



## What is Colorectal Cancer?

**Colorectal cancer** is a disease in which normal cells in the colon or rectum stop functioning properly and begin to grow uncontrollably. If not treated or removed, these cancerous cells will eventually form a growth or tumor, which can interfere with proper functioning of the colon or rectum and spread to cause cancer in other parts of the body.

The colon and rectum are segments of the large intestine, and they play an important role in the body's ability to digest food and pass waste. The colon makes up the first 6 feet of the large intestine and the rectum is the last 8 to 10 inches ending near the anus.

The colon has four sections. The ascending colon is the part that goes up from a pouch called the cecum on the right side of the abdomen. The transverse colon crosses the top of the abdomen. Then the descending colon takes food down the left side. Finally, the sigmoid colon at the bottom takes food a few more inches downward to the rectum.

**Colorectal cancer** can begin in either the colon or the rectum. Cancer that begins in the colon is often referred to as colon cancer and cancer that begins in the rectum may be called rectal cancer.

Most colorectal cancers begin in polyps, non-cancerous growths that may occur on the inner wall of the colon and rectum as people get older. Since certain types of polyps may eventually turn cancerous, one way to prevent colorectal cancer is to detect and remove polyps before they become cancerous.

Most **colon and rectal cancers** form cancerous tumors called adenocarcinomas, cancers of the cells that line the inside tissue of the colon and rectum. Tumors called carcinoid tumors, gastrointestinal stromal tumors and lymphomas can also begin in the colon or rectum.

As we well know, there are many kinds of cancer; unfortunately they all come about because of the out-of-control growth of abnormal cells.

**Cancer of the Colon and Rectum** is the **third most common cancer** in adults and accounts for **10% of all cancer deaths**. It is also referred to as colorectal cancer or carcinoma and usually grows in the lining of the large intestine. Other types of cancer that can grow in the large intestine include lymphomas, melanomas or sarcomas.

In most cases, **colon cancer** has **no symptoms**, therefore, it is very often diagnosed and treated in the **advanced stages** when the **success rate** is **reduced**. **Hidden blood**

in **the stool** is mostly the first, and often times the only **warning sign**. In a high percentage **polyps precede** the development of colon cancer.

### **Incidence**

Colorectal cancer generally occurs in 1 out of every 20 individuals at some point in their lifetimes. Approximately 150,000 new cases are diagnosed each year in this country. This is about 15% of the total number of new cancer diagnoses. Colorectal cancer causes about 56,000 deaths a year in the United States, although this number appears to have been declining over the past two decades.

When colorectal cancer is detected early, survival rates are much higher. For example, 92% of patients who receive early treatment are still alive after 5 years. When adjacent organs or lymph nodes are affected, 64% of people survive 5 years. If the cancer is carried to distant organs, the rate drops to only 7%.

Since these statistics are based on patients who were treated 5 years ago, patients currently undergoing treatment may show higher survival rates due to more effective detection and treatment methods.

Most professionals believe that colorectal cancer develops gradually over a period of years. Cells change from a precancerous state to a cancerous state during this time. Thus it is essential that patients undergo screening for early detection of precancerous conditions.

The American Cancer Society estimates that about 106,370 new cases of colon cancer (50,400 men and 55,970 women) and 40,570 new cases of rectal cancer (23,220 men and 17,350 women) will be diagnosed in 2004.

Colorectal cancer is expected to cause about 56,730 deaths (28,320 men and 28,410 women) during 2004.

### **Screening tests can prevent colorectal cancer**

There are ways to prevent colorectal cancer — screening tests are the most effective. Most cases of the disease begin as non-cancerous polyps — grape-like growths on the lining of the colon and rectum. These polyps can become cancerous.

Removing these polyps can prevent colorectal cancer from ever developing. Approximately 90 percent of colorectal cancers and deaths are thought to be preventable.

Because there are often no symptoms related to polyps, it is important to be routinely screened.

### **... or detect it in its earliest, most curable stages**

Colorectal cancer screening tests save lives even when they detect polyps that have become cancerous by catching colorectal cancer in its earliest, most curable stages. When discovered early, the disease can be cured in most cases.

Along with regular colorectal cancer screenings, regular exercise and maintaining a

healthy weight can reduce your risk of being diagnosed with colorectal cancer. While recent research has presented conflicting evidence about fruits and vegetables and the prevention of colorectal cancer, a diet rich in fruits and vegetables provides overall health benefits and can help prevent other cancers. On-going research will help answer questions about the extent to which dietary changes can protect against colorectal cancer.

The risk of developing colorectal cancer increases with age. Starting at age 50, men and women who are at average risk for the disease should get screened. Men and women who have a higher risk of colorectal cancer may need to be tested earlier and should talk to their health care professional about when.

Some people are at a higher risk for developing colorectal cancer and may need to be tested earlier. Because of disproportionate screening, minorities, particularly African-Americans and Hispanics, are more likely to be diagnosed with colorectal cancer in advanced stages. As a result, death rates are higher for these populations than they are for white Americans.

All men and women should talk with their health care professional about colorectal cancer and colorectal cancer screening tests. It is also very important to know your family medical history, because colorectal cancer can be hereditary.

- Personal or family history of colorectal cancer, colorectal polyps or inflammatory disease, like ulcerative colitis
- Diet low in vegetables, fruits and fiber
- Diet high in fat and saturated fat
- Diet high in red meat and/or processed meat
- Diet high in sugar and/or alcohol
- Over the age of 50
- Live in an economically developed, industrialized, urban environment
- Above average height and/or weight
- Physically inactive
- Smoke
  
- Eat more vegetables, fruits, legumes, and whole grains
- Eat less fat and saturated fat
- Stay active and maintain healthy weight
- Drink alcohol in moderation, if at all
- Don't use any form of tobacco
- Have regular exams by a physician
- Be alert of symptoms
  - Prolonged diarrhea
  - Blood in stool
  - Stools smaller in width than usual
  - General abdominal discomfort
  - Frequent gas pains
  - Feeling as if bowel does not empty completely
  - Abnormal fatigue

## Healthy Cells vs. Cancer Cells

Healthy cells are like a cat. They need structure to determine the size of bones and shape of the body, tail and whiskers. The DNA in genes and chromosomes determine this. They need energy to play and prowl and sustain life. This is derived from chemicals in food. Cats need a system to deliver chemicals (food nutrients like amino acids, carbohydrates, fats, vitamins and minerals) to all parts of their body. These are the blood vessels. Growth factors take a kitten into a lazy old cat, all the while helping it to function normally.

The body and its cells are mostly made up of protein. The building blocks of proteins are substances called amino acids that in the form of enzymes and hormones literally control every chemical reaction within the cells. When these are modified, different messages are sent to a complex control system that can alter their function. There are twenty different kinds of amino acids that are essential to life. Twelve of these can be synthesized within the body however; eight must be supplied by the daily diet

<b>Structure</b>	
<b>Normal Cells</b>	<b>Cancer Cells</b>
DNA in genes and chromosomes go about their business in a normal way.	Cancer cells develop a different DNA or gene structure or acquire abnormal numbers of chromosomes.
Cells divide in an orderly way to produce more cells only when the body needs them.	Cells continue to be created without control or order. If not needed, a mass of tissue is formed which is called a tumor.
<b>Energy</b>	
<b>Normal Cells</b>	<b>Cancer Cells</b>
Cells derive 70% of their energy from a system called the "Krebs Cycle."	Cells have a defective "Krebs Cycle" and derive little or no energy from it.
Cells derive only 20% of their energy from a system called "Glycolysis."	Cancer cells derive almost all their energy from "Glycolysis."
Cells derive most of their energy with the use of oxygen.	Cells derive most of their energy in the absence of oxygen.
<b>Blood Vessels</b>	
<b>Normal Cells</b>	<b>Cancer Cells</b>
Cells have a built-in blood vessel system.	Cells do not have a built-in blood vessel system. They require more of certain amino acids to grow.
<b>Growth Factors</b>	
<b>Normal Cells</b>	<b>Cancer Cells</b>
While similar to cancer cells, the amount of them is more in balance to produce a more normal level of activity.	These cells have over produced, require more chemicals (food) and are over active.
<b>Functions</b>	
<b>Normal Cells</b>	<b>Cancer Cells</b>
The enzymes and hormones go about business in a normal balanced manner.	The enzymes and hormones are either over active or under active.
<b>Tumors are Different</b>	
<b>Benign</b>	<b>Malignant</b>

Benign tumors are not cancerous. They do not invade nearby tissues nor spread to other parts of the body. They can be removed and are not a threat to life.	Malignant tumors are cancerous. They can invade and damage nearby tissues and organs and they can break away and enter the blood stream to form new tumors in other parts of the body. The spread of cancer is called metastasis.
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## Overview

Information about the prevention of cancer and the science of screening appropriate individuals at high-risk of developing cancer is gaining interest. Physicians and individuals alike recognize that the best "treatment" of cancer is preventing its occurrence in the first place or detecting it early when it may be most treatable.

Colorectal cancer is the second leading cause of cancer death in the United States. The disease strikes both men and women, with 130,000 cases diagnosed each year. Approximately 56,000 people die from colorectal cancer each year.

The chance of an individual developing cancer depends on both genetic and non-genetic factors. A genetic factor is an inherited, unchangeable trait, while a non-genetic factor is a variable in a person's environment, which can often be changed. Non-genetic factors may include diet, exercise, or exposure to other substances present in our surroundings. These non-genetic factors are often referred to as environmental factors. Some non-genetic factors play a role in facilitating the process of healthy cells turning cancerous (i.e. the correlation between smoking and lung cancer) while other cancers have no known environmental correlation but are known to have a genetic predisposition. A genetic predisposition means that a person may be at higher risk for a certain cancer if a family member has that type of cancer.

### Hereditry or Genetic Factors

People with a personal or family history of adenomatous polyps or familial adenomatous polyposis (FAP) are at an increased risk for developing colorectal cancer. Adenomatous polyps are non-cancerous tumors that grow in the colon or rectum and become cancerous, ultimately developing into colorectal cancer. Familial adenomatous polyposis (FAP) is a genetic disease that causes hundreds of adenomatous polyps to form in the colon or rectum. FAP most often affects adolescents and young adults, many of whom develop colorectal cancer at an early age.

Hereditary nonpolyposis colorectal cancer (HNPCC) is a genetic syndrome caused by mutation in one of several genes. HNPCC accounts for about 3-5% of all colorectal cancer. With HNPCC, people develop a single colorectal cancer rather than an unusual number of polyps, as in FAP. Individuals with the HNPCC gene mutations have an 80% lifetime risk of developing colorectal cancer.

Individuals with a family history of colorectal cancer or colorectal adenomas (polyps) also have an increased risk of developing colorectal cancer, as do those with a personal history of either of these conditions. In addition, people suffering from inflammatory bowel disease have a greater chance of developing colorectal cancer. Research indicates that the presence of a gene called the pituitary tumor transforming gene

(PTTG) may help to identify colon polyps most at risk for becoming cancerous.

### **Environmental or Non-Genetic Factors**

About 75% of all new cases of colorectal cancer occur in people who have no known risk factors other than age. Research indicates that the risk for colorectal cancer increase substantially after age 50.

#### **Diet:**

Some, but not all, research indicates that a high-fat diet, as well as a diet low in fiber and folic acid, may play a role in the development of colorectal cancer. Three recently published clinical studies, however, have failed to produce evidence to support the theory that a diet low in fiber leads to colorectal cancer. There is considerable evidence, however, that a high intake of red meat increases the risk of colorectal cancer.

In a study involving 76,402 women, researchers at the Harvard School of Public Health in Boston found that a “western” diet increases the risk of colon cancer, compared to a “prudent” diet. A “western” diet was defined as including higher levels of red and processed meats, sweets and desserts, French fries, and refined grains while the “prudent” diet consisted of higher intakes of fruits, vegetables, legumes, fish, poultry and whole grains. After the data was adjusted for additional risk factors (which can skew statistical results), the researchers reported that women on a Western diet were 46% more likely to develop colon cancer than women who ate a prudent diet. Obesity also appears to influence the development of polyps and their progression to malignancy. The reason for the relationship between obesity and colon cancer remains unknown; however, some researchers have theorized that elevated insulin may be a factor.

#### **Smoking:**

The use of alcohol and tobacco in combination has been linked to the risk of developing colorectal cancer. A recent study by the American Cancer Society (ACS) indicates that long-term smoking may significantly increase the risk of colorectal cancer. The ACS researchers examined 14 years of data (1982-1996) collected from the Cancer Prevention Study II (CPS II). They evaluated the smoking patterns of 312,332 men and 469,019 women as reported by these participants when they entered the study in 1982. The researchers found that colorectal cancer death rates were highest among current smokers, intermediate among former smokers and lowest among never smokers. The risk of dying from colorectal cancer was higher among those who smoked for 20 or more years.

The duration and amount of smoking was a significant factor, as the data showed that the risk of colorectal cancer increased with the number of cigarettes smoked daily and the number of years of smoking. A younger age at initiation also increased the risk. On the other hand, the colorectal cancer risk decreased with each year after quitting smoking. The data also showed that cigar and pipe smokers had an increased risk of colorectal cancer as well.

Since the data showed that the risk of dying from colorectal cancer increased with the duration and amount of smoking, the researchers concluded that there might be a causal relationship between smoking and colorectal cancer. If this causal relationship does

indeed exist, then approximately 12% of colorectal cancer deaths in the U.S. in 1997 were attributable to smoking.

## Prevention

Cancer is largely a preventable illness. Two-thirds of cancer deaths in the U.S. can be linked to tobacco use, poor diet, obesity, and lack of exercise. All of these factors can be modified. Nevertheless, an awareness of the opportunity to prevent cancer through changes in lifestyle is still under-appreciated.

Because colorectal cancer is a highly curable disease when detected early, the best form of prevention is screening and early detection. When an adenomatous polyp, which is a precursor lesion, develops, it takes 10 to 15 years to transform into cancer; therefore, people with an increased risk for developing colorectal cancer may want to undergo screening at a younger age and continue with screening frequently in an attempt to prevent this development. Several screening programs may be used to detect early stage colorectal cancer and polyps. These polyps can then be removed, thereby preventing the development of colorectal cancer.

### Diet:

Diet is a fertile area for immediate individual and societal intervention to decrease the risk of developing certain cancers. Numerous studies have provided a wealth of often-contradictory information about the detrimental and protective factors of different foods.

There is convincing evidence that excess body fat substantially increases the risk for many types of cancer. While much of the cancer-related nutrition information cautions against a high-fat diet, the real culprit may be an excess of calories. Studies indicate that there is little, if any, relationship between body fat and fat composition of the diet. These studies show that excessive caloric intake from both fats and carbohydrates lead to the same result of excess body fat. The ideal way to avoid excess body fat is to limit caloric intake and/or balance caloric intake with ample exercise.

It is still important, however, to limit fat intake, as evidence still supports a relationship between cancer and polyunsaturated, saturated and animal fats. Specifically, studies show that high consumption of red meat and dairy products can increase the risk of certain cancers. One strategy for positive dietary change is to replace red meat with chicken, fish, nuts and legumes.

High fruit and vegetable consumption has been associated with a reduced risk for developing at least 10 different cancers. Some researchers believe that this may be a result of potentially protective factors such as carotenoids, folic acid, vitamin C, flavonoids, phytoestrogens and isothiocyanates, often referred to as antioxidants.

For many years, researchers speculated that the low incidence of colorectal cancer in parts of Africa could be linked to a high-fiber diet; however, several studies have failed to support this theory. In 1999, three pivotal clinical studies evaluating the effects of a high-fiber diet on colorectal cancer failed to establish a correlation between high fiber consumption and reduction in the incidence of colorectal cancer. In two of these studies, researchers directly compared 2 groups of individuals with either high or low fiber

consumption and found an equal number of polyps in each group. There are many reasons to eat a diet high in fiber, particularly to help reduce the risk for coronary artery disease; however, such a diet does not appear to help prevent the development of colorectal polyps or cancer.

There is strong evidence that moderate to high alcohol consumption also increases the risk of certain cancers. One reason for this relationship may be that alcohol interferes with the availability of folic acid. Alcohol in combination with tobacco creates an even greater risk.

#### **Exercise:**

Higher levels of physical activity may reduce the incidence of some cancers. According to researchers at Harvard, if the entire population increased their level of physical activity by 30 minutes of brisk walking per day (or the equivalent energy expenditure in other activities), we would observe a 15% reduction in the incidence of colon cancer.

A group of Swiss researchers compared the physical activity levels of 223 individuals with colorectal cancer and 491 individuals without colorectal cancer. The results indicated an increased that individuals with a sedentary lifestyle have an increased risk of developing colorectal cancer. This association was present regardless of age, gender, weight or alcohol intake. Although there is no sure way to prevent any cancer from developing, these researchers concluded that increasing one's level of physical activity may help to prevent one-fifth to one-third of all colorectal cancer cases.

#### **Celecoxib:**

Research has indicated that a non-steroidal, anti-inflammatory drug called Celecoxib may reduce the number of polyps that develop in patients with FAP, thus significantly reducing their risk for developing colorectal cancer. The FDA has approved this drug to be used for treatment of individuals with FAP. Clinical studies will be ongoing to determine if other high-risk individuals can benefit from Celecoxib.

#### **Statins:**

A large study presented at the 2004 meeting of the American Society of Clinical Oncology showed that the use of statins (cholesterol-lowering drugs) for 5 years or more is associated with a 46% reduction in the risk of colorectal cancer. This rate was adjusted for other known risk factors such as age, physical activity, and diet.

### **Screening and Early Diagnosis**

For many types of cancer, progress in the areas of cancer screening and treatment has offered promise for earlier detection and higher cure rates. The term screening refers to the regular use of certain examinations or tests in persons who do not have any symptoms of a cancer but are at high risk for that cancer. When individuals are at high risk for a type of cancer, this means that they have certain characteristics or exposures, called risk factors that make them more likely to develop that type of cancer than those who do not have these risk factors. The risk factors are different for different types of cancer. An awareness of these risk factors is important because 1) some risk factors can be changed (such as smoking or dietary intake), thus decreasing the risk for developing

the associated cancer; and 2) persons who are at high risk for developing a cancer can often undergo regular screening measures that are recommended for that cancer type. Researchers continue to study which characteristics or exposures are associated with an increased risk for various cancers, allowing for the use of more effective prevention, early detection, and treatment strategies.

Screening is crucial for the prevention and early treatment of colorectal cancer. It is currently recommended that all patients over age 50 be screened regularly for colorectal cancer. Additionally, people with a personal or family history of adenomatous polyps, FAP, HNPCC, or colorectal cancer may begin screening much earlier.

Several screening strategies are currently available. These include the fecal occult blood test (FOBT), flexible sigmoidoscopy, colonoscopy and double contrast barium enema. It is currently recommended that patients begin receiving an annual fecal occult blood test (FOBT) at age 50 and a flexible sigmoidoscopy every 5 years after age 50. It is also recommended that a colonoscopy be performed every 10 years, and if the FOBT is positive or if adenomas are found during the sigmoidoscopy. Some physicians also recommend that a double-contrast barium enema be performed every 5 to 10 years after age 50, however, current research indicates that the colonoscopy may be a more effective screening procedure. Individuals interested in colorectal cancer screening should discuss the options with their physician in order to determine the most appropriate procedure.

#### **Fecal Occult-Blood Test (FOBT):**

The fecal occult-blood test checks for hidden blood in the stool. Recently, results from an 18-year study indicated that annual or biannual FOBT could significantly reduce the incidence of colorectal cancer. This test indicates the presence of bleeding polyps and thereby indicates a need for further screening. This follow-up screening allows for both the identification and removal of polyps, which results in a reduced incidence of colorectal cancer.

#### **Flexible sigmoidoscopy:**

During this procedure, a physician uses a lighted tube to look inside the rectum and the lower part of the colon (sigmoid colon) for polyps or areas suspicious for cancer. The physician may perform a biopsy in order to collect samples of suspicious tissues or cells for closer examination. This is an outpatient procedure that does not require sedative anesthesia or pain medication. There are no or few complications associated with this procedure.

#### **Colonoscopy:**

During this procedure, a longer flexible tube that is attached to a camera is inserted through the rectum, allowing physicians to examine the internal lining of the colon for polyps or other abnormalities. The physician may perform a biopsy in order to collect samples of suspicious tissues or cells for closer examination. This is a more difficult procedure than sigmoidoscopy requiring anesthesia or heavy sedation. Significant complications occur 1% of patients or less.

### **Double-contrast barium enema:**

A chalky substance called barium is inserted through the rectum and into the colon and rectum. The patient then undergoes x-rays of the colon and rectum so that the physician can evaluate the area for polyps or other abnormalities. The barium helps open the colon so that the x-rays are more detailed and clear.

While these screening strategies help to monitor for the development of adenomatous polyps and colorectal cancer, other tests exist which may allow physicians to identify patients who are at risk for the development or recurrence of colorectal cancer.

**Carcinoembryonic antigen (CEA):** The CEA test is designed to identify cancer cells in the patient's blood by recognizing a specific protein that is found on the surface of these cells, called the CEA. The CEA test is not currently utilized for screening purposes because it is a non-specific test, which means that the presence of CEA could be an indicator of any of a number of conditions. The presence of CEA in the blood appears to be a useful indicator to identify patients at high risk for recurrence after standard treatment for colorectal cancer.

**Predictive genetic testing:** A predictive medicine test for hereditary colorectal cancer is now available. This test detects disease-causing mutations in two genes, MLH1 and MSH2, which are responsible for the majority of hereditary non-polyposis colorectal cancer (HNPCC). This test may allow patients who are identified to be at a high risk for HNPCC to have earlier and more frequent exams and to have pre-cancerous polyps removed. Individuals interested in genetic testing should consult with their physicians about the risks and benefits of this procedure.

Research is ongoing to develop and refine the optimal screening programs for individuals at risk of developing colorectal cancer.

## **Strategies to Improve Screening and Early Detection**

The potential for earlier detection and higher cure rates increases with the advent of more refined screening techniques. In an effort to provide more screening options and perhaps more effective prevention strategies, researchers continue to explore new techniques for the screening and early detection of cancer.

Several new strategies for the screening of colorectal cancer have recently emerged. Despite progress in this area, it is still important that individuals continue to utilize the standard screening procedures in an effort to maintain health and detect colorectal cancer early when it is most treatable. However, these new procedures hold promise for earlier and more reliable detection of colorectal cancer and some individuals may be interested in participating in clinical trials that will help to determine the effectiveness of these new techniques.

### **DNA stool test:**

This new screening procedure involves looking for abnormal DNA in stool samples. Changes in DNA occur as tumors develop in the colon. The tumors shed cells into the intestine, which makes it possible to detect the abnormal DNA cells in stool samples.

This simple, non-invasive screening procedure has proven effective in clinical studies. Research is ongoing to determine the feasibility of using this as a standard screening procedure.

### **Virtual colonoscopy:**

In virtual colonoscopy, spiral CT scanners scan the entire colon to produce a 3-D image. The procedure allows for the complete visualization of the colon more quickly and less invasively than with conventional colonoscopy. While this is a promising new technique, more research will be needed to refine the procedure before it becomes a standard screening procedure for colorectal cancer. This procedure may evolve as technology continues to improve.

The above-mentioned techniques are new areas of exploration in the screening and early detection of colorectal cancer. Clinical trials are being utilized to determine the efficacy of these procedures. While the results look promising and the implications could be exciting, these procedures are not yet the standard. It is imperative that individuals continue to utilize the existing methods of screening for colorectal cancer in order to ensure early detection.

The colon and rectum are parts of the body's digestive system and together form a long, muscular tube called the large intestine. The colon is the first 6 feet of the large intestine and the rectum is the last 8-10 inches. Treatment approaches differ between cancers of the colon or rectum and are, therefore, discussed separately. A separate section has been created for Rectal Cancer.

Adenocarcinoma refers to cancer that begins in the cells that line the colon or large intestine and accounts for over 90%-95% of cancers originating in the colon. Other cancers, including carcinoid and leiomyosarcoma, also originate in the colon, but are not referred to as colon cancer. This treatment overview deals only with adenocarcinoma of the colon, which will be referred to as colon cancer.

The treatment of colon cancer typically consists of surgery and/or chemotherapy and may involve several physicians, including a gastroenterologist, a surgeon, a medical oncologist and other specialists. Care must be carefully coordinated between the various treating physicians involved in management of the cancer.

Colon cancer begins in cells that line the colon. As the cells increase in number, they spread circumferentially around the colon like a "napkin ring." If not detected early, the cancer may invade adjacent organs and spread through the lymph and blood systems throughout the body to the liver, lungs and other organs. In order to understand the best treatment options available for treatment of colon cancer, it is important to first determine where the cancer has spread in the body.

## **Staging**

Determining the stage of the cancer or the extent of the spread requires a number of tests and is ultimately confirmed by surgical removal of the cancer and exploration of the abdominal cavity. The following tests may be used to look for cancer in the chest, abdomen and pelvis.

Computerized Tomography (CT) Scan: A CT scan is a technique for imaging body tissues and organs, during which X-ray transmissions are converted to detailed images, using a computer to synthesize X-ray data. A CT scan is conducted with a large machine positioned outside the body that can rotate to capture detailed images of the organs and tissues inside the body. This method is more sensitive and precise than the chest x-ray.

Magnetic Resonance Imaging (MRI): MRI uses a magnetic field rather than X-rays, and can often distinguish more accurately between healthy and diseased tissue. MRI gives better pictures of tumors located near bone than CT, does not use radiation as CT does, and provides pictures from various angles that enable doctors to construct a three-dimensional image of the tumor.

### **Colonoscopy:**

Because 3-5% of patients with a colon cancer can already have an additional cancer in their colon, colonoscopy is routinely recommended to identify whether a second cancer is present in the colon prior to surgery. During a colonoscopy, a long flexible tube that is attached to a camera is inserted through the rectum, allowing physicians to examine the internal lining of the colon for polyps or other abnormalities. The physician may perform a biopsy in order to collect samples of suspicious tissues or cells for closer examination.

### **Doppler Ultrasound:**

Doppler ultrasound is a technique that can be used to measure blood flow in the artery to the liver (hepatic artery) and total liver flow in patients with colon cancer. This measurement is helpful because abnormalities occurring in hepatic artery blood flow can be used to detect early cancer metastasis to the liver. While this procedure is typically used to identify patients who need additional adjuvant treatment, one clinical study showed that it could more accurately predict outcomes following surgery than does the stage of cancer as determined by standard tests. Thus, Doppler ultrasound may actually predict those patients at a higher risk of a relapse in the liver.

### **Surgery**

Upon completion of the clinical "staging evaluation", surgery is performed to remove the cancer along with part of the normal adjacent colon (hemi-colectomy) and determine the level of spread within the colon and abdomen. Surgery is performed through an abdominal incision and more recently through a laparoscope. Laparoscopic hemi-colectomy may be associated with faster healing than traditional surgery and is currently being evaluated in clinical trials.

Following surgical removal of colon cancer and examination of removed tissue under a microscope, a final "pathologic" stage will be given. This may be a letter or a number, as several different staging systems are used to describe colon cancer. All new treatment information concerning colon cancer is categorized and discussed by the stage. In order to learn more about the most recent information available concerning the treatment of colon cancer, click on the appropriate stage.

### **Stage I or A-B1:**

Cancer is confined to the lining of the colon.

**Stage II or B2-3:**

Cancer may penetrate the wall of the colon into the abdominal cavity or other adjacent organs but does not invade any local lymph nodes.

**Stage III or C1-3:**

Cancer invades one or more of the local lymph nodes but has not spread to other distant organs.

**Stage IV or D:**

Cancer has spread to distant locations in the body, which may include the liver, lungs, bones or other sites.

**Recurrent/Relapsed:**

Colon cancer has progressed or returned (recurred/relapsed) following initial treatment.

**Obesity May Increase Colorectal Cancer Risk**

Recently, the journal *Cancer Causes and Control* published the results of a study that found that women with a higher body mass index value (BMI) have an increased risk of developing colorectal cancer.

Colorectal cancer is the second leading cause of cancer related deaths in the United States. Colorectal cancer is a malignancy that involves both the large intestines (colon) and a distal portion of the colon known as the rectum. There are many risk factors associated with colorectal cancer, some which are unalterable such as older age, male sex, inflammatory bowel disease, certain hereditary conditions, and a family history of colorectal cancer or adenomatous polyps. However, only 25% of all colorectal cancers occur in people with known predisposing factors for the disease. Other risk factors that have been associated with colorectal cancer include smoking, diets high in red meat, as well as diets high in fat and low in fiber. Evidence relating the risk of obesity to colorectal cancer in women has been uncertain; however, recent studies indicate that the presumed association of obesity with colorectal cancer may be modified depending on the women's hormonal status.

Body mass index is the common medical standard for measuring a person's body fat and is determined based on height and weight. Frequently, BMI is used to evaluate a person for obesity or for their risk of developing other diseases. A normal BMI is considered to be a score in the range of 18.5-24.9; individuals considered overweight have a BMI score in the range of 25-29.9; and obesity is determined if the BMI score is 30 or greater.

This recent trial involved women who were premenopausal or who were postmenopausal but were receiving hormone replacement therapy. The goal of the study was to evaluate women with relatively high hormone levels and determine the role of BMI in the risk of developing colorectal cancer. Baseline BMI was determined for 37,671

otherwise healthy women, ages 45 years or older, who were followed for 8 years. During the 8 years, 202 women developed colorectal cancer. Risk analysis found that the greatest risk was associated with women who had a BMI score greater than 27 when compared to women with a BMI score of <23. Further analysis found that women with higher BMI scores remained at the highest risk of colorectal cancer despite their use of hormone therapy or not.

Researchers concluded that women with higher BMI scores had an elevated risk of colorectal cancer that was not altered by their hormonal status. Patients are encouraged to speak to their physician regarding their individual risk factors and what they can do to decrease their risk of colorectal cancer.

**SOURCE: A.P. John Institute for Cancer Research**

**When considering any type of complementary cancer treatment or alternative cancer treatment, always consult with your physician first, as possible interactions could reduce your treatment protocol's efficacy.**