NCCN Guidelines for Patients™
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Part 1: About these guidelines

1.1 NCCN Guidelines for Patients™
NCCN aims to offer the most current and trustworthy cancer information to patients and their families in a manner that is easy to understand. To reach this goal, NCCN has developed the NCCN Patient Guidelines™. These guidelines are meant to help patients talk with doctors and make the best decisions possible. They are based on the NCCN Guidelines® that are developed for doctors. For more information on NCCN or the most recent NCCN Patient Guidelines, visit NCCN.com.

1.2 NCCN Clinical Practice Guidelines in Oncology®
The NCCN Guidelines are the most complete and frequently updated clinical practice guidelines in medicine. They give a step-by-step course of action that many cancer doctors follow so that their decisions are well-informed. The NCCN Guidelines are developed by 46 group panels. These panels include nearly 900 well-known experts from the 21 NCCN Member Institutions (Figure 1). The panel members include experts from different fields of medicine, such as medical oncology, radiology, and surgery. Some panels also have other types of health care workers and patient advocates to include other points of view.

Recommendations in the NCCN Guidelines are based on clinical trials and the experience of the panel members. Most panel members have jobs that include clinical research and treating people with cancer. Members work on the guidelines that match their area of expertise. Altogether, members volunteer more than 15,000 hours each year to revise the NCCN Guidelines. Their efforts allow new information to be quickly added to the guidelines.

Doctors use the NCCN Guidelines to inform their decisions when diagnosing and treating people with cancer. There are guidelines for 97% of the tumors seen in cancer clinics. All guidelines are updated as new information becomes available. The NCCN Guidelines allow others to have access to the information that is used by NCCN Panel Members. Doctors in your community may or may not perform research, but by using the NCCN Guidelines, they have access to the newest information from clinical trials.
By identifying what is the standard of care, the NCCN Guidelines help patients in two ways. First, they identify which treatments work best. Second, they give treatment options so that patients can get the best care for their situation.

The treatments in the NCCN Guidelines are the ones the NCCN doctors feel are most useful for most patients based on science and their experience. It is important to note that a treatment may not be right for all patients. Thus, even if a treatment is part of the NCCN Guidelines, it may not be right for everyone. This is because each patient has his or her own medical history and circumstances.

On the other hand, if a treatment isn’t in the NCCN Guidelines, it means that there isn’t enough proof at this time to use it as a standard of care. Because of differences between patients and other factors, the NCCN Guidelines don’t replace the expertise and clinical judgment of your doctors.

![Figure 1. NCCN Member Institutions](image-url)
1.3 NCCN Guidelines Panel Members

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1.4 How to use this booklet
The NCCN Guidelines for Patients™: Colon Cancer are written to help you better understand cancer treatment. These guidelines cover all the stages of colon cancer, so not all of the information will apply to you. Also, your treatment plan may differ from the guidelines recommendations because of your health and personal issues.

The guidelines have several important parts:

• In Part 2, you’ll find information about what colon cancer is.

• The tests and treatments for colon cancer are explained in Parts 3 through 6.

• Part 6 also has information about caring for caregivers.

• A step-by-step treatment guide from diagnosis to after treatment is in Part 7.

• Medical terms are defined in the text or side bar when first used. Definitions are repeated in Part 7, and all are listed in a Dictionary in Part 8.

• In Part 9, there are pages to help you talk with your doctor and track your treatment.

This booklet and your doctor can help you decide which choices best meet your medical and personal needs. Decisions about treatment are important for your long-term health and quality of life. Every choice has risks and benefits. Getting enough information to make informed decisions is an important first step.

To give you the information you need, these guidelines cover most aspects of cancer care. Many medical terms are included that describe cancer, tests, and treatments. These are terms that you will likely hear your treatment team use in the months and years ahead. Most of the information 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. There is a Dictionary in Part 8 that may help you. With time, you'll become more familiar with the medical information in these guidelines.

Reading the guidelines in order from beginning to end may be the most helpful. The first half of the guidelines has basic information to help you understand the detailed treatment guide in Part 7. As you learn about colon cancer, you may want to create a list of questions to ask your doctor. There is a list of suggested questions in Part 9, but you may think of more questions to ask.
Part 2: About colon cancer

Main Points

• The colon is a common place for cancer to form in the body.
• The colon changes eaten food from a liquid into a solid form.
• Colon cancer often starts in a polyp—an extra growth of the colon wall.
• Your chances for colon cancer are higher if a blood relative has had colon cancer.
• Tests can find colon cancer early.

Within the body, cancer often occurs in the colon or rectum. In fact, colorectal cancer is the fourth most common cancer. It is also the second most common cause of death from cancer. In recent years, fewer people have been diagnosed with or have died from colorectal cancer. This good news is likely due to better cancer screening and treatment. The information in these guidelines is about the treatment of adults with cancer in the colon. Treatment for rectal cancer is reviewed in other guidelines. Part 2 starts with explaining the colon, colon cancer, and screening tests.

2.1 What is the colon?

The colon is an organ in the body that is part of the digestive system. The digestive system changes food into small parts for the body to use as energy. Food passes from the mouth to the esophagus and into the stomach (Figure 2). From the stomach, food passes through the small intestine and then through the large intestine. The intestine is also called the bowel or gut. Unused food leaves the body through the anus.

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Figure 2. Digestive system

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The colon is part of the large intestine. It is about 5 feet long. Its four parts are the ascending, transverse, descending, and sigmoid colon (Figure 3). The colon changes unused food from a liquid into a solid form by absorbing water. This solid, unused food is called feces or stool.
The wall of the colon has five main layers. The inner layer that has contact with stool is called the mucosa. The mucosa has three types of tissue. The epithelium is tissue that absorbs water from stool. It also makes mucus to help move stool along. The lamina propria is connective tissue just below the epithelium. The muscularis mucosae is a thin strip of muscle tissue.

The second layer of the colon wall is called the submucosa. It consists of connective tissue and blood and lymph vessels. The third layer, called the muscularis propria, is mostly made of muscle fibers. These muscles help move stool through the colon. The fourth layer is mostly made of connective tissue and is called the subserosa. The fifth layer is called the serosa. It is the outer most part of the colon wall. It is a tissue lining that makes fluid to allow the colon to move smoothly against other organs.

Definitions:

Anus: The opening that allows stool to pass out of the body

Connective tissue: Supportive and binding fibers

Diagnose: To identify a disease

Esophagus: The tube-shaped digestive organ between the mouth and stomach

Large intestine: The digestive organ that prepares unused food for leaving the body

Lymph: A clear fluid containing white blood cells

Mouth: The opening in the head that allows food to be eaten

Mucus: A sticky, thick liquid that moisturizes or lubricates

Small intestine: The digestive organ that absorbs nutrients from eaten food

Stomach: The digestive organ that turns solid food into a liquid form
2.2 What is colon cancer?

Cells are the building blocks that form tissue in the body. Normal cells grow and then divide to form new cells. New cells are formed as the body needs them. When normal cells grow old or get damaged, they die. Cancer cells do not do this. Cancer cells make new cells that aren’t needed and don’t die when old or damaged (Figure 4). Over time, cancer cells grow and divide enough to form a tumor.

Unlike normal cells, cancer cells can spread to other parts of the body. This process is called metastasis. The uncontrolled growth and spread of cancer cells makes cancer dangerous. Cancer cells can replace or deform normal tissue causing vital organs to stop working.

Colon cancer often starts in a polyp. A polyp is an extra growth of tissue from the epithelium of the colon wall (Figure 5). Cancer that starts in epithelial cells is called adenocarcinoma. Not all polyps are likely to become cancerous. For more information on polyps, see Part 2.3.

Polyps can be removed before any cancer cells form. If you have a polyp with cancer, you can likely be cured if the cancer hasn’t spread far. When polyps aren’t treated, the cancer can grow through the colon wall and spread through the body. A cure may be impossible when colon cancer has metastasized.
2.3 Am I at risk?

Doctors haven’t found the causes of colon cancer. However, some risk factors are known. Risk factors can be activities that people do, things in the environment, or biological features that are passed down from parents to children through genes. If one or more risk factors apply to you, it doesn’t mean you’ll get colon cancer. Likewise, colon cancer occurs in some people who have no known risk factors. The major risk factors of colon cancer are as follows:

**Older age**
Your risk for colon cancer increases as you age. In fact, 90 out of 100 people with colon cancer are diagnosed at age 50 or older. The average age of all people diagnosed with colon cancer is 72 years of age.

**Colon polyps**
Not all polyps are the same. They all grow from the mucosa, but they differ in size, shape, and how their cells look. The odds of cancer forming in polyps differs by the type of polyp. The three types of colon polyps are:

- **Hyperplastic polyps** have cells that grow fast. They are often found in the last part of the colon. They rarely become cancerous.

- **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 cancerous, but most polyps with cancer started as adenomas. Your risk for cancer forming in adenomas is high if 3 or more adenomas are found, the adenomas are bigger than the width of an AAA battery, and the adenomas have a ruffled structure like a cauliflower. Adenomas with a ruffled structured are called villous adenomas.

- **Inflammatory polyps** often grow after a flare-up of an inflammatory bowel disease. They can have any shape. The chance of them becoming cancerous is low.

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**Definitions:**

**Adenocarcinoma:** Cancer in cells that line organs and make fluids or hormones

**Genes:** Instructions in cells for building new cells and controlling cell behavior

**Metastasis:** The growth of cancer beyond local tissue

**Risk factors:** Something that increases the chance of getting a disease

**Tumor:** A tissue mass made from an abnormal growth of cells
Inflammatory bowel disease
Inflammatory polyps don’t often become cancerous. However, people with an inflammatory bowel disease have a greater risk for colon cancer. Inflammatory bowel diseases include ulcerative colitis and Crohn’s disease.

Prior cancer
You may have had surgery for colon cancer before. Even if all the cancer was removed, your chances of forming new adenomas are higher than someone without prior colon cancer. You are also at risk for the return of colon cancer.

Some people with other cancers have a high risk for colon cancer. The higher risk is because of a genetic condition that causes both cancers. Examples of cancers linked with colon cancer because of a genetic condition are endometrial, uterine, pancreatic, and ovarian cancers.

Family history
Family history is the most important risk factor for colon cancer. If a close blood relative has been diagnosed with colon cancer, you’re at risk. Your risk is even higher if your relative had cancer at a young age or if multiple relatives have had colon cancer.

Genetic conditions
Some genetic conditions are known to increase the odds of getting colon cancer. Lynch syndrome is the most common type of genetic condition to cause colon cancer. Even so, only 2 out of 100 people with colon cancer have Lynch syndrome. Familial adenomatous polyposis is a rare genetic condition that often leads to colon cancer by age 40. It starts with hundreds of polyps forming in the colon and rectum. A third genetic condition linked to colon cancer is MYH-associated polyposis. This condition also causes many polyps to form.
2.4 Colon cancer screening

Serious health problems can be prevented by finding and removing polyps early. This is because newly formed polyps don't have cancer cells. Screening tests done on a regular basis can find polyps or colon cancer.

This part of the guidelines discusses symptoms of colon cancer and screening tests. For more information, see the NCCN Guidelines for Colorectal Cancer Screening, available at NCCN.org. These guidelines were written for your doctor, so he or she will likely be able to answer your questions about this information.

Symptoms

Polyps and small colon cancer tumors often don’t cause symptoms. You’ll have symptoms once the tumor is big. Which symptoms you’ll have depends on where the tumor is in the colon and if you have metastases. Common symptoms of colon cancer are:

- Diarrhea or constipation
- A feeling that your bowel doesn’t empty totally
- Blood in your stool
- Stool that isn’t as solid as normal
- Pain or discomfort from cramps, feeling bloated, or having gas
- Unexplained weight loss
- Feeling weak or tired despite good sleep
- Nausea or vomiting

These symptoms can be caused by other health problems. Most of the time, they aren’t caused by colon cancer. If caused by colon cancer, these symptoms aren’t likely to stop. See your doctor if you have these symptoms and they continue.

Definitions:

Genetic condition: A medical problem caused by abnormal genes

Inflammatory bowel disease: A medical condition that causes the intestine to swell
Screening tests
Screening tests for colon cancer include both structural tests and stool tests. Structural tests find polyps and small tumors using imaging machines. Stool tests are used to find signs of cancer but don’t find the actual tumor.

The tests suggested by the NCCN Guidelines Panel include a colonoscopy, flexible sigmoidoscopy, and guaiac stool test. A barium enema is only suggested if you are unable to have a colonoscopy or your colonoscopy can’t be completed. There is growing interest in a virtual colonography. However, there is disagreement among doctors about using it as a primary screening test.

Colonoscopy. A colonoscopy is the most complete screening test. Your doctor can see your entire large intestine and remove any polyps at one visit. A colonoscopy is the preferred screening test of NCCN doctors.

To prepare for the 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 your colon the night before the test. Right before the test, you may be given drugs to help you relax and to lessen any pain. You will be asked to wear a hospital gown and lie on your side during the test (Figure 6).

Figure 6.
Structural screening test
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A colonoscopy will be inserted into your anus and gently guided through your large intestine. To see the colon better, the colonoscope pumps gas into your colon to make it bigger. You may be asked to shift a little to help your doctor guide the colonoscope. The colonoscope takes pictures that can be seen on a computer. If a polyp is found, the colonoscope may have a tool to remove it.

A colonoscopy takes about 30 to 60 minutes. Afterward, you may stay at the hospital or outpatient clinic for another hour for the drugs to wear off. However, you’ll still need someone to drive you home. The next day, you are likely to feel normal. If you have severe pain, bloody stools, or weakness, contact your doctor.
Flexible sigmoidoscopy. If you’ve never had polyps and your age is your only risk factor, a flexible sigmoidoscopy is an option for you. This test is like a colonoscopy except it only views and removes polyps from the sigmoid colon and rectum. Enemas are suggested to clean out the lower gut, but a liquid diet and drugs often aren’t needed. A sigmoidoscopy takes about 20 minutes to complete.

Stool test. The guaiac stool test is the most common stool test for colon cancer screening. It finds hidden blood in stool but can miss tumors that bleed a little or not at all. The guaiac stool test is a screening option if you’ve never had polyps and your age is your only risk factor for colon cancer. To prepare for the test, eat only the foods your doctor tells you are okay. You may need to stop taking some medications. For the best results, your doctor will collect three stool samples from your rectum. If blood is found in your stool, you will need a colonoscopy.

Definitions:

Barium enema: A test that fills the colon with fluid and air and then takes pictures using x-rays

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

Enema: Injection of liquid into the colon to clear it of stool

Laxatives: Drugs used to clean out the stool in the intestines

Virtual colonography: A test that fills the colon with air and then uses advanced computed tomography to take pictures
**Main Points**

- The only way to know if you have colon cancer is to test colon tissue.
- Tests that take pictures of the inside of your body can tell if the cancer has spread.
- Tests of tissue from your lymph nodes may show if cancer is present.
- A report of the test results will be sent to your doctor.
- Colon cancers are grouped into stages 0 – IV based on how likely they are to act. Early stages of colon cancer are more likely to be cured.

**3.1 Do I have colon cancer?**

The only way to know if you have colon cancer is to test colon tissue. Colon tissue can be removed for testing by any of the methods described next. The sample is then sent to a lab to be tested for cancer cells.

**Endoscopic polypectomy**

Often, polyps are fully removed during a colonoscopy. This is called an endoscopic polypectomy. The tools used to remove polyps are based on size, shape, and cell type. Small polyps can be removed by forceps with or without an electric current. An electric current helps control bleeding. Other polyps can be removed with a snare (Figure 7). An electric current passes through the snare loop to cut off the polyp from the colon wall and control bleeding. Besides bleeding, the other risk of an endoscopic polypectomy is perforation of the colon wall.

**Other colon biopsies**

A polypectomy is not the only way to collect colon tissue. Sometimes, part of a polyp or part of the nearby colon wall is removed to test if cancer cells are present. Also, samples may be taken from the colon wall to test for pre-cancerous cells in people at high risk for colon cancer. Forceps or a needle biopsy during a colonoscopy may be used for these biopsies.
3.2 Tests after diagnosis

Tests of your general health and the status of your cancer can help treatment planning. Tests may find metastases before treatment has started or any time after. Such results will affect your treatment options. After treatment, tests can show if the cancer was cured or has returned. For long-term treatment, tests can show if the cancer is under control or if treatment is harming your body.

Medical history
Before and after cancer treatment, your doctor will assess your medical history. At your doctor’s office, you may be given a form to complete. Your doctor will also ask questions about your health. A medical history includes any symptoms and medical conditions that you have had. It is also important for your doctor to know all the medications you’re taking. It might help to bring a list of old and new medications to your doctor’s visit. Your doctor will also ask about the medical history of your family and about other risk factors for colon cancer.

Physical exam
Doctors often give a physical exam along with taking a medical history. A physical exam is an inspection of your body for signs of disease. During this exam, your doctor will listen to your lungs, heart, and gut. Parts of your body are often felt to see if organs are of normal size, are soft or hard, or cause pain when touched.

Blood tests
Blood tests may help tell if your colon cancer has spread and if your organs are working properly. Common tests include a complete blood cell count and blood chemistry. When colon cancer spreads, it can cause chemicals in the blood to be abnormal. An example of the chemicals that doctors look for is a high carcinoembryonic antigen level. Such results may sway your doctor to order imaging tests. Changes in your liver caused by some cancer treatments can also be detected by blood chemistry tests. Blood cell counts show if you have a normal number of blood cells. Blood cell counts are often repeated during chemotherapy since they can affect cells in the marrow that make blood.

Definitions:

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Forceps</td>
<td>A medical tool shaped like tongs used to grab and cut tissue</td>
</tr>
<tr>
<td>Marrow</td>
<td>Soft tissue found in the center of bones</td>
</tr>
<tr>
<td>Needle biopsy</td>
<td>Insertion of a needle into the tumor to remove tissue for testing</td>
</tr>
<tr>
<td>Perforation</td>
<td>A hole made in body tissue</td>
</tr>
<tr>
<td>Snare</td>
<td>A medical tool with a wire loop used to cut tissue</td>
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Imaging tests
Imaging tests take pictures of the inside of your body. They can help show if your cancer has spread beyond your colon. These tests are often easy to undergo. Computed tomography is the test most used for colon cancer. You may hear this test called a CT or CAT scan. Other tests you may have are magnetic resonance imaging (also called MRI) or positron emission tomography (also called PET). However, these tests are only suggested in very specific situations. See Part 7 for more information.

Imaging machines are large and have a tunnel in the middle. During the test, you will lie on a table that moves slowly through the tunnel. Imaging tests are done by technicians, and the results are later read by radiologists. There are usually no side effects. If radiation is used, the amount is small.

Computed tomography. A CT scan takes many pictures of a body part from different angles using x-rays (Figure 8). A contrast dye will be used to make the pictures clearer. The dye can be injected into your vein or mixed with a liquid you drink. The dye 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. As the machine takes pictures, you may hear buzzing, clicking, or whirring sounds. A computer combines the x-rays to make detailed pictures.

Lymph node biopsy
Lymph is a clear fluid that returns fluid and protein to the blood. It travels between tissues, blood, and lymph nodes in long, tube-shaped vessels. Lymph vessels and nodes are naturally found everywhere in the body, which allows colon cancer to spread far (Figure 9). If your tumor has grown through the submucosa of the colon wall, your lymph nodes will be removed during surgical treatment. The nodes will then be sent to a lab to be tested for cancer cells.
Genetic tests
In the nucleus of a cell, there are coded instructions for building new cells and controlling how cells behave. These instructions are called genes (Figure 10). Some medical conditions are caused by abnormal genes passed down from parents to children.

Genetic conditions that are risk factors for colon cancer are discussed in Part 2.3. You may be tested for these genetic conditions after diagnosis if you haven’t been tested before. To test for Lynch syndrome, your doctor may assess for microsatellite instability. Microsatellite instability is abnormal changes in deoxyribonucleic acid (DNA) when DNA is making a copy of itself.

Abnormal genes aren’t always passed down from parents to children. Instead, there can be non-inherited changes in genes, some of which affect colon cancer treatment. The KRAS gene is a set of instructions for the K-Ras protein. If you have metastatic colon cancer, you should be tested to see if the KRAS gene in your tumor is normal. If it is normal, the BRAF gene in your tumor may be tested next. The BRAF gene is a set of instructions for the B-Raf protein.

Definitions:
- **Chromosome**: The part of the cell’s nucleus that contains deoxyribonucleic acid
- **Deoxyribonucleic acid (DNA)**: The part of a cell containing genes
- **Imaging**: Medical tests that take pictures of the inside of the body
- **Lymph nodes**: Small groups of special immune cells located throughout the body
- **Magnetic resonance imaging (MRI)**: A test that uses powerful magnets to see body parts
- **Nucleus**: The control center of gene activity within a cell
- **Positron emission tomography (PET)**: A test that uses radioactive material to see body parts
- **Radiologist**: A doctor who specializes in reading imaging tests
3.3 The pathology report

The tissue removed during surgical treatment or biopsies will be reviewed by a pathologist. A pathologist is a doctor who specializes in looking at cells to identify disease. First, the pathologist will prepare the tissue to be looked at under a microscope. The tissue will be covered in a waxy material and cut into very thin slices. The slices will then be stained with dyes to help see the differences between parts of a single cell and differences between multiple cells. These stained samples will be placed on glass slides and then examined under a microscope.

Next, the pathologist will write one or more reports for your doctor. The pathology reports will include many important results. They will state whether cancer cells were found and, if so, what types of cancer cells. Other results will be used to stage your cancer, which is discussed in Part 3.4. The process of preparing the tissue, testing it, and writing the report usually takes 1 to 2 days. At times, the pathologist may request a 2nd opinion from another pathologist.

It is a good idea to ask for a copy of the pathology reports. Also, ask for a DVD of the imaging tests. If you have questions, talk with your doctor. It is important that you understand how the results will be used to decide treatment choices. You can also request that your tissue samples be reviewed by a pathologist at an NCCN Member Institution or another specialist suggested by your doctor.

### Pathology results

**Tumor grade.** How closely do the cancer cells look like normal cells?

**Tumor depth.** How far into the colon wall has the tumor grown?

**Tumor extension.** How far has the tumor grown into nearby tissues?

**Lymph node evaluation.** How many nearby lymph nodes were tested for cancer?

**Positive lymph nodes.** How many nearby lymph nodes had cancer?

**Distant metastases.** Has the colon cancer spread far?

**Margin status.** Are there cancer cells in the normal-looking tissue near the tumor?

**Tumor deposits.** Are there tiny tumors where the lymph drains from the tumor?

**Lymphovascular invasion.** Has the cancer invaded lymph or blood vessels?

**Perineural invasion.** Has the cancer invaded nearby nerves?

**Histologic subtype.** What type of cancer is it based on the traits of the cells?
3.4 Stages of colon cancer

Colon cancer is divided into different groups called stages. Your cancer stage is important for choosing your treatment and predicting your prognosis. There are five stages. They are based on tumor growth within and beyond the colon, number of nearby lymph nodes with cancer, and distant metastases. The physical exams and tests described in Parts 2 and 3 will give your doctor the information needed for staging.

Cancer doctors choose the criteria for each cancer stage by using information from thousands of patients. Thus, a cancer stage gives an average prognosis. It may not tell the outcome for one person. Some people will do better than expected. Others will do worse. Other factors not used for staging cancer are also very important. Some of these factors include your general health and if there’s a KRAS gene mutation in the tumor.

This section has very specific information on colon cancer staging. Knowing your cancer stage will help you use the treatment guide in Part 7. If you have any questions, your cancer care team can further explain cancer staging.

Definitions:

Prognosis: The pattern and outcome of a disease
System to define cancer stage

The TNM staging system is most often used to describe the growth of colon cancer. In this system, each of the letters—T, N, and M—describes a different area of growth. For each area, your cancer is scored twice. The first scores are based on tests before surgery. The second scores are based on review of the tissues removed during surgical treatment.

T category. The T category tells you how far the primary tumor has grown. For colon cancer, tumors usually start in the inner wall of the colon and grow outward (Figure 11). T scores for colon cancer include:

- **Tis** tumors have not grown beyond the muscularis mucosae.
- **T1** tumors have grown into the submucosa.
- **T2** tumors have grown into the muscularis propria.
- **T3** tumors have grown beyond the muscularis propria.
- **T4a** tumors have grown into the visceral peritoneum (Figure 12).
- **T4b** tumors have grown next to or into other organs or structures.

![Figure 11. TNM examples](www.nucleusinc.com)

![Figure 12. Peritoneum](www.nucleusinc.com)
Part 3: Tests of colon cancer

**N category.** The N category reflects how far colon cancer has spread to nearby lymph nodes. Nearby lymph nodes include the pericolic and perirectal nodes and those found along the arteries in the area.

- **N0** means that there is no cancer in nearby lymph nodes.
- **N1** is cancer that has grown into 1 to 3 lymph nodes.
  - **N1a** cancer has spread into 1 nearby lymph node.
  - **N1b** cancer has spread into 2 – 3 nearby lymph nodes.
  - **N1c** means there are tumor deposits in the subserosa, mesentery, or nearby nonperitonealized tissue but no cancer in lymph nodes.
- **N2** is cancer that has grown into 4 or more lymph nodes.
  - **N2a** cancer has spread into 4 – 6 lymph nodes.
  - **N2b** cancer has spread into 7 or more lymph nodes.

**M category.** The M category tells you if there are metastases to distant sites. Colon cancer tends to metastasize to the lungs and liver.

- **M0** means that there is no growth to distant sites.
- **M1** means there are distant metastases.
  - **M1a** cancer has spread to 1 distant site.
  - **M1b** cancer has spread to 2 or more distant sites or to the surface of the peritoneum.

---

**Definitions:**

**Mesentery:** A double layer of peritoneum attached to digestive organs

**Mutation:** Abnormal changes in genes

**Nonperitonealized:** Not connected to the peritoneum

**Peritoneum:** The lining of the abdomen

**Visceral peritoneum:** The inner layer of the peritoneum
The 5 stages of colon cancer
TNM scores are used to assign the cancer a stage. Each stage is represented by Roman numerals ranging from 0 to IV. Stages II through IV have substages marked with letters. The stages identify tumor types that have a similar prognosis and thus are treated in a similar way. Table 1 lists the staging groups by TNM scores. Also, two other definitions of staging are included but these definitions are not used often.

Your two sets of TNM scores will be used to assign a cancer stage twice. The first set of scores is used for clinical staging. The clinical stage is used for making an initial treatment plan. However, the clinical stage may be wrong about how far the cancer has spread. The second set of scores is used for pathologic staging. Most of the time, the pathologic stage is the most important stage. This is because your lymph nodes can only be completely examined under a microscope. In general, earlier stages of colon cancer have a better prognosis.

Table 1. Staging of colon cancer

<table>
<thead>
<tr>
<th>Group</th>
<th>T</th>
<th>N</th>
<th>M</th>
<th>Dukes*</th>
<th>MAC*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Tis</td>
<td>N0</td>
<td>M0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>I</td>
<td>T1</td>
<td>N0</td>
<td>M0</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N0</td>
<td>M0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II A</td>
<td>T3</td>
<td>N0</td>
<td>M0</td>
<td>B</td>
<td>B1</td>
</tr>
<tr>
<td>II B</td>
<td>T4a</td>
<td>N0</td>
<td>M0</td>
<td>B</td>
<td>B2</td>
</tr>
<tr>
<td>II C</td>
<td>T4b</td>
<td>N0</td>
<td>M0</td>
<td>B</td>
<td>B3</td>
</tr>
<tr>
<td>III A</td>
<td>T1 – T2</td>
<td>N1/N1c</td>
<td>M0</td>
<td>B</td>
<td>C1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N2a</td>
<td>M0</td>
<td>C</td>
<td>C1</td>
</tr>
<tr>
<td>III B</td>
<td>T3 – T4a</td>
<td>N1/N1c</td>
<td>M0</td>
<td>C</td>
<td>C2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C1/C2</td>
<td></td>
</tr>
<tr>
<td>III C</td>
<td>T4a</td>
<td>N2a</td>
<td>M0</td>
<td>C</td>
<td>C2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T3 – T4a</td>
<td>N2b</td>
<td>M0</td>
<td>C</td>
<td>C2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4b</td>
<td>N1 – N2</td>
<td>M0</td>
<td>C</td>
<td>C3</td>
</tr>
<tr>
<td>IVA</td>
<td>Any T</td>
<td>Any N</td>
<td>M1a</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>IV B</td>
<td>Any T</td>
<td>Any N</td>
<td>M1b</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

* Dukes B is a composite of better (T3 N0 M0) and worse (T4 N0 M0) prognostic groups, as is Dukes C (Any T N1 M0 and Any T N2 M0). MAC is the modified Astler-Coller classification.

Main Points

- Treating colon cancer takes a team of health care workers.
- You may wish to get a 2nd opinion on your treatment plan.
- Surgery and radiotherapy treat cancer in or near the colon.
- Systemic therapy treats cancer throughout the body. It includes chemotherapy and targeted therapy.
- There may be research on new treatments that you can take part in.

A diagnosis of cancer can be overwhelming. You will likely have many questions about your diagnosis and treatment. Your decision about treatment is important for your long-term health and quality of life. Part 4 gives a brief review of colon cancer treatments and other key issues.
4.1 Your treatment team
Cancer care is a team effort. Who is on your team depends on the treatment plan you need. Surgeons and radiation oncologists provide local treatment to the colon. Medical oncologists give drug treatments to destroy cancer cells that may have spread beyond the colon. Along with doctors, you may receive care from nurses, social workers, and other health care workers.

Deciding your treatment plan will require talking to doctors about possible results. Some people find it helpful to bring their spouse, partner, or a friend to appointments. It may also help to bring a list of questions with you when you meet with the doctors. A list of possible questions can be found in Part 9. There is no single treatment practice that is best for all patients. Your final decision will require weighing possible results and your personal feelings toward treatment. Your cancer care team can help you sort through the choices.

4.2 Getting a 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 treatment plan is best for you.

You may wish to have another doctor review your test results and the treatment plan your doctor has recommended. This is called getting a 2nd opinion. Colon cancer is a serious disease, and new information may have been published about which treatments are most effective and safe. You may completely trust your doctor, but a 2nd opinion on which treatment is right for you 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.

Choosing your cancer treatment is a very important decision. It can affect your length and quality of life. There are few cancers that are so aggressive that you can’t take a few weeks to get a 2nd opinion and select the best treatment for you.
4.3 Treatments for colon cancer

Colon cancer is a serious disease that can be treated. Knowing what the treatments are will help you read the treatment guide in Part 7. Not every person with colon cancer will receive every type of treatment listed. There are several terms used to describe when treatment is given. For example, some people receive chemotherapy after surgery. In this case, surgery is the primary treatment, and chemotherapy is an adjuvant treatment.

<table>
<thead>
<tr>
<th>Terms describing the order of a treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary treatment</td>
</tr>
<tr>
<td>Conversion treatment</td>
</tr>
<tr>
<td>Neoadjuvant treatment</td>
</tr>
<tr>
<td>Adjuvant treatment</td>
</tr>
<tr>
<td>First-line treatment</td>
</tr>
<tr>
<td>Second-line treatment</td>
</tr>
</tbody>
</table>

Colectomy

If the cancer has grown beyond the polyp, a colectomy is done to remove the part of the colon with cancer. There are a few steps to prepare for the surgery. You may need to stop taking some medications 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.

Definitions:

General anesthesia:
A controlled loss of consciousness from drugs
A colectomy may be done with either an open or a laparoscopic method. The open approach removes tissue through a large incision in your abdomen. The laparoscopic method removes tissue through a small incision with a laparoscope.

After removing the part of the colon with cancer, the two ends of the remaining colon are sewn or stapled back together (Figure 13). To allow the colon to heal, you may have a colostomy for a short period of time to allow stool to pass. If a large part of your colon was removed, it may not be possible to remove the colostomy.

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.

**Lymph node surgery**
The surgery to remove lymph nodes is called a lymphectomy. A lymphectomy is often done during a colectomy. A minimum of 12 nearby lymph nodes should be removed and tested. All abnormal-looking nodes should be removed, too.

**Radiotherapy**
This treatment uses high-energy beams to kill cancer cells. It is not often used to treat colon cancer. External radiotherapy delivers a beam of radiation from a machine outside the body. Internal radiotherapy places a radioactive object near or inside the body.

**Systemic therapy**
Colon cancer is able to spread beyond the colon to other parts of the body. Doctors use drugs to treat cancer cells that have spread through the body. This treatment is called systemic therapy.

It is important to understand the goal of systemic therapy if it is part of your treatment plan. After a colectomy, there may be signs that the cancer may return. In this case, systemic therapy would be given as an adjuvant treatment to prevent a recurrence. Systemic therapy may also be given as a primary treatment for metastatic disease.
Chemotherapy and targeted therapy are systemic therapies for colon cancer. Most of these drugs are liquids that are injected into a vein. Others are a pill that is swallowed. The drugs travel in the blood to all parts of the body, where they attack cancer cells. Table 2 lists the systemic drugs used for colon cancer.

### Table 2. NCCN recommended systemic therapies

<table>
<thead>
<tr>
<th>Generic name</th>
<th>Brand name</th>
<th>Drug type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bevacizumab</td>
<td>Avastin®</td>
<td>Targeted therapy</td>
</tr>
<tr>
<td>Capecitabine</td>
<td>Xeloda®</td>
<td>Chemotherapy</td>
</tr>
<tr>
<td>Cetuximab</td>
<td>Erbitux®</td>
<td>Targeted therapy</td>
</tr>
<tr>
<td>Floxuridine</td>
<td>–</td>
<td>Chemotherapy</td>
</tr>
<tr>
<td>Fluorouracil (5-FU)</td>
<td>–</td>
<td>Chemotherapy</td>
</tr>
<tr>
<td>Irinotecan hydrochloride</td>
<td>Camptosar®</td>
<td>Chemotherapy</td>
</tr>
<tr>
<td>Leucovorin calcium</td>
<td>–</td>
<td>Improves 5-FU</td>
</tr>
<tr>
<td>Levoleucovorin</td>
<td>Fusilev®</td>
<td>Improves 5-FU</td>
</tr>
<tr>
<td>Oxaliplatin</td>
<td>Eloxatin®</td>
<td>Chemotherapy</td>
</tr>
<tr>
<td>Panitumumab</td>
<td>Vectibix®</td>
<td>Targeted therapy</td>
</tr>
</tbody>
</table>

**Definitions:**

**Colostomy:** Surgery to connect a part of the colon to the outside of the abdomen.

**Laparoscope:** A thin, long tube with a light and camera used to see the abdomen.
Chemotherapy. These drugs treat cancer cells by stopping them from making new cells. Many people refer to these drugs as “chemo.” Sometimes chemotherapy is one drug, called a single agent. Other times a mix of drugs is used. This is called a chemotherapy regimen.

Chemotherapy is given in cycles of treatment days followed by days of rest. These cycles vary in length depending on which drugs are used. Typically, the cycles are 14, 21, or 28 days long. These cycles give the body a chance to recover before the next treatment. Thus, a regimen of 3 to 6 months has rest periods between treatments.

The listed chemotherapy drugs in Table 2 have been shown in clinical trials to work well and be safe. However, if your cancer metastasized, chemotherapy isn’t expected to destroy all cancer cells. Instead, it may shrink or slow the growth of tumors and reduce pain. In some people, it can prolong life. For metastatic cancer, a drug or regimen is used until it stops working and then is changed to another drug or regimen.

Targeted therapy. Some cancer treatments are made to stop cancer cell growth more than normal cell growth. This is called targeted therapy. Targeted therapy is often used with chemotherapy but is sometimes used alone.

4.4 What are clinical trials?

Many new cancer treatments are available because patients have been willing to take part in clinical trials. In these studies, new treatments are compared to current treatments, such as those described in Part 4.3. The purpose of the clinical trial is to find out if the new or current treatment is better at fighting cancer. Clinical trials may also look at new ways to diagnose or prevent a disease, make current treatments better, or assess whether a new treatment is safe. NCCN believes that the best management for any patient with cancer is in a clinical trial.

Your doctor may ask you if you would like to be in a clinical trial. There are several benefits. First, you’ll receive the most current cancer care according to a very specific treatment plan. Second, doctors who work with clinical trials know the newest cancer treatments. They also track the results of treatment—both good and bad—and compare their results with other doctors to improve treatment.

There are many decisions to make after your diagnosis of cancer. One may be if a clinical trial is right for you. A brief review of clinical trials is given next. Talking with your cancer care team, your family, and your friends can help you make the best treatment choice.
The purpose of clinical trials
Clinical trials are done to test new treatments to see whether they are better than the current treatments. A clinical trial is only done when there is good reason to believe that a new treatment, test, or procedure may be better than the current one. Treatments tested in clinical trials are often found to have benefits and may become tomorrow’s standard treatment. However, there is no way to know whether this will be the case before the results of the trial are known.

Clinical trials can focus on many things, such as:

- New uses of medications that are already approved by the U.S. Food and Drug Administration (FDA). For example, drugs that are used in one type of cancer may be tested in another type of cancer.
- Different ways of giving chemotherapy, such as by mouth instead of by a needle in the arm.
- New drugs that haven’t yet been approved by the FDA. For example, research to know the best dose that treats the disease and has the fewest side effects.
- Alternative medicines, such as herbs and vitamins.
- New diagnostic tests, such as genetic tests, to assess which patients are the best candidates for certain treatments.
- Medicines or procedures that relieve symptoms.

Definitions:

Alternative medicine: Treatments used in place of ones usually given by doctors

U.S. Food and Drug Administration (FDA): A federal government agency that regulates drugs and food
Phases of clinical trials
There are four phases of clinical trials, which are numbered I, II, III, and IV. The phases are described below using the example of a drug treatment:

- **Phase I clinical trials** are done to find the best way to safely give a new treatment to patients. The cancer care team closely watches patients for any harmful side effects. In phase I studies, the drug has already been tested in lab and animal studies. However, it needs to be tested in humans to know the best dose with the fewest side effects.

  Phase I trials are usually the first type of trial in humans. Thus, most patients in these trials have been previously treated with current treatments. Doctors start by giving very low doses of a new drug to the first patients and increase the doses for later groups of patients until side effects appear or the desired effect is seen. Doctors are hoping to help patients, but the main purpose of a phase I trial is to test the safety of the drug. If a drug is found to be reasonably safe in phase I studies, it can be tested in a phase II clinical trial.

- **Phase II clinical trials** assess if a drug works for a specific type of cancer. They are done in larger groups of patients for whom standard treatments aren’t working. Often, phase II trials involve new combinations of drugs. Patients are closely watched to see if the treatment has an effect, such as shrinking of the tumor. The cancer care team also looks for side effects. If a drug or combination of drugs is found to work in phase II studies, it can be tested in a phase III clinical trial.

- **Phase III clinical trials** include large numbers of patients. Often, these studies are randomized. This means that patients are put into a treatment group by chance. There can be more than two treatment groups in a clinical trial. The control group gets the standard treatment and the other groups get a new treatment. Neither you nor your doctor can choose your group. This may make you feel uneasy. Your doctor will explain to you the reason for the clinical trial and the risks and benefits of all treatments. Every patient in phase III studies is watched closely. The study will be stopped early if the side effects of the new treatment are too severe or if one group has much better results. Phase III clinical trials are usually needed before the FDA will approve the use of a new drug for the general public.

- **Phase IV clinical trials** test new drugs approved by the FDA. Treatment is tested in a very large number of patients with different types of cancer. This allows for better research on short-lived and long-lasting side effects and safety. For example, some rare side effects may only be found in large groups of people. Doctors can also learn more about how well the drug works and if it is helpful when used in other ways, such as in combination with other treatments.
Deciding to enter a clinical trial
If you would like to take part in a clinical trial, talk with your doctor. There may be clinical trials where you’re getting treatment. If you join a clinical trial, you’ll be tested to see if you qualify for the study. Study participants are usually alike in terms of their tumor and general health. The purpose of this is to know that any improvement is because of the treatment and not because of differences between patients. Even if you meet the conditions of the study, it is still your choice whether to participate.

All study participants need to sign a paper called an informed consent form (ICF). The ICF describes the study in detail, including the risks and benefits. You will be able to review the ICF before deciding whether to participate. Also, your doctor will explain why the clinical trial may be right for you.

How can I find out more about clinical trials that might be right for me?
You can get a list of clinical trials by calling the National Cancer Institute (NCI) Cancer Information Service. The toll free number is 1-800-4-CANCER (1-800-422-6237). You can also get this information at www.cancer.gov/clinicaltrials. Based on your type of cancer, this service will give you a list of clinical trials. The service will also ask where you live and whether you’re willing to travel so a nearby treatment center can be found.

Definitions:
Control group: Research participants who don’t receive a new treatment
Informed consent form (ICF): A document describing a study and requiring a signature from participants after review
Randomized: Assignment to a group by chance
Part 5: Treating signs and symptoms

Main Points

• All treatments for colon cancer can cause unwanted signs and symptoms.

• Not all persons have the same symptoms or severity of symptoms.

• Some side effects of treatment are serious and need to be checked regularly.

• Talk with your treatment team about ways to treat symptoms of colon cancer and its treatment.

• If you don’t want treatment for colon cancer, you can still receive treatment for symptoms.

5.1 Common side effects

Each treatment for colon cancer has possible side effects. Side effects are unpleasant physical or emotional conditions or symptoms caused by treatment. How your body responds to cancer and its treatment is as unique as your fingerprints. No one can be certain how you’ll respond. You can have different side effects than someone else on the same treatment. The severity of side effects can also vary between people. It is very important to consider how side effects may change your way of life when choosing treatment for colon cancer. Also, knowing about possible side effects can help you know what to expect from treatment and how to respond. Part 5.1 covers common side effects. You may have other side effects that aren’t reviewed.

Side effects of surgery

During a colectomy or lymphectomy, you may have complications. Although rare, a serious loss of blood can occur and require a transfusion. Risks of anesthesia include heart attack and blood clots. After surgery, you will have pain and swelling that often fade away within weeks. Scars from surgery don’t fully fade away. A risk of lymphectomy is lymphedema in the legs or arms. Lymphedema may be permanent.
Side effects of radiotherapy
Side effects most likely to occur from radiation are swelling and heaviness in the abdomen, sunburn-like skin changes in the treated area, and fatigue. Sometimes there can be swelling of the colon wall called radiation enteritis. Changes in the abdomen and skin usually go away in 6 to 12 months. Rarely, a second cancer may be caused by radiation.

Definitions:
Fatigue: Severe tiredness despite getting enough sleep
Lymphedema: Swelling due to buildup of lymph
Transfusion: Replacing lost blood with new blood

Possible side effects

<table>
<thead>
<tr>
<th>Colon surgery</th>
<th>Chemotherapy</th>
<th>Targeted therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pain, swelling, scars</td>
<td>• Nausea, vomiting</td>
<td>• Skin changes</td>
</tr>
<tr>
<td>• Lymphedema</td>
<td>• Loss of appetite</td>
<td>• Nausea, diarrhea</td>
</tr>
<tr>
<td>• Reaction to anesthesia</td>
<td>• Fatigue</td>
<td>• Sore eyes</td>
</tr>
<tr>
<td>• Severe bleeding</td>
<td>• Infections, fevers, low white blood cell counts</td>
<td>• Slow healing</td>
</tr>
<tr>
<td></td>
<td>• Bleeding, bruising</td>
<td>• Serious bleeding</td>
</tr>
<tr>
<td></td>
<td>• Mouth sores</td>
<td>• Perforation in the intestine</td>
</tr>
<tr>
<td></td>
<td>• Hair loss</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Heart damage</td>
<td></td>
</tr>
<tr>
<td>Radiotherapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sunburn-like skin changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Aches, swelling, heaviness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Radiation enteritis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Fatigue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Second cancer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Side effects of chemotherapy
Side effects of chemotherapy depend on the drug type, amount taken, length of treatment, and the person. Some people have many side effects. Others have few or none. Some side effects can be very serious while others can be unpleasant but not serious. Side effects include:

Infections, fevers, and low white blood cell counts. Many of the common chemotherapy drugs can cause these side effects because they target cells that quickly make new cells. White blood cells are among the fastest of these, so they are very vulnerable to chemotherapy. Your doctor will check the number of your blood cells before each chemotherapy cycle. If too low, a dose of chemotherapy might be delayed or the amount of chemotherapy might be reduced.

Blood cell counts are the lowest several days after chemotherapy. As a result, your body’s ability to fight off an infection is weakened during this time. You should contact your doctor immediately if you have a fever of 101°F or higher. High fevers are a sign of infection. Chemotherapy drugs that are likely to weaken the immune system should be used with extreme caution, if at all, in people with autoimmune disorders.

Bleeding and bruising. Platelets are another type of blood cell. They stop a wound from bleeding by forming blood clots. A shortage of platelets is fairly common during chemotherapy. Your doctors will check your platelet count and change your cancer treatment if needed.

Nausea and vomiting. These side effects are fairly common. However, your doctor can order drugs for you that greatly reduce these problems. Your doctor may recommend drugs for nausea and vomiting before starting chemotherapy. If so, it is important to take them. Preventing nausea and vomiting is much easier than stopping them once they start.

Other side effects. Short-lived side effects often include loss of appetite, fatigue, mouth sores, and hair loss. Your doctor or nurse can suggest ways to help with them.

Side effects of targeted therapy
Like chemotherapy, side effects of targeted therapy depend on the drug and dose. Possible side effects of bevacizumab are a perforation in the intestine, slow wound healing, and serious bleeding. It shouldn’t be used right before or after surgery. Cetuximab and panitumumab can cause skin reactions including an acne-like rash. Other possible side effects are nausea, diarrhea, and sore eyes.

5.2 Symptom control
Most of these guidelines cover ways to treat colon cancer. However, having a good quality of life is also a very important goal. You may be able to help yourself feel better by taking an active role in your care. If you know the side effects of treatment, you are more likely to quickly notice them and tell your treatment team. You should also take part in your hospital’s system for tracking and treating symptoms if available. These systems are often called a risk evaluation and mitigation strategy (REMS) program.
There are effective and safe ways to treat many symptoms of colon cancer and the problems caused by its treatment. Your doctor may give you instructions on how to decrease or prevent symptoms after cancer treatment. For other symptoms, ongoing tests can track if treatment for symptoms is needed. Depending on the symptom, changes in behavior, diet, or medications, or having additional surgery or radiotherapy may be helpful.

Symptom relief can help you to be more active and may, indirectly, help you to live longer. Don’t hesitate to discuss your symptoms or any other quality-of-life concerns with your cancer care team. If you don’t tell your treatment team, they may not know how you are feeling.

### 5.3 Supportive care

Some people with advanced colon cancer may decide not to continue treatment. In this situation, supportive care is an option. Supportive care includes treatments intended to stop suffering rather than to control the spread of the cancer. Pain medications are one example of supportive care. Removing tumors or killing cancer cells may also make you feel better. However, even when such treatment isn’t possible, there may be other choices. There is no reason to endure pain or other discomfort when supportive care treatments are available. Some patients assume that nothing can be done to help them. This is not the case. Talk with your cancer care team about any discomfort you are having. If you don’t, you may miss your chance to keep your best quality of life for as long as possible.

**Definitions:**

**Autoimmune disorders:** Diseases that cause the immune system to attack the body

**Immune system:** The body’s natural defense against disease

**Platelets:** A type of blood cell responsible for blood clotting

**White blood cells:** A type of blood cell that fights disease
Aren’t there other treatments?

You may hear about other treatments from your family and friends. They may suggest complementary and alternative medicine (CAM), such as vitamins, herbs, or stress reduction, as a treatment for your cancer or to help you feel better. CAM is a group of treatments that aren’t usually given by doctors. There is a great deal of interest today in CAM for cancer.

Complementary medicines are treatments given along with usual medical treatments. Examples include acupuncture for pain management or yoga for relaxation. Many CAMs are being studied to find out if they are truly helpful. While some of these treatments may not be designed to kill cancer cells, they may be helpful if they improve your comfort and well-being.

Alternative medicine is used in place of usual medicine. Some alternative medicines are promoted as cures, though typically they haven’t been proven to work. If there was good evidence that CAM or other treatments cured cancer, it would be included in these guidelines.

It is important that you let your cancer care team know of any CAMs that you are using for two key reasons: 1) Your cancer care team can help you figure out which CAMs may be helpful and which have no benefit; and 2) Some CAMs may limit how well treatment for your cancer or other medical conditions works.

What else can I do?

For most patients with cancer, their primary concern is that their treatment works. However, having cancer is complex and brings many physical and emotional challenges. It is important to know about these challenges, talk about them with your cancer care team, and use what support is available. Don’t wait until you feel overwhelmed to ask questions or raise issues. There are ways of dealing with most of the problems you’ll face.

It is also important to know that there is no norm for how people cope with their cancer. Everyone reacts differently. Your reaction can be shaped by your type of cancer, personality, overall health, the support you have, and other factors. You can help yourself by knowing possible challenges and taking an active role in managing them. Below are some of the issues you may face, and, in Part 9, there is a list of suggestions for taking care of yourself.
Becoming a “cancer patient”
Hearing the words, “you have cancer,” is life changing. Having colon cancer also means dealing with major changes in your life. These can include managing doctor visits, figuring out how to care for your kids, missing work, feeling a loss of control over life, and, possibly, considering the end of life itself. Some people try to keep their life as normal as they can. Others change their life drastically. However, many cancer survivors will tell you that during the active treatment period, being a patient with cancer becomes your job. It’s a job that requires a major commitment of time and energy and can be a difficult adjustment. Understanding how large an impact cancer has on your life may help you reach out for support.

Having a treatment plan
One of the best ways to make sure that you agree with your treatment plan is to have it written on paper. Treatment plans include information about your cancer, treatment, side effects, physical and emotional issues, and a statement about what is important to you in deciding future treatment goals. It can also include how you can help in your own recovery.

If you use tobacco, the treatment plan may include strategies to quit. Quitting will improve your overall health. It’ll also return your sense of smell so you can better enjoy a healthy diet. If you use alcohol, the treatment plan can outline how much you can drink.

Treatment plans are useful for anyone at any stage but are critical for people who may not survive cancer. A treatment plan allows you to be clear about your wishes for treating advanced disease and for end-of-life decisions. Treatment plans are also valuable when you change your care from one doctor to another, such as from your cancer care team back to your primary doctor. Ask your cancer care team for help with creating a written treatment plan.
Anxiety and depression
Feelings of anxiety and depression are common among patients with cancer. Many people experience anxiety before their biopsy and while waiting to hear the results. For some people, their anxiety or depression may be a minor problem. It may be normal like the anxiety felt while sitting in the doctor’s office or a passing depression during a hard part of treatment. However, you may have a longer lasting, more serious distress that limits your ability to live and interact with people.

If you are having anxiety or depression, tell your treatment team. Too many people hesitate to talk about emotional concerns when there is excellent help. This might include support groups, “talk” therapy, or medication. Some people also benefit from physical exercise, talking with family or friends, and using relaxation and meditation techniques. Your cancer care team has information to help you.

Body image
Some people question their looks because of treatment side effects. Common concerns are hair loss from chemotherapy, scars from surgery, and having a colostomy (Figure 14). It can be difficult to adapt to these changes. It may help to look at and touch your body to help accept changes.

You may also be concerned with how your partner might respond. Although scary, it may help to ask what your partner thinks of your body. Partners often have concerns. They may be unsure about how to express their love physically and emotionally. It may take them some time to stop thinking of themselves as a caregiver but a lover instead. Sharing what you need and want can help your partner and yourself.

Figure 14.
Colostomy
Illustration Copyright © 2011 Nucleus Medical Media, All rights reserved. www.nucleusinc.com
Fatigue
Fatigue is one of the most common problems for patients with cancer. It can occur during treatment and beyond, and can have a serious impact on life. Cancer-related fatigue differs from normal tiredness in that it comes on suddenly and isn’t relieved by sleep. Researchers aren’t sure what causes cancer-related fatigue. Surprisingly, clinical trials have found that physical exercise can help with cancer-related fatigue. Talk with your treatment team about an exercise program that is right for you.

Be aware of your energy levels and try to conserve your energy. Plan ahead, rest, limit activities, and prioritize. Good nutrition and stress management can also be helpful. Also, remember that there are many fun activities that don’t require much energy. Solving puzzles, visiting with friends, reading books, watching TV or movies, and even sitting outside can improve how you feel. If you are fatigued, talk with your cancer care team about making a treatment plan to help you.

Pain
Patients with cancer fear pain more than any other symptom. The good news is that it is usually possible to control cancer pain with the right drugs at the right doses. Pain medication also allows most people to function better than when they are not taking these drugs. Besides medication, there may be other ways to control your pain. Don’t suffer in silence. Talk with your doctors and nurses about pain control.

Nutrition
Some people with colon cancer lose weight while others gain weight during treatment. In every case, good nutrition is always important. Depending on your type of cancer and treatment, you may have changes in taste, loss of appetite, or problems eating and digesting food, or you may become much less active. For some people, eating is related to stress or anxiety. Be aware of your dietary needs during and after treatment. Talk to a nutritional specialist. Meeting your calorie needs, getting plenty of fluids, and eating a balanced diet are all important.
Part 6: Beyond usual treatment

Exercise
Until very recently, most patients with cancer were told not to exercise during treatment. New research, however, has shown that many patients benefit from moderate exercise. Exercise helps people maintain muscle tone and overall health, build good nutritional habits, and lower stress. Exercise programs vary depending on each person’s situation, so talk with your treatment team about which exercises would be best for you.

Being a survivor
Cancer survivorship begins on the day you learn of having colon cancer and continues throughout life. For many people, the end of active treatment signals a time of celebration but also of great anxiety. This is a very normal response. You may need support to address issues that arise from not having regular visits with your treatment team.

You may have different challenges than the ones listed. It is important to remember that everyone has strengths and talents. Use yours to help cope with cancer and its treatments. Maintain warm relationships with family and friends. Make a list for them of things that would help you. Most people would be happy to hear what you need. If you are a person of faith, your personal faith and faith community can help. There are also professionals in mental health, social work, and pastoral services who are able to assist you. You can also start attending support groups to receive help from other cancer survivors. Visit NCCN’s resources page (NCCN.com) for more information.

6.3 Caring for caregivers
No one experiences cancer alone. Having cancer deeply affects a patient’s family and friends, especially those who provide care. This care can take many forms and changes with the stage of the disease. It can range from providing emotional support to giving medical services in the home. Caregivers often take on extra duties to keep day-to-day life normal for the family. Caregivers also play a central role in explaining what is happening to the patient to others, including kids, friends, and the treatment team.

It is natural to focus on the needs of their loved one, but caregivers should pay attention to their own needs as well. Cancer treatment can last from months to years. Caregivers often describe themselves as exhausted by trying to meet the physical and mental challenges related to their loved one having cancer. It isn’t simple, but caregivers need to take care of themselves. If they don’t, they will likely be unable to give their loved one the best support and care. In Part 9, there is a list of suggestions for caregivers on how to take care of themselves.
Main Points

• The primary treatment for early colon cancer is surgery to remove the tumors.
• Lymph nodes with known or suspected cancer should be removed.
• Systemic treatment is given when there’s a high risk of cancer returning after surgery.
• When surgery isn’t possible, chemotherapy, targeted therapy, or both are treatment choices.

The treatment guide for colon cancer can be found on the following pages. The treatment guide is organized by cancer stage, so make sure that you know this information. The goal of this guide is to increase your understanding of the treatment pathways for colon cancer. These pages show under which conditions which tests and treatments are recommended. This information is taken from the NCCN Guidelines written for your doctors.

Every effort has been made to make this treatment guide easy to read. Charts are used to map the treatment pathways. The pathways are further described in the text. Some words that you may not know are defined on the page and in the Dictionary in Part 8. More information about the tests and treatments in this guide can be found in Parts 2 through 6.

Keep in mind that this guide is meant to help you talk with your doctor about your treatment options. Your doctor knows your medical history and personal wishes and how these factors might change your options. In Part 9, there is a personal treatment record that you may want to bring with you to your next doctor’s visit.

Definitions:

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

Endoscopic polypectomy: Surgery to remove a polyp during a colonoscopy

Lymph nodes: Small groups of special immune cells located throughout the body
In situ and cancerous polyps

Part 7.1 of the treatment guide is for people with a small tumor in a polyp. An in situ polyp is a Tis tumor—the cancer has not grown outside the mucosa of the colon wall. It is stage 0 colon cancer. A cancerous polyp is a T1 tumor—the cancer has grown into the submucosa. It is stage I colon cancer.

7.1.1 Initial tests

• Review by pathologist to confirm Tis or T1 tumor,
• Colonoscopy of entire colon, and
• Marking of the cancer sites during colonoscopy or within 2 weeks after polypectomy

For treatment of Tis and T1 tumors, see Part 7.1.2. For tumors larger than T1, see Part 7.2.

Polyps have two shapes. A pedunculated polyp has a stalk and round top (Figure 15). A sessile polyp doesn’t have a stalk. Instead, it grows right out of the colon wall.

In situ and cancerous polyps are often removed with an endoscopic polypectomy. A pathologist will look at the removed tissue to confirm if it is a Tis or T1 tumor. You may have other polyps so it is important to have a colonoscopy of your entire colon. All cancer sites will be marked with small metal clips so that the sites can be easily found again.

Colon cancer can run in families. It is important that your doctor talk to you about other family members having colon cancer and assess your risk for aggressive cancer. Your doctor may order tests of your genes to see if there is a genetic cause of your cancer.

7.1.2 Treatment after polypectomy

<table>
<thead>
<tr>
<th>Test results</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tis tumor</td>
<td>No treatment</td>
</tr>
<tr>
<td>T1 tumor without adverse signs</td>
<td>Pedunculated polyps → No treatment</td>
</tr>
<tr>
<td>T1 tumor with adverse signs</td>
<td>Sessile polyps → No treatment</td>
</tr>
<tr>
<td></td>
<td>Colectomy with lymph node removal</td>
</tr>
</tbody>
</table>

For follow-up tests, see Part 7.3.
Treatment for Tis and T1 tumors is based on the polypectomy results and the initial tests. You don’t need more treatment if you have an in situ polyp since all the cancer was likely removed. You also don’t need more treatment if the entire pedunculated polyp was removed and there are no adverse signs. Adverse signs suggest that cancer cells remain in your body after the polypectomy. Adverse signs are listed in Table 3.

**Table 3. Signs for more treatment after polypectomy**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragmented specimen</td>
<td>Tumor is removed in pieces.</td>
</tr>
<tr>
<td>High grade</td>
<td>A grade of 3 or 4.</td>
</tr>
<tr>
<td>Positive margins</td>
<td>Cancer was found in the surgical margins.</td>
</tr>
<tr>
<td>Unknown margins</td>
<td>The presence of cancer in margins can’t be confirmed.</td>
</tr>
<tr>
<td>Angiolymphatic invasion</td>
<td>Cancer has spread into the lymph vessels or bloodstream.</td>
</tr>
</tbody>
</table>

There are two treatment options if you have sessile polyps without adverse signs. No treatment is one option. However, some research suggests that your risk for future cancer growth is higher than for people with pedunculated polyps. Future growth may occur because cancer cells have spread beyond the tissue removed by the polypectomy. Your other option is a colectomy with removal of nearby lymph nodes. Adjuvant treatment isn’t needed after colectomy.

More surgery is the only option listed for polyps with adverse signs. A colectomy with removal of the nearby lymph nodes will treat local cancer and allow for testing of metastases. See *Principles of surgery* on next page for more information. Adjuvant treatment isn’t needed for stage I colon cancer.
Principles of surgery

A primary treatment of colon cancer is a colectomy with removal of nearby lymph nodes. How much of the colon is removed can differ between people. People at risk for aggressive cancer may benefit from having more of their colon removed. Signs of aggressive cancer include having a strong family history of colon cancer and having colon cancer before you are 50 years old. Location of the tumor may also affect how much of your colon is removed.

A colectomy can be done with either an open or a laparoscopic method. The results of the laparoscopic method are similar to the traditional open method. The NCCN Guidelines Panel supports the laparoscopic method if the following criteria are met:

- Your surgeon has experience with laparoscopic colectomy.
- Your abdomen has been fully examined.
- There is no cancer in the middle and lower parts of your rectum.
- You are not likely to have a tumor that is difficult to remove.
- The cancer has not grown into tissues outside your colon (ie, T4 tumors).
- The cancer has not blocked or torn your gut.
- If it will help your surgeon, small tumors will be marked before surgery.

No fewer than 12 lymph nodes should be examined to decide your cancer stage. Lymph nodes of the nearby blood arteries, the lymph nodes that send lymph to the tumor area, and any abnormal nodes should be examined.

Surgery to remove metastatic tumors in the lungs or liver may be an option for you. You should not have this surgery if these organs will be too small afterward. You should also not have this surgery if the primary tumor can’t be completely removed. Ablation therapy may be an option if surgery alone won’t remove the cancer. If you are unable to be cured with surgery, ablation, or both, a colectomy should only be done to treat heavy bleeding or a blocked gut.
7.2 Invasive colon cancer without metastases

Part 7.2 is for people with invasive colon cancer without distant metastases. Invasive colon cancer refers to tumors that have grown through the submucosa of the colon wall. Stage I with T2 tumors, stage II, and stage III are invasive colon cancers that haven’t spread beyond nearby lymph nodes.

7.2.1 Initial tests

- Review by pathologist to confirm T2 or larger tumor,
- Colonoscopy of entire colon,
- Complete blood count,
- Blood chemistry profile,
- Carcinoembryonic antigen level, and
- CT scan with contrast of chest/abdomen/pelvis

For treatment of invasive colon cancer, see Part 7.2.2. For metastatic cancer, see Part 7.4.

If you appear to have invasive colon cancer, tests for complete cancer staging are needed. The pathologist will examine the polypectomy sample for extent of cancer growth and signs of aggressive cancer. A total colonoscopy will be done to find any other tumors in the colon. Tests for metastases include a blood cell count, blood chemistry profile, carcinoembryonic antigen level, and CT scans of the chest, abdomen, and pelvis. The NCCN Guidelines Panel agrees that a PET/CT scan is not often needed before primary treatment. A PET/CT scan should only be considered for testing of metastases when a CT or MRI scan is unclear.

Colon cancer can run in families. It is important that your doctor talk to you about other family members having colon cancer and assess your risk for aggressive cancer. Your doctor may order tests to see if your cancer has a known genetic cause.

Definitions:

- Abdomen: The belly area between the chest and pelvis
- Ablation therapy: Treatment using radiofrequency to destroy cancer cells
- Blood cell count: The number of blood cells in a blood sample
- Blood chemistry test: A test to show unusual amounts of chemicals in the body
- Carcinoembryonic antigen: A protein present when cancer forms
- CT: A test that uses x-rays to see body parts
- Laparoscopic surgery: Surgery with a thin tool inserted through a small cut into the body
- MRI: A test that uses powerful magnets to see body parts
- Open surgery: Surgery with a knife done through a large cut into the body
- PET: A test that uses radioactive material to see body parts
7.2.2 Primary treatment
The surgery of choice for invasive colon cancer is a colectomy with removal of nearby lymph nodes. In some cases, the tumor has grown so large that it blocks the flow of stool. There are four options when there is a blockage. First, your surgeon can perform, as normal, a colectomy with lymph node removal to unblock your gut. Second, your surgeon can remove the part of the colon with cancer followed by a diversion to allow stool to pass. The third and fourth options involve a two-step surgical process. In the third option, the first surgery is a diversion to allow stool to pass, and the second surgery is to remove the cancer. The fourth option is to insert a stent into the colon to allow stool to pass followed by surgery for colon cancer. For more information, see the Principles of surgery on page 46.

Primary treatment

<table>
<thead>
<tr>
<th>Test results</th>
<th>Primary treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgeon can remove the tumor, and the gut is not blocked</td>
<td>Colectomy with lymph node removal</td>
</tr>
<tr>
<td></td>
<td>Colectomy with lymph node removal</td>
</tr>
<tr>
<td></td>
<td>Colectomy with lymph node removal</td>
</tr>
<tr>
<td></td>
<td>Colectomy with lymph node removal followed by diversion</td>
</tr>
<tr>
<td>Surgeon can remove the tumor, and the gut is blocked</td>
<td>Stent</td>
</tr>
<tr>
<td></td>
<td>Colectomy with lymph node removal</td>
</tr>
<tr>
<td></td>
<td>Diversion</td>
</tr>
</tbody>
</table>

For adjuvant treatment, see Part 7.2.3. If unable to have surgery, see Part 7.7.

7.2.3 Adjuvant treatment
Adjuvant therapy for invasive colon cancer is based on your risk for recurrence. Doctors will determine your risk by using your pathologic cancer stage. If adjuvant treatment is right for you, it should be received as soon as possible for the best results.

The risk of recurrence for stage I colon cancer is low since the tumor didn’t grow far into the colon wall. After colectomy, adjuvant treatment isn’t needed. Stage II colon cancer has a higher risk for recurrence than stage I and has multiple treatment options. Talk with your doctors about the risks and benefits of each option. Options should be discussed in light of your overall health, personal wishes, and type of colon cancer. It is important to know that chemotherapy may have little, if any, benefit for stage II colon cancer. If you have high microsatellite instability, 5-FU chemotherapy will not help.
### Adjuvant treatment

<table>
<thead>
<tr>
<th>Pathologic stage</th>
<th>Adjuvant treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>No treatment</td>
</tr>
<tr>
<td>T2, N0, M0</td>
<td></td>
</tr>
<tr>
<td>Low-risk stage IIA</td>
<td>• Clinical trial,</td>
</tr>
<tr>
<td>T3, N0, M0</td>
<td>• Observation, or</td>
</tr>
<tr>
<td></td>
<td>• Consider chemotherapy</td>
</tr>
<tr>
<td></td>
<td>• Capecitabine, or</td>
</tr>
<tr>
<td></td>
<td>• 5-FU/LV</td>
</tr>
<tr>
<td>High-risk stage IIA</td>
<td>• Chemotherapy,</td>
</tr>
<tr>
<td>T3, N0, M0</td>
<td>• 5-FU/LV,</td>
</tr>
<tr>
<td>Stage IIB or IIC</td>
<td>• FOLFOX,</td>
</tr>
<tr>
<td>T4, N0, M0</td>
<td>• FLOX,</td>
</tr>
<tr>
<td></td>
<td>• Capecitabine, or</td>
</tr>
<tr>
<td></td>
<td>• CapeOX</td>
</tr>
<tr>
<td></td>
<td>• Clinical trial, or</td>
</tr>
<tr>
<td></td>
<td>• Observation</td>
</tr>
<tr>
<td>Stage III</td>
<td>Chemotherapy,</td>
</tr>
<tr>
<td>T1 – T4, N1 – N2,</td>
<td>• FOLFOX (preferred),</td>
</tr>
<tr>
<td>M0</td>
<td>• FLOX,</td>
</tr>
<tr>
<td></td>
<td>• CapeOX,</td>
</tr>
<tr>
<td></td>
<td>• Capecitabine, or</td>
</tr>
<tr>
<td></td>
<td>• 5-FU/LV</td>
</tr>
</tbody>
</table>

For T4 tumors that have grown into nearby structures, consider radiotherapy with chemotherapy.

For follow-up tests, see Part 7.3.

### Definitions:

**Clinical trial:** Research comparing new and current treatments

**Diversion:** Surgery to attach the colon to the surface of the abdomen

**Microsatellite instability:** Changes in a DNA part when DNA is making a copy of itself

**Pathologic staging:** A cancer stage given by a pathologist based on surgery samples

**Recurrence:** The return of cancer after successful treatment

**Stent:** A thin tube
Treatment options for stage IIA colon cancer are based on risk factors in addition to pathologic stage. If you don’t have any of the risk factors listed in Table 4, you are at low risk. There are three options for low-risk stage IIA colon cancer. First, you can enroll in a clinical trial that is testing new treatments. Second, you can start follow-up testing. Third, you can talk with your doctors about starting chemotherapy. Capecitabine alone or 5-FU/LV are the only reasonable chemotherapies for low-risk stage IIA colon cancer.

**Table 4. Stage IIA risk factors for recurrence**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High grade</strong></td>
<td>A grade of 3 or 4 with low microsatellite instability.</td>
</tr>
<tr>
<td><strong>Positive margins</strong></td>
<td>Cancer was found in the surgical margins.</td>
</tr>
<tr>
<td><strong>Unknown margins</strong></td>
<td>The presence of cancer in margins can't be confirmed.</td>
</tr>
<tr>
<td><strong>Angiolympathatic invasion</strong></td>
<td>Cancer has spread into the lymph vessels or bloodstream.</td>
</tr>
<tr>
<td><strong>Bowel obstruction</strong></td>
<td>The tumor has grown large enough to block the gut.</td>
</tr>
<tr>
<td><strong>Limited lymphectomy</strong></td>
<td>Fewer than 12 lymph nodes were examined.</td>
</tr>
<tr>
<td><strong>Perineural invasion</strong></td>
<td>Cancer has spread around or into the nerves.</td>
</tr>
<tr>
<td><strong>Localized perforation</strong></td>
<td>Holes in the colon from the tumor.</td>
</tr>
</tbody>
</table>

Chemotherapy is the first option for high-risk stage IIA, stage IIB, and stage IIC colon cancer. See Table 5 for the complete names of the suggested chemotherapy regimens. In addition to chemotherapy for T4 tumors, consider radiotherapy if the tumor has grown into a nearby organ or structure. See Principles of radiotherapy for more information. Your second option is to join a clinical trial of new chemotherapy schedules or new drugs. A third option is to start follow-up testing.

**Table 5. Chemotherapy regimen drugs for stage II and III colon cancer**

<table>
<thead>
<tr>
<th>Regimens</th>
<th>Drug names</th>
</tr>
</thead>
</table>
| 5-FU/LV  | 5-FU = fluorouracil  
LV = leucovorin calcium |
| CapeOX   | Cape = capecitabine  
OX = oxaliplatin |
| FLOX     | F = fluorouracil  
L = leucovorin  
OX = oxaliplatin |
| FOLFOX   | FOL = leucovorin  
F = fluorouracil  
OX = oxaliplatin |
For stage III colon cancer, chemotherapy is the only suggested treatment option since your risk for recurrence is high. Recurrence is more likely for stage III than for stage I and II because cancer cells may have spread through the lymphatic system. The standard-of-care chemotherapy regimen is FOLFOX. There is also research supporting the use of FLOX and CapeOX. If oxaliplatin is not right for you, other chemotherapy options include capecitabine alone or 5-FU/LV.

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**Principles of radiotherapy**

Radiotherapy is not used often to treat colon cancer. When used, it is used most often for T4 tumors that have grown into nearby structures and for recurrent cancer. Conformal external beam radiotherapy (EBRT) is the preferred delivery method for T4 tumors. Intensity-modulated radiotherapy (IMRT) is used if you have a recurrence and have had radiotherapy before. Imaging tests or small metal clips can help direct the radiation beam to the right spot.

The dose of radiation for T4 tumors can be between 45 – 50 Gray (Gy) in 25 – 28 treatments. However, radiation to the small bowel should not exceed 45 Gy. A radiation boost may improve results when there are positive surgical margins or cancer cells near to the margin.

Consider intraoperative radiotherapy (IORT) for T4 tumors or recurrent cancers as an additional boost. If you will have fluorouracil-based chemotherapy, radiation should be given during the same time period. If IORT isn’t available, 10 – 20 Gy EBRT, internal radiotherapy, or both may be used.

Some cancer centers are using radiotherapy-based treatments for liver or lung metastases. These treatments include arterial radioembolization and conformal EBRT. These treatments weren’t approved by most of the NCCN Guidelines Panelists because of a lack of research. If you’re interested in these treatments, ask your doctor about taking part in a clinical trial.

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**Definitions:**

**Arterial radioembolization:** Radiotherapy given through an artery to treat liver tumors

**Conformal external beam radiation:** Radiotherapy that uses beams that match the shape of the tumor

**External beam radiotherapy (EBRT):** Radiation therapy received from a machine outside the body

**Gray units (Gy):** A measure of radiation dose

**Intensity-modulated radiotherapy (IMRT):** Radiotherapy that uses small beams of different intensities

**Internal radiotherapy:** Radiation therapy received from a radioactive object placed near or in the tumor

**Intraoperative radiotherapy (IORT):** Radiotherapy given during surgery

**Lymphatic:** Relating to the system made up of lymph, lymph nodes, and lymph vessels

**Radiation boost:** An extra dose of radiation to a specific area

**Risk factors:** Something that increases the chance of getting a disease
7.3 Follow-up tests for stages 0 – III

- History and physical
  Every 3 to 6 months for 2 years → If normal, then every 6 months for 3 years
  If no advanced adenoma, repeat in 3 years then every 5 years
  If advanced adenoma, repeat in 1 year

- Colonoscopy
  Within 1 year if colonoscopy before surgery, or
  Within 3 to 6 months if no colonoscopy before surgery

Other possible tests:
- Carcinoembryonic antigen for T2 or larger tumors
  Every 3 to 6 months for 2 years
  If normal, then every 6 months for 3 years
  If level is high and imaging tests are normal, repeat every 3 months until level stops increasing

- CT scans if at high risk for recurrence
  Every year for 3 to 5 years
  If no advanced adenoma, repeat in 3 years then every 5 years
  If normal, then every 6 months for 3 years
  If level is high and imaging tests are normal, repeat every 3 months until level stops increasing

For survivorship care plan, see Part 7.8.
For nonmetastatic recurrence, see Parts 7.1 and 7.2.
For metastatic recurrence, see Part 7.6.

Follow-up tests can be helpful for finding new cancer growth early. The test schedule listed in the chart is for people who were treated for stages 0 – III colon cancer and who now have no signs of cancer. You should receive a history and physical exam every 3 to 6 months for 2 years then every 6 months for a total of 5 years.

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 (Figure 16). 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, your next colonoscopy is needed 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 a villous polyp, a polyp larger than the width of an AAA battery, or a polyp with pre-cancerous cells.

Ongoing tests of carcinoembryonic antigen levels are mainly used to find cancer recurrences. If your risk for recurrence is low, your doctor may not order this test. Carcinoembryonic antigen levels should be tested every 3 to 6 months for 2 years and then every 6 months for a total of 5 years. If your level is high, you may receive CT scans.

CT scans may help find metastases. You should only receive a CT scan if you have a high risk of recurrence. Scans of your chest, abdomen, and pelvis are suggested each year for a maximum of 5 years if results are normal.

**Definitions:**

**Adenomas:** The most common type of polyp and the most likely to form cancer cells

**Lynch syndrome:** An inherited medical condition that increases the odds of colon cancer

**Villous polyp:** A polyp with a ruffled structure
7.4 Metastatic colon cancer at diagnosis

Part 7.4 is for people with stage IV colon cancer that has spread beyond the local lymph nodes. About 55 out of 100 people with colon cancer will develop metastases. Metastases may be found when you are first diagnosed with colon cancer. These advanced tumors are called synchronous metastases. Among 100 people with colon cancer, 20 to 34 people will develop synchronous liver metastases.

7.4.1 Initial tests

- Colonoscopy of entire colon,
- CT scan with contrast of chest/abdomen/pelvis,
- Complete blood counts,
- Blood chemistry profile,
- Carcinoembryonic antigen level,
- KRAS and possible BRAF gene status,
- Possible needle biopsy,
- Possible PET-CT scan only, and
- Results reviewed by experts in colon cancer

Multiple tests are needed if your doctor thinks you have distant metastases. A total colonoscopy is used to find all tumors in the colon. You should also receive a complete blood count, a blood chemistry profile, carcinoembryonic antigen test, and CT scans of the chest, abdomen, and pelvis. An MRI scan with contrast can be done if the CT image is unclear.

About 40 out of 100 people with colon cancer have KRAS gene mutations. If you are diagnosed with stage IV colon cancer, it is important to know your KRAS gene status as it will affect your treatment options if first-line treatment fails. You may also want to know your BRAF status if you have a normal KRAS gene. Testing of the KRAS and BRAF gene mutations should be done in a CLIA-88–certified lab, so ask about the certification of the lab that your doctor uses.

Your doctor may also order a needle biopsy and PET/CT scan. A needle biopsy of abnormal tissue can show if cancer cells are present (Figure 17). Usually, PET/CT scans aren’t used to assess colon cancer. However, you may receive a PET/CT scan when other imaging tests suggest that surgery could cure metastatic disease. In this case, a PET/CT scan is used to find metastases not found by other tests. If you have liver metastases, an MRI with contrast may provide better results for planning surgery than PET or CT scans.

For liver/lung metastases, see Parts 7.4.2 and 7.4.3. For metastases in the abdomen, see Part 7.4.4.
Review of your test results should be done by a team of experienced doctors from different fields of cancer medicine. One of the members of your team should be a surgeon. If you have liver metastases, it is important to have a surgeon who has experience removing these tumors.

**Definitions:**

**BRAF gene:** Instructions in a cell for making B-Raf protein

**Contrast:** A dye put into your body to make better pictures during imaging tests

**KRAS gene:** Instructions in a cell for making K-Ras protein

**Mutations:** Abnormal changes in genes

**Needle biopsy:** Insertion of a needle into the body to remove tissue for testing

![Needle biopsy of the liver](image-url)

*Figure 17. Needle biopsy of the liver*

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### 7.4.2 Liver or lung metastases fit for surgery

<table>
<thead>
<tr>
<th>Neoadjuvant treatment</th>
<th>Primary treatment</th>
<th>Adjuvant treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>No treatment</td>
<td>Colectomy and surgery for metastases at the same time or separately</td>
<td>Chemotherapy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ FOLFOX (preferred)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ FLOX</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ CapeOX</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Capecitabine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ 5-FU/LV</td>
</tr>
<tr>
<td>Chemotherapy/targeted therapy</td>
<td>Colectomy and surgery for metastases at the same time or separately</td>
<td>▪ Consider observation, or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Short course of chemotherapy</td>
</tr>
<tr>
<td>• FOLFIRI ± bevacizumab or</td>
<td></td>
<td>Chemotherapy/targeted therapy</td>
</tr>
<tr>
<td>• FOLFOX ± bevacizumab or</td>
<td></td>
<td>▪ FOLFIRI ± bevacizumab or</td>
</tr>
<tr>
<td>• CapeOX ± bevacizumab or</td>
<td></td>
<td>▪ FOLFOX ± bevacizumab or</td>
</tr>
<tr>
<td>▪ FOLFIRI ± panitumumab,</td>
<td></td>
<td>▪ CapeOX ± bevacizumab or</td>
</tr>
<tr>
<td>▪ FOLFOX ± panitumumab,</td>
<td></td>
<td>▪ FOLFIRI ± panitumumab,</td>
</tr>
<tr>
<td>▪ FOLFIRI ± cetuximab if</td>
<td></td>
<td>▪ FOLFIRI ± cetuximab if</td>
</tr>
<tr>
<td>normal KRAS gene</td>
<td></td>
<td>normal KRAS gene</td>
</tr>
</tbody>
</table>

- For conversion therapy, see Part 7.4.3.
- For follow-up tests, see Part 7.5.

This chart is for people with metastases in the liver, lungs, or both organs but not elsewhere. Metastases occur most often in the liver. Research on metastases other than in the liver is limited. As a result, the information in Part 7.4.2 focuses on liver metastases but also applies to lung metastases.
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. Your doctor may suggest a portal vein embolization to expand your liver.

If you haven’t had chemotherapy before, it is recommended along with surgery for treatment. Your chemotherapy choices are listed in the chart. See Table 7 on page 66 for the drug names of the chemotherapy regimens. The best order of chemotherapy and surgery is unknown, so three options are given.

First, you can have surgery followed by chemotherapy. Second, neoadjuvant chemotherapy may be given for 2 to 3 months before surgery. See Table 6 for benefits and risks. The third option is to have a colectomy followed by adjuvant chemotherapy for 2 to 3 months. After chemotherapy, the surgery for metastases will be done. For the second and third options, more chemotherapy is sometimes given after the final surgery. Together, neoadjuvant and adjuvant chemotherapy should not exceed 6 months. For more information, see Principles of systemic therapy on page 58.

Table 6. Benefits and risks of neoadjuvant chemotherapy for metastases

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>You may receive early treatment of possible cancer not yet found</td>
<td>Fat buildup in and swelling of the liver</td>
</tr>
<tr>
<td>Knowing your response to chemotherapy early can help treatment planning</td>
<td>You may become unable to have surgery if the cancer grows too much or if tumors shrink too much</td>
</tr>
<tr>
<td>If you have early disease progression, you can avoid local treatment</td>
<td>Injury to small blood vessels in the liver</td>
</tr>
</tbody>
</table>
Principles of systemic therapy

Systemic therapy for colon cancer includes chemotherapy. Chemotherapy can treat colon cancer but can also cause side effects. Be sure to tell your doctor about any new or worsening symptoms. To prevent severe side effects, the following is recommended.

- **5-FU** has fewer severe side effects when given by infusion rather than bolus. Thus, bolus 5-FU shouldn’t be given with irinotecan or oxaliplatin since severe side effects are likely. Another option is to give capecitabine rather than 5-FU with oxaliplatin.

- **Oxaliplatin** can harm your nervous system when used in a FOLFOX or CapeOX regimen. Stopping oxaliplatin after 3 to 4 months may prevent harm. If your cancer progresses, oxaliplatin may be restarted after it has been stopped because of side effects.

- **Irinotecan** should be used with caution and in low doses for patients with Gilbert’s disease or high serum bilirubin.

Chemotherapy may be used alone or with targeted therapy. There is good proof that cetuximab and panitumumab don’t work if you have a **KRAS** mutation. These targeted therapies should only be used if you have a normal **KRAS** gene.

Cetuximab and panitumumab appear to have a benefit when used as a first-line treatment in people with any **BRAF** status. However, there is no good proof to keep taking either cetuximab or panitumumab on a second-line regimen if they were used with a first-line regimen. Also, the doctor won’t use panitumumab after cetuximab failure or cetuximab after panitumumab failure because these drugs work in a similar way.

More research is needed to test the safety of bevacizumab when used with 5-FU. The NCCN Guidelines Panel suggests not having surgery until 6 weeks after the last dose of neoadjuvant bevacizumab. Adjuvant bevacizumab can be started 6 to 8 weeks after surgery.

There is no good proof that continuing bevacizumab on a second-line regimen will help if it was used with a first-line regimen. Bevacizumab may increase risk of stroke and other cardiovascular events if you are 65 years old or older. It may also reduce your ability to heal from wounds.

Chemotherapy can be given through the hepatic artery into the liver by an implanted device. There is some proof that this method may have greater benefits than systemic chemotherapy, but more research is needed. Not all of the NCCN Guidelines Panelists agree that implanted devices should be the standard of care. Instead, the panel suggests that a hepatic arterial port or implantable pump be used only in patients with liver metastases treated by doctors with experience in using such devices.
You may hear about treatments for liver metastases that don’t include surgery. Such treatments include arterial radioembolization and EBRT. There is very little research on these treatments for liver metastases among people with colon cancer. Most NCCN Guidelines Panelists don’t recommend these treatments as the standard of care at this time. Instead, they support patients enrolling in clinical trials testing these treatments. For more information, see Principles of radiotherapy on page 51.

### 7.4.3 Conversion treatment for liver or lung metastases

<table>
<thead>
<tr>
<th>Conversion treatment</th>
<th>Primary treatment</th>
<th>Adjuvant treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Drugs for conversion</td>
<td>Assess if surgery is possible</td>
<td>If possible, consider chemotherapy:</td>
</tr>
<tr>
<td>• FOLFIRI ± bevacizumab or FOLFOX ± bevacizumab or CapeOX ± bevacizumab or FOLFIRI ± panitumumab, FOLFOX ± panitumumab, or FOLFIRI ± cetuximab if normal KRAS gene</td>
<td>If possible, colectomy and surgical removal of metastases at the same time or separately</td>
<td>• Consider observation, or</td>
</tr>
<tr>
<td>• If at high risk of bleeding or a blocked gut, consider colectomy</td>
<td>Systemic treatment for advanced disease</td>
<td>• Short course of chemotherapy</td>
</tr>
</tbody>
</table>

If conversion treatment fails, see Part 7.7.

For systemic treatment, see Part 7.7.

For follow-up tests, see Part 7.5.

Most people with stage IV colon cancer aren’t able to be cured of their cancer. However, for a few people, chemotherapy may shrink the tumors enough so a surgical cure is possible. You are more likely to qualify for conversion therapy if you only have liver metastases and have very few metastatic tumors.

#### Definitions:

**Artery:** A tube-shaped vessel that carries blood away from the heart and through the body

**Bilirubin:** A substance in the body that causes bodily fluids to be yellow

**Bolus:** A fast injection of a drug

**Gilbert’s disease:** A genetic condition that causes high bilirubin levels

**Infusion:** The slow injection of a drug

**Side effect:** An unplanned physical or emotional response to treatment
Your choices of drugs for conversion treatment are listed in the chart. After the start of conversion treatment, get tested every 2 months to see if you can have surgery. When ready, surgery should be done right away to avoid harmful side effects to the liver except if you’re taking bevacizumab. See Principles of systemic therapy on page 58 for more information.

If surgery alone won’t cure your cancer, ablation therapy may be right for you. Ablation therapy with or without surgery should only be done when a cure is possible. You may qualify for ablation therapy when other illnesses, tumor location, or postsurgical liver size prevent surgery. Ablation therapy for this purpose has not been tested in clinical trials.

After surgery, no treatment or limited chemotherapy is an option if you have had neoadjuvant chemotherapy. Neoadjuvant and adjuvant chemotherapy should not exceed 6 months. Systemic treatment for advanced disease is another option for adjuvant treatment. However, this option wasn’t approved by a large number of the NCCN Guidelines Panelists.

### 7.4.4 Treatment for metastases in abdomen

<table>
<thead>
<tr>
<th>Treatment if blocked gut</th>
<th>Primary treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Colectomy,</td>
<td>Systemic treatment for advanced disease</td>
</tr>
<tr>
<td>• Diverting colostomy,</td>
<td></td>
</tr>
<tr>
<td>• Stent, or</td>
<td></td>
</tr>
<tr>
<td>• Bypass for gut soon</td>
<td></td>
</tr>
<tr>
<td>to be blocked</td>
<td></td>
</tr>
</tbody>
</table>

For systemic treatment, see Part 7.7. For follow-up tests, see Part 7.5.

The primary treatment for metastases in the abdomen or peritoneum is systemic treatment. Systemic treatment is reviewed in Part 7.7. Beforehand, you may have surgery to unblock or prevent blockage of your gut. Four surgical options are listed in the chart. See Figure 18 for an image of a diverting colostomy.

**Figure 18.**
Diverting colostomy

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### 7.5 Follow-up tests for stage IV

- **History and physical**
  - Every 3 to 6 months for 2 years
  - If normal, then every 6 months for 3 years
  - If abnormal results, CT tests or biopsy to confirm cancer

- **Carcinoembryonic antigen**
  - Every 3 to 6 months for 2 years
  - If normal, then every 6 months for 3 to 5 years
  - If level is increasing and CT scans are normal, repeat CT scans in 3 months and consider PET/CT scan

- **CT scans of chest/abdomen/pelvis**
  - Every 3 to 6 months for 2 years
  - If normal, then every 6 to 12 months for 3 years
  - If abnormal results, possible biopsy to confirm cancer

- **Colonoscopy**
  - Within 1 year if colonoscopy before surgery, or
  - Within 3 to 6 months if no colonoscopy before surgery
  - If no advanced adenoma, repeat in 3 years then every 5 years
  - If advanced adenoma, repeat in 1 year

For survivorship care plan, see Part 7.8.
For nonmetastatic recurrence, see Parts 7.1 and 7.2.
For metastatic recurrence, see Part 7.6.

The test schedule listed in the chart is for people who were treated for stage IV and now have no signs of cancer. After treatment, get tested on a regular basis to find new cancer growth early. A history and physical exam, carcinoembryonic antigen test, and CT scans should be done every 3 to 6 months for 2 years. If results are normal during this time, testing can occur less often.
Recent CT scans are needed if you have an abnormal physical exam or high carcinoembryonic antigen levels. You may have normal CT scans despite high carcinoembryonic antigen levels. In this case, repeat the CT scans in 3 months and consider a PET/CT scan. If tests find a tumor, a biopsy can confirm if the cancer has returned.

Another follow-up test is a colonoscopy. 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, your next colonoscopy will be needed 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 a villous polyp, a polyp larger than the width of an AAA battery, or a polyp with pre-cancerous cells.

### Part 7: A step-by-step treatment guide

#### 7.6 Metastatic return of colon cancer

Most distant metastases of colon cancer occur after treatment for stages I – III. These post-treatment tumors are called metachronous metastases. The liver is the most common site. Part 7.6 reviews the treatment options for metastases that can be treated with surgery. Unfortunately, only about 15 out of 100 people with metachronous metastases can have surgery.

**7.6.1 Tests for treatment**

- KRAS and possible BRAF gene status,
- Possible PET/CT scan, and
- Results reviewed by experts in colon cancer

For surgical treatment, see Part 7.6.2.
For conversion treatment, see Part 7.6.3.

After finding metachronous metastases, your doctor may order more tests. It may help to have 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 a surgical cure impossible.
If you are diagnosed with stage IV colon cancer, it is important to know your KRAS gene status. Having a KRAS mutation will affect your treatment options. You may also want to know your BRAF status if you have a normal KRAS gene. Testing of the KRAS and BRAF gene mutations should be done in a CLIA-88–certified lab, so ask about the certification of the lab that your doctor uses.

Review of your test results should be done by a team of experienced doctors from different fields of cancer medicine. One of the members of your team should be a surgeon. If you have liver metastases, it is important to have a surgeon who has experience removing these tumors.
7.6.2 Metastases fit for surgery
Primary treatment for metachronous metastases is surgery to remove metastases. A colectomy isn’t given. Chemotherapy may be given before or after surgery or at both times. Together, neoadjuvant and adjuvant chemotherapy should not exceed 6 months. See Principles of systemic therapy on page 58 for more information.

When not given neoadjuvant drugs, your choices for adjuvant treatment are based on if you’ve had chemotherapy before. If you haven’t, chemotherapy alone is given. If you have had chemotherapy before, chemotherapy with or without targeted therapy is an option. The other option is not to have more treatment.

When given neoadjuvant drugs, your choices for adjuvant treatment are based on if your cancer grows. If your cancer doesn’t grow, either start taking the neoadjuvant drugs again or try FOLFOX alone. If your cancer does grow, your choices are systemic treatment or no treatment.

For systemic treatment, see Part 7.7.
For follow-up tests, see Part 7.5.
### 7.6.3 Conversion therapy for metastases

<table>
<thead>
<tr>
<th>Chemotherapy history</th>
<th>Conversion treatment</th>
<th>Primary treatment</th>
<th>Adjuvant treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>No prior chemotherapy</td>
<td>Systemic treatment for advanced cancer</td>
<td>Assess if surgery is possible</td>
<td>・Systemic treatment, or ・Observation</td>
</tr>
<tr>
<td>Prior capecitabine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior 5-FU/LV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FOLFOX over 12 months ago</td>
<td>・FOLFIRI ± bevacizumab or ・FOLFIRI ± cetuximab or FOLFIRI ± panitumumab if normal KRAS gene</td>
<td>Surgical removal of metastases</td>
<td></td>
</tr>
<tr>
<td>FOLFOX within last 12 months</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If conversion treatment fails, see Part 7.7.  
For systemic treatment, see Part 7.7.  
For follow-up tests, see Part 7.5.

Conversion treatment for metachronous metastases is based on your history of chemotherapy. If you’ve had FOLFOX within the past 12 months, your choices for conversion treatment are limited. If you haven’t have FOLFOX within the past 12 months, you may choose from a longer list of chemotherapy drugs. See *Principles of systemic therapy* on page 58 for more information. If conversion treatment works, you may be able to have surgery to remove your metastases. Colectomies are not done for metachronous metastases. Talk with your doctor about having adjuvant treatment after surgery.
7.7 **Systemic therapy for advanced disease**

Systemic therapy for advanced colon cancer is given in many situations. When surgery is not possible, systemic therapy is an option. Systemic therapy is also given before surgery to shrink tumors and afterwards to treat any remaining cancer cells.

There are many chemotherapy choices for advanced colon cancer. Your doctor may start you on an intensive chemotherapy regimen. There are four groups of chemotherapy options for first-line treatment. The first group is oxaliplatin-based regimens, such as FOLFOX or CapeOX. See Table 7 for the drug names of the chemotherapy regimens. The second group is irinotecan-based regimens, such as FOLFIRI. The third group excludes both oxaliplatin and irinotecan, such as capecitabine. The fourth group includes one chemotherapy regimen of FOLFOXIRI. Targeted therapy is sometimes used with chemotherapy for advanced disease. See the Principles of systemic therapy on page 58 for more information. If your cancer grows, there are options for second- and third-line treatments based on your initial chemotherapy group.

Some people have severe side effects to the intensive regimens. You may better tolerate infusional 5-FU/LV or other options. If your cancer doesn’t respond to chemotherapy that isn’t considered intensive, you may want to receive supportive care for any symptoms you are having. If your cancer does respond for a period of time but then starts to grow again, consider taking intensive chemotherapy.

**Table 7. Chemotherapy regimen drugs for advanced disease**

<table>
<thead>
<tr>
<th>Chemotherapy Regimens</th>
<th>Drug names</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-FU/LV</td>
<td>5-FU = fluorouracil</td>
</tr>
<tr>
<td></td>
<td>LV = leucovorin calcium</td>
</tr>
<tr>
<td>CapeOX</td>
<td>Cape = capecitabine</td>
</tr>
<tr>
<td></td>
<td>OX = oxaliplatin</td>
</tr>
<tr>
<td>FOLFIRI</td>
<td>FOL = leucovorin</td>
</tr>
<tr>
<td></td>
<td>F = fluorouracil</td>
</tr>
<tr>
<td></td>
<td>IRI = Irinotecan</td>
</tr>
<tr>
<td>FOLFOX</td>
<td>FOL = leucovorin</td>
</tr>
<tr>
<td></td>
<td>F = fluorouracil</td>
</tr>
<tr>
<td></td>
<td>OX = oxaliplatin</td>
</tr>
<tr>
<td>FOLFOXIRI</td>
<td>FOL = leucovorin</td>
</tr>
<tr>
<td></td>
<td>F = fluorouracil</td>
</tr>
<tr>
<td></td>
<td>OX = oxaliplatin</td>
</tr>
<tr>
<td></td>
<td>IRI = Irinotecan</td>
</tr>
<tr>
<td>IROX</td>
<td>IR = Irinotecan</td>
</tr>
<tr>
<td></td>
<td>OX = Oxaliplatin</td>
</tr>
</tbody>
</table>
7.8 Survivorship care plan

- General health tests,
- Prevention of other diseases,
- Tests for late onset of symptoms of colon cancer or its treatment,
- Healthy lifestyle, and
- Transfer of care back to primary doctor

The time period from diagnosis through treatment can be very busy. Afterward, you may wonder what to do. Besides having follow-up tests, it is important to follow a survivorship care plan. Talk with your doctor about making a plan together. The NCCN Guidelines Panel suggests the following as part of your plan:

- Get exams and tests of your general health. After going through treatment for cancer, it may be hard to think about taking care of “less important” issues. However, your general health can have a big impact on your well-being.
- Take steps to prevent other diseases. Such steps can include getting immunization shots and screening tests for other cancers.
- Months after treatment, you may still develop problems from the colon cancer or its treatment. Tell your doctor if any new symptoms appear.
- Start or keep a healthy lifestyle. There is proof that healthy behaviors can improve your treatment results. If you are a smoker, see your doctor for help to stop. Your doctor may also be able to help you achieve a healthy body weight. Regular exercise and healthy foods may also improve treatment results.
- You are encouraged to have a primary care doctor throughout your life. Share your survivorship care plan with your primary doctor. Your cancer doctors should also tell your primary doctor about your prognosis, treatments, recovery time, lasting side effects, possible new side effects, and suggested follow-up tests.
**Part 8: Dictionary**

**Abdomen**
The belly area between the chest and pelvis.

**Ablation therapy**
Treatment using radiofrequency 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 polyp.

**Adenomatous polyp**
The most common type of polyp and is the most likely to form cancer cells; also called adenoma.

**Adjuvant treatment**
Treatment that follows primary treatment.

**Advance directive**
Written statements about your wishes for medical care should you become unable to make these wishes known at a later time.

**Aggressive cancer**
A cancer that spreads quickly.

**Alternative medicine**
Treatments used in place of ones usually given by doctors.

**Angiolympathic invasion**
Cancer has spread into the lymph vessels or bloodstream.

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

**Arterial radioembolization**
Radiotherapy given through an artery to treat liver tumors.

**Artery**
A tube-shaped vessel that carries blood away from the heart and through the body.

**Ascending colon**
The first part of the colon along the right side of the body.

**Autoimmune disorders**
Diseases that cause the immune system to attack the body.

**Barium enema**
A test that fills the colon with fluid and air and then takes pictures using x-rays.

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

**Biopsy**
A medical procedure that collects tissue to test for disease.

**Blood cell count**
The number of red blood cells, white blood cells, and platelets in blood.

**Blood chemistry profile**
A test to show unusual amounts of chemicals in the body.

**Bolus**
A fast injection of a drug.

**Bowel**
Another name for intestine; also called the gut.

**Bowel obstruction**
A medical condition in which a tumor is blocking stool from passing through the gut.

**BRAF gene**
Instructions in a cell for making B-Raf protein.

**Cancer stage**
The division of cancer into groups according to how likely the cancer will act.
Carcinoembryonic antigen
A protein present in babies growing in the womb or when cancer forms.

Cells
The “building blocks” of tissues in the body.

Chemotherapy
Drugs used to kill cancer cells.

Chromosome
The part of the cell’s nucleus that contains deoxyribonucleic acid.

Clinical staging
A cancer stage given by a doctor before surgery.

Clinical trials
A type of research that compares new treatments to the best current treatment to find out which is better. It may also compare different methods to prevent or diagnose disease.

Colectomy
Surgery to remove a part of the colon.

Colon
An organ in the digestive system that changes eaten food from a liquid into a solid form.

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.

Complementary medicines
Treatments given alongside of standard-of care treatments.

Complete blood count
A medical test that determines the number of red blood cells, white blood cells, and platelets in a sample of blood.

Computed tomography (CT)
A test that uses x-rays to view body parts.

Conformal external beam radiation
Radiotherapy that uses beams that match the shape of the tumor.

Connective tissue
Supportive and binding fibers.

Contrast
A dye put into the body to make better pictures during imaging tests.

Control group
Research participants who don’t receive a new treatment.

Conversion treatment
Treatments given to qualify a person for surgery.

Crohn's disease
An inflammatory disease.

Deoxyribonucleic acid (DNA)
The part of a cell containing genetic information to build new cells.

Descending colon
The third part of the colon along the left side of the body.

Diagnose
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.

Diversion
Surgery to attach the colon to the surface of the abdomen.
Endoscopic polypectomy
Surgery to remove a polyp during a colonoscopy.

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

Epithelium
Tissue that lines the colon wall.

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

External beam radiotherapy (EBRT)
Radiation therapy received from a machine outside the body.

Familial adenomatous polyposis
An inherited medical condition that increases the odds of colon cancer.

Fatigue
Severe tiredness despite getting enough sleep that limits one’s ability to function.

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

First-line treatment
The first treatment given.

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

Forceps
A medical tool shaped like tongs used to grab and cut tissue.

Fragmented specimen
Tumor is removed in pieces during surgery.

General anesthesia
A controlled loss of consciousness from drugs.

Genes
Instructions in cells for building new cells and controlling cell behavior.

Genetic condition
A medical problem caused by abnormal genes.

Gilbert’s disease
A genetic condition that causes high bilirubin levels.

Gray units (Gy)
A measure of radiation dose.

Guaiac stool test
A test that finds hidden blood in stool.

Gut
Another name for the intestine; also called the bowel.

Histologic subtype
The type of cancer based on the traits of the cells.

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

Imaging
Medical tests that take pictures of the inside of the body.

Immune system
The body’s natural defense against disease.

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

Informed consent form (ICF)
A document describing a study and requiring a signature from participants after review.

Infusion
The slow injection of a drug.

In situ polyp
Cancer cells in a polyp that have not spread beyond the mucosa of the colon wall.
Intensity-modulated radiotherapy (IMRT)
Radiotherapy that uses small beams of different intensities.

Internal radiotherapy
Radiation therapy received from a radioactive object placed near or in the tumor.

Intraoperative radiotherapy (IORT)
Radiotherapy given during surgery.

Invasive colon cancer
Cancer cells that have spread through the submucosa of the colon wall.

KRAS gene
Instructions in a cell for making K-Ras protein.

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

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

Laparoscopic surgery
Surgery with a thin tool inserted through a small cut into the body.

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

Laxatives
Drugs used to clean out the intestines.

Localized perforation
Holes in the colon from the tumor.

Lymph
A clear fluid containing white blood cells.

Lymph nodes
Small groups of special immune cells located throughout the body.

Lymph vessel
Tube-shaped ducts that carry lymph throughout the body.

Lymphatic
Relating to the system made up of lymph, lymph nodes, and lymph vessels.

Lymphectomy
Surgery to remove lymph nodes.

Lymphedema
Swelling due to buildup of lymph.

Lymphovascular invasion
Spread of cancer into lymph or blood vessels.

Lynch syndrome
An inherited medical condition that increases the odds of colon cancer.

Magnetic resonance imaging (MRI)
A test that uses radio waves and powerful magnets to view the parts of the body and how they are working.

Margin status
The presence or absence of cancer cells in the normal-looking tissue near the tumor.

Marrow
Soft tissue found in the center of bones.

Medical oncologist
A doctor who specializes in all types of cancer.

Mesentery
A double layer of peritoneum attached to digestive organs.

Metachronous metastases
Metastases that occur after colon cancer treatment.
**Metastasis**
The growth of cancer beyond local tissue.

**Microsatellite instability**
Abnormal changes in a DNA part that happen when DNA is making a copy of itself.

**Mouth**
The opening at the start of the digestive system that allows food to be eaten.

**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**
Abnormal changes in genes.

**MYH-associated polyposis**
An inherited medical condition that increases the odds of colon cancer.

**Needle biopsy**
Insertion of a needle into the tumor to remove tissue for testing.

**Neoadjuvant treatment**
Treatments given before the primary treatment.

**Nonperitonealized**
Not connected to the peritoneum.

**Nucleus**
The control center of gene activity within a cell.

**Open surgery**
Surgery with a knife done through a large cut into the body.

**Pathologic staging**
A cancer stage given by a pathologist based on surgery samples.

**Pathologist**
A doctor who specializes in testing cells to identify disease.

**Pedunculated polyp**
A polyp shaped like a mushroom with a stalk.

**Perforation**
A hole made in body tissue.

**Pericolic nodes**
Lymph nodes near the colon.

**Perineural invasion**
Spread of cancer into nearby nerves.

**Perirectal nodes**
Lymph nodes near the rectum.

**Peritoneum**
The lining of the abdomen.

**Platelets**
A type of blood cell responsible for blood clotting.

**Polyp**
An extra growth of tissue from the epithelium of the colon wall.

**Polypectomy**
Surgery to remove a polyp.

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

**Positive lymph nodes**
Lymph nodes with cancer cells.
Positive margin
The normal-looking tissue around the tumor has cancer cells.

Positron emission tomography (PET)
A test that uses radioactive material to see the shape and function of body parts.

Primary treatment
The main treatment for cancer.

Prognosis
The pattern and outcome of a disease.

Radiation boost
An extra dose of radiation to a specific area.

Radiation enteritis
Swelling of the colon wall.

Radiation oncologist
A doctor who specializes in the treatment of cancer with radiation.

Radioactive
Containing a powerful energy called radiation.

Radiologist
A doctor who specializes in reading imaging tests.

Randomized
Assignment to a group by chance.

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

Recurrence
The return of cancer after successful treatment.

Risk evaluation and mitigation strategy (REMS)
A plan strategy to tests for and manage a serious side effect.

Risk factors
Something that increases the chance of getting a disease.

Second-line treatment
The treatment given after the first treatment fails.

Serosa
The outer layer of the colon wall that makes fluid so that organs can slide against one another.

Sessile polyp
A polyp that is flat.

Side effect
An unplanned physical or emotional response to treatment.

Sigmoid colon
The last part of the colon on the left side of the body that is shaped like the letter S.

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

Snare
A medical tool with a wire loop used to cut tissue.

Stent
A thin tube.

Stomach
An organ of the digestive system that turns solid food into a liquid form.

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

Structural tests
Tests that use machines.
**Part 8: Dictionary**

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

**Subserosa**
The fourth layer of the colon wall made mostly of connective tissue.

**Supportive care**
Treatment for symptoms of a disease.

**Synchronous metastases**
Metastases found at diagnosis.

**Systemic therapy**
Treatment to destroy cancer cells throughout the body.

**Targeted therapy**
Treatment that stops cancer cell growth more than normal cell growth.

**Transfusion**
Replacing lost blood with new blood.

**Transverse colon**
The second part of the colon that crosses from the right to the left side of the body.

**Tumor**
A tissue mass made from an abnormal growth of cells.

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

**Tumor depth**
How far the tumor has grown into the colon wall.

**Tumor extension**
How far the tumor has grown into nearby tissues.

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

**Ulcerative colitis**
An inflammatory disease.

**U.S. Food and Drug Administration (FDA)**
A federal government agency that regulates drugs and food.

**Villous adenoma**
A polyp with a ruffled structure.

**Virtual colonography**
A test that fills the colon with air and then uses advanced computed tomography to take pictures.

**White blood cells**
A type of blood cell that fights disease.
9.1 Questions to ask about testing for colon cancer

• What tests will I have?

• Where will the tests take place? Will I have to go to the hospital?

• How long will it take? Will I be awake?

• Will it hurt? Will I need local anesthesia?

• What are the risks? What are the chances of infection or bleeding afterward?

• How do I prepare for it? Will I need to avoid taking aspirin to reduce the chance of bleeding? Should I not eat beforehand?

• Should I bring a list of my medications?

• Should I bring someone with me?

• How long will it take for me to recover? Will I be given an antibiotic or other medicine afterward?

• How soon will I know the results and who will explain them to me? If a biopsy is done, will I get a copy of the pathology report?

• If I do have cancer, who will talk with me about the next steps? When?
9.2 Questions to ask about treating colon cancer

- What are the available treatments for colon cancer?
- What are the risks and benefits of each treatment for colon cancer?
- How will my age, general health, stage of colon cancer, and other medical conditions influence treatment choices?
- Do I have to get treated?
- Would you help me get a 2nd opinion?
- Where will I be treated? Will I have to stay in the hospital or can I go home after each treatment?
- What can I do to prepare for treatment? Should I stop taking my medications? Should I store my blood in case I need a transfusion?
- How many colectomies have you done? How many of your patients have had complications?
- How soon should I start treatment? How long does treatment take?
- How much will the treatment cost? How can I find out how much my insurance company will cover?
- How likely is it that I’ll be cancer-free after treatment?
- What symptoms should I look out for while being treated for colon cancer?
- When will I be able to return to my normal activities?
- What is the chance that my cancer will come back and/or spread?
- What should I do after I finish treatment?
- Are there supportive services that I can get involved in? Support groups?
Part 9: Tools

9.3 Questions to ask about clinical trials

• Is there a clinical trial that I could take part in?
• What is the purpose of the study?
• What kinds of tests and treatments does the study involve?
• What does the treatment do?
• Has the treatment been used before? Has it been used for other types of cancers?
• Will I know which treatment I receive?
• What is likely to happen to me with, or without, this new treatment?
• What are my other choices? What are their benefits and risks?
• How might the study change my daily life?
• What side effects can I expect from the study? Can the side effects be controlled?
• Will I have to stay in the hospital? If so, how often and for how long?
• Will the study cost me anything? Will any of the treatment be free?
• If I’m harmed as a result of the research, what treatment might I get?
• What type of long-term follow-up care is part of the study?
9.4 Suggestions for taking care of yourself

- Let other people help you. This is the time to take advantage of offers for rides, meals, childcare, or just good company.

- Be as healthy as you can—eat well, get enough rest, exercise, and stop smoking.

- Talk with your family and friends about your concerns and needs. Let them know what is important to you, including your feelings about end-of-life decisions.

- Do the things that help you cope—keep a journal, garden, play music, or take that trip you’ve been wanting to take.

- Don’t be afraid to take medications that can help your emotional and physical symptoms. Let your cancer care team help you.

- Talk with your treatment team about what you are experiencing. Don’t wait until you are feeling overwhelmed.

- Know the resources that are available to you and use them.

- Be your own advocate—ask questions, take notes, and be active in your treatment.
9.5 Suggestions for taking care of caregivers

- Take the time to understand your loved one’s cancer and its treatment. Educating yourself will help you know what to expect and how you can be supportive.

- Help provide eyes and ears and sometimes a voice for your loved one. It is extremely useful for patients to have someone with them at doctor’s visits to listen, ask questions, take notes, process what is said, and sometimes speak up on their behalf.

- Talk about the important issues. Do it from the very beginning. Don’t wait until a patient is too sick or has lost too much ability to address important matters.

- Help develop a treatment plan, and, if appropriate, an advance directive. Such plans help everyone involved understand what is important to the patient in terms of treatment goals and end-of-life decisions.

- Take care of yourself. Find the time to get away—take a walk, have lunch with a friend, see a movie, and do something that feels normal. In addition, eat well, try to sleep well, and exercise. You’ll be a better caregiver if you are taking care of yourself.

- Let other people help you. Take advantage of those offers to make a meal, provide a ride, watch the kids, or just give you a break. Let your friends know what they can do.

- Take advantage of the resources that are available. There are many approaches to dealing with the complex issues you may face as a caregiver. You should know what support is there for you and use these resources.

- Understand that caregivers are survivors just as much as patients are. Cancer is life-changing whether you are the patient or the person caring for the patient.
### 9.6 Personal treatment record

#### GENERAL INFORMATION

**PATIENT INFORMATION**

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**PROVIDER INFORMATION**

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#### CLINICAL ASSESSMENT

**TESTS**

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#### CANCER INFORMATION

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#### TUMOR TREATMENT

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<th>End date</th>
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#### SYMPTOM TREATMENT

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#### POST-TREATMENT PLAN

Describe: ____________________________

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*NCCN Guidelines for Patients™: Colon Cancer*  
Version 1.2012  
80
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The NCCN Foundation gratefully acknowledges Teva Pharmaceuticals for their charitable contribution to the printing and distribution of these NCCN Guidelines for Patients™.
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