most often it is considered for colon cancer that has spread to the liver or lung. Ablation is done by an interventional radiologist or surgeon.

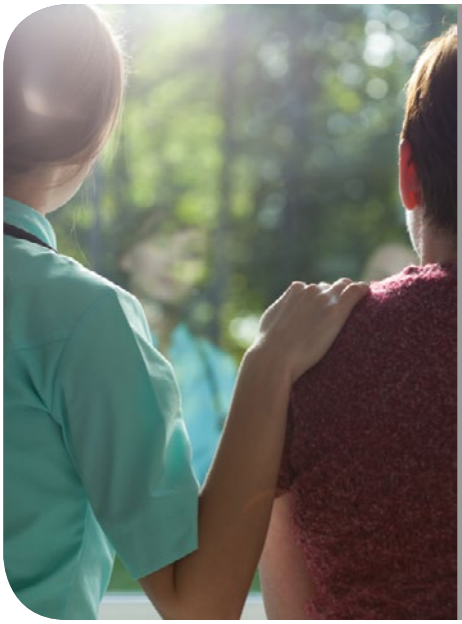
There is more than one way to "ablate" a tumor. Cryoablation kills cancer cells by freezing them with liquid nitrogen. Radiofrequency and microwave ablation kills cancer cells with high-energy radio waves. A probe placed into the tumor emits the waves. The probe will be guided into place by ultrasound, CT, or other imaging and will be removed when treatment is done.

Embolization

Embolization treats tumors with beads that are placed into the artery that supplies blood to the tumor. The beads block blood flow to the tumor, which causes the cancer cells to "starve" and die. With chemoembolization, the beads are coated with chemotherapy. Radioembolization uses small radioactive beads. The chemotherapy and radiation further damage the cancer cells and cause the tumor to shrink.

Chemoembolization and radioembolization have been used to treat colon cancer that has spread to the liver. Embolization is done by an interventional radiologist. A catheter will be inserted into an artery in your leg and guided to the tumor. Once in place, the beads will be inserted into the blood vessel.

Embolization to treat colon cancer in the liver hasn't been well tested. More research is needed to learn how well this treatment works. If interested, ask your treatment team if there is a clinical trial that you can join. Outside of a clinical trial, strong support of this treatment among NCCN experts is lacking.



Supportive care

Supportive care doesn't aim to treat cancer but aims to improve quality of life. It is also called palliative care. It can address many needs.

One example is treatment for physical and emotional symptoms. Supportive care can also help with treatment decisions as you may have more than one option. It can also help with coordination of care between health providers. Talk with your treatment team to plan the best supportive care for you.

Clinical trials

New tests and treatments aren't offered to the public as soon as they're made. They first need to be studied. A clinical trial is a type of research that studies a test or treatment.

Clinical trials study how safe and helpful tests and treatments are. When found to be safe and helpful, they may become tomorrow's standard of care. Because of clinical trials, the tests and treatments in this book are now widely used to help people with colon cancer. Future tests and treatments that may have better results than today's treatments will depend on clinical trials.

New tests and treatments go through a series of clinical trials to make sure they're safe and work. Without clinical trials, there is no way to know if a test or treatment is safe or helpful. Clinical trials have four phases. Some examples of the four phases for treatment are:

- Phase I trials – aim to find the best dose of a new drug with the fewest side effects.
- Phase II trials – assess if a drug works for a specific type of cancer.
- Phase III trials – compare a new drug to the standard treatment.
- Phase IV trials – test new drugs approved by the U.S. FDA (**F**ood and **D**rug **A**dministration) in many patients with different types of cancer.

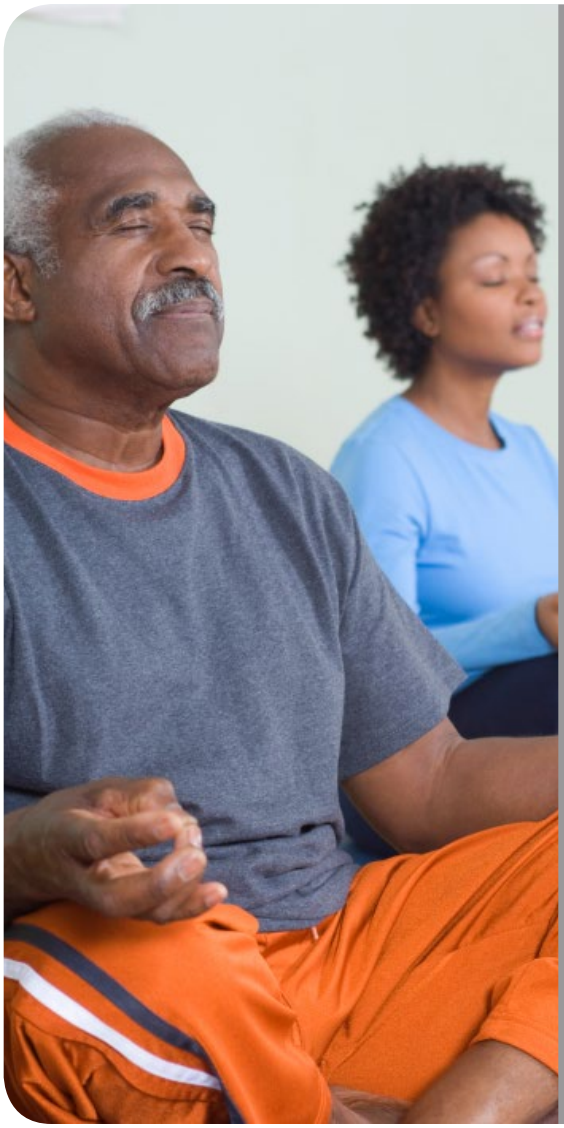
Joining a clinical trial has benefits. First, you'll have access to the most current cancer care. Second, you will receive the best management of care. Third, the results of your treatment—both good and bad—will be carefully tracked. Fourth, you may help other people who will have cancer in the future.

Clinical trials have risks, too. Like any test or treatment, there may be side effects. Also, new tests or treatments may not help. Another downside may be that paperwork or more trips to the hospital are needed.

To join a clinical trial, you must meet the conditions of the study. Patients in a clinical trial are often alike in terms of their cancer and general health. This is to know that any progress is because of the treatment and not because of differences between patients.

To join, you'll need to review and sign a paper called an informed consent form. This form describes the study in detail. The study's risks and benefits should be described and may include others than those described above.

Ask your treatment team if there is an open clinical trial that you can join. There may be clinical trials where you're getting treatment or at other treatment centers nearby. You can also find clinical trials through the websites listed in Part 7.



Complementary and alternative medicine

You may hear about other treatments from your family and friends. They may suggest using CAM (complementary and alternative medicine). CAM is a group of treatments that aren't often given by doctors. There is much interest today in CAM for cancer. Many CAMs are being studied to see if they are truly helpful.

Complementary medicines are treatments given along with usual medical treatments. While CAMs aren't known to kill cancer cells, they may improve your comfort and well-being. Two examples are acupuncture for pain management and yoga for relaxation.

Alternative medicine is used in place of usual medicine. Some alternative medicines are sold as cures even though they haven't been proven to work. If there was good proof that CAMs or other treatments cured cancer, they would be included in this book.

It is important to tell your treatment team if you are using any CAMs. They can tell you which CAMs may be helpful and which CAMs may limit how well treatments work.

Review

- A colectomy is an operation that removes the part of the colon with cancer. A lymphadenectomy is the removal of lymph nodes, and a metastasectomy is the removal of metastases.
- Chemotherapy stops cancer cells from completing their life cycle so they can't increase in number.
- One type of targeted therapy stops the growth of new blood vessels into colon tumors. Without blood, cancer cells starve and die. A second type of targeted therapy for colon cancer stops the cancer cells from receiving certain growth signals.
- Radiation kills cancer cells or stops new cancer cells from being made. It isn't often used to treat colon cancer.
- Ablation destroys small tumors by freezing or burning them. It isn't often used for colon cancer.
- Embolization treats cancer by blocking blood flow to the tumor and damaging cancer cells with chemotherapy or radiation. At this time, strong support of embolization outside of a clinical trial is lacking among NCCN experts of colon cancer.
- Clinical trials give people access to new tests and treatments that otherwise can't usually be received. These new tests and treatments may, in time, be approved by the FDA.

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4

Treatment guide: Nonmetastatic cancer

4 Treatment guide: Nonmetastatic cancer

Part 4 is a treatment guide for colon cancer that hasn't spread to distant sites. The cancer is confined within the colon, has grown to nearby structures, or has spread to nearby lymph nodes. Treatment options are partly based on cancer stage.

This information is taken from treatment guidelines written by NCCN experts of colon cancer. These treatment guidelines list options for people with colon cancer in general. Thus, your doctors may suggest other treatment for you based on your health and personal wishes. Fully discuss your treatment options with your doctor.

Cancer stage I

Guide 4. Treatment for T1 tumors

Test results	What are my options?
Pedunculated polyp without high-risk features	• Start follow-up testing
Sessile polyp without high-risk features	• Start follow-up testing, or • Colectomy + lymphadenectomy
Any polyp with high-risk features	• Colectomy + lymphadenectomy, or • Chemotherapy listed in Part 6 ± radiation therapy

Guide 4 lists the treatment options for tumors rated as T1. These tumors haven't grown beyond the second layer of the colon wall. They are sometimes called "polyps with cancer" because the cancer hasn't grown far.

Some people with T1 tumors will need treatment. The option of surgery is based on the shape of the polyp and whether cancer will likely return after a polypectomy. The cancer is more likely to return if these high-risk features are present:

- Fragmented specimen – The tumor was removed in pieces,
- Positive surgical margin – Cancer was found in the normal-looking tissue around the tumor,
- Unknown surgical margin – The presence of cancer in the normal-looking tissue around the tumor can't be confirmed,
- Cancer grade 3 or 4 – The cancer cells don't look like the normal cells in which the cancer started, and
- Angiolymphatic invasion – The cancer has spread into the tumor's lymph and blood vessels.

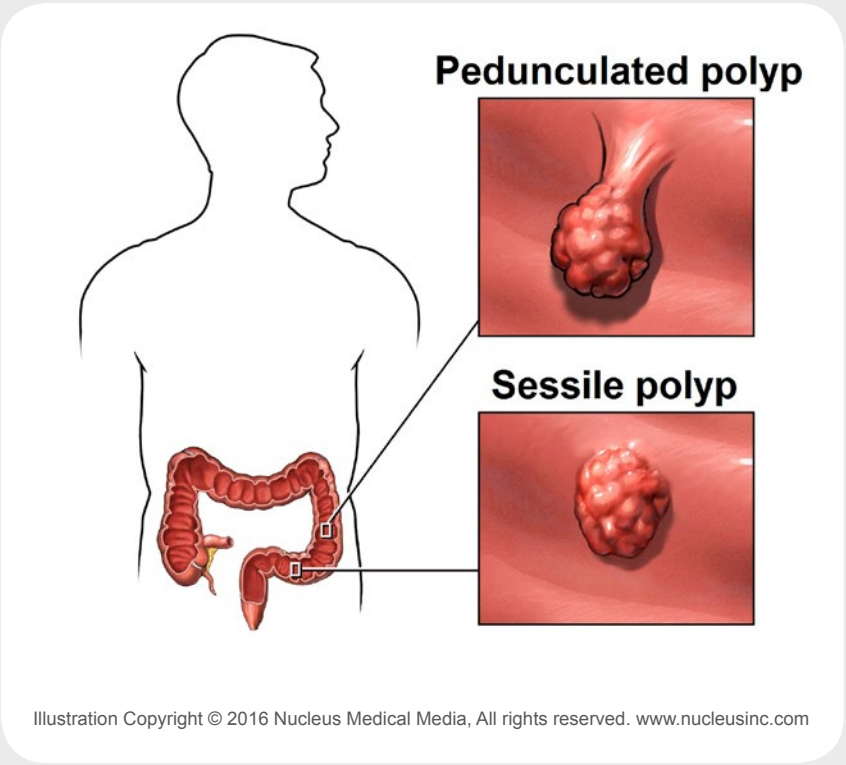
Shapes of polyps are shown in **Figure 14**. A polypectomy likely removed all the cancer if you had a pedunculated polyp without high-risk features. No more treatment is advised. You can start follow-up testing.

If you had a sessile polyp without high-risk features, there are two options if the polyp was fully removed. You may start follow-up testing but surgery is also an option. It is an option because research has shown that sessile polyps have worse outcomes than other polyps when surgery isn't received.

Surgery is advised for any polyps with high-risk features. If you are unable to have surgery, the cancer can be treated with chemotherapy that is listed in Part 6. Radiation therapy may be added.

Figure 14. Shapes of polyps

Treatment for stage I, T1 tumors is partly based on the shape of the polyp. A pedunculated polyp has a stalk and round top. A sessile polyp doesn't have a stalk.



Guide 5. Treatment for T2 tumors

Test results	What are my options?
The tumor can be treated with surgery and isn't blocking the gut	• Colectomy + lymphadenectomy
The tumor can be treated with surgery and is blocking the gut	• Colectomy + lymphadenectomy, • Colectomy + lymphadenectomy + diversion, • Diversion followed by colectomy + lymphadenectomy, or • In some cases, stent followed by colectomy + lymphadenectomy

Guide 6. Follow-up testing

Tests	Schedule
• Colonoscopy	• At 1 year after treatment ◦ If no advanced adenoma, repeat in 3 years - If results are normal, then repeat every 5 years ◦ If advanced adenoma, repeat in 1 year

Guide 5 lists the treatment options for tumors rated as T2. These tumors haven't grown beyond the third layer of the colon wall. Treatment is needed.

If you are able to have surgery, a colectomy and lymphadenectomy are advised. It is very rare that surgery can't be done. If surgery isn't an option, sometimes chemotherapy is given if you're healthy enough. Radiation therapy may be added.

In very rare cases, a T2 tumor has grown so large that it blocks the flow of stool. There are four surgical options when there is a blockage. The first option is a colectomy that unblocks your gut. The second option is removal of the cancer and a diversion within one operation. A diversion is a surgery that attaches the colon to the surface of the abdomen, and a "bag" is needed. The third option is a diversion followed by a second operation to remove the cancer. The fourth option is placement of a stent followed by a second operation to remove the cancer.

The tissue that is removed from your body will be sent to a pathologist. The pathologist will assess how far the cancer has grown within the colon wall. He or she will also test for cancer in your lymph nodes. If the cancer stage doesn't change, you will not need more treatment. If the cancer is upstaged to stage II or III, read Chart 4.2.3 to learn what further treatment is advised.

Guide 6 lists follow-up testing for polyps with cancer. Follow-up testing is started when there are no signs of cancer after treatment. It can be helpful for finding new cancer growth early.

A colonoscopy is recommended 1 year after treatment has ended. If results are normal, the next colonoscopy should be received 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 the width of an AAA battery (>1 cm), or a polyp with pre-cancerous cells (high-grade dysplasia).

Cancer stage II and III

Guide 7. Neoadjuvant treatment

Test results	What are my options?
Colon tumors haven't grown to nearby sites (T1–T4a)	• Start primary treatment
Colon tumors have grown to nearby sites (T4b)	• Start primary treatment, or • Chemotherapy listed in Part 6

Guide 8. Primary treatment

Test results	What are my options?
The tumor can be treated with surgery and isn't blocking the gut	• Colectomy + lymphadenectomy
The tumor can be treated with surgery and is blocking the gut	• Colectomy + lymphadenectomy, • Colectomy + lymphadenectomy + diversion, • Diversion followed by colectomy + lymphadenectomy, or • In some cases, stent followed by colectomy + lymphadenectomy

Guide 7 lists the options for neoadjuvant treatment for stage II and III cancers. The aim of neoadjuvant treatment is to shrink a tumor that may be hard to fully remove during surgery. Less invasive cancers are often easier to remove.

Neoadjuvant treatment is based on the T score of the cancer stage. Tumors that are rated as T1, T2, T3, and T4a haven't grown through the colon wall to nearby organs. Thus, neoadjuvant treatment isn't advised for these tumors. Tumors rated as T4b have grown through the colon wall to nearby structures. In this case, your doctor may want to use first-line chemotherapy before surgery. Choices of chemotherapy are listed in Part 6.

"In spite of everything I have been through—a traumatic surgery, potential brain damage from my surgery, physical pain, doubt, fear, financial uncertainty and much more as a result of colon cancer—all of my good days still outweigh all of my bad days. I am here to fight the good fight for colorectal cancer research and awareness! We are strong!"

- Roland Cooper, Stage II survivor

Guide 8 lists the options for primary treatment. Primary treatment is the main treatment used to rid your body of cancer. Your treatment options are based on whether the tumor can be removed with surgery.

If you are able to have surgery, a colectomy and lymphadenectomy are advised. In rare cases, a tumor has grown so large that it blocks the flow of stool. There are four surgical options when there is a blockage. The first option is a colectomy that unblocks your gut. The second option is removal of the cancer and a diversion within one operation. A diversion is a surgery that attaches the colon to the surface of the abdomen, and a "bag" is needed. The third option is a diversion followed by a second operation to remove the cancer. The fourth option is placement of a stent followed by a second operation to remove the cancer.

The tissue that is removed from your body will be sent to a pathologist. The pathologist will assess how far the cancer has grown within the colon wall. He or she will also test for cancer in your lymph nodes. Based on test results, a pathologic stage will be assigned.

It is very rare but you may be unable to have surgery because of where the cancer is or because of your health. In this case, sometimes chemotherapy is given if you are healthy enough. Radiation therapy may be added. For very invasive tumors, chemotherapy may shrink the tumor enough so that surgery can be done. IORT may be added to surgery. If you're still unable to have surgery, you may be treated with more cycles of chemotherapy.

Guide 9. Adjuvant treatment

Stage	MMR status	High-risk features	What are my options?
Stage IIA	MSI-H or dMMR	Yes or no	• Start follow-up testing
Stage IIA	MSS, MSI-L, or normal MMR	No	• Clinical trial, • Start follow-up testing, or • Consider capecitabine or 5-FU/LV
Stage IIA	MSS, MSI-L, or normal MMR	Yes	• Capecitabine or 5-FU/LV, • FOLFOX or CapeOX, • Clinical trial, or • Start follow-up testing
Stage IIB	Any status	Yes or no	
Stage IIC	Any status	Yes or no	
Stage III	Any status	Yes or no	• FOLFOX or CapeOX, • Capecitabine, or • 5-FU/LV

Guide 9 lists the options for adjuvant treatment for stage II and III cancers. Adjuvant treatment is given when all visible cancer has been removed by surgery but unseen cancer cells may remain. The aim of this treatment is to kill the unseen cancer cells. If adjuvant treatment is right for you, it should be received as soon as possible for the best results.

Options for adjuvant treatment are based on multiple factors. The pathologic stage is one such factor. Options for pathologic stage II are grouped by stage IIA, IIB, and IIC. Stage IIA cancer has grown into the fourth layer of the colon wall. Stage IIB cancer has grown through the colon wall but not to nearby structures, whereas stage IIC has grown to nearby structures.

The MMR status is used to advise which options are best in some cases. The MMR system is explained in Part 2. High-risk features may also affect treatment. The presence of high-risk features increases the chance of the cancer returning. High-risk features include:

- High cancer grade – a grade of 3 or 4,
- Positive or close surgical margin – Cancer was found in or near the normal-looking tissue around the tumor,
- Unknown surgical margin – The presence of cancer in the normal-looking tissue around the tumor can't be confirmed,
- Angiolymphatic invasion – The cancer has spread into the tumor's lymph and blood vessels,
- Perineural invasion – Cancer has spread around or into the nerves,
- Limited lymphadenectomy – Fewer than 12 lymph nodes were examined,
- Bowel obstruction – The tumor has grown large enough to block the gut, and
- Localized perforation – Holes have formed in the colon from the tumor.

It is important to know that chemotherapy may have little, if any, benefit for stage II colon cancer. If a stage II tumor is MSI-H or dMMR, 5-FU chemotherapy will not help. You can start follow-up testing. For other stage II tumors, talk with your doctor about the pros and cons of each option. Options should be discussed in light of your overall health, personal wishes, and type of colon cancer.

There are three options for stage IIA cancer that isn't MSI-H or dMMR and doesn't have high-risk features. First, you can enroll in a clinical trial that is testing new treatments. Second, you can start follow-up testing and wait to see if the cancer will return. Third, you can talk with your doctors about starting chemotherapy. Capecitabine alone or 5-FU/LV is the only reasonable chemotherapy for these tumors.

High-risk stage IIA without MSI-H or dMMR, stage IIB, and stage IIC cancers have four options. You may receive chemotherapy. Capecitabine or 5-FU/LV is the first option. FOLFOX or CapeOX is a second option. For T4 tumors, consider radiation therapy with chemotherapy if the tumor has grown to a nearby structure. The third option is to join a clinical trial testing new treatment. A third option is to start follow-up testing to wait and see if the cancer will return.

For stage III, chemotherapy is the only suggested option. The risk for cancer returning after treatment is high. Recurrence is more likely for stage III than for stages I and II because cancer cells may have spread through lymph. FOLFOX or CapeOX is often given for stage III. If oxaliplatin is not right for you, other options include capecitabine alone or 5-FU/LV.

Guide 10. Follow-up testing

Tests	Schedule
• Medical history and physical exam	• Every 3–6 months for 2 years ◦ If normal, then repeat every 6 months for 3 years
• CEA blood test	• Every 3–6 months for 2 years ◦ If normal, then repeat every 6 months for 3 years
• CT of chest, abdomen, pelvis	• Not usually needed for stage II that is low risk • Every 6–12 months for up to 5 years if high-risk stage II • Every 6–12 months for up to 5 years if stage III
• Colonoscopy	• At 1 year after treatment ◦ If no advanced adenoma, repeat in 3 years - If results are normal, then repeat every 5 years ◦ If advanced adenoma, repeat in 1 year

Guide 10 lists the follow-up tests for stage II and III cancers. You should receive a medical history and physical exam every 3 to 6 months for 2 years. If results are normal for 2 years, then get these tests every 6 months for 3 years.

Ongoing tests of CEA levels are mainly used to find cancer recurrences. If your risk for recurrence is low, your doctor may not order this test. CEA blood tests should be done every 3 to 6 months for 2 years. If results are normal for 2 years, get this test every 6 months for another 3 years.

CT scans may help find metastases. They are advised for people with high-risk stage II cancer and all people with stage III cancer. Scans of your chest, abdomen, and pelvis are suggested every 6 to 12 months for a maximum of 5 years if results are normal. CT should be done with both IV and oral contrast. MRI may be done if you can't have CT. An MRI uses radio waves and powerful magnets to make pictures.

A colonoscopy is also needed since your risk for another tumor is high within 2 years after diagnosis. You may never have had a colonoscopy of your entire colon if your gut was blocked. If so, get your first colonoscopy within 3 to 6 months after treatment. If you had a colonoscopy before, get another test 1 year after treatment.

Your second colonoscopy after treatment is based on the initial results. However, colonoscopies may be needed more often if you are younger than 50 years old or have Lynch syndrome. If results are normal, have your next colonoscopy in 3 years and then every 5 years. If the test finds an advanced adenoma, your next colonoscopy will be needed within 1 year. Advanced adenomas include polyps with a ruffled structure (villous), a polyp larger than the width of an AAA battery (>1 cm), or a polyp with pre-cancerous cells (high-grade dysplasia).

"Don't lose hope! Live every day to the fullest and share your story with everyone you can. You will rapidly find that there are others all around you who are also impacted by this disease. Together we can build a better future."

- Sandy Muschenheim, Stage III survivor

Review

- Stage I colon cancer has grown into the second layer of the colon wall (T1 tumors) or into the third layer (T2 tumors). Some T1 tumors may not need treatment after a polypectomy. Otherwise, T1 and T2 tumors may be treated with colectomy and lymphadenectomy.
- Surgery is advised for stages II and III colon cancer if you are able and willing to have it. You may receive chemotherapy before surgery if you have a T4b tumor. Chemotherapy after surgery may not be helpful for stage II cancers but is helpful for stage III.
- If you can't have surgery, chemotherapy is an option.
- Follow-up testing is for people who have no signs of cancer after surgery and is used to find any new cancer early.

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5

Treatment guide: Metastatic disease

5 Treatment guide: Metastatic cancer

Part 5 is a treatment guide for colon cancer that has spread to the liver, lungs, or both organs but not elsewhere. Treatment options for liver and lung metastases are based on whether the metastasis has occurred at diagnosis or recurrence. Treatment options for metastases in other distant sites is addressed in Part 6.

The spread of cancer to distant sites—metastatic disease—occurs in at least half of people with colon cancer. Colon cancer most often spreads to the liver and the lungs. Among every 100 people with colon cancer, 20 to 34 people will have liver metastases at diagnosis.

Research on metastases other than in the liver is limited. As a result, the information in Part 5 focuses on liver metastases but also applies to lung metastases. Treatment for other metastases is discussed in Part 6.

Metastases at diagnosis

Guide 11. Surgical options

Option 1

Primary treatment		Adjuvant treatment
• Colectomy and metastasectomy ± local liver treatment, or • Colectomy and local liver treatment (ie, ablation, SBRT)	→	• FOLFOX, or • CapeOX

Option 2

Neoadjuvant treatment		Primary treatment		Adjuvant treatment
• FOLFIRI ± bevacizumab, • FOLFOX ± bevacizumab, • CapeOX ± bevacizumab, or • If normal *KRAS*/*NRAS* gene: ◦ FOLFIRI + panitumumab, ◦ FOLFIRI + cetuximab, or ◦ FOLFOX + panitumumab	→	Colectomy and metastasectomy	→	• Start follow-up testing, or • Short course of chemotherapy

Option 3

Primary treatment		Adjuvant treatment		Primary treatment		Adjuvant treatment
Colectomy	→	• FOLFIRI ± bevacizumab, • FOLFOX ± bevacizumab, • CapeOX ± bevacizumab, • If normal *KRAS/NRAS* gene: ◦ FOLFIRI + panitumumab, ◦ FOLFIRI + cetuximab, or ◦ FOLFOX + panitumumab	→	Metastasectomy	→	• Start follow-up testing, or • Short course of chemotherapy

In this section, treatment options for distant metastases that are found at diagnosis are explained. Options for colon cancer that can be treated with surgery are explained first. However, most people with metastases can't have surgery. If you can't have surgery, treatment options are explained on page 60.

Research has shown that colon cancer with liver metastases can sometimes be cured. Thus, a cure is the goal when possible. Surgery is needed for a cure, but most people with liver metastases can't have surgery. Surgery is only done when all tumors can be fully removed and your liver won't be too small after surgery.

To enlarge your liver, your doctor may suggest portal vein embolization. Portal vein embolization is the blocking of the blood vessel to the liver tumor. This blockage causes the healthy part of the liver to grow larger.

Guide 11 presents surgical options for liver or lung metastases at diagnosis. Surgery with chemotherapy is advised. However, the best order of chemotherapy and surgery is unknown, so three options are given.

Option 1 starts with surgery. Surgery may consist of a colectomy and metastasectomy with or without local treatment to the liver. The colectomy and metastasectomy can be done during one operation or one after another in two operations. Local liver treatments include ablation and SBRT. Instead of metastasectomy, a local liver treatment with colectomy may be done; however, metastasectomy is preferred by NCCN experts.

Chemotherapy follows surgery in Option 1. FOLFOX and CapeOX are preferred regimens. Six months of chemotherapy is preferred.

Option 2 starts with chemotherapy. Targeted therapy may be added. Panitumumab and cetuximab should only be used for tumors that have normal *KRAS* and *NRAS* genes.

There are pros and cons to starting with chemotherapy. Some of these are:

Pros

- 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 while taking chemotherapy, you can avoid local treatment.

Cons

- Fat may build up in your liver and your liver may swell.
- You may become unable to have surgery if the cancer grows too much or if tumors shrink too much.
- Injury to small blood vessels may occur in your liver.

After 2 to 3 months of chemotherapy, you can have the colectomy and metastasectomy. The colectomy and metastasectomy can be done during one operation or one after another in two operations. Sometimes, more chemotherapy will be given after surgery. Together, chemotherapy given before and after surgery should not exceed 6 months.

Option 3 starts with a colectomy. Afterward, you will receive chemotherapy with or without targeted therapy for 2 to 3 months. Panitumumab and cetuximab should only be used for tumors that have normal *KRAS* and *NRAS* genes. After chemotherapy, the surgery for metastases will be done. Sometimes, more chemotherapy is given after surgery. Together, chemotherapy given before and after surgery should not exceed 6 months.

Guide 12. Nonsurgical treatment

What are my options?
• FOLFIRI ± bevacizumab
• FOLFOX ± bevacizumab
• CapeOX ± bevacizumab
• FOLFOXIRI ± bevacizumab
• If normal *KRAS/NRAS* gene: ◦ FOLFIRI + panitumumab, ◦ FOLFIRI + cetuximab, or ◦ FOLFOX + panitumumab

Guide 13. Follow-up testing

Tests	Schedule
• Medical history and physical exam	• Every 3–6 months for 2 years ◦ If normal, then repeat every 6 months for 3 years
• CEA blood test	• Every 3–6 months for 2 years ◦ If normal, then repeat every 6 months for 3–5 years
• CT of chest, abdomen, pelvis	• Every 3–6 months for 2 years ◦ If normal, then repeat every 6–12 months for 3 years
• Colonoscopy	• At 1 year after treatment ◦ If no advanced adenoma, repeat in 3 years - If results are normal, then repeat every 5 years ◦ If advanced adenoma, repeat in 1 year

Guide 12 presents the nonsurgical options for liver or lung metastases present at diagnosis. Chemotherapy with or without targeted therapy is advised. Panitumumab and cetuximab should only be used for tumors that have normal *KRAS* and *NRAS* genes.

Most people with metastatic colon cancer aren't able to be cured of their cancer. However, for some people, chemotherapy may shrink the tumors enough so a surgical cure is possible. Surgery is more likely to be possible if you have only very few liver metastases.

After the start of chemotherapy, get tested every 2 months to see if you can have surgery. Chemotherapy should be only given for 2 to 4 months before surgery to avoid harmful side effects to the liver. Limiting chemotherapy should also reduce complications from surgery. Bevacizumab can cause bleeding and slow healing after surgery. Thus, if you will take bevacizumab, surgery should be done about 6 to 8 weeks after your last dose.

After surgery, starting follow-up testing or a full or short course of chemotherapy is an option. Chemotherapy received before and after surgery should not exceed 6 months.

Guide 13 lists the follow-up tests for metastatic colon cancer treated with surgery. Follow-up testing is for people who have no signs of cancer after treatment. It can be helpful for finding new cancer growth early.

You should receive a medical history and physical exam every 3 to 6 months for 2 years. If results are normal for 2 years, then get these tests every 6 months for another 3 years.

Ongoing tests of CEA levels are mainly used to find cancer recurrences. CEA blood tests should be done every 3 to 6 months for 2 years. If results are normal for 2 years, get this test every 6 months for 3 to 5 years.

CT scans may help find metastases. Scans of your chest, abdomen, and pelvis are suggested every 3 to 6 months for 2 years. If results are normal for 2 years, then get these scans every 6 to 12 months for 3 years. CT should be done with both intravenous and oral contrast. MRI may be done if you can't have CT.

A colonoscopy is also needed since your risk for another tumor is high within 2 years after diagnosis. You may never have had a colonoscopy of your entire colon if your gut was blocked. If so, get your first colonoscopy within 3 to 6 months after treatment. If you had a colonoscopy before, get another test 1 year after treatment.

Your second colonoscopy after treatment is based on the initial results. If results are normal, have your next colonoscopy in 3 years and then every 5 years. If the test finds an advanced adenoma, your next colonoscopy will be needed within 1 year. Advanced adenomas include polyps with a ruffled structure (villous), a polyp larger than the width of an AAA battery (> 1 cm), or a polyp with pre-cancerous cells (high-grade dysplasia). Colonoscopies may be needed more often if you are younger than 50 years old or have Lynch syndrome.

Metastases at recurrence

Guide 14. Surgical options if you've *never had* chemotherapy before

Option 1

Primary treatment		Adjuvant treatment
• Metastasectomy ± local liver treatment (ie, ablation, SBRT), or • Local liver treatment	→	• FOLFOX, • CapeOX, • Capecitabine, or • 5-FU/leucovorin

Option 2

Neoadjuvant treatment		Primary treatment		Adjuvant treatment
• FOLFOX, • CapeOX, • Capecitabine, or • 5-FU/leucovorin	→	• Metastasectomy ± local liver treatment (ie, ablation, SBRT), or • Local liver treatment	→	• If neoadjuvant worked: ◦ Re-start neoadjuvant regimen, or ◦ FOLFOX
			→	• If neoadjuvant didn't work: ◦ Treatment in Part 6, or ◦ Observation

In this section, treatment for colon cancer that returns as metastatic disease in the liver or lungs is discussed. Options for colon cancer that can be treated with surgery are explained first. However, most people with metastases can't have surgery. If you can't have surgery, treatment options are explained on page 66.

Guide 14 presents surgical options for metastases at recurrence among people who have never had chemotherapy before. Surgery with chemotherapy is advised. However, the best order of chemotherapy and surgery is unknown, so two options are given.

Option 1 starts with a metastasectomy with or without local treatment. Local liver treatments include ablation and SBRT. Instead of metastasectomy, you may be treated with a local liver treatment only; however, metastasectomy is preferred by NCCN experts. Chemotherapy follows surgery. FOLFOX and CapeOX are preferred regimens. Other possible regimens are capecitabine and 5-FU/LV. Six months of chemotherapy is preferred.

Option 2 starts with chemotherapy. FOLFOX and CapeOX are preferred regimens. Other possible regimens are capecitabine and 5-FU/LV.

After 2 to 3 months of chemotherapy, a metastasectomy with or without local treatment may be done. Local liver treatments include ablation and SBRT. Instead of metastasectomy, you may be treated with a local liver treatment only; however, metastasectomy is preferred by NCCN experts.

Adjuvant treatment is based on the success of neoadjuvant treatment. If the neoadjuvant treatment worked, you may re-start that treatment or take FOLFOX. Together, chemotherapy given before and after surgery should not exceed 6 months.

"I always tell people going through treatment two things: to get themselves a 'chemo buddy' like a stuffed animal. It's not only therapeutic for them, but other patients and even the staff! And I also tell people to let others help you with things so you can focus on getting through the treatment!"

- Shaye Dunn, Stage IIIb survivor

If the neoadjuvant treatment didn't work, you can start a treatment regimen in Part 6 or start observation. Observation is a period of testing to assess for cancer growth. Together, chemotherapy given before and after surgery should not exceed 6 months.

Guide 15. Surgical options if you *have had* chemotherapy before

Option 1

Primary treatment		Adjuvant treatment
• Metastasectomy ± local liver treatment (ie, ablation, SBRT), or • Local liver treatment	→	• Observation, or • Treatment in Part 6

Option 2

Neoadjuvant treatment		Primary treatment		Adjuvant treatment
• Treatment in Part 6	→	• Metastasectomy ± local liver treatment (ie, ablation, SBRT), or • Local liver treatment	→	• If neoadjuvant worked: ◦ Re-start neoadjuvant regimen, ◦ FOLFOX, or ◦ Observation
			→	• If neoadjuvant didn't work: ◦ Treatment in Part 6, or ◦ Observation

Guide 15 presents surgical options for metastases at recurrence among people who have had chemotherapy before. Surgery with chemotherapy is advised. However, the best order of chemotherapy and surgery is unknown, so two options are given.

Option 1 starts with a metastasectomy with or without local treatment. Local liver treatments include ablation and SBRT. Instead of metastasectomy, you may be treated with a local liver treatment only; however, metastasectomy is preferred by NCCN experts.

After surgery, you may have two options. One option is to start observation. Observation is a period of testing to assess for cancer growth. The second option is a drug regimen listed in Part 6.

Option 2 starts with a drug regimen listed in Part 6. After 2 to 3 months of chemotherapy, a metastasectomy with or without local treatment may be done. Local liver treatments include ablation and SBRT. Instead of metastasectomy, you may be treated with a local liver treatment only; however, metastasectomy is preferred by NCCN experts.

Adjuvant treatment is based on the success of neoadjuvant treatment. If the neoadjuvant treatment worked, you may re-start that treatment, take FOLFOX, or start observation. If the neoadjuvant treatment didn't work, you can start a treatment regimen in Part 6 or start observation. Together, chemotherapy given before and after surgery should not exceed 6 months.

"What was the one thing I needed most during those 10 awful days after diagnosis? INFORMATION—solid, easy-to-understand information about treatment options, how to cope with chemotherapy, radiation, depression, anxiety, family—the list goes on. And I needed someone to talk to who understood my situation."

- Elaine Newcomb, Stage IV survivor

Guide 16. Nonsurgical treatment

Chemotherapy history	What are my options?
Adjuvant FOLFOX or CapeOX ≤12 months ago	• FOLFIRI ± bevacizumab, • FOLFIRI ± ziv-aflibercept, or • If normal *KRAS*/*NRAS* gene: ◦ FOLFIRI + panitumumab, or ◦ FOLFIRI + cetuximab
Adjuvant FOLFOX or CapeOX >12 months ago	• Treatments listed in Part 6
Prior 5-FU/LV	• Treatments listed in Part 6
Prior capecitabine	• Treatments listed in Part 6
Never had chemotherapy	• Treatments listed in Part 6

Guide 16 presents options for liver or lung metastases at recurrence that can't be treated with surgery. Treatment is based on your history of chemotherapy. If you've had FOLFOX or CapeOX within the past 12 months, treatment options are listed in the chart. If you haven't had FOLFOX or CapeOX within the past 12 months, you may start a treatment regimen listed in Part 6.

Most people with metastatic colon cancer aren't able to be cured of their cancer. However, for some people, chemotherapy may shrink the tumors enough so a surgical cure is possible. Surgery is more likely an option if you only have liver or lung metastases and have very few metastatic tumors.

After the start of chemotherapy, get tested every 2 months to see if you can have surgery. Chemotherapy should be only given for 2 to 4 months before surgery to avoid harmful side effects to the liver. Limiting chemotherapy should also reduce complications from surgery. Bevacizumab can cause bleeding and slow healing after surgery. Thus, if you will take bevacizumab, surgery should be done about 6 to 8 weeks after your last dose.

After surgery, you may start a treatment regimen listed in Part 6. Another option is to start observation. Observation is a period of testing to assess for cancer growth.

Review

- Colon cancer most often spreads to the liver and the lungs.
- Some metastases in the liver or lungs may be treated and cured with surgery. Although surgery is preferred, local treatment to the liver may be an option. Chemotherapy should be part of treatment, too.
- If surgery is not an option, chemotherapy with or without targeted therapy may be used to treat metastases.

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6

Treatment guide: Chemotherapy

6 Treatment guide: Chemotherapy

Part 6 presents the chemotherapy pathways used to treat advanced colon cancer. There are many options. If one option doesn't work or stops working, another option is given.

The chemotherapy pathways are divided into 5 groups. The groups are based on which type of chemotherapy is given first. The first group starts with oxaliplatin regimens—FOLFOX or CapeOX. The second group starts with an irinotecan-based regimen, FOLFIRI. The third group starts with either 5-FU/LV or capecitabine. The fourth group starts with FOLFOXIRI. The fifth group includes treatments that usually result in the least harmful side effects.

Your doctors will plan your treatment based on many factors. One such factor is the side effects of the drug regimens. Some regimes cause worse side effects than others. Your doctors will assess your health to know which side effects you can withstand. Your treatment plan will also be based on your treatment goals and the type and timing of prior treatment.

Oxaliplatin

Guide 17. Pathway for abnormal or normal *KRAS* and *NRAS* genes

Initial treatment
FOLFOX,
FOLFOX + bevacizumab,
CapeOX, or
CapeOX + bevacizumab

1st progression
FOLFIRI,
FOLFIRI + bevacizumab,
FOLFIRI + ziv-aflibercept,
FOLFIRI + ramucirumab,
Irinotecan,
Irinotecan + bevacizumab,
Irinotecan + ziv-aflibercept, or
Irinotecan + ramucirumab

2nd progression
Regorafenib, or
Trifluridine + tipiracil

3rd progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Guide 17 maps a treatment path that starts with FOLFOX or CapeOX. Bevacizumab may be added. The regimens in this pathway can be received whether the cancer has *RAS* mutations or not.

Oxaliplatin in the FOLFOX or CapeOX regimens can harm your nervous system. Stopping oxaliplatin—but not the other drugs—after 3 months of use may prevent harm. Keep taking the other drugs for 6 months. If the cancer progresses, oxaliplatin may be restarted if it was stopped due to side effects. You should only restart if the side effects have ended.

Capecitabine in the CapeOx regimen 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.

Oxaliplatin may not prevent the cancer from progressing. If this happens, you may start to take FOLFIRI or irinotecan. Bevacizumab, ziv-aflibercept, or ramucirumab may be added.

If the cancer progresses despite irinotecan, your doctor may start you on regorafenib or trifluridine with tipiracil. There may also be a clinical trial that you could join. Supportive care may give you relief from symptoms.

Guide 18. Pathways for normal *KRAS* and *NRAS* genes only

Initial treatment
FOLFOX,
FOLFOX + bevacizumab,
CapeOX, or
CapeOX + bevacizumab

1st progression
FOLFIRI,
FOLFIRI + bevacizumab,
FOLFIRI + ziv-aflibercept,
FOLFIRI + ramucirumab,
Irinotecan,
Irinotecan + bevacizumab,
Irinotecan + ziv-aflibercept, or
Irinotecan + ramucirumab

2nd progression
Irinotecan + panitumumab,
Irinotecan + cetuximab,
Cetuximab, or
Panitumumab

3rd progression
Regorafenib, or
Trifluridine + tipiracil

4th progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Initial treatment
FOLFOX,
FOLFOX + bevacizumab,
CapeOX, or
CapeOX + bevacizumab

1st progression
FOLFIRI,
FOLFIRI + panitumumab,
FOLFIRI + cetuximab,
Irinotecan,
Irinotecan + panitumumab, or
Irinotecan + cetuximab

2nd progression
Regorafenib, or
Trifluridine + tipiracil

3rd progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Initial treatment
FOLFOX + panitumumab, or
FOLFOX + cetuximab
1st progression
FOLFIRI,
FOLFIRI + bevacizumab,
FOLFIRI + ziv-aflibercept,
FOLFIRI + ramucirumab,
Irinotecan,
Irinotecan + bevacizumab,
Irinotecan + ziv-aflibercept, or
Irinotecan + ramucirumab
2nd progression
Regorafenib, or
Trifluridine + tipiracil
3rd progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Guide 18 maps three more pathways for colon cancer with normal *KRAS* or *NRAS* genes. These pathways include regimens with panitumumab or cetuximab. If cetuximab or panitumumab don't work, there is no good proof to keep taking them. Also, your doctor won't use panitumumab after cetuximab failure or cetuximab after panitumumab failure because these drugs work in a similar way.

The cancer may progress despite irinotecan, oxaliplatin, panitumumab, or cetuximab. In this case, your doctor may start you on regorafenib or trifluridine with tipiracil. There may also be a clinical trial that you could join. Supportive care may give you relief from symptoms.

Irinotecan

Guide 19. Pathway for abnormal or normal *KRAS* and *NRAS* genes

Initial treatment

- FOLFIRI, or
- FOLFIRI + bevacizumab

1st progression

- FOLFOX,
- FOLFOX + bevacizumab,
- CapeOX, or
- CapeOX + bevacizumab

2nd progression

- Regorafenib, or
- Trifluridine + tipiracil

3rd progression

- Regorafenib,
- Trifluridine + tipiracil,
- Clinical trial, or
- Best supportive care

Guide 19 maps a treatment path that starts with FOLFIRI. Bevacizumab may be added. The regimens in this pathway can be received whether the cancer has *RAS* mutations or not.

Irinotecan is part of the FOLFIRI regimen. It should be used with caution and at a low dose if you have Gilbert's disease. Gilbert's disease is a health problem that people are born with. The disease impairs the liver from correctly processing bilirubin. Irinotecan should be used with caution and at a low dose if you have high bilirubin levels in your blood for any reason.

FOLFIRI may not prevent the cancer from progressing. If this happens, you may start to take an oxaliplatin regimen—FOLFOX or CapeOX. Bevacizumab may be added.

If the cancer progresses despite oxaliplatin, your doctor may start you on regorafenib or trifluridine with tipiracil. There may also be a clinical trial that you could join. Supportive care may give you relief from symptoms.

Guide 20. Pathways for normal *KRAS* and *NRAS* genes only

Initial treatment
FOLFIRI, or
FOLFIRI + bevacizumab
1st progression
FOLFOX,
FOLFOX + bevacizumab,
CapeOX, or
CapeOX + bevacizumab
2nd progression
Irinotecan + panitumumab,
Irinotecan + cetuximab,
Cetuximab, or
Panitumumab
3rd progression
Regorafenib, or
Trifluridine + tipiracil
4th progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Initial treatment
FOLFIRI, or
FOLFIRI + bevacizumab
1st progression
Irinotecan + panitumumab,
Irinotecan + cetuximab,
Cetuximab, or
Panitumumab
2nd progression
FOLFOX, or
CapeOX
3rd progression
Regorafenib, or
Trifluridine + tipiracil
4th progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Initial treatment
FOLFIRI + panitumumab, or
FOLFIRI + cetuximab

1st progression
FOLFOX,
FOLFOX + bevacizumab,
CapeOX, or
CapeOX + bevacizumab

2nd progression
Regorafenib, or
Trifluridine + tipiracil

3rd progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Guide 20 maps three more pathways for colon cancer with normal *KRAS* or *NRAS* genes. These pathways include regimens with panitumumab or cetuximab. If cetuximab or panitumumab don't work, there is no good proof to keep taking them. Also, your doctor won't use panitumumab after cetuximab failure or cetuximab after panitumumab failure because these drugs work in a similar way.

The cancer may progress despite irinotecan, oxaliplatin, panitumumab, or cetuximab. In this case, your doctor may start you on regorafenib or trifluridine with tipiracil. There may also be a clinical trial that you could join. Supportive care may give you relief from symptoms.

5-FU and capecitabine

Guide 21. Pathways for abnormal or normal *KRAS* and *NRAS* genes

Initial treatment
5-FU/LV,
Capecitabine, or
Capecitabine + bevacizumab

1st progression
FOLFOX,
FOLFOX + bevacizumab,
CapeOX, or
CapeOX + bevacizumab

2nd progression
Irinotecan

3rd progression
Regorafenib, or
Trifluridine + tipiracil

4th progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Initial treatment
5-FU/LV,
Capecitabine, or
Capecitabine + bevacizumab

1st progression
Irinotecan + oxaliplatin, or
Irinotecan + oxaliplatin + bevacizumab

2nd progression
Regorafenib, or
Trifluridine + tipiracil

3rd progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Initial treatment
5-FU/LV,
Capecitabine, or
Capecitabine + bevacizumab
1st progression
Irinotecan,
Irinotecan + bevacizumab,
Irinotecan + ziv-aflibercept,
Irinotecan + ramucirumab,
FOLFIRI,
FOLFIRI + bevacizumab,
FOLFIRI + ziv-aflibercept, OR
FOLFIRI + ramucirumab
2nd progression
FOLFOX, or
CapeOX
3rd progression
Regorafenib, or
Trifluridine + tipiracil
4th progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Guide 21 maps three treatment paths that start with 5-FU/LV or capecitabine. The regimens in these pathways can be received whether the cancer has *RAS* mutations or not. 5-FU/LV is given by infusion. Bevacizumab may be added to capecitabine. The side effects of 5-FU/LV and capecitabine aren't usually as bad as those caused by oxaliplatin or irinotecan. Thus, if these regimens are too harsh, you should start supportive care if the cancer grows or spreads.

If the cancer progresses despite 5-FU/LV or capecitabine, you should try regimens with oxaliplatin, irinotecan, or both. Choices of regimens are shown in the chart. Read Parts 6.1 and 6.2 to learn about some of the side effects of oxaliplatin and irinotecan.

If the cancer progresses despite oxaliplatin or irinotecan, your doctor may start you on regorafenib or trifluridine with tipiracil. There may also be a clinical trial that you could join. Supportive care may give you relief from symptoms.

Guide 22. Pathways for normal *KRAS* and *NRAS* genes only

Initial treatment
5-FU/LV,
Capecitabine, or
Capecitabine + bevacizumab
1st progression
FOLFOX,
FOLFOX + bevacizumab,
CapeOX, or
CapeOX + bevacizumab
2nd progression
Irinotecan
3rd progression
Irinotecan + panitumumab,
Irinotecan + cetuximab,
Cetuximab, or
Panitumumab
4th progression
• Regorafenib, or
• Trifluridine + tipiracil
5th progression
• Regorafenib,
• Trifluridine + tipiracil,
• Clinical trial, or
• Best supportive care

Initial treatment
5-FU/LV,
Capecitabine, or
Capecitabine + bevacizumab
1st progression
Irinotecan + oxaliplatin, or
Irinotecan + oxaliplatin + bevacizumab
2nd progression
Irinotecan + panitumumab,
Irinotecan + cetuximab,
Cetuximab, or
Panitumumab
3rd progression
Regorafenib, or
Trifluridine + tipiracil
4th progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Initial treatment
5-FU/LV,
Capecitabine, or
Capecitabine + bevacizumab
1st progression
Irinotecan,
Irinotecan + bevacizumab,
Irinotecan + ziv-aflibercept,
Irinotecan + ramucirumab,
FOLFIRI,
FOLFIRI + bevacizumab,
FOLFIRI + ziv-aflibercept, OR
FOLFIRI + ramucirumab
2nd progression
FOLFOX, or
CapeOX
3rd progression
Irinotecan + panitumumab,
Irinotecan + cetuximab,
Cetuximab, or
Panitumumab
4th progression
Regorafenib, or
Trifluridine + tipiracil
5th progression
Regorafenib,
Trifluridine + tipiracil,
Clinical trial, or
Best supportive care

Guide 22 maps three more pathways for colon cancer with normal *KRAS* or *NRAS* genes. These pathways include regimens with panitumumab or cetuximab. If cetuximab or panitumumab don't work, there is no good proof to keep taking them. Also, your doctor won't use panitumumab after cetuximab failure or cetuximab after panitumumab failure because these drugs work in a similar way.

If the cancer progresses despite panitumumab or cetuximab, your doctor may start you on regorafenib or trifluridine with tipiracil. There may also be a clinical trial that you could join. Supportive care may give you relief from symptoms.

FOLFOXIRI

Guide 23. Pathway for abnormal or normal *KRAS* and *NRAS* genes

Initial treatment

- FOLFOXIRI, or
- FOLFOXIRI + bevacizumab

1st progression

- Regorafenib, or
- Trifluridine + tipiracil

2nd progression

- Regorafenib,
- Trifluridine + tipiracil,
- Clinical trial, or
- Best supportive care

Guide 24. Pathway for normal *KRAS* and *NRAS* genes only

Initial treatment

- FOLFOXIRI, or
- FOLFOXIRI + bevacizumab

1st progression

- Irinotecan + panitumumab,
- Irinotecan + cetuximab,
- Cetuximab, or
- Panitumumab

2nd progression

- Regorafenib, or
- Trifluridine + tipiracil

3rd progression

- Regorafenib,
- Trifluridine + tipiracil,
- Clinical trial, or
- Best supportive care

Guide 23 maps a treatment path that starts with FOLFOXIRI with or without bevacizumab. The regimens in this pathway can be received whether the cancer has *RAS* mutations or not. You may have worse side effects with FOLFOXIRI than if you were taking FOXFIRI. Thus, this pathway is only recommended if the tumor is likely to shrink enough so surgery would be possible. If the cancer progresses despite FOLFOXIRI, the next options include regorafenib, trifluridine with tipiracil, clinical trials, and best supportive care.

Guide 24 maps another pathway for colon cancer with normal *KRAS* or *NRAS* genes. If the cancer progresses despite FOLFOXIRI, the next options include irinotecan with panitumumab or cetuximab. If you're unable to take irinotecan, you may take panitumumab or cetuximab alone.

If these treatments don't work, your doctor may start you on regorafenib or trifluridine with tipiracil. There may also be a clinical trial that you could join. Supportive care may give you relief from symptoms.

Least toxic

Guide 25. Pathway for abnormal or normal *KRAS* and *NRAS* genes

Initial treatment
FOLFOXIRI, or
FOLFOXIRI + bevacizumab

Guide 26. Pathway for normal *KRAS* and *NRAS* genes only

Initial treatment
Cetuximab, or
Panitumumab

Guide 25 lists regimens that are likely to be the least harmful to you. These regimens can be received whether the cancer has *RAS* mutations or not. Infusional 5-FU/LV is an option. 5-FU has fewer severe side effects when given by infusion rather than bolus. Another option is to take capecitabine with or without bevacizumab. If your treatment works, you may find that you are able to do more activities. In this case, your doctor may want you to start a regimen listed in the prior sections in Part 6.

Guide 26 lists another pathway for colon cancer with normal *KRAS* or *NRAS* genes. Targeted therapy without chemotherapy is advised. Panitumumab or cetuximab are options. If your treatment works, you may find that you are able to do more activities. In this case, your doctor may want you to start a regimen listed in the prior sections in Part 6.

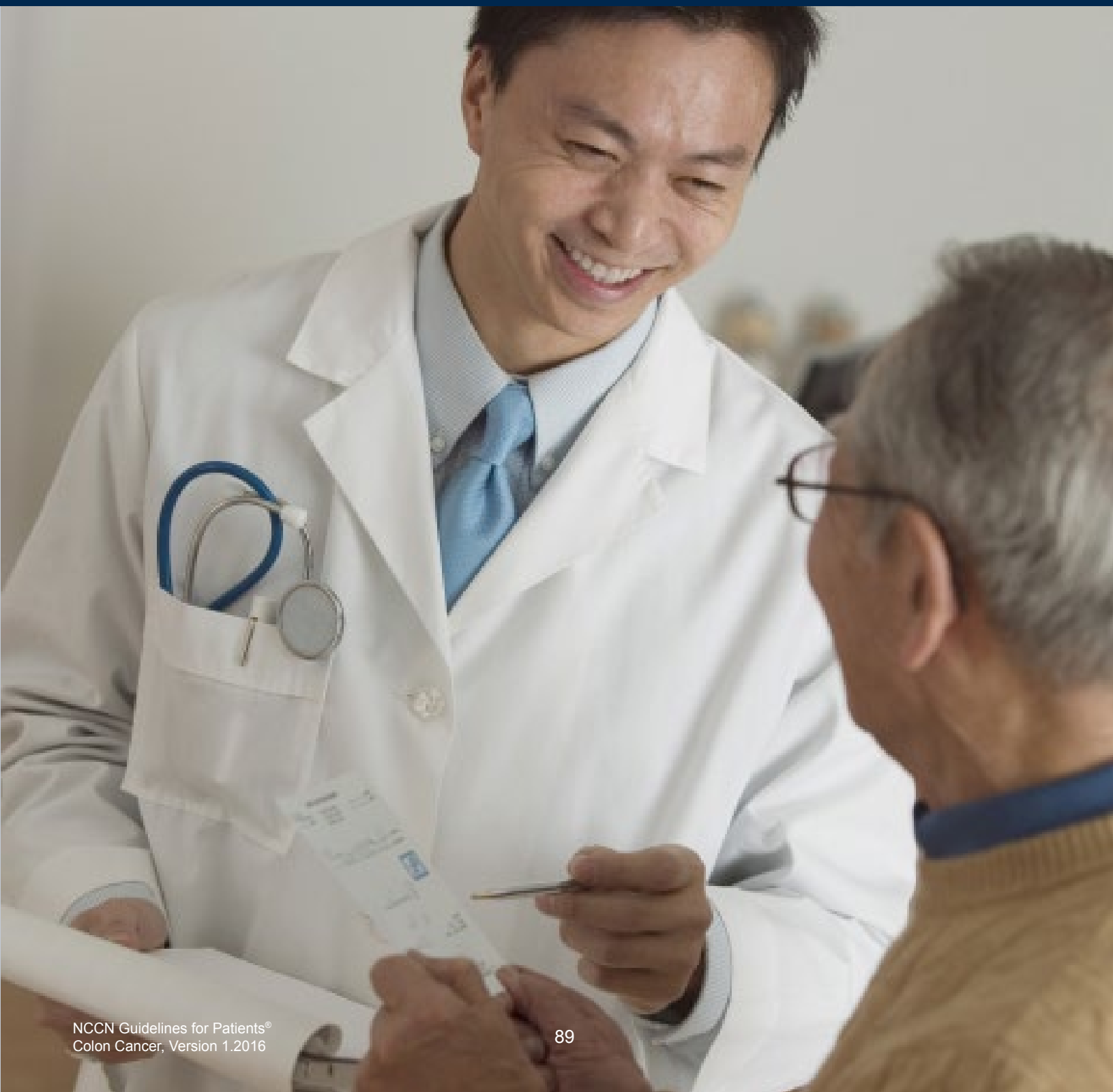
Review

- There are many cancer drugs that can be used to treat advanced colon cancer.
- Some cancer drugs may cause worse side effects than others.
- Your doctor will choose a drug regimen for you based on your treatment goals, the type and timing of prior treatment, and possible side effects.

National Comprehensive Cancer Network®

7

Making treatment decisions



7 Making treatment decisions

Having cancer is very stressful. While absorbing the fact that you have cancer, you have to learn about tests and treatments. In addition, the time you have to accept a treatment plan feels short. Parts 1 through 6 described the cancer and the test and treatment options recommended by NCCN experts. These options are based on science and agreement among NCCN experts. Part 7 aims to help you make decisions that are in line with your beliefs, wishes, and values.

It's your choice

The role patients want in choosing their treatment differs. You may feel uneasy about making treatment decisions. This may be due to a high level of stress. It may be hard to hear or know what others are saying. Stress, pain, and drugs can limit your ability to make good decisions. You may feel uneasy because you don't know much about cancer. You've never heard the words used to describe cancer, tests, or treatments. Likewise, you may think that your judgment isn't any better than your doctors'.

Letting others decide which option is best may make you feel more at ease. But, whom do you want to make the decisions? You may rely on your doctors alone to make the right decisions. However, your doctors may not tell you which to choose if you have multiple good options. You can also have loved ones help. They can gather information, speak on your behalf, and share in decision-making with your doctors. Even if others decide which treatment you will receive, you still have to agree by signing a consent form.

On the other hand, you may want to take the lead or share in decision-making. Most patients do. In shared decision-making, you and your doctors share information, weigh the options, and agree on a treatment plan. Your doctors know the science behind your plan but you know your concerns and goals. By working together, you are likely to get a higher quality of care and be more satisfied. You'll likely get the treatment you want, at the place you want, and by the doctors you want.

Questions to ask your doctors

You may meet with experts from different fields of medicine. Strive to have helpful talks with each person. Prepare questions before your visit and ask questions if the person isn't clear. You can also record your talks and get copies of your medical records. It may be helpful to have your spouse, partner, or a friend with you at these visits. A patient advocate or navigator might also be able to come. They can help to ask questions and remember what was said. Suggested questions to ask include:

What's my diagnosis and prognosis?

It's important to know that there are different types of cancer. Cancer can greatly differ even when people have a tumor in the same organ. Based on your test results, your doctors can tell you which type of cancer you have. He or she can also give a prognosis. A prognosis is a prediction of the pattern and outcome of a disease. Knowing the prognosis may affect what you decide about treatment.

1. Where did the cancer start? In what type of cell?
2. Is this cancer common?
3. What is the cancer stage? Does this stage mean the cancer has spread far?
4. Is this a fast- or slow-growing colon cancer?
5. What other tests results are important to know?
6. How often are these tests wrong?
7. Would you give me a copy of the pathology report and other test results?
8. How likely is it that I'll be cancer-free after treatment?

What are my options?

There is no single treatment practice that is best for all patients. There is often more than one treatment option along with clinical trial options. Your doctor will review your test results and recommend treatment options.

1. What will happen if I do nothing?
2. Can I just carefully monitor the cancer?
3. Do you consult NCCN recommendations when considering options?
4. Are you suggesting options other than what NCCN recommends? If yes, why?
5. Do your suggested options include clinical trials? Please explain why.
6. How do my age, health, and other factors affect my options?
7. What if I am pregnant?
8. Which option is proven to work best?
9. Which options lack scientific proof?
10. What are the benefits of each option? Does any option offer a cure? Are my chances any better for one option than another? Less time-consuming? Less expensive?
11. What are the risks of each option? What are possible complications? What are the rare and common side effects? Short-lived and long-lasting side effects? Serious or mild side effects? Other risks?
12. What can be done to prevent or relieve the side effects of treatment?
13. What are my chances that the cancer will return?

What does each option require of me?

Many patients consider how each option will practically affect their lives. This information may be important because you have family, jobs, and other duties to take care of. You also may be concerned about getting the help you need. If you have more than one option, choosing the option that is the least taxing may be important to you:

1. Will I have to go to the hospital or elsewhere? How often? How long is each visit?
2. Do I have a choice of when to begin treatment? Can I choose the days and times of treatment?
3. How do I prepare for treatment? Do I have to stop taking any of my medicines? Are there foods I will have to avoid?
4. Should I bring someone with me when I get treated?
5. Will the treatment hurt?
6. How much will the treatment cost me? What does my insurance cover?
7. Will I miss work or school? Will I be able to drive?
8. Is home care after treatment needed? If yes, what type?
9. How soon will I be able to manage my own health?
10. When will I be able to return to my normal activities?

What is your experience?

More and more research is finding that patients treated by more experienced doctors have better results. It is important to learn if a doctor is an expert in the cancer treatment he or she is offering.

1. Are you board certified? If yes, in what area?
2. How many patients like me have you treated?
3. How many procedures like the one you're suggesting have you done?
4. Is this treatment a major part of your practice?
5. How many of your patients have had complications?

Weighing your options

Deciding which option is best can be hard. Doctors from different fields of medicine may have different opinions on which option is best for you. This can be very confusing. Your spouse or partner may disagree with which option you want. This can be stressful. In some cases, one option hasn't been shown to work better than another, so science isn't helpful. Some ways to decide on treatment are discussed next.

2nd opinion

The time around a cancer diagnosis is very stressful. People with cancer often want to get treated as soon as possible. They want to make their cancer go away before it spreads farther. While cancer can't be ignored, there is time to think about and choose which option is best for you.

You may wish to have another doctor review your test results and suggest a treatment plan. This is called getting a 2nd opinion. You may completely trust your doctor, but a 2nd opinion on which option is best can help.

Copies of the pathology report, a DVD of the imaging tests, and other test results need to be sent to the doctor giving the 2nd opinion. Some people feel uneasy asking for copies from their doctors. However, a 2nd opinion is a normal part of cancer care.

When doctors have cancer, most will talk with more than one doctor before choosing their treatment. What's more, some health plans require a 2nd opinion. If your health plan doesn't cover the cost of a 2nd opinion, you have the choice of paying for it yourself.

If the two opinions are the same, you may feel more at peace about the treatment you accept to have. If the two opinions differ, think about getting a 3rd opinion. A 3rd opinion may help you decide between your options. Choosing your cancer treatment is a very important decision. It can affect your length and quality of life.

Support groups

Besides talking to health experts, it may help to talk to patients who have walked in your shoes. Support groups often consist of people at different stages of treatment. Some may be in the process of deciding while others may be finished with treatment. At support groups, you can ask questions and hear about the experiences of other people with colon cancer.

Compare benefits and downsides

Every option has benefits and downsides. Consider these when deciding which option is best for you. Talking to others can help identify benefits and downsides you haven't thought of. Scoring each factor from 0 to 10 can also help since some factors may be more important to you than others.

My notes

Websites

American Cancer Society
cancer.org/cancer/colonandrectumcancer/detailedguide/index

The Colon Cancer Alliance
ccalliance.org

Fight Colorectal Cancer
FightColorectalCancer.org

National Coalition for Cancer Survivorship
www.canceradvocacy.org/toolbox

National Cancer Institute
www.cancer.gov/types/colorectal

NCCN
www.nccn.org/patients

Review

- Shared decision-making is a process in which you and your doctors plan treatment together.
- Asking your doctors questions is vital to getting the information you need to make informed decisions.
- Getting a 2nd opinion, attending support groups, and comparing benefits and downsides may help you decide which treatment is best for you.

Glossary

Dictionary
Acronyms

Dictionary

abdomen
The belly area between the chest and pelvis.

ablation
Treatment using radiofrequency or cold to destroy cancer cells.

adenocarcinoma
Cancer in cells that line organs and make fluids or hormones.

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

adjuvant treatment
Treatment that is given to lower the chances of the cancer returning.

adventitia
The outer layer, in some places, of the colon wall.

angiolymphatic invasion
Cancer has spread into the tumor's lymph or blood vessels.

anus
The opening at the end of the digestive system that allows stool to pass out of the body.

bilirubin
A substance in the body that causes bodily fluids to be yellow.

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

bolus
A fast injection of a drug.

boost
An extra dose of radiation to a specific area of the body.

brachytherapy
Treatment with radiation received from an object placed near or in the tumor.

cancer grade
How closely the cancer cells look like normal cells.

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
Cancer that has not grown into tissue that could allow cancer cells to spread. It is a noninvasive cancer.

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

chemotherapy
Drugs that stop the life cycle of cells so they don't increase in number.

clinical stage
The rating of the extent of cancer based on tests before treatment.

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.

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

defective mismatch repair (dMMR)
Abnormal changes in genes that contain instructions for making proteins that fix errors in DNA.

deoxyribonucleic acid (DNA)
A very thin and long molecule that contains genetic code. Also called the “blueprint of life.”

diagnosis
To identify a disease.

digestive system
A set of organs in the body that changes food into small parts for the body to use as energy.

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

endoscopic polypectomy
Surgery to remove a polyp during a colonoscopy.

enema
Injection of liquid into the rectum to clear the bowel.

epidermal growth factor receptor (EGFR)
A protein on the edge of a cell that sends signals for the cell to grow.

epithelium
Tissue that lines the colon wall.

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

external beam radiation therapy (EBRT)
Treatment with radiation received from a machine outside the body.

familial adenomatous polyposis (FAP)
An inherited medical condition that increases the odds of colon cancer.

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

general anesthesia
A controlled loss of wakefulness from drugs.

hereditary non-polyposis colon cancer (HNPCC)
An inherited medical condition that increases the odds of colon cancer. Also called Lynch syndrome.

histologic typing
The study of cells to classify disease.

hives
Itchy, swollen, and red skin caused by the body ridding itself of an invader.

hyperplastic polyp
A polyp that grows fast and is often found in the last part of the colon.

imaging test
A test that makes pictures of the insides of the body.

immunohistochemistry (IHC)
A lab test of cancer cells to find specific cell traits involved in abnormal cell growth.

inflammatory bowel disease
A medical condition that causes the intestine to swell.

inflammatory polyp
A polyp that often grows after the intestine swells.

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.

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.

lamina propria
Connective tissue within the mucosa of the colon wall.

large intestine
The digestive organ that prepares unused food for leaving the body.

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.

medical history
All health events and medications taken to date.

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 (MSI)
Errors in a small DNA part that happen when DNA is making a copy of itself.

microsatellite instability-high (MSI-H)
The presence of 2 or more MSI markers.

mismatch repair (MMR) proteins
Proteins that correct DNA errors that occur when copies of DNA are being made.

mucosa
The first, inner layer of the colon wall.

mucus
A sticky, thick liquid that moisturizes or lubricates.

muscularis mucosae
A thin layer of muscle within the mucosa of the colon wall.

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

mutation
An abnormal change in the instructions within cells for making and controlling cells.

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

neoadjuvant treatment
Treatment given before the main treatment used to cure disease. Also called preoperative treatment.

noninvasive cancer
Cancer cells have not grown into the second layer of the colon wall.

observation
A period of testing for cancer growth.

parietal peritoneum
The outer layer of tissue lining around the abdomen.

pathologic stage
A rating of the extent of cancer based on tests given after treatment.

pathologist
A doctor who's an expert 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.

perineural invasion
Spread of cancer into nearby nerves.

physical exam
A review of the body by a health expert for signs of disease.

polymerase chain reaction (PCR)
A process in which copies of a DNA part are made.

polyp
An extra growth of tissue from the epithelium 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.

positron emission tomography/computed tomography (PET/CT)
A test that uses radioactive material and x-rays to view the shape and function of organs and tissues.

primary tumor
The first mass of cancer cells in the body.

prognosis
The pattern and outcome of a disease.

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

radiation therapy
The use of high-energy rays to destroy cancer cells.

radiologist
A doctor who specializes in reading imaging tests.

rectum
An organ in the digestive system that holds stool until expelled from the body.

recurrence
The return of cancer after a cancer-free period.

serosa
The outer layer, in some places, of the colon wall that makes fluid so that organs can slide against one another; also called the visceral peritoneum.

sessile polyp
A polyp that is flat.

side effect
An unplanned physical or emotional response to treatment.

small intestine
The digestive organ that absorbs nutrients from eaten food.

stereotactic body radiation therapy (SBRT)
Radiation therapy that uses precise, high-dose beams.

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

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

subserosa
A thin layer of connective tissue that makes fluid.

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

surface receptor
A protein found in the membrane of cells.

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

targeted therapy
Drugs that stop the action of molecules that start the growth of cancer cells.

three-dimensional conformal radiation therapy (3D-CRT)
Radiation therapy that uses beams that match the shape of the tumor.

total colonoscopy
Insertion of a thin tool into the colon to view the entire colon and, if needed, remove tissue.

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

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

vascular endothelial growth factor (VEGF)
A molecule that binds to cells that form blood vessels.

villous polyp
A polyp with a ruffled structure.

Acronyms

3D-CRT
three-dimensional conformal radiation therapy

AJCC
American Joint Committee on Cancer

CAM
complementary and alternative medicine

CBC
complete blood count

CEA
carcinoembryonic antigen

cm
centimeters

CT
computed tomography

dMMR
defective mismatch repair

DNA
deoxyribonucleic acid

EBRT
external beam radiation therapy

EGF
epidermal growth factor

EGFR
epidermal growth factor receptor

FAP
familial adenomatous polyposis

FDA
Food and Drug Administration

HAI
hepatic arterial infusion

HNPCC
hereditary non-polyposis colon cancer

IHC
immunohistochemistry

IMRT
intensity-modulated radiation therapy

IORT
intraoperative radiation therapy

MMR
mismatch repair

MRI
magnetic resonance imaging

MSI
microsatellite instability

MSI-H
microsatellite instability-high

MSI-L
microsatellite instability-low

MSI-S
microsatellite instability-stable

PCR
polymerase chain reaction

PET
positron emission tomography

PET/CT
positron emission tomography/ computed tomography

SBRT
stereotactic body radiation therapy

VEGF
vascular endothelial growth factor

NCCN Abbreviations and Acronyms

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National Comprehensive Cancer Network®

NCCN Patient Guidelines®
NCCN Guidelines for Patients®

NCCN Guidelines®
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NCCN Panel Members for Colon Cancer

Al B. Benson, III, MD/Chair
Robert H. Lurie Comprehensive Cancer Center of Northwestern University

Alan P. Venook, MD/Vice-Chair
UCSF Helen Diller Family Comprehensive Cancer Center

Tanios Bekaii-Saab, MD
The Ohio State University Comprehensive Cancer Center - James Cancer Hospital and Solove Research Institute

Emily Chan, MD, PhD
Vanderbilt-Ingram Cancer Center

Yi-Jen Chen, MD, PhD
City of Hope Comprehensive Cancer Center

Harry S. Cooper, MD
Fox Chase Cancer Center

Paul F. Engstrom, MD
Fox Chase Cancer Center

Peter C. Enzinger, MD
Dana-Farber/Brigham and Women's Cancer Center

Moon J. Fenton, MD, PhD
St. Jude Children's Research Hospital/ University of Tennessee Health Science Center

Charles S. Fuchs, MD, MPH
Dana-Farber/Brigham and Women's Cancer Center

Jean L. Grem, MD
Fred & Pamela Buffett Cancer Center

Axel Grothey, MD
Mayo Clinic Cancer Center

Howard S. Hochster, MD
Yale Cancer Center/Smilow Cancer Hospital

Steven Hunt, MD
Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine

Ahmed Kamel, MD
University of Alabama at Birmingham Comprehensive Cancer Center

Natalie Kirilcuk, MD
Stanford Cancer Institute

Smitha Krishnamurthi, MD Þ
Case Comprehensive Cancer Center/ University Hospitals Seidman Cancer Center and Cleveland Clinic Taussig Cancer Institute

Lucille A. Leong, MD
City of Hope Comprehensive Cancer Center

Edward Lin, MD
Fred Hutchinson Cancer Research Center/ Seattle Cancer Care Alliance

Wells A. Messersmith, MD
University of Colorado Cancer Center

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

James D. Murphy, MD, MS
UC San Diego Moores Cancer Center

Steven Nurkin, MD, MS
Roswell Park Cancer Institute

David P. Ryan, MD
Massachusetts General Hospital Cancer Center

Leonard Saltz, MD
Memorial Sloan Kettering Cancer Center

Sunil Sharma, MD
Huntsman Cancer Institute at the University of Utah

John M. Skibber, MD
The University of Texas MD Anderson Cancer Center

Constantinos T. Sofocleous, MD, PhD
Memorial Sloan Kettering Cancer Center

Elena M. Stoffel, MD, MPH
University of Michigan Comprehensive Cancer Center

Eden Stotsky-Himelfarb, BSN, RN
The Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins

Christopher G. Willett, MD §
Duke Cancer Institute

NCCN Staff

Kristina M. Gregory, RN, MSN, OCN
Vice President/Clinical Information Operations

Deborah Freedman-Cass, PhD
Oncology Scientist
Senior Medical Writer

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Research Center/
Seattle Cancer Care Alliance
Seattle, Washington
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The Sidney Kimmel Comprehensive Cancer
Center at Johns Hopkins
Baltimore, Maryland
410.955.8964
hopkinskimmelcancercenter.org

Robert H. Lurie Comprehensive Cancer
Center of Northwestern University
Chicago, Illinois
866.587.4322
cancer.northwestern.edu

Mayo Clinic Cancer Center
Phoenix/Scottsdale, Arizona
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Cancer Center
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Smilow Cancer Hospital
New Haven, Connecticut
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Colon Cancer

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275 Commerce Drive
Suite 300
Fort Washington, PA 19034
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