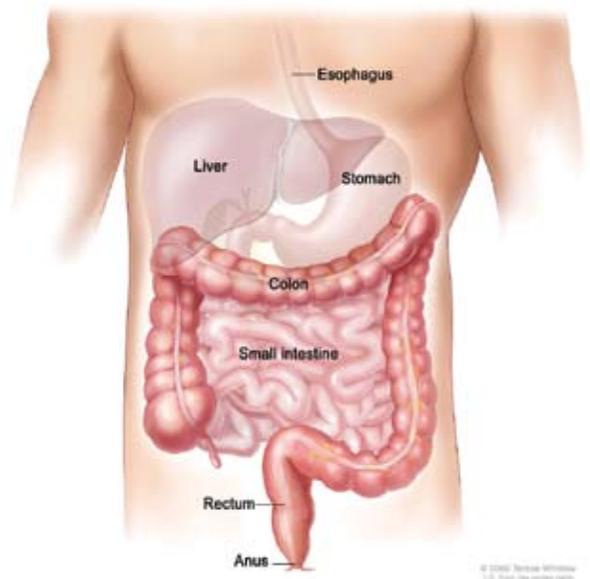


## THE COLON AND RECTUM

### THE COLON AND RECTUM

The colon and rectum, which together form the large bowel, perform vital functions in the last phases of digestion.

Digestion first begins in the mouth where food is chewed into smaller pieces and swallowed. The food travels down the esophagus to the stomach where it is further broken down by gastric juices and sent to the small intestine. The small intestine continues to break down the contents in addition to absorbing most of the nutrients, including carbohydrates, proteins and vitamins. Once the contents have passed through the small intestine, the material has become mostly liquid and is moved into the colon, which measures about 5 1/2 feet long. The main function of the colon is to absorb water and dehydrate the leftover material, forming semi-solid matter, or stool. The colon moves the stool into the approximately 6-inch long rectum, which acts as a holding chamber, until it is ready to be expelled through the anus.



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## COLORECTAL CANCER

### WHAT IS COLORECTAL CANCER?

Because colon and rectal cancers arise from the same type of cell and have many similarities, they are often referred to collectively as “colorectal cancer”.

The cells lining the colon or rectum can sometimes become abnormal and divide rapidly. These cells can form benign (non-cancerous) tumours or growths called polyps. Although not all polyps will develop into colorectal cancer, colorectal cancer almost always develops from a polyp. Over a period of many years, a polyp’s cells may undergo a series of DNA mutations that cause them to become malignant (cancerous). At first these cancer cells are contained on the surface of a polyp, but can grow into the wall of the colon or rectum where they can gain access to blood and lymph vessels. Once this happens, the cancer can spread to lymph nodes and other organs such as the liver or lungs—this process is called metastasis. The cancer replaces normal, healthy tissue, leading to its destruction.

### SIGNS AND SYMPTOMS

The symptoms of colorectal cancer are unspecific, meaning they can be caused by a number of different conditions. Often symptoms don’t appear until the later stages of the disease.

The following symptoms MAY indicate colorectal cancer and should be evaluated by a doctor:

- Prolonged diarrhea or constipation
- Narrower-than-normal stools
- Blood in stool
- Loss of appetite, unexplained weight loss
- Feeling that the bowel does not completely empty
- Fatigue, anemia
- Nausea, vomiting
- Abdominal pain or discomfort

## DIAGNOSIS

### DIAGNOSIS – TESTS FOR COLORECTAL CANCER

If a doctor suspects a patient may have colorectal cancer, he/she will take a complete medical history, perform a physical exam (which may include a rectal exam) and arrange for tests to determine if the disease is present.

These tests may include the following:

### FECAL OCCULT BLOOD TEST / FECAL IMMUNOCHEMICAL TEST

Blood vessels at the surface of colorectal cancers and polyps are often very fragile and can become damaged with the passage of feces, releasing an amount of blood too small to be seen with the naked eye. A fecal occult blood test (FOBT) can detect occult (hidden) blood in feces. This test is done at home by the patient and involves taking samples from three separate bowel movements and smearing them onto a collection card which is sent to a laboratory for evaluation. If an FOBT is positive for blood, it should always be followed up with the internal examination test, colonoscopy (see next page), to determine the cause of bleeding. A newer, less widely used test for detecting blood in the stool is called a fecal immunochemical test (FIT). An FOBT can give positive results for any blood present in the stool, i.e. animal blood from meat, but an FIT detects only human blood, making it more accurate.

### BLOOD TESTS

Blood tests can be helpful in the diagnostic evaluation of colorectal cancer. A test called a complete blood count (CBC) measures the number and quality of blood cells. A CBC can detect anemia (low red blood count) which many people with colorectal cancer have due to prolonged, undetected bleeding from a tumour. Another blood test for high levels of carcinoembryonic antigen (CEA), a protein often produced by colorectal cancer cells, may indicate the presence of colorectal cancer. A CEA test during diagnostic work-up is frequently used as a reference point for future CEA tests to monitor how a treatment is working (decreased levels of CEA indicate effective treatment). The test can also be used after successful treatment, providing an early sign of cancer recurrence (increased levels of CEA).

## DIAGNOSIS

### DOUBLE CONTRAST BARIUM ENEMA

A double contrast barium enema (DCBE) is an X-ray test that provides images of the entire colon. A liquid containing the substance barium sulfate is inserted into a patient's rectum and spreads throughout the colon to define its appearance on the X-rays. Air is also pumped into the colon to expand it before the X-rays are taken. If polyps or other abnormalities show up on the X-ray images, a colonoscopy will need to be performed to investigate.

### FLEXIBLE SIGMOIDOSCOPY

A flexible sigmoidoscopy is the internal examination of the lower part of the colon, called the sigmoid colon, using a thin, bendable tube containing a light and video camera, which can be hooked up to a display monitor. The tube is inserted into the anus and slowly guided into the sigmoid colon for inspection. If polyps or other abnormalities are detected, they can be entirely or partially removed by an instrument passed through the end of the tube—this is called a biopsy. The biopsy specimen is sent to a laboratory to determine if cancer cells are present. A colonoscopy is also required to check for growths in the entire colon.

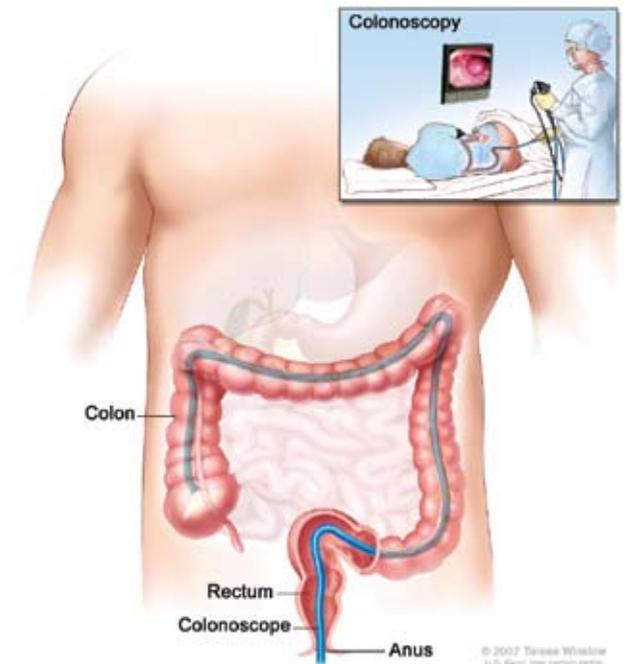
## DIAGNOSIS

### COLONOSCOPY

A colonoscopy is similar to a sigmoidoscopy except that it examines the entire length of the colon. If polyps or other abnormalities are detected, they can be biopsied and sent to a laboratory to determine if cancer cells are present. Because this procedure is more invasive, sedation is usually administered to the patient. Colonoscopy is considered the most effective and thorough of all the tests for colorectal cancer. A newer, less invasive test called a virtual colonoscopy involves the use of the X-ray procedure, computed tomography (see Imaging Tests section), to create images of the bowel. If anything suspicious is identified on the images, a conventional colonoscopy is required.

### BIOPSY

Removed tissue examined under a microscope by a pathologist (a doctor specializing in the diagnosis of diseases) is the only definitive way to make a colorectal cancer diagnosis. A biopsy sample can also determine how aggressive a cancer is, and may be able to show the extent it has affected the colon or rectum wall.



## SCREENING

### SCREENING

The term “screening” means to perform tests on people who do not exhibit any symptoms of a disease as a method of prevention and early detection. For the average person, age is the main risk factor for colorectal cancer, with more than 90 per cent of cases occurring in those over 50. The Colorectal Cancer Association of Canada therefore recommends that all men and women age 50 and over undergo regular screening for colorectal cancer with a fecal occult blood test or fecal immunochemical test at least every two years. Positive tests should always be followed up with a colonoscopy.

Those at a higher risk of developing the disease should talk to their doctor about earlier and more frequent screening as well as which test would be appropriate.

People at a higher risk of developing colorectal cancer include those who have:

- a first-degree relative with colorectal cancer
- a personal history of colorectal cancer
- a personal history of benign polyps
- inflammatory bowel disease such as ulcerative colitis or Crohn’s disease
- a family history, or diagnosis, of hereditary syndromes linked to colorectal cancer, such as familial adenomatous polyposis (FAP) or hereditary nonpolyposis colorectal cancer (HNPCC)

Colorectal cancer is over 90 per cent curable when detected early, however this percentage drops significantly when detected at a more advanced stage.

## IMAGING TESTS

### IMAGING TESTS

Once colorectal cancer has been diagnosed, additional tests may need to be performed so doctors can view the cancer inside the body and help determine how far it has progressed or spread. These tests may include the following:

#### X-RAYS

An X-ray is an imaging procedure that sends a small dose of radiation from a machine through an area of the body and onto a recording material, such as film, located behind the body. X-rays are sometimes used to evaluate the chest and abdomen. If anything suspicious is found, a CT scan (below) may be ordered to provide more detail.

#### COMPUTED TOMOGRAPHY

A computed tomography (CT) scan is an X-ray procedure that creates 3-dimensional, cross-sectional images of the body. A scanner takes a series of X-rays throughout a region of the body and transmits them to a computer which puts the images together to produce “slices” of the area of interest. If a suspicious lesion is detected on an outlying organ, a doctor may order a CT-guided needle biopsy to determine if cancer is present. With the aid of a CT scan, a needle is guided through the skin to the abnormal area and a small amount of tissue is obtained for further study.

### MAGNETIC RESONANCE IMAGING

A magnetic resonance imaging (MRI) scan is similar to a CT scan in that it produces 3-dimensional, cross-sectional images of the body, but it does so using magnetic forces and radio waves instead of X-rays. In the presence of a magnetic field, an MRI scanner sends out radio waves to the body which are reflected back and processed by a computer, generating images. An MRI scan can provide more detail in certain tissues than a CT scan.

#### ULTRASOUND

Ultrasound uses sound waves to view organs of the body. A device (called a transducer) emits sound waves to the area of interest which are bounced back to the apparatus and sent to a computer to construct images. Ultrasound is frequently used in the evaluation of rectal cancer (by way of a transducer inserted in the rectum) to see how deeply the cancer has penetrated the wall and if lymph nodes are affected.

#### POSITRON EMISSION TOMOGRAPHY

A positron emission tomography (PET) scan is an entirely different form of imaging. It measures the activity of tissues as opposed to detailing their anatomy, like the other forms of imaging. A radioactive sugar is injected into a patient's vein which gets readily absorbed by any cancer cells. Because cancer cells use more energy than regular cells, they absorb more of the sugary substance, which they release as tiny particles called positrons. A scanner records the emission of positrons and sends the information to a computer which constructs 3-dimensional colour images of the body. PET scans can detect cancer that is too small to be seen by other imaging tests.

### STAGES OF COLORECTAL CANCER

Doctors will analyze information gathered from physical examination, biopsies, blood, and imaging tests to establish an initial stage of the cancer, called the “clinical stage”. Staging describes the extent of cancer based on how many layers of the bowel wall are affected, whether lymph nodes are involved, and if there is spread to other organs. Clinical staging is important as it helps doctors decide on the first type of treatment a patient should receive. Treatment depends on the stage of cancer.

For many colorectal cancers, the first form of treatment is surgery to remove the tumour. Definitive staging often can't be completed until after surgery when a pathologist has examined all of the tissues that were removed by the surgeon. This is known as determining the cancer's “pathologic stage” and can differ from the clinical stage. If this happens, a patient's treatment plan may be altered.

There are five main stages of colorectal cancer.

The higher the number, the more advanced the cancer.

- 0** — The cancer is confined to the innermost layer of the colon or rectum. It has not yet invaded the bowel wall.
- I** — The cancer has penetrated several layers of the colon or rectum wall.
- II** — The cancer has penetrated the entire wall of the colon or rectum and may extend into nearby tissue(s).
- III** — The cancer has spread to the lymph nodes.
- IV** — The cancer has spread to distant organs, usually the liver or lungs. Cancerous tumours found in these organs are called metastases.

### TREATMENT

Although colon and rectal cancer have been discussed as one thus far, the treatment for each is quite different, so for the remaining sections we'll refer to the two separately. The reason for this difference is because of the rectum's location at the end of the digestive tract, which means the amount of bowel that can be removed along with the tumour (called margins) is far smaller than the amount that can be removed from the plentiful 5 1/2 foot colon. Adequate disease-free margins are important as cancer cells can seep into the surrounding bowel tissue.

The rectum's very close proximity to the bladder and sex organs also make it difficult for the surgeon to maneuver around and completely remove the tumour. Therefore, for rectal cancer, the treatment required to ensure all cancer cells around tumour are eliminated may be more involved than for colon cancer. Treatment for colon or rectal cancer may include a combination of the following:

### SURGERY

Surgery is the main treatment for colon and rectal cancer. The standard operation, called a radical resection, involves an incision through the abdomen and removal of the tumour and surrounding bowel tissue, as well as the adjacent blood vessels and lymph nodes. The two ends of the remaining bowel are reattached. In rectal cancer, a colostomy (where the bowel is brought through the skin to externally expel waste) is sometimes required, particularly when the cancer is low in the rectum and affects the anus.

### RADIATION

High doses of radiation from a machine are directed to the area of the tumour from outside the body. Radiation is more frequently used to treat rectal cancer. It may be used before surgery to shrink the tumour, making it easier to remove, or after surgery to kill any remaining cancer cells.

### CHEMOTHERAPY

Chemotherapy involves the distribution of cancer-killing chemicals throughout a patient's body via a vein, or in a pill form by mouth, to destroy fast-growing cancer cells that may be lingering after surgery. Chemotherapy can also be used to shrink a rectal tumour before surgery, and treat advanced (Stage IV) disease.

### TARGETED THERAPIES

Targeted therapies are newer intravenous medications used in advanced disease that target specific biological processes involved in cancer growth. These drugs are different from chemotherapy drugs which kill any fast-growing cells in the body, including healthy cells.

## TREATMENT BY STAGE

The following is an overview of the treatment for each stage of colon and rectal cancer. It is important to remember that each patient is different and treatment plans vary.

### STAGE 0

**Colon cancer:** Removal of the cancerous tumour through sigmoidoscopy or colonoscopy (if not done during diagnostic work-up) is usually all that is required for this stage of colon cancer. If the tumour is too large or does not have clear margins, radical resection may be required.

**Rectal cancer:** In addition to the above, because of the rectum's location near the anal orifice, some rectal cancers may be surgically removed through the anus; this procedure is called transanal excision.

### STAGE I

**Colon cancer:** Radical resection of the tumour is normally all that is required.

**Rectal cancer:** The tumour is usually removed by radical resection. In some cases, the cancer may be removed by transanal excision. Radiation and chemotherapy before or after this procedure may be recommended.

### STAGE II

**Colon cancer:** Radical resection of the tumour is usually the only treatment that is needed, however if the cancer appears to be aggressive or extends into nearby tissue, chemotherapy may be recommended after surgery.

**Rectal cancer:** The tumour is removed through radical resection. Radiation should be given before or after surgery. Chemotherapy may be given before AND after surgery.

### STAGE III

**Colon cancer:** The tumour is removed through radical resection. Chemotherapy should follow.

**Rectal cancer:** The tumour is removed through radical resection. Radiation therapy should be given before or after surgery. Chemotherapy may be given before AND after surgery.

### STAGE IV

**Colon cancer:** The tumour in the bowel will usually be removed through radical resection. If metastases are few, they may be removed during the same operation, which can still result in a cure. If this isn't possible because metastases are too large, too numerous or close to vital structures of an organ, chemotherapy may be given to control the cancer and may even shrink metastases to the point where surgery becomes feasible. Surgery is the best hope for cure. Targeted therapies can also be added to a chemotherapy regimen to produce better results. After surgery to remove metastases, chemotherapy is routinely given.

If metastases still can't be removed, it may be possible to destroy them by heating or freezing the diseased tissue (with probes through the skin) or by other non-surgical methods—these methods are used to control the cancer, not cure it, but can markedly improve quality of life and extend lifespan.

**Rectal cancer:** Generally the same as above, except for removal of the primary tumour which may include radiation and pre-operative chemotherapy.

### FOLLOW-UP

Follow-up is very important to ensure a patient remains healthy. If anything unusual is detected, it can be caught early and treated promptly. Follow-up may include colonoscopy, blood and imaging tests. Follow-up tests and interval times vary among the stages of the past cancer, the treatment received, and the individual case.

