GUIDE TO COLORECTAL CANCER

Comprehensive, oncologist-approved cancer information from the American Society of Clinical Oncology (ASCO)

www.cancer.net

Made available through:

ASCO Cancer Foundation
ABOUT ASCO
The American Society of Clinical Oncology (ASCO) is the world’s leading professional organization representing physicians of all oncology subspecialties who care for people with cancer.

ABOUT THE CANCER.NET GUIDES TO CANCER
The Cancer.Net Guides to Cancer provide patients with comprehensive, peer-reviewed information based on content from Cancer.Net (www.cancer.net), ASCO’s patient information website. All the information and content on Cancer.Net was developed and approved by the cancer doctors who are members of ASCO, making Cancer.Net an up-to-date and trusted resource for cancer information.

The best cancer care starts with the best cancer information. Well-informed patients are their own best advocates and invaluable partners for physicians. ASCO’s patient education materials are available both in print and online to provide trusted, authoritative information for people living with cancer and those who care for and about them.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>2</td>
</tr>
<tr>
<td>Anatomy of the colon and rectum</td>
<td>2</td>
</tr>
<tr>
<td>About colorectal polyps</td>
<td>2</td>
</tr>
<tr>
<td>Types of colorectal cancer</td>
<td>3</td>
</tr>
<tr>
<td>Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Risk Factors and Prevention</td>
<td>4</td>
</tr>
<tr>
<td>Screening</td>
<td>6</td>
</tr>
<tr>
<td>Recommendations</td>
<td>7</td>
</tr>
<tr>
<td>Symptoms</td>
<td>8</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>9</td>
</tr>
<tr>
<td>Staging</td>
<td>11</td>
</tr>
<tr>
<td>Cancer stage grouping</td>
<td>12</td>
</tr>
<tr>
<td>Treatment</td>
<td>18</td>
</tr>
<tr>
<td>Overview of colorectal cancer treatment</td>
<td>18</td>
</tr>
<tr>
<td>Surgery</td>
<td>19</td>
</tr>
<tr>
<td>Radiation therapy</td>
<td>20</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>21</td>
</tr>
<tr>
<td>Targeted therapy</td>
<td>22</td>
</tr>
<tr>
<td>Advanced colorectal cancer (stage IV; metastatic)</td>
<td>23</td>
</tr>
<tr>
<td>Recurrent colorectal cancer</td>
<td>24</td>
</tr>
<tr>
<td>Clinical Trials Resources</td>
<td>25</td>
</tr>
<tr>
<td>Side Effects</td>
<td>25</td>
</tr>
<tr>
<td>After Treatment</td>
<td>26</td>
</tr>
<tr>
<td>Questions to Ask the Doctor</td>
<td>28</td>
</tr>
</tbody>
</table>

The ideas and opinions expressed in the Guide to Colorectal Cancer do not necessarily reflect the opinions of ASCO or The ASCO Cancer Foundation. The information in this guide is not intended as medical or legal advice, or as a substitute for consultation with a physician or other licensed health care provider. Patients with health care-related questions should call or see their physician or other health care provider promptly, and should not disregard professional medical advice, or delay seeking it, because of information encountered here. The mention of any product, service, or treatment in this guide should not be construed as an ASCO endorsement. ASCO is not responsible for any injury or damage to persons or property arising out of or related to any use of ASCO’s patient education materials, or to any errors or omissions.
OVERVIEW
Colorectal cancer begins when normal cells in the lining of the colon or rectum begin to change and grow uncontrollably, forming a mass called a tumor. A tumor can be benign (noncancerous) or malignant (cancerous, meaning it can spread to other parts of the body). These changes usually take years to develop; however, in some cases, when a person has an inherited syndrome, changes can occur within months to years. Both genetic and environmental factors can cause the changes.

Anatomy of the colon and rectum
The colon and rectum make up the large intestine, which plays an important role in the body’s ability to process waste. The colon makes up the first five to six feet of the large intestine, and the rectum makes up the last six inches, ending at the anus.

The colon has four sections. The ascending colon is the portion that extends from a pouch called the cecum (the beginning of the large intestine into which the small intestine empties) on the right side of the abdomen. The transverse colon crosses the top of the abdomen. The descending colon takes waste down the left side. Finally, the sigmoid colon at the bottom takes waste a few more inches, down to the rectum. Waste leaves the body through the anus.

About colorectal polyps
Colorectal cancer most often begins as a polyp, a noncancerous growth that may develop on the inner wall of the colon and rectum as people get older. If not treated or removed, a polyp can become a potentially life-threatening cancer. Recognizing and removing precancerous polyps can prevent colorectal cancer.

There are several forms of polyps. Adenomatous polyps, or adenomas, are growths that may become cancerous and can be detected with a colonoscopy (see the Risk Factors and Prevention

Anatomical and staging illustrations for many types of cancer are available at www.cancer.net.
Polyps are most easily found during a colonoscopy because they usually bulge into the colon, forming a mound on the wall of the colon that can be detected by the doctor.

About 10% of colon polyps are flat and hard to detect through a colonoscopy, unless a dye is used to highlight them. These flat polyps have a high risk of becoming cancerous, regardless of their size.

**Types of colorectal cancer**

Colorectal cancer can begin in either the colon or the rectum. Cancer that begins in the colon is called colon cancer, and cancer that begins in the rectum is called rectal cancer.

Most colon and rectal cancers are a type of tumor called adenocarcinoma, which is cancer of the cells that line the inside tissue of the colon and rectum. This guide specifically covers adenocarcinoma. Other types of cancer that occur far less frequently but can begin in the colon or rectum include carcinoid tumor, gastrointestinal stromal tumor (GIST), and lymphoma.

Find out more about basic cancer terms used in this section at [www.cancer.net/dictionaryresources](http://www.cancer.net/dictionaryresources).

**STATISTICS**

Colorectal cancer is the third most common cancer among both men and women in the United States. It is also the third most common cause of cancer death among men and women separately (and the second most common cause of cancer death in men and women combined) in the United States.

When colorectal cancer is detected early, it can often be cured. The death rate from this type of cancer has been declining for most of the past 20 years, possibly because more cases are now detected early and treatments have improved.

Survival rates for colorectal cancer can vary based on a variety of factors, particularly the stage. If the cancer is detected at an early, localized stage, the five-year survival rate (the percentage of people who survive at least five years after the cancer is detected, excluding those who die from other diseases) for people with colorectal cancer is 91%. If the cancer has spread to adjacent lymph nodes or organs, the five-year relative survival rate is 70%. If the cancer has spread to distant parts of the body, the five-year relative survival rate is 11%. However, for patients who have just one or a few tumors that have spread from the colon to the lung or liver, surgical removal of these tumors can eliminate the cancer, which greatly improves the five-year survival rate.

Cancer survival statistics should be interpreted with caution. These estimates are based on data from thousands of cases of
this type of cancer in the United States each year, but the actual risk for a particular individual may differ. It is not possible to tell a single individual how long he or she will live with colorectal cancer. Because the survival statistics are measured in five-year intervals, they may not represent advances made in the treatment or diagnosis of this cancer.

Statistics adapted from the American Cancer Society.

**RISK FACTORS AND PREVENTION**

A risk factor is anything that increases a person’s chance of developing cancer. Although risk factors can influence the development of cancer, most do not directly cause cancer. Some people with several risk factors never develop cancer, while others with no known risk factors do. However, knowing your risk factors and communicating them to your doctor may help you make more informed lifestyle and health care choices.

The cause of colorectal cancer is not known, but certain factors appear to increase the risk of developing the disease. The following factors may raise a person’s risk of developing colorectal cancer:

**Adenomatous polyps (adenomas).** Polyps are not cancer, but some types of polyps called adenomas are most likely to develop into colorectal cancer. Polyps can often be completely removed using a tool during a colonoscopy, a test in which a doctor looks through a lighted tube into the colon after the patient has been sedated. Polyp removal can prevent colon cancer. People who have had adenomas have a greater risk of additional polyps and of colon cancer, and they should have follow-up screening tests regularly (see the Screening section).

**Age.** The risk of colorectal cancer increases as people get older. Colorectal cancer can occur in young adults and teenagers, but more than 90% of colorectal cancers occur in people over 50. The average age of diagnosis in the United States is 72.

**Family history of cancer.** Colorectal cancer is more likely to develop in a person whose parents, siblings, or children have had colorectal cancer, particularly if the family member was diagnosed with colorectal cancer before age 60. Members of families with certain uncommon inherited conditions also have a significant increased risk of colorectal cancer; these include familial adenomatous polyposis (FAP), attenuated familial adenomatous polyposis (AFAP), Gardner syndrome, hereditary nonpolyposis colorectal cancer (HNPCC), juvenile polyposis syndrome (JPS), Muir-Torre syndrome, MYH-associated polyposis (MAP), Peutz-Jeghers syndrome (PJS), and Turcot syndrome. Relatives of women with uterine cancer may also be at higher risk. Learn more about the genetics of colorectal cancer at www.cancer.net/genetics.
Inflammatory bowel disease (IBD). People with IBD, such as ulcerative colitis or Crohn’s disease, may develop chronic inflammation of the large intestine, which increases the risk of colon cancer. IBD is not the same as irritable bowel syndrome.

Personal history of certain types of cancer. People with a personal history of colon cancer and women who have had cancer of the ovary or uterus are more likely to develop colon cancer.

Race. Black people have the highest rates of sporadic (non-hereditary) colorectal cancer in the United States, and colon cancer is a leading cause of cancer-related deaths among black people. Black women are more likely to die from colorectal cancer than women from any other racial group, and black men are even more likely to die from colorectal cancer than black women. The reasons for these differences are unclear. Noting that black people are more likely to be diagnosed with colon cancer at a younger age, the American College of Gastroenterology suggests that black people begin screening with colonoscopies at age 45 (see the Screening section for details). Earlier screening may detect colon abnormalities at a more treatable stage.

Physical inactivity and obesity. People who lead an inactive lifestyle (no regular exercise and a lot of sitting) and people who are overweight may have an increased risk of colorectal cancer.

Smoking. Recent studies have shown that smokers are more likely to die from colorectal cancer than nonsmokers.

The following may lower a person’s risk of colorectal cancer:

Nonsteroidal anti-inflammatory drugs (NSAIDs). Some studies suggest that aspirin and other NSAIDs may reduce the development of polyps in people with a history of colorectal cancer or polyps. However, regular use of NSAIDs may result in major side effects, including bleeding of the stomach lining and blood clots leading to stroke or heart attack. Taking aspirin or other NSAIDs cannot be substituted for regular colorectal cancer screening. People should talk with their doctor about the risks and benefits of taking aspirin on a regular basis.

Diet and supplements. A diet rich in fruits and vegetables and low in red meat may help reduce the risk of colon cancer. Some studies have also found that people who take calcium and vitamin D supplements have a lower risk of colorectal cancer.
Screening

Colorectal cancer can often be prevented through regular screening, which can identify precancerous polyps. Talk with your doctor about when screening should begin based on your age and family history of the disease. Although some people should be screened earlier, people of average risk should begin screening at age 50, and black people should start at age 45 (because they are more commonly diagnosed at a younger age). Because most colorectal cancer occurs without symptoms until the disease is advanced, it is important for people to talk with their doctor about the pros and cons of each screening test and how often each test should be given.

People should begin colorectal cancer screening earlier and/or undergo screening more often if they have any of the following colorectal cancer risk factors:

- A personal history of colorectal cancer or adenomatous polyps
- A strong family history of colorectal cancer or polyps (cancer or polyps in a first-degree relative younger than 60 or in two first-degree relatives of any age; a first-degree relative is defined as a parent, sibling, or child).
- A personal history of chronic inflammatory bowel disease
- A family history of hereditary colorectal cancer syndromes (FAP, HNPCC, or other syndromes). Learn more about the genetics of colorectal cancer at www.cancer.net/genetics.

The tests used to screen for colorectal cancer are described below:

**Colonoscopy.** This test allows the doctor to look inside the entire rectum and colon while a patient is sedated. A colonoscope (a flexible, lighted tube) is inserted into the rectum and the entire colon to look for polyps or cancer. During this procedure, a doctor can remove polyps or other tissue for examination (see biopsy in the Diagnosis section). This is the only screening test that allows the removal of polyps, which can also prevent colorectal cancer. Learn more about what to expect during a colonoscopy at www.cancer.net/features.

**Computed tomography (CT or CAT) colonography.** CT colonography (sometimes called virtual colonoscopy) is an investigational screening method offered in some centers. It requires interpretation by a skilled radiologist (a doctor who specializes in obtaining and interpreting medical images) to be used to the best advantage. However, it may be an alternative for people who cannot have a standard colonoscopy due to the risk of anesthesia or a person who has an obstruction in the colon that prevents a full examination.

**Sigmoidoscopy.** A sigmoidoscope (a flexible, lighted tube) is inserted into the rectum and lower colon to check for polyps, cancer, and other abnormalities. During this procedure, a doctor can remove polyps or other tissue for later examination.
If polyps or cancer are detected, a colonoscopy to view the entire colon is recommended. The doctor cannot check the upper part of the colon (ascending and transverse colon) with this test. Learn more about what to expect during a sigmoidoscopy at www.cancer.net/features.

**Fecal occult blood test (FOBT).** This is a test used to detect blood in the feces (stool), which can indicate the presence of polyps or cancer. A positive FOBT test (meaning that blood is found) can be from causes other than a colon polyp or cancer, including bleeding in the stomach or upper GI tract and even ingestion of rare meat or other foods. There are two types of tests: guaiac and immunochemical. Polyps and cancers do not bleed continually, so the FOBT must be done on several stool samples each year and should be repeated each year. Even then, the reduction in deaths from colorectal cancer is fairly small (in the range of 30% if done yearly and 18% if done every other year). Learn more about what to expect during a fecal occult blood test at www.cancer.net/features.

**Double contrast barium enema (DCBE).** For patients who cannot have a colonoscopy, an enema containing barium is given, which helps the outline of the colon and rectum stand out on x-rays. A series of x-rays is then taken of the colon and rectum. In general practice, most doctors would recommend other screening tests because a barium enema has a lower likelihood of detecting precancerous polyps than a colonoscopy, sigmoidoscopy, or CT colonography. Learn more about what to expect during a barium enema at www.cancer.net/features.

**Stool DNA tests.** This test analyzes the DNA from a person’s stool sample to look for cancer. It uses changes in the DNA that occur in polyps and cancers to determine whether a colonoscopy should be done.

**Recommendations**

Different organizations have made different recommendations for colorectal cancer screening. Talk with your doctor about the best test and time between tests based on your health history and personal cancer risk.

The American Gastroenterological Association, the American College of Gastroenterology, the American Society for Gastrointestinal Endoscopy, the American Cancer Society, and the American College of Radiology have developed consensus guidelines for screening for colorectal cancer, with the goal of cancer prevention.

Beginning at age 50, both men and women of average risk should follow one of these testing schedules.

The following tests detect both polyps and cancer:

- Flexible sigmoidoscopy, every five years
- Colonoscopy, every 10 years
• DCBE, every five years
• CT colonography, every five years

These tests primarily detect cancer:
• Guaiac-based FOBT, every year
• Fecal immunochemical test, every year
• Stool DNA test, as often as your doctor recommends

The U.S. Preventative Services Task Force (USPSTF) also has guidelines for colon cancer screening, which differ somewhat from those mentioned above. The USPSTF recommends one of the following testing methods:
• A high-sensitivity FOBT, every year
• Sigmoidoscopy, every five years, with FOBT testing between tests
• Colonoscopy, every 10 years

In addition, this task force did not think there was enough evidence of benefit or harm to recommend virtual colonography and fecal DNA testing.

According to the USPSTF, adults between ages 76 and 85 should not have routine screening, because the risks outweigh the benefits, and adults older than 85 can forgo colorectal cancer screening.

It is important to note that, regardless of the screening test and schedule, any test that indicates an abnormality should be followed up with a colonoscopy.

**SYMPTOMS**

By being alert to the symptoms of colorectal cancer, it may be possible to detect the disease early, when it is most likely to be treated successfully. However, many people with colorectal cancer do not have any symptoms until the disease is advanced, so people need to be screened regularly. People with colorectal cancer may experience the following symptoms or signs. It is also possible that these symptoms may be caused by a medical condition that is not cancer.

This is particularly true for the general symptoms of abdominal discomfort, bloating, and irregular bowel movements. Talk with your doctor if these symptoms last for several weeks or become more severe. And talk with your doctor if you are concerned about any symptom or sign on this list and ask to schedule a colonoscopy to find the underlying reason(s).
• A change in bowel habits
• Diarrhea, constipation, or feeling that the bowel does not empty completely
• Bright red or very dark blood in the stool
• Stools that look narrower or thinner than normal
• Discomfort in the abdomen, including frequent gas pains, bloating, fullness, and cramps
• Weight loss with no known explanation
• Constant tiredness or fatigue
• Unexplained iron-deficiency anemia (low number of red blood cells)

Since colon cancer can occur in people younger than the recommended screening age and in older people between screenings, anyone at any age who experiences these symptoms should be evaluated by a doctor to determine if he/she should have a colonoscopy.

**DIAGNOSIS**

Doctors use many tests to diagnose cancer and to find out if it has metastasized (spread). Some tests may also determine which treatments may be the most effective. For most types of cancer, a biopsy is the only way to make a definitive diagnosis of cancer. If a biopsy is not possible, the doctor may suggest other tests that will help make a diagnosis. Imaging tests may be used to find out whether the cancer has metastasized. Your doctor may consider these factors when choosing a diagnostic test:

- Age and medical condition
- The type of cancer suspected
- Severity of symptoms
- Previous test results

In addition to a physical examination, the following tests may be used to diagnose colorectal cancer. The doctor will also ask about the person’s medical and family history.

**Colonoscopy.** As described in Screening, this test allows the doctor to look inside the entire rectum and colon while a patient is sedated. A colonoscopist is a doctor who specializes in performing this test. If colorectal cancer is present, a complete diagnosis that accurately describes the location and spread of the cancer may not be possible until the tumor is surgically removed.

**Biopsy.** A biopsy is the removal of a small amount of tissue for examination under a microscope. Other tests can suggest that cancer is present, but only a biopsy can make a definite diagnosis of colorectal cancer. The sample removed from the biopsy is analyzed by a pathologist (a doctor who specializes in interpreting laboratory tests and evaluating cells, tissues, and organs to diagnose disease). A biopsy may be performed during a colonoscopy, or it may be done on any tissue that is removed.
during surgery. Sometimes, a CT scan or ultrasound is used to perform a needle biopsy (removing tissue through the skin with a needle that is guided into the tumor).

**Blood tests.** Because colorectal cancer often bleeds into the large intestine or rectum, people with the disease may become anemic. A test of the number of red cells in the blood, which is part of a complete blood count (CBC), can indicate that bleeding may be occurring.

Another blood test detects the levels of a protein called carcinoembryonic antigen (CEA). High levels of CEA may indicate that a cancer has spread to other parts of the body. CEA is not an absolute test for colorectal cancer because it is elevated in only about 60% of people with colorectal cancer that has spread to other organs from the colon. In addition, other medical conditions can cause a rise in CEA. CEA tests are most often used to monitor patients already being treated for colorectal cancer and are not screening tests. Learn more about tumor markers for colorectal cancer at www.cancer.net/whattoknow.

**CT scan.** A CT scan creates a three-dimensional picture of the inside of the body with an x-ray machine. A computer then combines these images into a detailed, cross-sectional view that shows any abnormalities or tumors. Sometimes, a contrast medium (a special dye) is injected into a patient’s vein to provide better detail. In a person with colon cancer, a CT scan can check for the spread of cancer in the lungs, liver, and other organs. It is often done before surgery (see the Treatment section).

**Ultrasound.** Ultrasound is a procedure that uses sound waves to create a picture of the internal organs to tell if cancer has spread. Endorectal ultrasound is commonly used to determine the depth of penetration of rectal cancer and can be used to help plan treatment; however, this test cannot accurately detect metastatic lymph nodes (cancer that has spread to nearby lymph nodes) or metastatic disease beyond the pelvis. Ultrasound can also be used to view the liver, although CT scans or MRIs are preferred because of their greater sensitivity for finding tumors in the liver.

**X-ray.** An x-ray is a picture of the inside of the body. For instance, a chest x-ray can help doctors determine if the cancer has spread to the lungs.

**Positron emission tomography (PET) scan.** A PET scan is a way to create pictures of organs and tissues inside the body. A small amount of a radioactive substance is injected into a patient’s body. This substance is absorbed mainly by organs and tissues that use the most energy. Because cancer tends to use energy actively, it absorbs more of the radioactive substance. A scanner then detects this substance to produce images of the inside of the body.
Learn more about what to expect when having common tests, procedures, and scans at www.cancer.net/tests.

Find out more about common terms used during a diagnosis of cancer at www.cancer.net/dictionaryresources.

STAGING

Staging is a way of describing a cancer, such as where it is located, whether or where it has spread, and whether it is affecting the functions of other organs in the body. Doctors use diagnostic tests to determine the cancer’s stage, so staging may not be complete until all of the tests are finished. Knowing the stage helps the doctor to decide what kind of treatment is best and can help predict a patient’s prognosis (chance of recovery). There are different stage descriptions for different types of cancer.

One tool that doctors use to describe the stage is the TNM system. This system uses three criteria to judge the stage of the cancer: the tumor itself, the lymph nodes around the tumor, and if the tumor has spread to other parts of the body. The results are combined to determine the stage of cancer for each person. There are five stages: stage 0 (zero) and stages I through IV (one through four). The stage provides a common way of describing the cancer, so doctors can work together to plan the best treatments.

TNM is an abbreviation for tumor (T), node (N), and metastasis (M). Doctors look at these three factors to determine the stage of cancer:

• How deeply has the primary (first) tumor penetrated the bowel lining? (Tumor, T)
• Has the tumor spread to the lymph nodes? (Node, N)
• Has the cancer metastasized to other parts of the body? (Metastasis, M)

Tumor. Using the TNM system, the “T” plus a letter or number (0 to 4) is used to describe how deeply the primary tumor has penetrated the bowel lining. Some stages are also divided into smaller groups that help describe the tumor in even more detail.

Node. The “N” in the TNM system stands for lymph nodes. The lymph nodes are tiny, bean-shaped organs that are located throughout the body that help the body fight infections as part of the body’s immune system. There are regional lymph nodes (lymph nodes near the colon and rectum). All others are distant lymph nodes (lymph nodes found in other parts of the body).

Distant metastasis. The “M” in the TNM system describes cancer that has spread to other parts of the body (such as the liver or lungs).

For specific information on substages for T, N, and M, visit cancer.net/colorectal.
Cancer stage grouping
Doctors assign the stage of the cancer by combining the T, N, and M classifications.

Stage 0: Refers to cancer in situ. The cancer cells are only in the mucosa (the inner lining) of the colon or rectum. Most colorectal cancers at this stage can be treated by polypectomy (removal of the mass of tissue that develops on the inside wall).

Stage I: The cancer has grown through the mucosa and has invaded the muscular layer of the colon or rectum. It has not spread into nearby tissue or lymph nodes (T1 or T2, N0, M0).

Stage IIA: The cancer has grown through the wall of the colon or rectum and has not spread to nearby tissue or to the nearby lymph nodes (T3, N0, M0).

Stage IIB: The cancer has grown through the layers of the muscle to involve the lining of the abdomen (visceral peritoneum). It has not spread to the nearby lymph nodes or elsewhere (T4a, N0, M0).
Illustration of colorectal cancer at stage IIA.

Illustration of colorectal cancer at stage IIB.

Illustration of colorectal cancer at stage IIC.
Illustration of colorectal cancer at stage IIIB, group 1.
Illustration of colorectal cancer at stage IIIB, group 2.

Illustration of colorectal cancer at stage IIIB, group 3.

Illustration of colorectal cancer at stage IIIC, group 1.
Illustration of colorectal cancer at stage IIIC, group 2.

Illustration of colorectal cancer at stage IIIC, group 3.

Illustration of colorectal cancer at stage IVA.
Illustration of colorectal cancer at stage IVB.

Anatomical and staging illustrations for many types of cancer are available at www.cancer.net.

**Stage IIC:** The tumor has spread through the wall of the colon or rectum and has invaded neighboring structures. It has not spread to the nearby lymph nodes or elsewhere (T4b, N0, M0).

**Stage IIIA:** The cancer has grown through the inner lining or into the muscle layers of the intestine and spread to one to three lymph nodes, or to a nodule of tumor in tissues around the colon or rectum that do not appear to be lymph nodes but has not spread to other parts of the body (T1 or T2, N1 or N1c, M0; or T1, N2a, M0).

**Stage IIIB:** The cancer has grown through the bowel wall or to surrounding organs and into one to three lymph nodes or to a nodule of tumor in tissues around the colon or rectum that do not appear to be lymph nodes but has not spread to other parts of the body (T3 or T4a, N1 or N1c, M0; T2 or T3, N2a, M0; or T1 or T2, N2b, M0).

**Stage IIIC:** The cancer, regardless of the depth of invasion in the wall of the colon, has spread to four or more lymph nodes, but not to other distant parts of the body (T4a, N2a, M0; T3 or T4a, N2b, M0; or T4b, N1 or N2, M0).

**Stage IVA:** The cancer has metastasized to a single distant part of the body, such as the liver or lungs (any T, any N, M1a).

**Stage IVB:** The cancer has metastasized to multiple parts of the body (any T, any N, M1b).

**Recurrent:** Recurrent cancer is cancer that has come back after treatment. The disease may be found in the colon, rectum, or in another part of the body.

**Tumor grade.** Doctors may also use the term “grade,” which describes how much the tumor appears like normal tissue. The
grade of a cancer can help the doctor predict how quickly the cancer might grow. In cancer that resembles normal tissue, doctors can clearly see different types of cells grouped together (called well differentiated). In a higher-grade cancer, the cancer cells usually look less like normal cells, or “wilder” (called poorly differentiated or undifferentiated). In general, a better-differentiated tumor (the lower grade) means a better prognosis.

GX: The tumor grade cannot be identified.

G1: The cells are well differentiated.

G2: The cells are moderately differentiated.

G3: The cells are poorly differentiated.

G4: The cells are undifferentiated.


TREATMENT

The treatment of colorectal cancer depends on the size and location of the tumor, whether the cancer has spread, and the person’s overall health. In many cases, a team of specialists, including a gastroenterologist (a doctor who specializes in the function and disorders of the gastrointestinal tract), surgeon, medical oncologist, and radiation oncologist, will work with the patient to determine the best treatment plan.

This section outlines treatments that are the standard of care (the best treatments available) for colorectal cancer. Patients are also encouraged to consider clinical trials as a treatment option when making treatment plan decisions. A clinical trial is a research study to test a new treatment to prove it is safe, effective, and possibly better than standard treatment. Your doctor can help you review all treatment options. For more information, see the Clinical Trials section.

Overview of colorectal cancer treatment

This section provides a brief overview of standard treatment of colon and rectal cancer by stage. Details about each treatment option follow this section.

The usual treatment of stage 0 cancer in situ is a simple polypectomy during a colonoscopy. There is no additional surgery unless the polyp is unable to be fully removed by polypectomy.

If the cancer is stage I, surgical removal of the tumor and lymph nodes is usually the only treatment necessary.
Patients with stage II colon cancer, which involves deeper penetration of the bowel lining without involving the regional lymph nodes, are advised to talk with their doctor about the need for further treatment after surgery, as some patients are treated with adjuvant chemotherapy. This is treatment after surgery with chemotherapy aimed at trying to destroy any remaining cancer cells. However, cure rates for surgery alone are quite good, and the benefits of additional treatment are still uncertain for people with this stage of colon cancer. Learn more about adjuvant therapy for stage II colorectal cancer at www.cancer.net/whattoknow. A clinical trial is also an option after surgery. Additional drugs are being investigated in clinical trials.

If the cancer is stage III and has spread to nearby lymph nodes, the treatment usually involves surgical removal of the tumor followed by adjuvant chemotherapy. A clinical trial is also an option.

For patients with stage II or III rectal cancer, radiation therapy is usually offered in combination with chemotherapy, either before or after surgery.

At stage IV, it is usually not recommended that patients have surgery to remove the primary tumor in the colon, unless the tumor is causing physical problems, such as bleeding or blocking the intestines. Standard treatment includes chemotherapy along with a targeted treatment. If possible, surgery to remove metastases (areas where cancer has spread) may also be done. Generally, such surgery is possible if there are a limited number of spots to where the tumor has spread.

Descriptions of the most common treatment options for colorectal cancer are listed below.

**Surgery**
The most common treatment for colorectal cancer is surgery to remove the tumor, called surgical resection. Part of the healthy colon or rectum and nearby lymph nodes will also be removed. While both general surgeons and specialists may perform colorectal surgery, many people consult specialists who have additional training and experience in colorectal surgery. A surgical oncologist is a doctor who specializes in treating cancer using surgery, and a colorectal surgeon has additional training beyond general surgery.

Some patients may be able to undergo laparoscopic colorectal cancer surgery. With this technique, several viewing scopes are passed into the abdomen while a patient is under anesthesia. The incisions are smaller and the recovery time is often shorter than with standard colon surgery. Laparoscopic surgery is as effective as conventional colon surgery in removing the cancer. Surgeons who perform laparoscopic surgery have been specially trained in that technique.
Less often, a person with rectal cancer may need to have a colostomy. This is a surgical opening, or stoma, through which the colon is connected to the abdominal surface to provide a pathway for waste to exit the body; such waste is collected in a pouch worn by the patient. Sometimes, the colostomy is only temporary to allow the rectum to heal, but it may be permanent. With modern surgical techniques and the use of radiation therapy and chemotherapy before surgery, most people treated for rectal cancer do not require a permanent colostomy.

Some patients may be candidates for surgery on the liver or lungs to remove tumors that have spread to those organs. An alternative is to use radiofrequency ablation (RFA; energy in the form of radiofrequency waves to heat the tumors). Not all liver or lung tumors can be treated with this approach. In some cases, RFA can be done through the skin. In other cases, RFA can be done during surgery. While this can allow preservation of liver and lung tissue that might be removed in a regular surgical resection, there is also a chance that some portions of the tumor will not be destroyed using this technique.

In general, the side effects of surgery include pain and tenderness in the area of the operation. The operation may also cause constipation or diarrhea, which usually goes away after a while. People who receive a colostomy may have irritation around the stoma. The doctor, nurse, or a specialist in colostomy management (called an enterostomal therapist) can teach the patient how to clean the area and prevent infection. Many people require retraining of the bowel after surgery; this may require some time and assistance. People should talk with their doctor if they do not regain good control of bowel function.

Learn more about cancer surgery at www.cancer.net/features.

**Radiation therapy**

Radiation therapy is the use of high-energy x-rays to kill cancer cells and is commonly used for treating rectal cancer because this tumor tends to recur locally. A doctor who specializes in giving radiation therapy to treat cancer is called a radiation oncologist. A radiation therapy regimen (schedule) usually consists of a specific number of treatments given over a specific time.

External-beam radiation therapy uses a machine to deliver x-rays to the site of the body where the cancer is located. Radiation treatment is given five days a week for several weeks and may be given in the doctor’s office or at the hospital.

In some cases, specialized radiation therapy techniques, such as intraoperative radiation therapy (a high, single dose of radiation therapy given during surgery) or brachytherapy (placing
radioactive “seeds” inside the body), may help eliminate small areas of tumor that could not be removed during surgery. In one type of brachytherapy with a product called SIR-Spheres, tiny amounts of yttrium-90 (a radioactive substance) are injected into the liver to treat colorectal cancer that has spread to the liver in cases when surgery is not an option. While limited information is available about how effective this approach is, some studies suggest that it may help slow the growth of cancer cells.

For rectal cancer, radiation therapy may be used before surgery (called neoadjuvant therapy) to shrink the tumor so that it is easier to remove or after surgery to destroy any remaining cancer cells, as both have shown value in treating this disease. One recent study found that pre-operative radiation therapy in combination with chemotherapy showed greater benefit compared with the same radiation therapy and chemotherapy given after surgery. The main benefits included a lower rate of the tumor coming back in the area where it started, fewer patients that needed permanent colostomies, and fewer problems with scarring of the bowel in the area where the radiation therapy was administered. Chemotherapy is often given at the same time as radiation therapy (called chemoradiation therapy) to increase the effectiveness of the radiation therapy. Chemoradiation therapy is often used in rectal cancer before surgery to avoid colostomy or reduce the chance that the cancer will recur.

Side effects from radiation therapy may include fatigue, mild skin reactions, upset stomach, and loose bowel movements. It may also cause bloody stools (bleeding through the rectum) or bowel obstruction. Most side effects go away soon after treatment is finished.

Sexual problems, as well as infertility (the inability to have a child) in both men and women, may occur after radiation therapy to the pelvis. Before treatment begins, talk with your doctor about the possible sexual and fertility-related side effects of your treatment and the available options for preserving fertility.

Learn more about radiation therapy at www.cancer.net/features.

**Chemotherapy**
Chemotherapy is the use of drugs to kill cancer cells. Systemic chemotherapy is delivered through the bloodstream, targeting cancer cells throughout the body. Chemotherapy is usually given by a medical oncologist, a doctor who specializes in treating cancer with medication. Some people may receive chemotherapy in their doctor’s office or outpatient clinic; others may go to the hospital. A chemotherapy regimen (schedule) usually consists of a specific number of cycles given over a specific time. Chemotherapy for colorectal cancer is usually injected directly into a vein, although some chemotherapy can be given as a pill.
Chemotherapy may be given after surgery to eliminate any remaining cancer cells. In some situations, for rectal cancer, a doctor will give chemotherapy and radiation therapy before surgery to reduce the size of a rectal tumor and lower the chance of cancer returning.

Currently, seven drugs are approved for the treatment of colorectal cancer in the United States. Your doctor may recommend one or several of them at various times during treatment. These drugs are fluorouracil (5-FU, Adrucil), capecitabine (Xeloda), irinotecan (Camptosar), oxaliplatin (Eloxatin), bevacizumab (Avastin), cetuximab (Erbitux), and panitumumab (Vectibix). (These last three are described under “Targeted therapy” below.) Many new drugs are in the process of being tested and may provide additional future options for treatment. Some common treatments are:

- 5-FU
- 5-FU with leucovorin, a vitamin that improves the effectiveness of 5-FU
- Capecitabine, an oral form of 5-FU
- 5-FU with leucovorin and oxaliplatin (FOLFOX)
- 5-FU with leucovorin and irinotecan (FOLFIRI)
- Irinotecan alone
- Capecitabine with either irinotecan or oxaliplatin
- Any of the above with either cetuximab or bevacizumab

The most common chemotherapy given for colorectal cancer may cause vomiting, nausea, diarrhea, or mouth sores. However, medications to prevent these side effects are available. Because of the way drugs are given, these side effects are less problematic than they have been in the past for most patients. In addition, patients may be unusually tired, and there is an increased risk of infection. Neuropathy (tingling or numbness in feet or hands) may also occur with some drugs. Hair loss is an uncommon side effect with the drugs used to treat colorectal cancer. Medications are available to ease most side effects, including nausea, neuropathy, and diarrhea. Most side effects usually go away once treatment is finished. If side effects are particularly difficult, the dose of drug may be lowered or a treatment session may be postponed. Patients should talk with their health care team to understand when to call their doctor about side effects. Read more about managing side effects at www.cancer.net/sideeffects.

Learn more about chemotherapy and preparing for treatment at www.cancer.net/features. The medications used to treat cancer are continually being evaluated. Talking with your doctor is often the best way to learn about the medications prescribed for you, their purpose, and their potential side effects or interactions with other medications. Learn more about your prescriptions by using searchable drug databases at www.cancer.net/druginforesources.

**Targeted therapy**

Targeted therapy is a treatment that targets specific genes, proteins, or the tissue environment that contributes to cancer
growth and survival. These drugs are becoming more important in the treatment of colorectal cancer.

**Anti-angiogenesis therapy.** Some of the first targeted treatments focused on stopping angiogenesis, the process of making new blood vessels. Because a tumor needs the nutrients found in blood vessels to grow and spread, the goal of anti-angiogenesis therapies is to “starve” the tumor. One such therapy is bevacizumab, a specialized drug, called a monoclonal antibody, made in a laboratory. When given with chemotherapy, bevacizumab improves survival for people with advanced colorectal cancer. In 2004, the U.S. Food and Drug Administration (FDA) approved bevacizumab along with chemotherapy for the first-line treatment of patients with advanced colorectal cancer. Recent studies have shown it also to be effective as second-line therapy along with chemotherapy.

**Epidermal growth factor receptor (EGFR) inhibitors.**
Researchers have found that drugs that block EGFR may be effective in shrinking or stabilizing the growth of colorectal cancer. Cetuximab and panitumumab are monoclonal antibodies that block EGFR. Cetuximab is an antibody made from mouse cells that still has some of the mouse structure. Panitumumab is entirely made from human proteins and is less likely to cause an allergic reaction than cetuximab.

Recent studies show that cetuximab and panitumumab are not effective in patients with tumors that have specific mutations (changes) to a gene called KRAS. ASCO released a provisional clinical opinion recommending that all patients with metastatic colorectal cancer who may receive anti-EFGR therapy, such as cetuximab and panitumumab, have their tumors tested for KRAS gene mutations. If a patient’s tumor has a mutated form of the KRAS gene, ASCO recommends against the use of anti-EFGR antibody therapy. Furthermore, the FDA now recommends that both cetuximab and panitumumab only be given to patients with tumors with non-mutated (sometimes called wild type) KRAS genes.

Research is underway to determine what role cetuximab and panitumumab might play in patients with metastatic colorectal cancer who’ve had surgery and who have not previously been given chemotherapy. Learn more about targeted treatments at www.cancer.net/features.

In terms of side effects, targeted treatments can cause a rash to the face and upper body, which can be prevented or reduced with various treatments. Find out more about skin reactions to targeted therapies at www.cancer.net/sideeffects.

**Advanced colorectal cancer (stage IV; metastatic)**
Colorectal cancer can spread to distant organs, such as the liver, lungs, peritoneum (the tissue lining the abdomen), or a woman’s...
ovaries. A combination of surgery, radiation therapy, and chemotherapy can be used to slow the spread of the disease and, in many cases, can temporarily shrink a cancerous tumor.

With metastatic colorectal cancer, it is particularly important to talk with doctors who are experienced in treating this disease. There can be different opinions in how to treat colorectal cancer, particularly about which combination of treatments to use. Patients are encouraged to seek a second opinion before starting treatment because they should be comfortable with the treatment plan they choose and should ask about clinical trials. Often surgeons, radiation oncologists, radiologists, and medical oncologists will work together to use various treatments over time. When these individuals work closely together they are referred to as a multidisciplinary team. Bringing the different skills of all of these doctors together can result in better care for the patient.

At this stage, surgery to remove the portion of the colon where the cancer started usually cannot cure the cancer, but it can help relieve blockage of the colon or other complications, if they occur. Surgery may also be used to remove parts of other organs that contain cancer (called resection) and can cure some people if a limited amount of cancer spreads to a single organ, such as the liver or lung.

In colon cancer, if spread is limited to the liver and if liver resection (surgery) is possible—either before or after chemotherapy—the patient has a chance of complete cure. Even in cases when cure is not possible, surgery may add months or even years to an individual’s life. Determining who can benefit from surgery in this setting is often a complicated process that involves collaboration between doctors of multiple specialties.

Chemotherapy and radiation therapy at this stage can rarely cure cancer, but they may help to relieve pain and other symptoms (called palliative care) and prolong survival. Clinical trials that test new treatments may also be an option.

**Recurrent colorectal cancer**

Treatment of recurrent cancer depends on where the cancer is located and the person’s overall health. Generally, the treatment options for recurrent cancer are the same as those for metastatic cancer (see above) and include surgery, radiation therapy, and chemotherapy. Clinical trials of investigational treatments may also be an option.

Find out more about common terms used during cancer treatment at www.cancer.net/dictionaryresources.
CLINICAL TRIALS RESOURCES
Doctors and scientists are always looking for better ways to treat patients with colorectal cancer. A clinical trial is a way to test a new treatment to prove that it is safe, effective, and possibly better than a standard treatment. The clinical trial may be evaluating a new drug, a new combination of existing treatments, a new approach to radiation therapy or surgery, or a new method of treatment or prevention. Patients who participate in clinical trials are among the first to receive new treatments before they are widely available. However, there is no guarantee that the new treatment will be safe, effective, or better than a standard treatment. Clinical trials to test new ways of preventing and screening for colorectal cancer are also available.

Patients decide to participate in clinical trials for many reasons. For some patients, a clinical trial is the best treatment option available. Because standard treatments are not perfect, patients are often willing to face the added uncertainty of a clinical trial in the hope of a better result. Other patients volunteer for clinical trials because they know that this is the only way to make progress in treating colorectal cancer, such as finding new drugs. Even if they do not benefit directly from the clinical trial, their participation may benefit future patients with colorectal cancer.

Sometimes people have concerns that, by participating in a clinical trial, they may receive no treatment by being given a placebo or a “sugar pill.” The use of placebos in cancer clinical trials is rare. When a placebo is used in a study, it is done with the full knowledge of the participants. Find out more about placebos in cancer clinical trials at www.cancer.net/features.

To join a clinical trial, patients must participate in a process known as informed consent. During informed consent, the doctor should list all of the patient’s options, so the person understands how the new treatment differs from the standard treatment. The doctor must also list all of the risks of the new treatment, which may or may not be different from the risks of standard treatment. Finally, the doctor must explain what will be required of each patient in order to participate in the clinical trial, including the number of doctor visits, tests, and the schedule of treatment. Learn more about clinical trials, including patient safety, phases of a clinical trial, deciding to participate in a clinical trial, questions to ask the research team, and links to find cancer clinical trials at www.cancer.net/clinicaltrials.

For specific topics being studied for colorectal cancer, learn more in the Current Research section at www.cancer.net/colorectal.

SIDE EFFECTS
Cancer and its treatment can cause a variety of side effects. However, doctors have made major strides in recent years in reducing pain, nausea and vomiting, and other physical side effects of cancer treatments. Many treatments used today are
less intensive but as effective as treatments used in the past. Doctors also have many ways to provide relief to patients when such side effects do occur.

Fear of treatment side effects is common after a diagnosis of cancer, but it may be helpful to know that preventing and controlling side effects is a major focus of your health care team. Before treatment begins, talk with your doctor about possible side effects of the specific treatments you will be receiving.

The specific side effects that can occur depend on a variety of factors, including the type of cancer, its location, the individual treatment plan (including the length and dosage of treatment), and the person’s overall health. Common side effects for each treatment option for colorectal cancer are described in detail within the Treatment section.

Ask your doctor which side effects are most likely to happen (and which are not), when side effects are likely to occur, and how they will be addressed by the health care team if they do happen. Also, be sure to communicate with the doctor about side effects you experience during and after treatment. Learn more about the most common side effects of cancer and different treatments, along with ways to prevent or control them at www.cancer.net/sideeffects.

In addition to physical side effects, there may be psychosocial (emotional and social) effects as well. Learn more about the importance of addressing such needs, including concerns about managing the cost of your cancer care at www.cancer.net/patientcare and www.cancer.net/managingcostofcare.

Learn more about late effects or long-term side effects by reading the After Treatment section or talking with your doctor.

**AFTER TREATMENT**

After treatment for colorectal cancer ends, talk with your doctor about developing a follow-up care plan. This plan may include regular physical examinations and/or medical tests to monitor your recovery for the coming months and years. Get specific recommendations for follow-up care for colorectal cancer at www.cancer.net/whattoknow. In addition, ASCO offers cancer treatment summary forms to help keep track of the colorectal cancer treatment you received and develop a survivorship care plan once treatment ends at www.cancer.net/treatmentsummaries.
People recovering from colorectal cancer are encouraged to follow established guidelines for good health, such as maintaining a healthy weight, not smoking, eating a balanced diet, and having recommended cancer screening tests. Talk with your doctor to develop a plan that is best for your needs. Moderate exercise can help rebuild your strength and energy level. Your doctor can help you create a safe exercise plan based upon your needs, physical abilities, and fitness level. Learn more about healthy living after cancer at www.cancer.net/features.

Find out more about common terms used after cancer treatment is complete at www.cancer.net/dictionaryresources.
QUESTIONS TO ASK THE DOCTOR

Regular communication with your doctor is important in making informed decisions about your health care. Consider asking the following questions of your doctor:

- Where exactly is the cancer located?
- What are my treatment options based on my diagnosis?
- What clinical trials are open to me?
- What treatment option do you recommend? Why?
- What other tests will I have before surgery?
- Can you describe the surgery I will be having?
- What are you planning to remove during surgery (the colon, rectum, lymph nodes)?
- Is a biopsy part of the surgery?
- How soon after surgery will I have all test results and a firm diagnosis?
- Do you think I may need a temporary or permanent colostomy?
- How will my pain be controlled after surgery?
- What is my diagnosis based on the results of surgery and biopsy reports, in TNM format?
- Can you explain my pathology report (laboratory test results) to me?
- What is my prognosis?
- What additional treatment do you recommend? Why?
- What is the goal of each treatment?
- What are the risks and possible side effects of treatment, both in the short term and the long term?
- How will this treatment affect my daily life? Will I able to work, exercise, and perform my usual activities?
- How long will it be before I can go back to work after surgery? Can I work during chemotherapy?
- If I’m worried about managing the costs related to my cancer care, who can help me with these concerns?
- What follow-up tests will I need, and how often will I need them?
- What support services are available to me? To my family?

For rectal cancer:
- Should I have radiation therapy and chemotherapy before my rectal cancer surgery?

Patient Information Resources

Find organizations that offer information for colorectal cancer at www.cancer.net/support.
Dear Partner in the Fight Against Colorectal Cancer,

We know in the wake of a cancer diagnosis, knowledge is power. That’s why The ASCO Cancer Foundation® brings you resources developed through the expertise of the world’s leading cancer doctors. We support breakthrough research, education, and cancer care programs—so you can be more informed, ask better questions, get involved, and be empowered.

The Foundation’s charitable mission is founded upon four core tenets: (1) research is at the heart of progress against cancer; (2) cutting-edge knowledge is essential when it comes to treating people with cancer; (3) getting good cancer care starts with getting good cancer information; and (4) all people with cancer deserve access to the best possible care.

Since 1984, The ASCO Cancer Foundation Grants Program has awarded more than $67 million in grants to more than 800 clinical researchers. We are pleased to be able to increase our grants opportunities each year, but we always have more fundable grant applications than we are able to support.

The ASCO Cancer Foundation is also proud to provide support for ASCO’s patient information resources including the award-winning website: Cancer.Net (www.cancer.net). Cancer.Net was developed and approved by the cancer doctors at ASCO, making it an up-to-date and trusted resource for cancer information on the Internet.

If you are a current supporter of The ASCO Cancer Foundation, thank you! For those of you who have not partnered with The ASCO Cancer Foundation before, we invite you to join us now in making a world of difference in cancer care.

Warmest regards,

Nancy R. Daly, MS, MPH
Executive Director
The ASCO Cancer Foundation

The ASCO Cancer Foundation® is a four-star charity, as rated by Charity Navigator. To learn more or support the work of the Foundation, please visit our website: www.ascocancerfoundation.org or call us at 571-483-1700.