



GASTROINTESTINAL STROMAL TUMOR (GIST)

What is cancer?

The body is made up of hundreds of millions of living cells. Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries.

Cancer begins when cells in a part of the body start to grow out of control. There are many kinds of cancer, but they all start because of out-of-control growth of abnormal cells.

Cancer cell growth is different from normal cell growth. Instead of dying, cancer cells continue to grow and form new, abnormal cells. Cancer cells can also invade (grow into) other tissues, something that normal cells cannot do. Growing out of control and invading other tissues are what makes a cell a cancer cell.

Cells become cancer cells because of damage to DNA. DNA is in every cell and directs all its actions. In a normal cell, when DNA gets damaged the cell either repairs the damage or the cell dies. In cancer cells, the damaged DNA is not repaired, but the cell doesn't die like it should. Instead, this cell goes on making new cells that the body does not need. These new cells will all have the same damaged DNA as the first cell does.

People can inherit damaged DNA, but most DNA damage is caused by mistakes that happen while the normal cell is reproducing or by something in our environment. Sometimes the cause of the DNA damage is something obvious, like cigarette smoking. But often no clear cause is found.

In most cases the cancer cells form a tumor. Some cancers, like leukemia, rarely form tumors. Instead, these cancer cells involve the blood and blood-forming organs and circulate through other tissues where they grow.

Cancer cells often travel to other parts of the body, where they begin to grow and form new tumors that replace normal tissue. This process is called metastasis. It happens when the cancer cells get into the bloodstream or lymph vessels of our body.

No matter where a cancer may spread, it is always named for the place where it started. For example, breast cancer that has spread to the liver is still called breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bone is metastatic prostate cancer, not bone cancer.

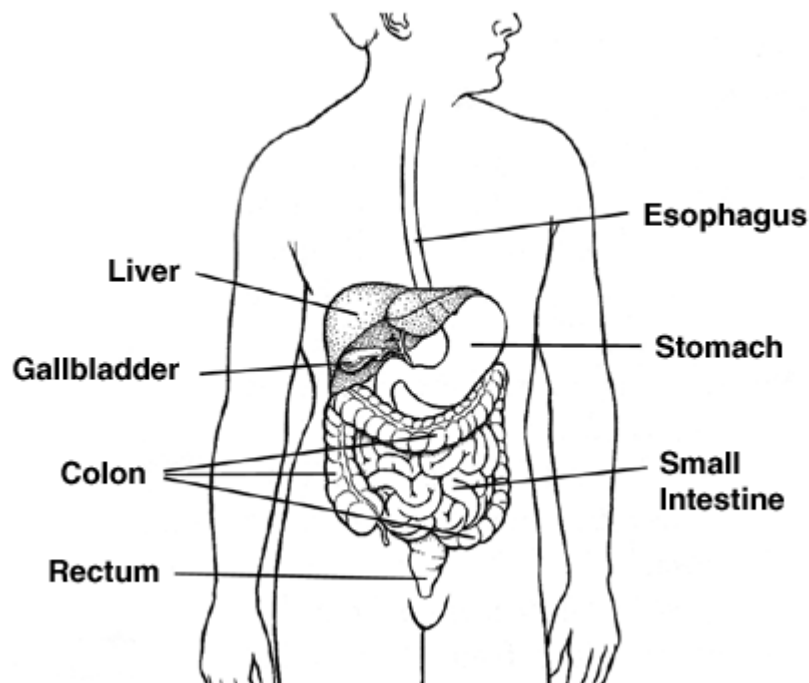
Different types of cancer can behave very differently. For example, lung cancer and breast cancer are very different diseases. They grow at different rates and respond to different treatments. That is why people with cancer need treatment that is aimed at their particular kind of cancer.

Not all tumors are cancerous. Tumors that aren't cancer are called benign. Benign tumors can cause problems – they can grow very large and press on healthy organs and tissues. But they cannot grow into (invade) other tissues. Because they can't invade, they also can't spread to other parts of the body (metastasize). These tumors are almost never life threatening.

What are gastrointestinal stromal tumors?

The gastrointestinal system

The gastrointestinal (GI) system processes food for energy and rids the body of solid waste. It is also known as the *digestive system*. After food is chewed and swallowed, it enters the esophagus, a tube that carries food through the neck and chest to the stomach. The esophagus joins the stomach just beneath the diaphragm (the breathing muscle under the lungs).



The stomach is a sac-like organ that holds food and helps the digestive process by secreting gastric juice. The food and gastric juices are mixed into a thick fluid called chyme that is then emptied into the small intestine. The small intestine continues breaking down the food and absorbs most of the nutrients. It is the longest section of the gastrointestinal (GI) tract, measuring more than 20 feet.

The small intestine joins the large intestine (colon), a muscular tube about 5 feet long. The colon absorbs water and mineral nutrients from the food matter and serves as a storage place for waste. The waste left after this process goes into the rectum as stool (feces). From there it passes out of the body through the anus.

Gastrointestinal stromal tumors

Gastrointestinal stromal tumors (GISTs) are fairly rare tumors of the GI tract. In the past, they were thought to start in muscle or nerve cells in the GI tract. This is because the tumor cells look like muscle or nerve cells under the microscope.

We now know that GISTs start in special cells found in the wall of the GI tract, called the *interstitial cells of Cajal* (ICCs), or in very early cells that can develop into ICCs. ICCs are part of the autonomic nervous system, the part of the nervous system that regulates body processes. The autonomic nervous system sends signals to the GI tract telling it to digest food. ICCs are sometimes called the "pacemakers" of the GI tract because they send signals

to the muscles in the digestive system, telling them to contract to move food and liquid through the GI tract.

Not all GISTs are cancerous. Some are benign -- they don't grow into other areas or spread to other parts of the body. Ways to try to determine whether a GIST is benign or cancerous are discussed further in the section "How are gastrointestinal stromal tumors diagnosed?"

Other gastrointestinal tract cancers

Cancers can occur anywhere in the GI tract -- from the esophagus to the anus. Usually, these cancers start in glandular cells that line most of the GI tract. The cancers that develop in these cells are called *adenocarcinomas*.

Some parts of the GI tract, such as the upper part of the esophagus and the end of the anus, are lined with flat cells called squamous cells. These are the same type of cells that are found on the surface of the skin. Cancers starting in these cells are called *squamous cell carcinomas*.

The GI tract also has neuroendocrine cells. These cells have some features in common with nerve cells but other features in common with hormone-producing (endocrine) cells. Neuroendocrine cancers can develop from these cells. This type of cancer is rare in the GI tract. Carcinoid tumors are an example of a neuroendocrine cancer found in the GI tract.

Other rare types of cancer that can be seen in the GI tract include leiomyosarcoma, angiosarcoma, and peripheral nerve sheath tumors. These arise from muscle cells, blood vessel cells, and nerve cells in the GI tract.

GISTs are different from these other GI tract cancers. First of all, they start in different types of cells. GISTs are also quite different in their prognosis (outlook) and their treatment. For these reasons, doctors need to figure out whether a patient has a GIST, some other type of cancer, or a non-cancerous condition.

It is also important for patients to understand that GISTs are not the same as other, more common types of GI tract cancers. By learning more about GISTs, patients can better take part in their health care and make informed decisions about treatment options.

What are the key statistics about gastrointestinal stromal tumors?

Gastrointestinal stromal tumors (GISTs) are not common, but the exact number of people diagnosed with this tumor each year is not known. Based on various studies, estimates for the total number of GIST cases each year in the United States have ranged from about 4,500 to

about 6,000. Of these, about 1,500 have already spread to distant sites (metastasized) when they are initially found.

Although these tumors can start anywhere in the GI tract, they occur most often in the stomach (50% to 70%) or the small intestine (20% to 30%). The rest are found in the esophagus, large intestine (colon and rectum), and anus.

Most people diagnosed with GIST are older than 50, but these tumors can occur in people of any age. They are slightly more common in men. African Americans are more likely to develop GISTs than whites.

What are the risk factors for gastrointestinal stromal tumors?

A risk factor is anything that affects a person's chance of getting a disease such as cancer. Different cancers have different risk factors. For example, exposing skin to strong sunlight is a risk factor for skin cancer. Smoking is a risk factor for cancer of the lung, and many other cancers. But risk factors don't tell us everything. Having a risk factor, or even several, does not mean that a person will get the disease. And many people who get the disease may not have had any known risk factors.

Currently, there are very few known risk factors for GISTs.

Genetic syndromes

Most GISTs are sporadic (not inherited) and have no clear cause. In rare cases, though, GISTs have been found in several members of the same family. These family members inherited a gene mutation that can lead to GISTs.

Familial gastrointestinal stromal tumor syndrome: This is a rare, inherited condition that leads to increased risk of developing GISTs. People with this inherited condition tend to develop GISTs at a younger age than GISTs usually occur. They are also more likely to have multiple GISTs. Most often, this syndrome is caused by an abnormal copy of the *c-kit* gene that is passed from parent to child. The *c-kit* gene is the same gene that is mutated (changed) in most sporadic GISTs. In people who inherited the abnormal gene, it is present in all the cells of their body, while in people with sporadic GISTs it is only found in the cancer cells. In a few cases, an abnormal copy of a different gene, the *PDGFRA* gene, causes this genetic syndrome. Defects in the *PDGFRA* gene are found in about 5% of sporadic GISTs. Sometimes people with familial GIST syndrome also have skin spots like those seen in patients with neurofibromatosis (discussed below). Before tests for the *c-kit* and *PDGFRA* genes became available, some of these people were mistakenly thought to have neurofibromatosis.

Type 1 Neurofibromatosis (or von Recklinghausen's disease): Is a disease that is often inherited. It is caused by defects in the gene *NF1*. People affected by this syndrome have many benign tumors that form in nerves (called neurofibromas). These tumors form under the skin and in other parts of the body. They also have a certain type of tan or brown spots on the skin (called café au lait spots). People with this condition have a high risk of GISTs and many other cancers.

Do we know what causes gastrointestinal stromal tumors?

In recent years, scientists have made great progress in learning how certain changes in DNA can cause normal cells to become cancerous. DNA is the chemical that carries the instructions for nearly everything our cells do. We look like our parents because they are the source of our DNA. But DNA affects more than the way we look. Some genes (parts of our DNA) contain instructions for controlling when cells grow and divide.

Every time a cell prepares to divide into 2 new cells, it must duplicate its DNA. This process is not perfect and, sometimes errors occur, especially if the cells are growing rapidly. These copying errors result in a defect (or mutation) in a gene.

Certain genes that promote cell growth and division are called *oncogenes*. Others that slow down cell division or cause cells to die at the right time are called *tumor suppressor genes*. We know that cancers can be caused by DNA mutations (defects) that turn on oncogenes or turn off tumor suppressor genes.

Some people with certain types of cancer have DNA mutations they inherited from a parent, which increased their risk for the disease. There are a few families that have GISTs caused by a mutation passed down from parent to child. But most DNA mutations related to GISTs are not inherited. These mutations occur for no apparent reason, and are called sporadic.

We do not know the exact cause of GIST. However, we do know that the cancer cells of most patients with GIST have a change in an oncogene called *c-kit*. The *c-kit* gene is found in all cells of the body. It leads to the formation of a protein called KIT. This protein causes the cell to grow and divide. Usually the *c-kit* gene is inactive. It is only activated if there is a need for more interstitial cells of Cajal (ICCs). In most GISTs the *c-kit* gene is mutated and is always active. This may explain why the cancer forms. The cells are always growing and dividing. In some of the families that have many members with GISTs, doctors have found inherited mutations of the *c-kit* gene.

In some GISTs, a different gene mutation causes the cell to make too much of a protein called PDGFRA. This has the same effect on the cell as does KIT.

These proteins (KIT and PDGFRA) act as enzymes called tyrosine kinases. These are important in the diagnosis and treatment of GIST (see the section "How Are Gastrointestinal Stromal Tumors Treated?").

Can gastrointestinal stromal tumors be prevented?

We do not yet know of any way to prevent GISTs. We know that in some rare cases the disease has been diagnosed in members of the same family, but this is not a factor that can be controlled.

Can gastrointestinal stromal tumors be found early?

Screening refers to tests and exams used to find a disease such as cancer in people who do not have any symptoms. The American Cancer Society has recommendations for screening tests to find several types of cancer as early as possible. But for rare tumors like GISTs, no effective screening tests have been found, and routine testing of people without any symptoms is not recommended.

GISTs may be found early by chance. Sometimes they are seen on an exam for another problem, such as during colonoscopy to look for colon cancer. Rarely, a GIST may be seen when an imaging test, such as a computed tomography scan (CT scan) or barium study, is performed for another reason.

GISTs may also be found incidentally (unexpectedly) during abdominal surgery for another problem.

How are gastrointestinal stromal tumors diagnosed?

Signs and symptoms of gastrointestinal stromal tumors

Most gastrointestinal stromal tumors (GISTs) occur in the stomach or small intestine. These tumors may not cause any symptoms unless they are in a certain location or grow to a certain size.

The most common symptoms of GISTs are abdominal discomfort or pain, with bleeding into the intestinal tract. If the bleeding is fast enough, it can make bowel movements black and tarry. Slower bleeding may not change the color of bowel movements, but it can lead to

anemia (low red blood cell counts). This can cause a person to feel tired and weak. If the tumor bleeds into the stomach, it may cause the patient to vomit blood.

Nausea, vomiting, loss of appetite, and weight loss can also occur. Tumors in the esophagus can cause problems with swallowing. In some cases a person may actually feel a growth (tumor) in his or her abdomen.

In some people the tumor may grow into the intestine and block it. This is called intestinal obstruction, and it causes severe abdominal pain and vomiting. Emergency surgery is often needed to treat the blockage.

Small tumors may not cause any symptoms. They are found accidentally when the doctor is looking for some other problem. These are often benign.

If there is a reason to suspect that you may have a GIST, the doctor will use one or more methods to find out if the disease is really present.

Medical history and physical exam

To learn your medical history, the doctor will ask you questions about symptoms and risk factors you may have. If you have one or more symptoms that suggest you have a GIST, the doctor will ask about signs and symptoms that might be caused by a mass in the esophagus, stomach, intestine, or rectum. A thorough physical exam may provide evidence of a GIST, such as a mass in the abdomen, or other health problems.

Imaging tests

Your doctor may order an imaging test to help find the cause of your symptoms.

Barium x-rays

For these studies (tests), a barium-containing solution is used to coat the lining of the esophagus, stomach, and intestines. This makes abnormalities of the lining easier to see on x-ray. These are sometimes useful in diagnosing GI tumors. They are least effective in finding small intestine tumors. You will probably have to fast starting the night before the test. If the colon is being examined, you may need to take laxatives and/or enemas to clean out the bowel the night before or the morning of the exam.

Barium swallow: This test (also known as an *upper GI series*) is used to examine the lining of the esophagus, stomach, and the first part of the small intestine. Patients getting this test drink a barium solution before the x-ray pictures are taken.

Small bowel follow through: This is a continuation of the barium swallow test that is sometimes used to look for problems in the small intestine. For this test, x-rays are taken at regular intervals over the course of a few hours as the barium passes through the intestines.

Enteroclysis: This procedure is another way to look at the small intestine. In this test, a thin tube is passed through the mouth or nose and through the stomach into the start of the small intestine. Barium is sent through the tube, along with a substance that creates more air in the intestines, causing them to expand. X-rays of the intestines are then taken. This test can give better images of the small intestine than a small bowel follow through, but it is also more uncomfortable.

Barium enema: This test (also known as a lower GI series) is used to look at the inner surface of the large intestine. For this test, the barium solution is given through the anus while the patient is lying on the x-ray table. When the colon is about half full of barium, the patient rolls over so the barium spreads throughout the colon. For a regular barium enema, x-rays are then taken. After the barium is put in the colon, air may be blown in to help push the barium toward the wall of the colon and better coat the inner surface. Then x-rays are taken. This is called an *air-contrast barium enema* (also known as *double-contrast barium enema*).

Barium x-rays are used less these days than before. In many cases they are being replaced by endoscopy -- where the doctor actually looks into the colon or stomach with a narrow fiber optic scope (see below).

Computed tomography

The computed tomography (CT) scan is an x-ray procedure that produces detailed, cross-sectional images of your body. Instead of taking one picture, like a standard x-ray, a CT scanner takes many pictures as it rotates around you. A computer then combines these into images of slices of the part of your body that is being studied.

Before any pictures are taken, you may be asked to swallow an oral contrast liquid. This helps outline your intestinal tract to make tumors easier to see. You may also receive an intravenous (IV) line so that a dye (IV contrast) can be injected. This can help better outline structures in your body.

The IV injection can cause some flushing (redness and warm feeling). Some people are allergic and get hives or, rarely, more serious reactions like trouble breathing and low blood pressure. Medicines can be given to prevent and treat any allergic reactions, so it is important for you to let the doctor know before the scan about any previous reactions you might have had to contrast material used for x-rays.

CT scans take longer than regular x-rays. You need to lie still on a table, and the part of your body being looked at is placed within the scanner, a cylinder-shaped machine that completely surrounds the table. The test is painless, but you may find it uncomfortable to hold still in certain positions for minutes at a time.

CT scans are useful in patients with GISTs to find the location and size of the tumor, as well as to see whether it has spread into the abdomen or the liver.

In some cases, CT scans can also be used to guide a biopsy needle precisely into a suspected cancer or metastatic lesion. However, because this can be risky when a GIST is involved (bleeding, possible increased risk of tumor spread), these types of biopsies are usually done only if the result might affect the decision on treatment. (For more information, see the information about biopsy below.)

Magnetic resonance imaging

Magnetic resonance imaging (MRI) scans use radio waves and strong magnets instead of x-rays. The energy from the radio waves is absorbed and then released in a pattern formed by the type of tissue and by certain diseases. A computer translates the pattern into a very detailed image of parts of the body. Not only does this produce cross-sectional slices of the body like a CT scanner, but it can also produce slices that are parallel with the length of your body. A contrast material might be injected just as with CT scans, but is used less often.

MRI scans are a little more uncomfortable than CT scans. They take longer -- often up to an hour. You have to lie inside a tube, which is confining and can upset some people with a fear of enclosed spaces (claustrophobia). Newer, "open" MRI machines can be easier to tolerate, but they are less available. The machine also makes buzzing and clicking noises that some people might find disturbing. Many places will provide ear plugs or headphones with music to block this noise out.

MRI scans are useful in GISTs to find the extent of the cancer in the abdomen, although usually CT scans are adequate. They are also useful in looking for return of cancer (recurrence) or spread (metastases) to distant organs, particularly in the brain or spine.

Positron emission tomography

Positron emission tomography (PET) scans have become one of the most useful tests for spotting GISTs. In PET scanning, low-level radioactive glucose (sugar) is injected into the patient's vein. Because cancer cells use sugar much faster than normal cells, the tumor takes up the radioactive material more quickly. A special camera can then be used to spot the radioactive areas in the body.

This test can be useful to find areas of cancer spread. PET scans are often used to find out if a drug treatment is working. The scan is usually obtained at least 4 weeks after starting the medication. If the drug is working, the tumor will stop taking up the radioactive glucose. If the tumor still takes up the glucose, your doctor may decide to change your drug treatment.

Some imaging machines combine a PET scanner with a CT scan to better pinpoint areas of tumor spread.

Endoscopy

These tests use a flexible lighted tube (endoscope) with a video camera on the end. The camera sends pictures to a video screen, so that the doctor can clearly see any masses (tumors) in the lining of the digestive organs. If abnormal areas are found, small pieces of tissue can be removed through the endoscope (biopsy). The tissue can be looked at under the microscope to find out if cancer is present and what kind of cancer it is.

When looking into the GI tract with an endoscope, the doctor may see only a bulge under the normally smooth surface if a GIST is present. This is because GIST tumors are often below the lining (mucosa) of the GI tract. This makes them harder to see with endoscopy than more common GI tract tumors. GISTs that are below the mucosa (submucosal) are also harder to biopsy through the endoscope. As a result, only about half of GISTs are diagnosed before surgery.

If the tumor breaks through the lining of the GI tract and is easy to see, there is a greater chance that the GIST is cancerous (malignant).

Upper endoscopy (also known as *esophogogastroduodenoscopy* or *EGD*): patients are given medicines to make them sleepy (sedated). Then the endoscope is passed down through the mouth to show the esophagus, stomach, and first part of the small bowel.

Colonoscopy (also known as a *lower endoscopy*): a type of endoscope known as a colonoscope is inserted through the anus and up into the colon. This allows the doctor to see the lining of the entire rectum and colon. To get a good look at the inside of the colon, it must be empty and cleaned out before the test. This often means using a strong laxative the night before. Sometimes enemas are also needed the morning of the procedure to make sure the bowels are empty. You will be given intravenous (IV; into a vein) medicine to make you feel relaxed and sleepy during the procedure. A colonoscopy may be done in a hospital outpatient department, in a clinic, or in a doctor's office. It usually takes 15 to 30 minutes, although it may take longer if a tumor is seen and/or a biopsy taken.

Capsule endoscopy: Unfortunately, neither upper nor lower endoscopy can reach all areas of the small intestine, Capsule endoscopy is one way to look at the small intestine. This procedure does not actually use an endoscope. Instead, the patient swallows a capsule (about the size of a large vitamin pill) that contains a light source and a very small camera. Like any other pill, the capsule goes through the stomach and into the small intestine. As it travels (usually over the course of about 8 hours), it takes thousands of pictures. These images are transmitted electronically to a device worn around the person's waist. The pictures can then be downloaded onto a computer, where the doctor can view them as a video. The capsule passes out of the body during a normal bowel movement and is discarded. This test requires no sedation -- the patient can just continue normal daily activities as the capsule travels through the GI tract. This technique is fairly new, and the best way to use it is still being studied.

Double balloon enteroscopy: This is another way to look at the small intestine. The small intestine is too long (20 feet) with too many curves to be examined well with regular endoscopy. This method gets around these problems by using a special endoscope that is made up of 2 tubes, one inside the other. First the inner tube, which is an endoscope, goes forward about a foot, and then a balloon at its end is inflated to anchor it. Then the outer tube goes forward to near the end of the inner tube and it is then anchored in place with a balloon. This process keeps being repeated over and over, letting the doctor see the intestine a foot at a time. The procedure is done after the patient is given drugs to make him or her sleepy. The main advantage of this test over capsule endoscopy is that the doctor can take a biopsy if something abnormal is seen.

Endoscopic ultrasound

This test uses an endoscope with a small ultrasound probe on the end. Since the probe is on the end of an endoscope, it can be placed very close to (or on top of) the tumor. The probe gives off high-frequency sound waves and then detects the sound wave echoes that bounce off tissues of the digestive tract wall. A computer then translates the pattern of echoes into an image of the area being looked at.

Endoscopic ultrasound can be used to find the precise location of the GIST and to determine its size. It is useful in finding out how deeply a tumor has grown into the wall of the digestive tract (esophagus, stomach, intestine, or rectum). The test can also help predict whether the tumor has spread to lymph nodes or has started growing into other tissues nearby. In some cases it may be used to help guide a biopsy (see below).

Biopsy

Even if a mass is found on a barium x-ray or CT scan, these imaging tests cannot tell if the mass is a GIST, some other type of tumor (benign or cancerous), or some other condition (like an infection). The only way to know what it is for sure is to remove cells from the abnormal area and look at them under a microscope. This procedure is called a biopsy. There are several ways to take a sample from a GI tract tumor.

Endoscopic biopsy

Biopsy samples can be obtained through the endoscope. When a tumor is found, the doctor can operate a biopsy forceps (pincers or tongs) through the tube to take a small sample of the tumor. Even though the sample will be very small, doctors can usually make an accurate diagnosis. About half the time, the biopsy will not get the cancer because it grows underneath the lining of the intestine or stomach. (The biopsy forceps can't go deep enough.)

Bleeding from a GIST after a biopsy is rare but can be a serious problem. If this occurs, doctors can sometimes inject drugs that constrict blood vessels through the endoscope into the tumor to stop the bleeding.

Fine needle biopsy

In some cases, a biopsy sample is obtained with a thin, hollow needle. The doctor places this needle into the tumor while being guided by imaging tests such as a CT scan or endoscopic ultrasound. These types of biopsies must be done carefully and are usually done only if they will help determine treatment options, because doctors are concerned they may cause bleeding or possibly increase the risk of cancer spreading.

Surgical biopsy

If a sample can't be obtained from an endoscopic or needle biopsy or if the result wouldn't affect treatment options, a doctor may recommend waiting until surgery to get a sample of the tumor. This is done in an operation called a *laparotomy*, where the doctor creates an opening in the abdomen to reach and remove the tumor directly.

Testing the biopsy sample

Once a tumor sample is obtained, a doctor who specializes in lab tests (a pathologist) looks at it under a microscope. Although the pathologist may suspect that a tumor is a GIST, he or she can't be sure without a special test called immunohistochemistry.

In this test, a part of the sample is treated with special manmade antibodies that will attach only to the KIT protein (also called CD117). The antibodies cause color changes if the KIT protein is present, which can be seen under a microscope. Because most GIST cells contain this substance but cells of most other types of cancer do not, this test can be useful in determining whether a GI tumor is a GIST or not. If the tumor cells do not contain KIT, they will be checked to see if they have the protein made by the PDGFRA gene. This is found in about 5% of GISTs.

Blood tests

Your doctor may order some blood tests if he or she thinks you may have a GIST. A blood count can tell if you are anemic (have a low red blood cell count). Some people with GIST may become anemic because of bleeding from the tumor.

Other blood tests can measure your liver function. If the results of these tests are abnormal, it may mean that the GIST has spread to your liver.

There are no blood tests that can detect GIST cancer cells in the blood. These tumors do not release any known substances in the blood that can be used as markers to measure the response of a GIST to treatment.

How are gastrointestinal stromal tumors staged?

Staging is the process of finding out how far a cancer has spread from its original site. For many cancers, its stage can be the most important factor in selecting treatment options. It is also often helpful in predicting the patient's prognosis (the course of the disease and outlook). To help stage the tumor, doctors may use several types of imaging, endoscopy, or other tests, such as those described in the previous section ("How are gastrointestinal stromal tumors diagnosed?").

Doctors describe the extent of spread of most types of cancer by using a staging system. The most common system used is the TNM system of the American Joint Committee on Cancer (AJCC). (*T* stands for the size of the tumor, *N* stands for spread to lymph nodes, and *M* is for distant metastasis.) The AJCC recently developed a TNM staging system for GISTs. This system contains 4 key pieces of information:

- **T** describes the size of the primary tumor, measured in centimeters (cm), and whether the cancer has spread to organs next to the tumor.
- **N** describes the extent of spread to nearby (regional) lymph nodes.
- **M** indicates whether the cancer has **metastasized** (spread) to other organs of the body.
- The mitotic rate is a measure of how fast the cancer cells are growing and dividing. It is described as either low or high. A low mitotic rate predicts a better outcome.

Numbers or letters appear after *T*, *N*, and *M* to provide more details about each of these factors:

- The numbers 0 through 4 indicate increasing severity.
- The letter X means "cannot be assessed" because the information is not available.
- The letters "is" mean "carcinoma in situ," which means the tumor is contained within the top layer of cells and has not yet reached deeper layers of tissue.

T categories for GIST

TX: The primary (main) tumor cannot be assessed.

T0: No signs of a primary tumor.

T1: The tumor is 2 cm or less in size (2 cm is about 4/5 or an inch).

T2: The tumor is larger than 2 cm but not larger than 5 cm (5 cm is about 2 inches).

T3: The tumor is larger than 5 cm but not larger than 10 cm (about 4 inches).

T4: The tumor is larger than 10 cm (4 inches) in size.

N categories for GIST

NX: Regional (nearby) lymph nodes cannot be assessed.

N0: The cancer has not spread to nearby lymph nodes.

N1: The cancer has spread to nearby lymph nodes.

M categories for GIST

M0: The cancer has not spread (metastasized) to distant organs or sites.

M1: The cancer has spread to distant organs or sites (like the liver or the lung).

Stage grouping

Once the T, N, and M categories have been determined, this information is combined, along with the mitotic rate, in a process called stage grouping. The overall stage is expressed in Roman numerals from I (the least advanced) to IV (the most advanced). This is done to help determine treatment options and the outlook for survival or cure. The stage grouping is a bit different depending on where the tumor starts.

Stage grouping for GIST that start in the stomach or the omentum*

*The omentum is an apron-like layer of fatty tissue that covers the abdomen

Stage IA: T1 or T2, N0, M0, low mitotic rate: The tumor is no larger than 5 cm across (T1 or T2). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is low.

Stage IB: T3, N0, M0, low mitotic rate: The tumor is larger than 5 cm but not larger than 10 cm across (T3). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is low.

Stage II: either

T1 or T2, N0, M0, high mitotic rate: The tumor is no larger than 5 cm across (T1 or T2). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is high.

OR

T4, N0, M0, low mitotic rate: The tumor is larger than 10 cm (4 inches) across (T4). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is low.

Stage IIIA: T3, N0, M0, high mitotic rate: The tumor is larger than 5 cm but not larger than 10 cm across (T3). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is high.

Stage IIIB: T4, N0, M0, high mitotic rate: The tumor is larger than 10 cm (4 inches) across (T4). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is high.

Stage IV: either

Any T, N1, M0, any mitotic rate: The tumor can be any size (any T) and the cancer has spread to nearby lymph nodes (N1). It has not spread to distant sites (M0). The tumor can have any mitotic rate.

OR

Any T, any N, M1, any mitotic rate: The tumor can be any size (any T) and it may or may not have spread to nearby lymph nodes (any N). The cancer has spread to distant sites, such as the liver or the lungs (M1). The tumor can have any mitotic rate.

Stage grouping for GIST of the small intestine, esophagus, colon, rectum, and peritoneum**

**The peritoneum is a layer of tissue that coats the contents of the abdomen.

Stage I: T1 or T2, N0, M0, low mitotic rate: The tumor is no larger than 5 cm across (T1 or T2). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is low.

Stage II: T3, N0, M0, low mitotic rate: The tumor is larger than 5 cm but not larger than 10 cm across (T3). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is low.

Stage IIIA: either

T1, N0, M0, high mitotic rate: The tumor is 2 cm or less in size (T1). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is high.

OR

T4, N0, M0, low mitotic rate: The tumor is larger than 10 cm (4 inches) across (T4). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is low.

Stage IIIB: T2 to T4, N0, M0, high mitotic rate: The tumor is larger than 2cm across (T2 to T4). The cancer has not spread to nearby lymph nodes (N0) or distant sites (M0). The mitotic rate is high.

Stage IV: either:

Any T, N1, M0, any mitotic rate: The tumor can be any size (any T) and the cancer has spread to nearby lymph nodes (N1). It has not spread to distant sites (M0). The tumor can have any mitotic rate.

OR

Any T, any N, M1, any mitotic rate: Any T, any N, M1, any mitotic rate: The tumor can be any size (any T) and it may or may not have spread to nearby lymph nodes (any N). The cancer has spread to distant sites, such as the liver or the lungs (M1). The tumor can have any mitotic rate.

Prognostic factors

For GISTs, factors such as the size of the tumor, its grade, and whether it has already shown signs of spread in the abdomen can be helpful in predicting how fast the cancer will grow and how likely it is to come back after treatment. Before the staging system was developed, doctors often used these factors to help predict the outcome of patients with GIST, as well as to select the best treatment.

The size of the tumor can give some indication of prognosis (outlook). Smaller tumors (generally those less than 2 inches across) tend to be less likely to spread and have better outcomes than larger ones. The best outlook is for tumors smaller than 1 inch.

Another factor in prognosis is the tumor's histologic grade - its tendency to grow and spread more rapidly based on how the cells look under the microscope. For GISTs, this is done by finding out how many dividing cells, or mitoses, there are. The pathologist looks at many different areas (or fields) of a tumor sample under the microscope and counts the actual

number of dividing cells. By doing these counts, the doctor comes up with a number called *mitoses per high-powered field*. This number will help predict whether the GIST is most likely to be a cancer or a benign tumor.

Doctors often use these factors to separate patients into very low-, low-, intermediate-, and high-risk groups. These groupings describe the risk of the cancer spreading to distant areas in the body.

Whether or not a tumor has already spread to other areas when it is first found is an important factor in determining outlook. It may have an effect on whether certain treatment options, such as surgery, are available.

When these tumors are cancerous and spread away from the initial (primary) site, they most often spread within the abdomen, and, in particular, to the liver. Less often, they may also spread to the lungs and bone. Spread to the lymph nodes, brain, and elsewhere is not common. About half the time, the tumor is still localized when it is found; one fourth of the time it has spread to nearby tissues and one fourth of the time it has spread to distant sites.

Survival rates

It is very hard to get accurate numbers on survival rates for GISTs. Part of this is because these tumors are fairly rare to begin with. In the past, they were often classified as other types of cancers, which made the numbers available for study even smaller. Finally, treatment has changed dramatically in the past few years now that newer, targeted therapies are being used. The survival rates now available are based on people treated 5 or more years ago, before these treatments were around, so people being treated for GISTs today are likely to have a better outlook.

Based on people treated between 1992 and 2000, the overall relative 5-year survival rate of people diagnosed with a malignant GIST was estimated to be about 45%. If the tumor was confined to the organ where it started, the 5-year relative survival was 64%. If it had grown into nearby tissue, the 5-year relative survival was around 30%. If it had spread to distant sites when it was first diagnosed, the 5-year relative survival was 13%. Again, the numbers for people now being diagnosed with GISTs are likely to be much better.

The 5-year survival rate refers to the percentage of patients who live *at least 5 years* after their cancer is diagnosed. Five-year rates are used to produce a standard way of discussing prognosis. Of course, many people live much longer than 5 years. Five-year relative survival rates assume that people will die of other causes and compare the observed survival of people with GISTs with that expected for people without GISTs. That means that relative survival only includes deaths from GIST.s

How are gastrointestinal stromal tumors treated?

This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.

The treatment information in this document is not official policy of the Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor.

Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

Surgery

The main treatment for a gastrointestinal tumor (GIST) that hasn't spread is usually surgery. The goal of the surgery is to completely remove all of the cancer.

If the tumor is very small, it often can be removed with a small area of normal tissue around it. Unlike many other cancers, removing the nearby lymph nodes is usually not needed. This is because GIST does not often spread to the lymph nodes. For small cancers, "keyhole" (laparoscopic) surgery may be enough.

If the tumor is large or growing into other organs, the surgeon may still try to remove it entirely. To remove the tumor completely, the doctor may have to remove portions of other organs (such as sections of the intestines). Even if the tumor is large and has spread into other organs, this may help patients live longer. It can also reduce the chances that the cancer will block (obstruct) the digestive tract later on. The surgeon may also remove GISTs that have spread elsewhere in the abdomen, such as the liver.

If the tumor can't be removed totally without causing major problems, the doctor may try treating the patient with the drug imatinib (see the Chemotherapy section) first. The goal is to shrink the tumor enough to make it easier to remove with surgery.

No matter what type of surgery is done, it is very important that it is done carefully by a surgeon with experience treating GISTs. GISTs are thought to be delicate tumors, and many doctors have voiced their concerns about bleeding and the possible increased risk of spreading the cancer if the capsule around the tumor is opened during surgery.

Chemotherapy

Chemotherapy is the use of drugs to treat cancer. Often, these drugs are injected into a vein (IV) or given by mouth. They enter the bloodstream and reach throughout the body, making this treatment potentially useful for cancers that have spread beyond the organ they started in.

There is little use for standard chemotherapy drugs in patients with a malignant GIST because tumors rarely shrink when these drugs are given. But some newer drugs are proving to be helpful.

Targeted therapy

A drug called imatinib (Gleevec) is very helpful for many patients with advanced-stage GIST, and it may also help patients with earlier stage tumors. The drug targets both the KIT protein and the PDGFRA protein, blocking their ability to cause tumor cells to grow and divide.

Overall, in about 2 out of 3 patients treated, the tumors shrink by at least half. In a small number of patients there is only mild shrinkage or at least no further growth. In about 15% of patients, the drug doesn't help and the cancer continues growing.

This treatment doesn't seem to cure advanced GISTs, but it can help people with them live longer. Often, the drug stops working within a few years and then the cancer starts growing again. Raising the dose of imatinib may help stop the growth of the cancer for some time, but the higher dose has more side effects.

This drug is taken daily as a pill. Side effects may include mild stomach upset, diarrhea, muscle pain, and skin rashes. The stomach upset is lessened if the drug is taken with food. Imatinib can also cause people to retain fluid. Often this is just some swelling in the face (around the eyes) or in the ankles. Rarely the drug causes more severe problems, with fluid building up in the lungs and in the abdominal cavity. It may also affect heart function in some people..

Sunitinib (Sutent) can also be useful in treating GIST. It targets the KIT and PDGFRA proteins (as well as several proteins that imatinib does not target). It is used in GIST patients when imatinib doesn't work or if they can't take imatinib (because of side effects). It seems to help about 1 out of 3 patients who can't take imatinib. Sunitinib caused tumors to shrink in a few patients. The drug often stopped the tumors from growing for a time. More importantly, patients getting the drug may live longer.

Sunitinib is also taken as a pill. The most common side effects of sunitinib are diarrhea, mouth irritation, and skin color changes. More serious side effects can include high blood pressure, increased risk of bleeding, and swelling.

Other drugs like imatinib and sunitinib are being studied in the treatment of GISTs.

Radiation therapy

Radiation therapy is the use of high-energy x-rays (or particles) to kill cancer cells. Radiation is not very effective in GISTs, so it is used rarely. However, it may be used to relieve symptoms such as pain.

Side effects of radiation therapy may include mild skin changes resembling sunburn or suntan, nausea, vomiting, diarrhea, and fatigue. Often these go away after a short while. Radiation therapy also may make the side effects of chemotherapy worse. Talk with your doctor about the potential side effects and the ways to reduce or relieve them.

Treatment choices based on tumor spread

Although GISTs are not formally staged, the treatment options often depend on the extent of the tumor. The main treatment is surgery to remove the tumor when possible, but targeted therapies and other treatments may also help in some situations.

Localized, smaller tumors

Surgery removes smaller tumors. In some patients, this is the only treatment needed. Still, even when they are removed completely, about half of GISTs come back within 2 years. The chance that a GIST will come back is higher in larger tumors and in those with cancer cells that are dividing rapidly (have a high mitotic rate). If the doctor thinks that the cancer has a high risk of growing back, treatment with imatinib may be started after surgery. Treating with anti-cancer drugs after the cancer has been removed completely with surgery is known as adjuvant therapy. Taking imatinib can lower the chance that a GIST will come back (at least for a time), but it is not clear if it really prevents the cancer from coming back or if it just postpones it. So far, it is still too early to tell if this treatment helps patients live longer. The use of adjuvant treatment for GISTs is still being studied.

Localized, larger tumors

Larger tumors may be harder to remove completely and might require more extensive surgery, which could cause health problems later on. Because of this, once a biopsy is done to confirm the tumor is a GIST, treatment with imatinib is usually started. It is continued at least until the tumor stops shrinking. Then, surgery may be done if the surgeon feels that the remaining tumor can be removed safely. Imatinib may be continued after surgery to lower the chance that the cancer will come back. If surgery still isn't possible, this drug is often continued as long as it seems to help.

Tumors that are not removable or have spread to distant sites

Treatment options for GISTs that are not resectable or have metastasized may depend on where they have spread and how extensive the spread is.

For most of these tumors, imatinib is the preferred first option, as it may shrink them. It is continued until it is no longer effective (the tumor starts to grow). Some tumors respond to increasing the dose of imatinib. If the tumor shrinks enough, surgery may then be an option. If the tumor continues to grow or the side effects from imatinib are severe, a switch to sunitinib may be helpful.

If the cancer has spread to only 1 or 2 sites in the abdomen (such as the liver), the surgeon may remove the main tumor and try to remove these other tumors as well. If this is the case, you should discuss the risks and benefits of this approach to treatment with your doctor and family. Usually this should be considered only for tumors that are slow growing or those causing local complications such as uncontrollable bleeding.

There are also newer ways to treat cancers that have spread to the liver. These treatments may include cryosurgery (freezing the tumor), radiofrequency ablation (RFA; using electric currents to heat the tumor), embolization (injecting material into large blood vessels feeding the tumor to block blood flow), or ethanol ablation (injecting concentrated alcohol into the tumor). These methods do not require surgery. The freezing probe, RFA probe, or needle is inserted through the skin and guided to the tumor by CT (computed tomography) scans or ultrasound images. The value of these treatments in patients with a GIST is not fully known because not enough studies have focused on this rare type of cancer.

Recurrent tumors

When a cancer comes back after treatment, it is called recurrence. If the cancer comes back (recurs) in or near the place it started, it is called a *local recurrence*. If it recurs at other sites (like the lungs or liver) it is called a *distant recurrence*. Treatment options for GISTs that recur after treatment depend on the location and extent of the recurrence.

For most recurrences, doctors will likely recommend treatment with imatinib, as it probably offers the best chance to shrink any tumors. If the first dose of imatinib does not work, the dose can be increased. Another option is to try sunitinib.

For the recurrence of a single, well defined tumor, removing or destroying the tumor may be an option. Doctors are still not certain if removing GISTs that come back after treatment really helps people live longer. Some studies found that it did, but other studies disagreed. You should discuss with your doctor and family the risks and benefits of this treatment.

Clinical trials

You may have had to make a lot of decisions since you've been told you have cancer. One of the most important decisions you will make is choosing which treatment is best for you. You may have heard about clinical trials being done for your type of cancer. Or maybe someone on your health care team has mentioned a clinical trial to you.

Clinical trials are carefully controlled research studies that are done with patients who volunteer for them. They are done to get a closer look at promising new treatments or procedures.

If you would like to take part in a clinical trial, you should start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach this service at 1-800-303-5691 or on our Web site at <http://clinicaltrials.cancer.org>. You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll-free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials Web site at www.cancer.gov/clinicaltrials.

There are requirements you must meet to take part in any clinical trial. If you do qualify for a clinical trial, it is up to you whether or not to enter (enroll in) it.

Clinical trials are one way to get state-of-the-art cancer treatment. They are the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

You can get a lot more information on clinical trials in our document called *Clinical Trials: What You Need to Know*. You can read it on our Web site or call our toll-free number (1-800-227-2345) and have it sent to you.

Complementary and alternative therapies

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that your doctor hasn't mentioned. Everyone from friends and family to Internet groups and Web sites offer ideas for what might help you. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

What exactly are complementary and alternative therapies?

Not everyone uses these terms the same way, and they are used to refer to many different methods, so it can be confusing. We use *complementary* to refer to treatments that are used *along with* your regular medical care. *Alternative* treatments are used *instead of* a doctor's medical treatment.

Complementary methods: Most complementary treatment methods are not offered as cures for cancer. Mainly, they are used to help you feel better. Some methods that are used along with regular treatment are meditation to reduce stress, acupuncture to help relieve pain, or peppermint tea to relieve nausea. Some complementary methods are known to help, while others have not been tested. Some have been proven not to be helpful, and a few have even been found harmful.

Alternative treatments: Alternative treatments may be offered as cancer cures. These treatments have not been proven safe and effective in clinical trials. Some of these methods may pose danger, or have life-threatening side effects. But the biggest danger in most cases is that you may lose the chance to be helped by standard medical treatment. Delays or interruptions in your medical treatments may give the cancer more time to grow and make it less likely that treatment will help.

Finding out more

It is easy to see why people with cancer think about alternative methods. You want to do all you can to fight the cancer, and the idea of a treatment with no side effects sounds great. Sometimes medical treatments like chemotherapy can be hard to take, or they may no longer be working. But the truth is that most of these alternative methods have not been tested and proven to work in treating cancer.

As you consider your options, here are 3 important steps you can take:

- Look for "red flags" that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a "secret" that requires you to visit certain providers or travel to another country?
- Talk to your doctor or nurse about any method you are thinking about using.
- Contact us at 1-800-ACS-2345 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at.

The choice is yours

Decisions about how to treat or manage your cancer are always yours to make. If you want to use a non-standard treatment, learn all you can about the method and talk to your doctor about it. With good information and the support of your health care team, you may be able to safely use the methods that can help you while avoiding those that could be harmful.

More treatment information

For more details on treatment options -- including some that may not be addressed in this document -- the National Comprehensive Cancer Network (NCCN) and the National Cancer Institute (NCI) are good sources of information.

The NCCN, made up of experts from many of the nation's leading cancer centers, develops cancer treatment guidelines for doctors to use when treating patients. Those are available on the NCCN Web site (www.nccn.org).

The NCI provides treatment guidelines via its telephone information center (1-800-4-CANCER) and its Web site (www.cancer.gov). Detailed guidelines intended for use by cancer care professionals are also available on www.cancer.gov.

What should you ask your doctor about gastrointestinal stromal tumors?

As you cope with cancer and cancer treatment, we encourage you to talk openly with your doctor, nurse, and cancer care team. You should feel free to ask any question that's on your mind, no matter how small it might seem. Here are some questions you might want to ask. Be sure to add your own questions as you think of them. Nurses, social workers, and other members of the treatment team may also be able to answer many of your questions.

- Where is my tumor located?
- How likely is this tumor to grow or spread quickly?
- Has my tumor spread beyond the primary site?
- What is the stage of my cancer and what does that mean in my case?
- What treatment choices do I have?
- What do you recommend and why?
- What risks or side effects are there to the treatments you suggest?
- How would treatment affect my daily activities?
- What are the chances my cancer will come back with these treatment plans? What would we do if this happens?
- What should I do to be ready for treatment?
- Should I follow a special diet?
- Will my insurance plan pay for the cost of all of the treatments that are recommended?

In addition to these sample questions, be sure to write down some of your own. For instance, you might want more information about second opinions or about clinical trials for which you may qualify.

What happens after treatment for gastrointestinal stromal tumors?

Completing treatment can be both stressful and exciting. You will be relieved to finish treatment, yet it is hard not to worry about cancer coming back. (When cancer returns, it is called recurrence.) This is a very common concern among those who have had cancer.

It may take a while before your confidence in your own recovery begins to feel real and your fears are somewhat relieved. Even with no recurrences, people who have had cancer learn to live with uncertainty.

Follow-up care

After your treatment is over, it is very important to go to all follow-up appointments. During these visits, your doctors will ask about symptoms, do physical exams, and order blood tests or imaging studies such as CT scans or x-rays. Follow-up is needed to check for cancer recurrence or spread, as well as possible side effects of certain treatments. This is the time for you to ask your health care team any questions you need answered and to discuss any concerns you might have.

Because of the risk that a gastrointestinal stromal tumor (GIST) may come back after treatment, most doctors recommend imaging tests such as CT scans (computed tomography) and follow-up visits every 3 to 6 months for 5 years after treatment, then yearly after that. If you are still being treated with imatinib (or sunitinib), you will also need to have CTs to make sure that the drug is still working.

Almost any cancer treatment can have side effects. Some may last for a few weeks to several months, but others can be permanent. Don't hesitate to tell your cancer care team about any symptoms or side effects that bother you so they can help you manage them.

Seeing a new doctor

At some point after your cancer diagnosis and treatment, you may find yourself in the office of a new doctor. Your original doctor may have moved or retired, or you may have moved or changed doctors for some reason. It is important that you be able to give your new doctor the exact details of your diagnosis and treatment. Make sure you have the following information handy:

- a copy of your pathology report from any biopsy or surgery
- if you had surgery, a copy of your operative report
- if you were hospitalized, a copy of the discharge summary that every doctor must prepare when patients are sent home from the hospital
- finally, since some cancer treatment drugs can have long-term side effects, a list of your drugs, drug doses, and when you took them
- copies of your CT scans and other imaging tests (often these can be put on a DVD)

Lifestyle changes to consider during and after treatment

Having cancer and dealing with treatment can be time-consuming and emotionally draining, but it can also be a time to look at your life in new ways. Maybe you are thinking about how to improve your health over the long term. Some people even begin this process during cancer treatment.

Make healthier choices

Think about your life before you learned you had cancer. Were there things you did that might have made you less healthy? Maybe you drank too much alcohol, or ate more than you needed, or smoked, or didn't exercise very often. Emotionally, maybe you kept your feelings bottled up, or maybe you let stressful situations go on too long.

Now is not the time to feel guilty or to blame yourself. However, you can start making changes today that can have positive effects for the rest of your life. Not only will you feel better but you will also be healthier. What better time than now to take advantage of the motivation you have as a result of going through a life-changing experience like having cancer?

You can start by working on those things that you feel most concerned about. Get help with those that are harder for you. For instance, if you are thinking about quitting smoking and need help, call the American Cancer Society's Quitline[®] tobacco cessation program at 1-800-227-2345.

Diet and nutrition

Eating right can be a challenge for anyone, but it can get even tougher during and after cancer treatment. For instance, treatment often may change your sense of taste. Nausea can be a problem. You may lose your appetite for a while and lose weight when you don't want to. On the other hand, some people gain weight even without eating more. This can be frustrating, too.

If you are losing weight or have taste problems during treatment, do the best you can with eating and remember that these problems usually improve over time. You may want to ask your cancer team for a referral to a dietitian, an expert in nutrition who can give you ideas on how to fight some of the side effects of your treatment. You may also find it helps to eat small portions every 2 to 3 hours until you feel better and can go back to a more normal schedule.

One of the best things you can do after treatment is to put healthy eating habits into place. You will be surprised at the long-term benefits of some simple changes, like increasing the variety of healthy foods you eat. Try to eat 5 or more servings of vegetables and fruits each day. Choose whole grain foods instead of white flour and sugars. Try to limit meats that are high in fat. Cut back on processed meats like hot dogs, bologna, and bacon. Get rid of them

altogether if you can. If you drink alcohol, limit yourself to 1 or 2 drinks a day at the most. And don't forget to get some type of regular exercise. The combination of a good diet and regular exercise will help you maintain a healthy weight and keep you feeling more energetic.

Rest, fatigue, work, and exercise

Fatigue is a very common symptom in people being treated for cancer. This is often not an ordinary type of tiredness but a "bone-weary" exhaustion that doesn't get better with rest. For some, this fatigue lasts a long time after treatment, and can discourage them from physical activity.

However, exercise can actually help you reduce fatigue. Studies have shown that patients who follow an exercise program tailored to their personal needs feel physically and emotionally improved and can cope better.

If you are ill and need to be on bed rest during treatment, it is normal to expect your fitness, endurance, and muscle strength to decline some. Physical therapy can help you maintain strength and range of motion in your muscles, which can help fight fatigue and the sense of depression that sometimes comes with feeling so tired.

Any program of physical activity should fit your own situation. An older person who has never exercised will not be able to take on the same amount of exercise as a 20-year-old who plays tennis 3 times a week. If you haven't exercised in a few years but can still get around, you may want to think about taking short walks.

Talk with your health care team before starting, and get their opinion about your exercise plans. Then, try to get an exercise buddy so that you're not doing it alone. Having family or friends involved when starting a new exercise program can give you that extra boost of support to keep you going when the push just isn't there.

If you are very tired, though, you will need to balance activity with rest. It is okay to rest when you need to. It is really hard for some people to allow themselves to do that when they are used to working all day or taking care of a household. (For more information about fatigue, please see the publication, *Fatigue in People With Cancer*.)

Exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.
- It strengthens your muscles.
- It reduces fatigue.
- It lowers anxiety and depression.
- It makes you feel generally happier.
- It helps you feel better about yourself.

And long term, we know that exercise plays a role in preventing some cancers. The American Cancer Society, in its guidelines on physical activity for cancer prevention, recommends that adults take part in at least 1 physical activity for 30 minutes or more on 5 days or more of the week. Children and teens are encouraged to try for at least 60 minutes a day of energetic physical activity on at least 5 days a week.

How about your emotional health?

Once your treatment ends, you may find yourself overwhelmed by emotions. This happens to a lot of people. You may have been going through so much during treatment that you could only focus on getting through your treatment.

Now you may find that you think about the potential of your own death, or the effect of your cancer on your family, friends, and career. You may also begin to re-evaluate your relationship with your spouse or partner. Unexpected issues may also cause concern -- for instance, as you become healthier and have fewer doctor visits, you will see your health care team less often. That can be a source of anxiety for some.

This is an ideal time to seek out emotional and social support. You need people you can turn to for strength and comfort. Support can come in many forms: family, friends, cancer support groups, church or spiritual groups, online support communities, or individual counselors.

Almost everyone who has been through cancer can benefit from getting some type of support. What's best for you depends on your situation and personality. Some people feel safe in peer-support groups or education groups. Others would rather talk in an informal setting, such as church. Others may feel more at ease talking one-on-one with a trusted friend or counselor. Whatever your source of strength or comfort, make sure you have a place to go with your concerns.

The cancer journey can feel very lonely. It is not necessary or realistic to go it all by yourself. And your friends and family may feel shut out if you decide not to include them. Let them in -- and let in anyone else who you feel may help. If you aren't sure who can help, call your American Cancer Society at 1-800-227-2345 and we can put you in touch with an appropriate group or resource.

You can't change the fact that you have had cancer. What you can change is how you live the rest of your life -- making healthy choices and feeling as well as possible, physically and emotionally.

What happens if treatment is no longer working?

If cancer continues to grow after one kind of treatment, or if it returns, it is often possible to try another treatment plan that might still cure the cancer, or at least shrink the tumors

enough to help you live longer and feel better. On the other hand, when a person has received several different medical treatments and the cancer has not been cured, over time the cancer tends to become resistant to all treatment. At this time it's important to weigh the possible limited benefit of a new treatment against the possible downsides, including continued doctor visits and treatment side effects.

Everyone has his or her own way of looking at this. Some people may want to focus on remaining comfortable during their limited time left.

This is likely to be the most difficult time in your battle with cancer -- when you have tried everything medically within reason and it's just not working anymore. Although your doctor may offer you new treatment, you need to consider that at some point, continuing treatment is not likely to improve your health or change your prognosis or survival.

If you want to continue treatment to fight your cancer as long as you can, you still need to consider the odds of more treatment having any benefit. In many cases, your doctor can estimate the response rate for the treatment you are considering. Some people are tempted to try more chemotherapy or radiation, for example, even when their doctors say that the odds of benefit are less than 1%. In this situation, you need to think about and understand your reasons for choosing this plan.

No matter what you decide to do, it is important that you be as comfortable as possible. Make sure you are asking for and getting treatment for any symptoms you might have, such as pain. This type of treatment is called *palliative* treatment.

Palliative treatment helps relieve these symptoms, but is not expected to cure the disease; its main purpose is to improve your quality of life. Sometimes, the treatments you get to control your symptoms are similar to the treatments used to treat cancer. For example, radiation therapy might be given to help relieve bone pain from bone metastasis. Or chemotherapy might be given to help shrink a tumor and keep it from causing a bowel obstruction. But this is not the same as receiving treatment to try to cure the cancer.

At some point, you may benefit from hospice care. Most of the time, this is be given at home. Your cancer may be causing symptoms or problems that need attention, and hospice focuses on your comfort. You should know that receiving hospice care doesn't mean you can't have treatment for the problems caused by your cancer or other health conditions. It just means that the focus of your care is on living life as fully as possible and feeling as well as you can at this difficult stage of your cancer.

Remember also that maintaining hope is important. Your hope for a cure may not be as bright, but there is still hope for good times with family and friends -- times that are filled with happiness and meaning. In a way, pausing at this time in your cancer treatment is an opportunity to refocus on the most important things in your life. This is the time to do some things you've always wanted to do and to stop doing the things you no longer want to do.

What's new in gastrointestinal stromal tumors research and treatment?

There has been a great deal of progress in recent years, especially in treating gastrointestinal stromal tumors (GISTs). As researchers have come to understand the genetic changes that cause these tumors, they've been able to use newer treatments to target these changes.

Although doctors know treatments like imatinib (Gleevec) work, they still aren't sure exactly how and when to give them to make them most effective. Do they improve survival when given before surgery? Should they be given after surgery to all patients, even those with very small tumors? Should they be given indefinitely, or is there a time period after which they can be stopped? Would sunitinib (Sutent) be as effective as imatinib if it was given first? These questions are now being studied in clinical trials.

Drugs that target the KIT or PDGFRA proteins, such as sorafenib (Nexavar), nilotinib, dasatinib, and others are also being studied. Other studies are looking to see if adding other targeted drugs, such as oblimersen and bevacizumab (Avastin), can help imatinib work better. People with GISTs that are no longer responding to standard treatments may want to ask their doctor about clinical trials of these newer targeted therapies.

Additional resources

More information from your American Cancer Society

We have selected some related information that may also be helpful to you. These materials may be ordered from our toll-free number, 1-800-227-2345.

After Diagnosis: A Guide for Patients and Families (also available in Spanish)

Pain Control: A Guide for People With Cancer and Their Families (also available in Spanish)

Sexuality & Cancer: For the Man Who Has Cancer, and His Partner (also available in Spanish)

Sexuality & Cancer: For the Woman Who Has Cancer, and Her Partner (also available in Spanish)

Targeted Therapy

The following books are available from the American Cancer Society. Call us at 1-800-227-2345 to ask about costs or to place your order.

American Cancer Society's Guide to Pain Control

Cancer in the Family: Helping Children Cope with a Parent's Illness

Caregiving: A Step-By-Step Resource for Caring for the Person with Cancer at Home

National organizations and Web sites*

In addition to the American Cancer Society, other sources of patient information and support include:

National Cancer Institute

Toll-free number: 1-800-4-CANCER (1-800-422-6237)

Web site: www.cancer.gov

**Inclusion on this list does not imply endorsement by the American Cancer Society*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at 1-800-227-2345 or visit www.cancer.org.

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Last Medical Review: 5/11/2009

Last Revised: 5/11/2009

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