OVARIAN CANCER

What is cancer?

Cancer develops when cells in a part of the body begin to grow out of control. Although there are many kinds of cancer, they all start because of out-of-control growth of abnormal cells.

Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide more rapidly until the person becomes an adult. After that, cells in most parts of the body divide only to replace worn-out or dying cells and to repair injuries.

Because cancer cells continue to grow and divide, they are different from normal cells. Instead of dying, they outlive normal cells and continue to form new abnormal cells.

Cancer cells develop because of damage to DNA. This substance is in every cell and directs all its activities. Most of the time when DNA becomes damaged the body is able to repair it. In cancer cells, the damaged DNA is not repaired. People can inherit damaged DNA, which accounts for inherited cancers. Many times though, a person’s DNA becomes damaged by exposure to something in the environment, like smoking.

Cancer usually forms as a tumor. Some cancers, like leukemia, do not form tumors. Instead, these cancer cells involve the blood and blood-forming organs and circulate through other tissues where they grow.

Often, cancer cells travel to other parts of the body, where they begin to grow and replace normal tissue. This process is called metastasis. Regardless of where a cancer may spread, however, it is always named for the place it began. For instance, breast cancer that spreads to the liver is still called breast cancer, not liver cancer.

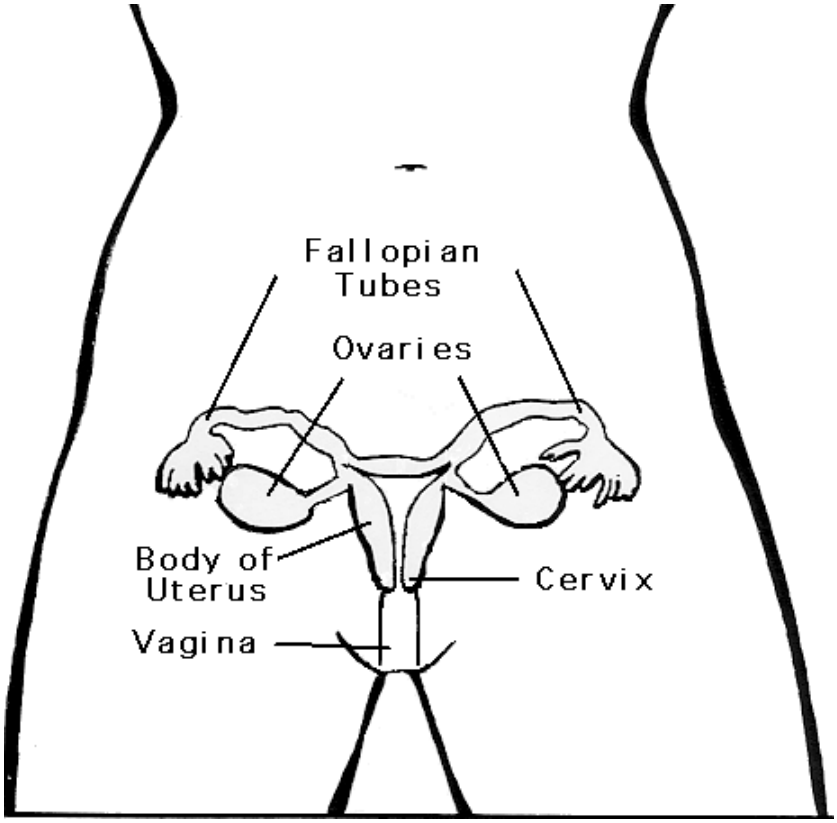
Not all tumors are cancerous. Benign (non-cancerous) tumors do not spread (metastasize) to other parts of the body and, with very rare exceptions, are not life threatening.

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.

Cancer is the second leading cause of death in the United States. Nearly half of all men and a little over one third of all women in the United States will develop cancer during their lifetimes. Today, millions of people are living with cancer or have had cancer. The risk of developing most types of cancer can be reduced by changes in a person's lifestyle, for example, by quitting smoking and eating a better diet. The sooner a cancer is found and treatment begins, the better are the chances for living for many years.

What is ovarian cancer?

Ovarian cancer is cancer that begins in the ovaries. Ovaries are reproductive glands found only in women. The ovaries produce eggs (ova) for reproduction. The eggs travel through the fallopian tubes into the uterus where the fertilized egg implants and develops into a fetus. The ovaries are also the main source of the female hormones estrogen and progesterone. One ovary is located on each side of the uterus in the pelvis.



The ovaries contain 3 kinds of tissue:
Epithelial cells, which cover the ovary.
Germ cells are found inside the ovary. These cells develop into the eggs (ova) that are released into the fallopian tubes every month.
Stromal cells, which produce most of the female hormones estrogen and progesterone.

Types of ovarian tumors

Many types of tumors can start growing in the ovaries. Most of these are *benign* (non-cancerous) and never spread beyond the ovary. Benign tumors can be treated successfully by removing either the ovary or the part of the ovary that contains the tumor. Ovarian tumors that are not benign are malignant (cancerous) and can spread (metastasize) to other parts of the body. Their treatment is more complex and is discussed later in this document.

In general, ovarian tumors are named according to the kind of cells the tumor started from and whether the tumor is benign or cancerous. There are 3 main types of ovarian tumors:

- Epithelial tumors start from the cells that cover the outer surface of the ovary. Most ovarian tumors are epithelial cell tumors.
- Germ cell tumors start from the cells that produce the ova (eggs).
- Stromal tumors start from connective tissue cells that hold the ovary together and produce the female hormones estrogen and progesterone.

Epithelial ovarian tumors

Benign epithelial ovarian tumors: Most epithelial ovarian tumors are benign, do not spread, and usually do not lead to serious illness. There are several types of benign epithelial tumors including serous adenomas, mucinous adenomas, and Brenner tumors.

Tumors of low malignant potential: When looked at under the microscope, some ovarian epithelial tumors do not clearly appear to be cancerous. These are called tumors of *low malignant potential* (LMP tumors). They are also known as *borderline epithelial ovarian cancer*. These differ from typical ovarian cancers in that they do not grow into the supporting tissue of the ovary (called the ovarian stroma). Likewise, if they spread outside the ovary, for example, into the abdominal cavity, they do not usually grow into the lining of the abdomen.

These cancers tend to affect women at a younger age than the typical ovarian cancers. LMP tumors grow slowly and are less life-threatening than most ovarian cancers. Although they can be fatal, this is not common.

Malignant epithelial ovarian tumors: Cancerous epithelial tumors are called carcinomas. About 85% to 90% of ovarian cancers are epithelial ovarian carcinomas. When someone says

that they had ovarian cancer, they usually mean that they had epithelial ovarian carcinoma. When these tumors are looked at under the microscope, the cells have several features that can be used to classify epithelial ovarian carcinomas into different types. The *serous* type is by far the most common, but there are other types called *mucinous*, *endometrioid*, and *clear cell*.

If the cells don't look like any of these 4 subtypes, the tumor is called *undifferentiated*. Undifferentiated epithelial ovarian carcinomas tend to grow and spread more quickly than the other types. In addition to being classified by these subtypes, epithelial ovarian carcinomas are also given a *grade* and a *stage*.

The grade classifies the tumor based on how much it looks like normal tissue on a scale of 1, 2, or 3. Grade 1 epithelial ovarian carcinomas look more like normal tissue and tend to have a better prognosis (outlook). Grade 3 epithelial ovarian carcinomas look less like normal tissue and usually have a worse outlook.

The tumor stage describes how far the tumor has spread from where it started in the ovary. Staging is explained in detail in a later section.

Primary peritoneal carcinoma

Primary peritoneal carcinoma (PPC) is a rare cancer closely related to epithelial ovarian cancer. At surgery, it looks the same as an epithelial ovarian cancer that has spread through the abdomen. Under a microscope, PPC also looks just like epithelial ovarian cancer. Other names for this cancer include extra-ovarian (meaning outside the ovary) primary peritoneal carcinoma (EOPPC) or serous surface papillary carcinoma. Primary peritoneal carcinoma develops in cells from the lining of the pelvis and abdomen (which is called the *peritoneum)*. These cells are very similar to the cells on the surface of the ovaries. Like ovarian cancer, PPC tends to spread along the surfaces of the pelvis and abdomen, so it is often difficult to tell exactly where the cancer first started. This type of cancer can occur in women who still have their ovaries, but it is of more concern for women who have had their ovaries removed to prevent ovarian cancer.

Symptoms of PPC are similar to those of ovarian cancer, including abdominal pain or bloating, nausea, vomiting, indigestion, and a change in bowel habits. Also, like ovarian cancer, PPC may elevate the blood level of a tumor marker called CA-125.

Women with PPC usually get the same treatment as those with widespread ovarian cancer. This could include surgery to remove as much of the cancer as possible (this process is called debulking and is discussed in the Surgery section), followed by chemotherapy like that given for ovarian cancer. Its outlook is similar to widespread ovarian cancer.

Fallopian tube cancer

This is an extremely rare cancer. It begins in the tube that carries an egg from the ovary to the uterus (the fallopian tube). Like PPC, fallopian tube cancer causes symptoms similar to those seen in women with ovarian cancer. The treatment and outlook for survival (prognosis) is similar to that for ovarian cancer.

Germ cell tumors

Germ cells are the cells that usually form the ova or eggs. Most germ cell tumors are benign, although some are cancerous and may be life threatening. About 5% of ovarian cancers are germ cell tumors. There are several subtypes of germ cell tumors. The most common germ cell tumors are teratoma, dysgerminoma, endodermal sinus tumor, and choriocarcinoma.

Teratoma

Teratomas are germ cell tumors with areas that, when viewed under the microscope, look like each of the 3 layers of a developing embryo: the endoderm (innermost layer), mesoderm (middle layer), and ectoderm (outer layer). This germ cell tumor has a benign form called *mature* teratoma and a cancerous form called *immature* teratoma.

The mature teratoma is by far the most common ovarian germ cell tumor and usually affects women of reproductive age (teens through forties). It is often called a dermoid cyst because its lining resembles skin. These tumors or cysts can contain different kinds of benign tissues including, bone, hair, and teeth. The patient is cured by surgically removing the cyst.

Immature teratomas occur in girls and young women, usually younger than 18. These are rare cancers that contain cells that look like those from embryonic or fetal tissues such as connective tissue, respiratory passages, and brain. Tumors that are not very immature (grade 1 immature teratoma) and have not spread beyond the ovary are cured by surgical removal of the ovary. When they have spread beyond the ovary and/or much of the tumor has a very immature appearance (grade 2 or 3 immature teratomas), chemotherapy is recommended in addition to surgery to remove the ovary.

Dysgerminoma

Although this type of cancer is rare, it is the most common ovarian cancer of germ cells. It usually affects women in their teens and twenties. Although dysgerminomas are considered malignant (cancerous), most do not grow or spread very rapidly. When they are limited to the ovary, more than 75% of patients are cured by surgically removing the ovary, without any further treatment. Even when the tumor has spread further (or if it comes back later), surgery

and/or chemotherapy is effective in controlling or curing the disease in about 90% of patients.

Endodermal sinus tumor (yolk sac tumor) and choriocarcinoma

These very rare tumors typically affect girls and young women. They tend to grow and spread rapidly but are usually very sensitive to chemotherapy. Choriocarcinoma that starts in the placenta (during pregnancy) is more common than the kind that starts in the ovary. Placental choriocarcinomas usually respond even better to chemotherapy than ovarian choriocarcinomas.

Stromal tumors

About 5% to 7% of ovarian cancers are ovarian stromal cell tumors. Most of these are granulosa cell tumors. More than half of stromal tumors are found in women older than 50, but about 5% of stromal tumors occur in young girls. The most common symptom of these tumors is abnormal vaginal bleeding. This happens because many of these tumors produce female hormones (like estrogen). These hormones can cause vaginal bleeding (like a period) to start again after menopause, or can cause menstrual periods and breast development in young girls. Less often, stromal tumors make male hormones (like testosterone). If male hormones are produced, the tumors can disrupt normal periods and cause facial and body hair to grow. Another symptom of stromal tumors can be sudden, severe, abdominal pain. This occurs if the tumor starts to bleed. Types of malignant (cancerous) stromal tumors include granulosa cell tumors, granulosa-theca tumors, and Sertoli-Leydig cell tumors, which are usually considered low-grade cancers. Thecomas and fibromas are benign stromal tumors.

Ovarian cysts

An ovarian cyst is a collection of fluid inside an ovary. Most ovarian cysts occur as a normal part of ovulation (release of eggs) - these are called "functional" cysts. These cysts usually go away within a few months without any treatment. If you develop a cyst, your doctor may want to check it again after your next cycle (period) to see if it has gotten smaller. In a female who isn't ovulating (like a woman after menopause or girl who hasn't started her periods), an ovarian cyst is a little more concerning, and the doctor may want to do more tests. The doctor may also order other tests if the cyst is large or if it does not go away in a few months. Even though most of these cysts are benign, a small number of them could be cancer. Sometimes the only way to know for sure if the cyst is malignant is to take it out with surgery. Benign cysts can be observed (follow-up with physical exams and imaging tests), treated with medicines, or removed with surgery.

What are the key statistics about ovarian cancer?

Ovarian cancer is the eighth most common cancer among women, excluding non-melanoma skin cancers. The American Cancer Society estimates that about 21,650 new cases of ovarian cancer will be diagnosed in the United States during 2008. Ovarian cancer accounts for about 3% of all cancers in women.

A woman's risk of getting invasive ovarian cancer during her lifetime is about 1 in 71. Her lifetime chance of dying from invasive ovarian cancer is about 1 in 95. (These statistics do not count low malignant potential ovarian tumors.)

This cancer mainly develops in older women. Around two-thirds of women who are diagnosed with ovarian cancer are 55 or older. It is slightly more common in white women that African-American women.

The ovarian cancer incidence rate has been slowly falling over the past 20 years. The incidence rate is a precise way for scientists to describe how common or rare a disease is and is defined as the number of new cases diagnosed each year per 100,000 women.

Ovarian cancer ranks fifth in cancer deaths among women, accounting for more deaths than any other cancer of the female reproductive system. It is estimated that there will be about 15,520 deaths from ovarian cancer in the United States during 2008.

About 3 in 4 women with ovarian cancer survive at least 1 year after diagnosis. Almost half (45%) of women with ovarian cancer are still alive at least 5 years after diagnosis (this is called the *5-year survival rate*). Women younger than 65 have better 5-year survival rates than older women. If ovarian cancer is found (and treated) before the cancer has spread outside the ovary, the 5-year survival rate is 92%. However, less than 20% of all ovarian cancer is found at this early stage.

What are the risk factors for ovarian cancer?

A risk factor is anything that changes your chance of getting a disease such as cancer. Different cancers have different risk factors. For example, unprotected exposure to strong sunlight is a risk factor for skin cancer. Smoking is a risk factor for a number of cancers.

But risk factors don't tell us everything. Having a risk factor, or even several risk factors, does not mean that you will get the disease. And many people who get the disease may not have had any known risk factors. Even if a person with ovarian cancer has a risk factor, it is very hard to know how much that risk factor may have contributed to the cancer.

Researchers have discovered several specific factors that change a woman's likelihood of developing *epithelial* ovarian cancer. These risk factors do not apply to other less common types of ovarian cancer such as germ cell tumors and stromal tumors.

Age

The risk of developing ovarian cancer gets higher with age. Ovarian cancer is rare in women younger than 40. Most ovarian cancers develop after menopause. Half of all ovarian cancers are found in women over the age of 63.

Obesity

Various studies have looked at the relationship of obesity and ovarian cancer. Overall, it does seem that obese women (those with a body mass index of at least 30) do have a higher risk of developing ovarian cancer. A study from the American Cancer Society also found a higher rate of death from ovarian cancer in obese women. The risk was increased by 50% in the heaviest women.

Reproductive history

A woman who has had children has a lower risk of ovarian cancer than women who have no children. The risk gets even lower with each pregnancy. Breast feeding may lower the risk even further. Using oral contraceptives (also known as birth control pills or "the pill') also lowers the risk of ovarian cancer.

Gynecologic surgery

Tubal ligation (having your "tubes tied") may reduce the chance of developing ovarian cancer by up to 67%. A hysterectomy (removal of the uterus without removing the ovaries) also seems to reduce the risk of getting ovarian cancer by about one-third.

Fertility drugs

In some studies, researchers have found that using the fertility drug clomiphene citrate (Clomid®) for longer than one year may increase the risk for developing ovarian tumors. The

risk seemed to be highest in women who did not get pregnant while on this drug. Fertility drugs seem to increase the risk of the type of ovarian tumors known as "low malignant potential" (LMP tumors). If you are taking fertility drugs, you should discuss the potential risks with your doctor. However, women who are infertile may be at higher risk (than fertile women) even if they do not use fertility drugs. This may be in part because they haven't had children or have not used birth control pills (which are protective). More research to clarify these relationships is now underway.

Androgens

Androgens are male hormones. Danazol increases androgen levels. A recent study found a link between the drug danazol (used to treat endometriosis) and an increased risk of ovarian cancer. Further studies are planned to look at this.

Estrogen replacement therapy and hormone replacement therapy

Some recent studies suggest women using estrogens after menopause have an increased risk of developing ovarian cancer. The risk seems to be higher in women taking estrogen alone (without progesterone) for many years (at least 5 or 10). The increased risk is less certain for women taking both estrogen and progesterone.

Family history of ovarian cancer, breast cancer, or colorectal cancer

Ovarian cancer can run in families. Your ovarian cancer risk is increased if your mother, sister, or daughter has (or has had) ovarian cancer. The younger your relative was when she developed ovarian cancer, the higher your risk. The risk also gets higher the more relatives you have with ovarian cancer. Increased risk for ovarian cancer does not have to come from your mother's side of the family - it can also come from your father's side. About 10% to 15% of ovarian cancers result from an inherited tendency to develop the disease. A family history of cancer caused by an inherited *mutation* (change) in certain genes can increase the risk of ovarian cancer. Some of these genes (named BRCA1 and BRCA2) also increase the risk of breast cancer - so having a family member with breast cancer can increase your risk of ovarian cancer. Another set of genes increase the risk of colon cancer, so women who have colon cancer in their families may have a higher risk of developing ovarian cancer. Many cases of familial epithelial ovarian cancer are caused by inherited gene mutations that can be identified by genetic testing.

Women with ovarian cancers caused by some of these inherited gene mutations may have a better outlook than patients who do not have any family history of ovarian cancer. (See the section on causes of ovarian cancer for information on these gene mutations.)

Genetic counseling, genetic testing, and strategies for preventing ovarian cancer in women with an increased familial risk are discussed in the prevention section of this document.

Personal history of breast cancer

If you have had breast cancer, you also have an increased risk of developing ovarian cancer. There are several reasons for this. Some of the reproductive risk factors for ovarian cancer may also increase breast cancer risk. Also, if you have a strong family history of breast cancer, you may have inherited a mutated BRCA1 or BRCA2 gene. (See the section, "Do we know what causes ovarian cancer?") You have a strong family history if one or more of your close relatives age 50 or younger has or had ovarian cancer.

Talcum powder

It has been suggested that talcum powder applied directly to the genital area or on sanitary napkins may be carcinogenic (cancer-causing) to the ovaries. Some, studies suggest a very slight increase in risk of ovarian cancer in women who used talc on the genital area. In the past, talcum powder was sometimes contaminated with asbestos, a known cancer-causing mineral. This may explain the association with ovarian cancer in some studies. Body and face powder products have been required by law for more than 20 years to be asbestos-free. However, proving the safety of these newer products will require follow-up studies of women who have used them for many years. There is no evidence at present linking cornstarch powders with any female cancers.

Diet

A recent study of women who followed a low-fat diet for at least 4 years showed a lower risk of ovarian cancer. Some studies have shown a reduced rate of ovarian cancer in women who ate a diet high in vegetables, but other studies disagree. The American Cancer Society recommends eating a variety of healthful foods, with an emphasis on plant sources. Eat at least 5 servings of fruits and vegetables every day, as well as several servings of whole grain foods from plant sources such as breads, cereals, grain products, rice, pasta, or beans. Limit the intake of red meat and processed meats. Even though the impact of these dietary recommendations on ovarian cancer risk remains uncertain, following these

recommendations can help prevent several other diseases, including some other types of cancer.

Analgesics

In some studies, both aspirin and acetaminophen have been shown to reduce the risk of ovarian cancer. However, the information is not consistent. Women who do not already take these medicines regularly for other health conditions should not start doing so to try to prevent ovarian cancer. More research is needed on this issue.

Smoking and alcohol use

These do not increase the risk for most ovarian cancers, but some studies have found they increase the risk for the mucinous type.

Do we know what causes ovarian cancer?

We do not yet know exactly what causes most ovarian cancers. As discussed in the previous section, we do know some factors that make a woman more likely to develop epithelial ovarian cancer. Much less is known about risk factors for germ cell and stromal tumors of the ovaries.

There are many theories about the causes of ovarian cancer. Some of them came from looking at the things that change the risk of ovarian cancer. For example, pregnancy and taking birth control pills both lower the risk of ovarian cancer. Since both of these things reduce the number of times the ovary releases an egg (ovulation), some researchers think that there may be some relationship between ovulation and the risk of developing ovarian cancer.

Also, we know that tubal ligation and hysterectomy decrease the risk of ovarian cancer. One theory to explain this is that some cancer-causing substances may enter the body through the vagina and pass through the uterus and fallopian tubes to reach the ovaries. This would explain the effect of removing the uterus or blocking the fallopian tubes on ovarian cancer risk. Another theory is that male hormones (androgens) can cause ovarian cancer. This is supported by the finding that taking the drug danazol may increase ovarian cancer risk (danazol is taken to relieve heavy periods, pain, and infertility caused by endometriosis and for breast cysts).

Researchers have made great progress in understanding how certain mutations (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 usually resemble our parents because they

are the source of our DNA. However, DNA affects more than our outward appearance. Some genes (parts of our DNA) contain instructions for controlling when our cells grow and divide. Certain genes that promote cell division are called oncogenes. Others that slow down cell division, cause cells to die at the appropriate time, or help repair DNA damage are called tumor suppressor genes. We know that DNA mutations (defects) that turn on oncogenes or turn off tumor suppressor genes can cause cancer.

Inherited genetic factors

Scientists have learned a lot about how certain genes you inherit from your parents can greatly increase your ovarian cancer risk. These include the BRCA1 and BRCA2 genes and several genes related to hereditary nonpolyposis colon cancer (see section below).

BRCA1 and BRCA2 genes: Although inherited mutations in these genes were first found in women with breast cancer, they are also responsible for most inherited ovarian cancers. When these genes are normal, they act as *tumor suppressors* - they help to prevent cancer by making proteins that keep cells from growing abnormally. But if you have inherited a *mutation* of one of these genes from either parent, this cancer-preventing protein is less effective, and your chances of developing breast and/or ovarian cancer increase. Mutations in BRCA1 and BRCA2 are about 10 times more common in those who are Ashkenazi Jewish than those in the general U.S. population.

The lifetime ovarian cancer risk for women with a BRCA1 mutation is estimated to be between 35% and 70%. This means that if 100 women had the BRCA1 mutation, between 35 and 70 of them would get ovarian cancer. For women with BRCA2 mutations the risk has been estimated to be between 10% and 30% by age 70. These mutations also increase the risks for primary peritoneal carcinoma and fallopian tube carcinoma.

In comparison, the ovarian cancer lifetime risk for the women in the general population is about 1.5%.

Hereditary nonpolyposis colon cancer : There are 4 different genes involved in this syndrome. They are called MLH1, MSH2, MSH6, and PMS2. An abnormal copy of any one of these genes reduces the body's ability to repair damage to its DNA. This results in a very high risk of colon cancer. Women with this syndrome also have an increased risk of developing cancer of the uterus (endometrial cancer) and ovarian cancer. The lifetime risk of ovarian cancer in women with hereditary nonpolyposis colon cancer **(**HNPCC) is about 10%. This syndrome causes up to 1% of all ovarian epithelial cancers. An older name for HNPCC is Lynch syndrome.

Peutz-Jeghers syndrome: People with this rare genetic syndrome develop polyps in the stomach and intestine while they are teenagers. They also have a high risk of cancer, particularly cancers of the digestive tract (esophagus, stomach, small intestine, colon).

Women with this syndrome have an increased risk of ovarian cancer, including both epithelial ovarian cancer and a type of stromal tumor (granulosa cell tumors).

Acquired genetic changes

Most DNA mutations related to ovarian cancer are not inherited but instead occur during a woman's life. In some cancers, acquired mutations of oncogenes and/or tumor suppressor genes may result from radiation or cancer-causing chemicals, but there is no evidence for this in ovarian cancer. So far, studies have not been able to specifically link any single chemical in the environment or in our diets to mutations that cause ovarian cancer. The cause of most acquired mutations remains unknown.

Most ovarian cancers have several acquired gene mutations. Research has suggested that tests to identify acquired changes of certain genes, such as the p53 tumor suppressor gene or the HER2 oncogene, in ovarian cancers may help predict a woman's prognosis. The role of these tests is still not certain, and some cancer specialists feel that more research is needed.

Can ovarian cancer be prevented?

Most women have one or more risk factors for ovarian cancer. However, most of the common factors only slightly increase your risk, so they only partly explain the frequency of the disease. So far, what is known about risk factors has not translated into practical ways to prevent most cases of ovarian cancer.

There are several ways you can reduce your risk of developing epithelial ovarian cancer. Much less is known about ways to lower the risk of developing germ cell and stromal tumors of the ovaries. The remainder of this section refers to epithelial ovarian cancer only. It is important to realize that some of these strategies reduce the risk only slightly, while others decrease it much more. Some strategies are easily followed, and others require surgery. If you are concerned about your risk of ovarian cancer, you may want to discuss this information with your health care professionals. They can help you consider these ideas as they apply to your own situation.

Oral contraceptives

Using oral contraceptives (birth control pills) decreases the risk of developing ovarian cancer, especially among women who use them for several years. Women who used oral contraceptives for 5 or more years have about a 50% lower risk of developing ovarian cancer compared with women who never used oral contraceptives.

Gynecologic surgery

Although both tubal ligation and hysterectomy may reduce the chance of developing ovarian cancer, experts agree that these operations should only be done for valid medical reasons - not for their effect on ovarian cancer risk.

If you are going to have a hysterectomy for a valid medical reason and you have a strong family history of ovarian or breast cancer, you may wish to consider having both ovaries removed (bilateral oophorectomy) as part of that procedure.

Even if you do not have an increased risk of ovarian cancer, some doctors recommend that the ovaries be removed with the uterus if a woman has already gone through menopause or is close to menopause. If you are older than 40 and you are going to have a hysterectomy , you should discuss having your ovaries removed with your doctor.

Prevention strategies for women with a family history of ovarian cancer, including cancer due to BRCA mutation

Genetic counseling can predict whether you are likely to have one of the gene mutations associated with an increased ovarian cancer risk. If your family history suggests that you might have one of these gene mutations, you might consider genetic testing.

Before having genetic tests, you should discuss their benefits and potential drawbacks with the counselor. Genetic testing can determine if you or members of your family carry certain gene mutations that cause a high risk of ovarian cancer. For some women with a strong family history of ovarian cancer, knowing they do not have a mutation that increases their ovarian cancer risk can be a great relief for them and their children. Knowing that you do have such a mutation can be stressful, but many women find this information very helpful in making important decisions about certain prevention strategies for them and their children.

Using oral contraceptives is one way that women at average risk of developing ovarian cancer can reduce their risk for this disease. Oral contraceptives also seem to reduce the risk for women with BRCA1 and BRCA2 mutations. Some studies, however, have indicated that oral contraceptives might increase breast cancer risk in those who carry the mutation. Research is continuing to find out more about the risks and benefits of oral contraceptives for women at high ovarian and breast cancer risk.

It is not clear if tubal ligation is effective in reducing the risk of ovarian cancer in women who have the BRCA1 or BRCA2 mutations. Studies that have looked at this issue have not

agreed about this. Researchers do agree that removing both ovaries (oophorectomy) protects women with BRCA1 or BRCA2 mutations against ovarian cancer.

Sometimes a woman has this surgery to reduce her risk of ovarian cancer before cancer is even suspected. If the ovaries are removed to prevent ovarian cancer, the surgery is called "risk-reducing" or "prophylactic." Generally, oophorectomy is recommended only for very high-risk patients after they have finished having children. This operation lowers ovarian cancer risk a great deal but does not entirely eliminate it. That is because some women who have a high risk of ovarian cancer already have a cancer at the time of surgery. These ovarian cancers can be so small that they are only found when the ovaries are looked at under the microscope (after they are removed). Also, women with BRCA1/BRCA2 gene mutations have an increased risk of primary peritoneal carcinoma (PPC). This cancer can still develop after the ovaries are removed. Because the risk of fallopian tube cancer is also increased in women with mutations in BRCA1 or BRCA2, experts currently recommend that women at high risk of ovarian cancer who are having their ovaries removed should also have their fallopian tubes completely removed.

Research has shown that women who have BRCA gene mutations and have had their ovaries removed have a substantial reduction in their risk of breast cancer as well as their risk of ovarian cancer. The risk of ovarian cancer is reduced by 85% to 95%, and the risk of breast cancer cut by 50% to 60%.

Can ovarian cancer be found early?

About 20% of ovarian cancers are found at an early stage. When ovarian cancer is found early at a localized stage, about 94% of patients live longer than 5 years after diagnosis. Several large studies are in progress to learn the best ways to find ovarian cancer in its earliest stage.

Ways to find ovarian cancer early

Regular women’s health exams

During a pelvic exam, the health care professional feels the ovaries and uterus for size, shape, and consistency. Although a pelvic exam is recommended because it can find some reproductive system cancers at an early stage, most early ovarian tumors are difficult or impossible for even the most skilled examiner to feel. Pelvic exams may, however, help identify other cancers or gynecologic conditions. Women should discuss the need for these exams with their doctor.

Although the Pap test is effective in detecting cervical cancer early, it is not a test for ovarian cancer. Rarely ovarian cancers are detected through Pap tests, but usually these are at an advanced stage.

See a doctor if you have symptoms

Early cancers of the ovaries tend to cause symptoms that are more commonly caused by other things. These symptoms include abdominal swelling or bloating (due to a mass or accumulation of fluid), pelvic pressure or abdominal pain, difficulty eating or feeling full quickly, and/or urinary symptoms (having to go urgently or often). Most of these symptoms can also be caused by other less serious conditions, but when the symptoms are caused by ovarian cancer they tend to be more severe and are a change from how a woman usually feels.

By the time ovarian cancer is considered as a possible cause of these symptoms, it may have already spread beyond the ovaries. Also, some types of ovarian cancer can rapidly spread to the surface of nearby organs. Still, prompt attention to symptoms may improve the odds of early diagnosis and successful treatment. If you have symptoms similar to those of ovarian cancer almost daily for more than a few weeks, and they can't be explained by other more common conditions, report them to your health care professional -- preferably a gynecologist -- right away.

Screening tests for ovarian cancer

Screening tests and exams are used to detect a disease, such as cancer, in people who do not have any symptoms. Perhaps the best example of this is the mammogram, which can often detect breast cancer in its earliest stage, even before a doctor can feel the cancer. Although there has been a lot of research to develop a screening test for ovarian cancer, there hasn’t been much success so far. There are 2 tests that are used most commonly to screen for ovarian cancer. These tests, transvaginal sonography and CA-125, are often offered to women who are at high risk of developing epithelial ovarian cancer, such as those with a very strong family history.

Transvaginal sonography is an ultrasound test that places a small instrument in the vagina. It can help find a mass in the ovary, but it can't actually tell which masses are cancers and which are not.

CA-125 is a protein in the blood that is higher in many women with ovarian cancer. The problem with this test is that conditions other than cancer can also cause high levels of CA-125. In addition, someone with ovarian cancer can still have a normal CA-125 level. When a CA-125 level is abnormal, many doctors will repeat the test (to make sure the result is

correct). The doctor may also consider ordering a transvaginal ultrasound test, or even taking samples of fluid from the abdomen or tissue from the ovaries to find out if a cancer is really present.

In studies of women at average risk of ovarian cancer, these screening tests did not lower the number of deaths caused by ovarian cancer. For this reason, transvaginal sonography and the CA-125 blood test are not recommended for ovarian cancer screening of women without known strong risk factors. These tests are often done in women at high risk, but it is not known how helpful they are. Ways to improve ovarian cancer screening tests are being researched. Hopefully, further improvements will make these tests effective enough to lower the ovarian cancer death rate.

There are no recommended screening tests for germ cell tumors or stromal tumors. Some germ cell cancers release certain protein markers such as human chorionic gonadotropin (HCG) and alpha-fetoprotein (AFP) into the blood. After these tumors have been treated by surgery and chemotherapy, blood tests for these markers can be used to see if treatment is working and to determine if the cancer may be coming back.

Researchers continue to look for new tests to help diagnose ovarian cancer early.

How is ovarian cancer diagnosed?

Signs and symptoms of ovarian cancer

Ovarian cancer may cause several signs and symptoms. Women are more likely to have symptoms if the disease has spread beyond the ovaries, but even early stage ovarian cancer can cause them. The most common symptoms include:

- bloating
- pelvic or abdominal pain
- trouble eating or feeling full quickly
- urinary symptoms such as urgency (always feeling like you have to go) or frequency (having to go often)

These symptoms are also commonly caused by benign (non-cancerous) diseases and by cancers of other organs. When they are caused by ovarian cancer, they tend to be *persistent* and represent a *change from normal* -- for example, they occur more often or are more severe. If a woman has these symptoms almost daily for more than a few weeks, she should see her doctor, preferably a gynecologist.

- Others symptoms of ovarian cancer can include:
- fatigue
- upset stomach
- back pain
- pain during sex
- constipation
- menstrual changes

However, these symptoms are more likely to be caused by other conditions, and they occur just about as often in women who do not have ovarian cancer.

If there is reason to suspect you may have ovarian cancer, your doctor will use one or more tests or procedures to be absolutely certain that the disease is present and to determine the stage of the cancer.

Consultation with a specialist

If your pelvic exam or other tests suggest that you may have ovarian cancer, you will need a doctor or surgeon who specializes in treating women with this type of cancer. A *gynecologic oncologist* is an obstetrician/gynecologist who is specially trained in treating cancers of the female reproductive system.

Imaging studies

Imaging methods such as computed tomography (CT) scans, magnetic resonance imaging (MRI) scans, and ultrasound studies can confirm whether a pelvic mass is present. Although these studies cannot confirm that the mass is a cancer, they are useful if your doctor is looking for spread of ovarian cancer to other tissues and organs.

Ultrasound

Ultrasound (ultrasonography) is the use of sound waves to create an image on a video screen. Sound waves are released from a small probe placed in the woman's vagina or on the surface of her abdomen. The sound waves create echoes as they enter the ovaries and other organs. The same probe detects the echoes that bounce back, and a computer translates the pattern of echoes into a picture. Because ovarian tumors and normal ovarian tissue often reflect sound waves differently, this test may be used to find tumors and determine whether a mass is solid or a fluid-filled cyst.

Computed tomography

The CT scan is an x-ray procedure that produces detailed cross-sectional images of your body. Instead of taking one picture, like a conventional x-ray, a CT scanner takes many pictures as it rotates around you. A computer then combines these pictures into an image of a slice of your body. The machine will take pictures of multiple slices of the part of your body that is being studied.

This test can help tell if the cancer has spread into your liver or other organs. CT scans are useful in showing how large the tumor is, what other organs it may be invading, whether lymph nodes are enlarged and if your kidneys or bladder are affected.

You may be asked to drink 1 to 2 pints of a liquid before the CT scan called "oral contrast." This helps outline the intestine so that certain areas are not mistaken for tumors. You may also receive an IV (intravenous) line through which a different kind of contrast dye is injected. This helps better outline structures in your body.

The injection can cause some flushing (redness and warm feeling that may last hours to days). A few people are allergic to the dye and get hives. Rarely, more serious reactions like trouble breathing and low blood pressure can occur. Medicine can be given to prevent and treat allergic reactions. Be sure to tell the doctor if you have ever had a reaction to any contrast material used for x-rays.

CT scans are not usually used to biopsy (see biopsy in the section "Other tests") an ovarian tumor, but they can be used to biopsy a suspected metastasis. For this procedure, called a CT-guided needle biopsy, the patient stays on the CT scanning table, while a radiologist moves a biopsy needle toward the location of the mass. CT scans are repeated until the doctors are confident that the needle is within the mass. A fine needle biopsy sample (tiny fragment of tissue) or a core needle biopsy sample (a thin cylinder of tissue about ½ inch long and less than 1/8 inch in diameter) is removed and examined under a microscope.

CT scans take longer than regular x-rays and you need to lie still on a table while they are being done. But just like other computerized devices, they are getting faster and the most modern ones take only seconds.

Barium enema x-ray

This is a test to see whether the cancer has invaded the colon (large intestine) or rectum (it is also used to look for colorectal cancer). After taking laxatives the day before, the radiology technician puts barium sulfate, a chalky substance, into the rectum and colon. Because barium is impermeable to x-rays (impossible for x-rays to go through), it outlines the colon and rectum on x-rays of the abdomen. This test is rarely used now in women with ovarian cancer. Colonoscopy may be done instead.

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 of radio waves given off by the tissues 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, it can also produce slices that are parallel with the length of the body. A contrast material might be injected into a vein (same as with a CT scan). MRI scans are not used often to look for ovarian cancer.

MRI scans are particularly helpful to examine the brain and spinal cord. MRI scans take longer than CT scans, -- often up to 30 minutes or more. Also, you have to be placed inside a tube, which is confining and can upset people with claustrophobia (fear of enclosed spaces). The machine also makes a thumping noise that you may find disturbing. Some places will provide headphones with music to block the sound.

Chest x-ray

This procedure may be done to determine whether ovarian cancer has spread (metastasized) to the lungs. This spread may cause one or more tumors in the lungs and often causes fluid to collect around the lungs. This fluid, called a pleural effusion, can be seen with chest x-rays.

Positron emission tomography (PET scan)

In this test radioactive glucose (sugar) is given to look for the cancer. Because cancers use glucose (sugar) at a higher rate than normal tissues, the radioactivity will tend to concentrate in the cancer. A scanner can spot the radioactive deposits. This test has can be helpful for spotting small collections of cancer cells. In some instances this test has proved useful in finding ovarian cancer that has spread. It is even more valuable when combined with a CT scan (PET/CT scan). Although PET scans can help find cancer when it has spread, they are expensive and many insurance companies will not cover the cost.

Other tests

Laparoscopy

This procedure uses a thin, lighted tube through which a doctor can look at the ovaries and other pelvic organs and tissues in the area around the bile duct. The tube is inserted through a small incision (cut) in the lower abdomen and sends the images of the pelvis or abdomen to a video monitor. Laparoscopy provides a view of organs that can help plan surgery or other treatments and can help doctors confirm the stage (how far the tumor has spread) of the cancer. Also, doctors can manipulate small instruments through the laparascopic incision(s) to perform biopsies.

Colonoscopy

A colonoscopy is a way to examine the inside of the large intestine (colon). After the large intestine has been cleaned with laxatives, the doctor inserts a fiberoptic tube into the rectum and passes it through the entire colon. The images are sent to a video monitor. This allows the doctor to see the inside and detect any abnormalities. Colonoscopy can be uncomfortable, so the patient is sedated before the procedure. This test is more commonly used to look for colorectal cancer.

Biopsy

The only way to determine for certain if a growth is cancer is to remove a sample of the growth from the suspicious area and examine it under a microscope. This procedure is called a *biopsy*. For ovarian cancer, the biopsy is most commonly done by removing the tumor at surgery. It can also be done during a laparoscopy procedure or with a needle placed directly into the tumor through the skin of the abdomen. Usually the needle will be guided by either ultrasound or CT scan. A needle biopsy is sometimes used instead of surgery if the patient cannot have surgery because of advanced cancer or some other serious medical condition.

In patients with ascites (collection of fluid inside the abdomen), samples of fluid can also be used to diagnose the cancer. In this procedure, called *paracentesis*, the skin of the abdomen is numbed and a needle attached to a syringe is passed through the abdomen wall into the fluid in the abdominal cavity. The fluid is sucked up into the syringe and then sent for analysis.

In all these procedures, the tissue obtained is sent to the pathology laboratory. There it is examined under the microscope by a *pathologist*, a doctor who specializes in diagnosing and classifying diseases by examining cells under a microscope and using other lab tests.

Blood tests

Your doctor will order blood counts to make sure you have enough red blood cells, white blood cells and platelets (cells that help stop bleeding). There will also be tests to measure your kidney and liver function as well as your general health status. Finally the doctor will order a CA-125 test. If the test result is elevated, consultation with a gynecologic oncologist is recommended.

How is ovarian cancer staged?

Staging is the process of finding out how widespread a cancer is. Most ovarian cancers that are not obviously widespread are staged at the time of surgery. One of the goals of surgery for ovarian cancer is to obtain tissue samples for diagnosis and staging. In order to stage the cancer, samples of tissues are taken from different parts of the pelvis and abdomen and examined under the microscope.

Staging is very important because ovarian cancers have a different prognosis at different stages and are treated differently. The accuracy of the staging may determine whether or not a patient will be cured. If the cancer is not properly staged, then cancer that has spread outside the ovary may be missed and not treated. Once a stage has been given it does not change, even when the cancer comes back or spreads to new locations in the body.

Ask your cancer care team to explain the staging procedure. Also ask them if they will perform a thorough staging procedure. After surgery, ask what your cancer's stage is. In this way, you will be able to take part in making informed decisions about your treatment.

Ovarian cancer is staged according to the AJCC/TNM System. This describes the extent of the primary *T*umor (T), the absence or presence of metastasis to nearby lymph *N*odes (N), and the absence or presence of distant *M*etastasis (M). This closely resembles the system that is actually used by most gynecologic oncologists, called the FIGO system. Both rely on the results of surgery for the actual stages.

T categories for ovarian cancer

Tx: No description of the tumor's extent is possible because of incomplete information.

T1: The cancer is confined to the ovaries -- one or both.

> **T1a:** The cancer is only inside one ovary - it is not on the outside of the ovary, it doesn’t penetrate the tissue covering the ovary (called the capsule) and is not in fluid taken from the pelvis.

T1b: The cancer is inside both ovaries but doesn't penetrate to the outside and is not in fluid taken from the pelvis (like T1a except the cancer is in both ovaries).

T1c: The cancer is in one or both ovaries and is either on the outside of an ovary, grown through the capsule of an ovary, or is in fluid taken from the pelvis.

T2: The cancer is in one or both ovaries and is extending into pelvic tissues.

T2a: The cancer has spread (metastasized) to the uterus and/or the fallopian tubes but is not in fluid taken from the pelvis.

T2b: The cancer has spread to pelvic tissues besides the uterus and fallopian tubes but it is not in fluid taken from the pelvis.

T2c: The cancer has spread to the uterus and/or fallopian tubes and/or other pelvic tissues (like T2a or T2b) and is also in fluid taken from the pelvis.

T3: The cancer is in one or both ovaries and has spread to the abdominal lining outside the pelvis. This lining is called the *peritoneum*.

T3a: The cancer metastases are so small that they can not be seen except under a microscope.

T3b: The cancer metastases can be seen but no tumor is bigger than 2 centimeters (0.8 inches).

T3c: The cancer metastases are larger than 2 centimeters (0.8 inches).

N categories for ovarian cancer

N categories indicate whether or not the cancer has spread to regional (nearby) lymph nodes.

Nx: No description of lymph node involvement is possible because of incomplete information.

N0: No lymph node involvement.

N1: Cancer cells are found in the lymph nodes close to tumor.

M categories for ovarian cancer

M categories indicate whether or not the cancer has spread to distant organs, such as the liver, lungs, or non-regional lymph nodes.

Mx: No description of distant spread is possible because of incomplete information.

M0: No distant spread.

M1: Cancer has spread to the inside of the liver, to the lungs, or other organs.

Grade categories

(The higher the grade, the more likely it is that the cancer will spread.)

Grade 1: Well differentiated -- looks similar to normal ovarian tissue.

Grade 2: Not as well differentiated -- looks less like ovarian tissue.

Grade 3: Poorly differentiated – does not look like ovarian tissue.

Stage grouping

Once a patient's T, N, and M categories have been determined, this information is combined in a process called stage grouping to determine the stage, expressed in Roman numerals from stage I (the least advanced stage) to stage IV (the most advanced stage). The following table illustrates how TNM categories are grouped together into stages.

Stage	T	N	M
I	T1	N0	M0
IA	T1a	N0	M0
IB	T1b	N0	M0
IC	T1c	N0	M0
II	T2	N0	M0
IIA	T2a	N0	M0
IIB	T2b	N0	M0
IIC	T2c	N0	M0
III	T3	N0	M0
IIIA	T3a	N0	M0
IIIB	T3b	N0	M0
IIIC	T3c	N0	M0
	Any T	N1	M0
IV	Any T	Any N	M1

What the stages of ovarian cancer mean

Stage I: The cancer is still contained within the ovary (or ovaries).

Stage IA (T1a, N0, M0**):** Cancer has developed in one ovary, and the tumor is confined to the inside of the ovary. There is no cancer on the outer surface of the ovary. Laboratory examination of washings from the abdomen and pelvis did not find any cancer cells.

Stage IB (T1b, N0, M0**):** Cancer has developed within both ovaries without any tumor on their outer surfaces. Laboratory examination of washings from the abdomen and pelvis did not find any cancer cells.

Stage IC (T1c, N0, M0**):** The cancer is present in one or both ovaries and one or more of the following are present:

- Cancer on the outer surface of at least one of the ovaries
- In the case of cystic tumors (fluid-filled tumors), the capsule (outer wall of the tumor) has ruptured (burst)
- Laboratory examination found cancer cells in fluid or washings from the abdomen.

Stage II: The cancer is in one or both ovaries and has involved other organs (such as the uterus, fallopian tubes, bladder, the sigmoid colon, or the rectum) within the pelvis.

Stage IIA (T2a, N0, M0)**:** The cancer has spread to or has actually invaded (grown into) the uterus or the fallopian tubes, or both. Laboratory examination of washings from the abdomen did not find any cancer cells.

Stage IIB (T2b, N0, M0)**:** The cancer has spread to other nearby pelvic organs such as the bladder, the sigmoid colon, or the rectum. Laboratory examination of fluid from the abdomen did not find any cancer cells.

Stage IIC (T2c, N0, M0)**:** The cancer has spread to pelvic organs as in stages IIA or IIB and laboratory examination of the washings from the abdomen found evidence of cancer cells.

Stage III: The cancer involves one or both ovaries, and one or both of the following are present: (1) cancer has spread beyond the pelvis to the lining of the abdomen; (2) cancer has spread to lymph nodes.

Stage IIIA (T3a, N0, M0)**:** During the staging operation, the surgeon can see cancer involving the ovary or ovaries, but no cancer is grossly visible (can be seen without using a microscope) in the abdomen and the cancer has not spread to lymph nodes. However, when biopsies are checked under a microscope, tiny deposits of cancer are found in the lining of the upper abdomen.

Stage IIIB (T3b, N0, M0)**:** There is cancer in one or both ovaries, and deposits of cancer large enough for the surgeon to see, but smaller than 2 cm (about 3/4 inch) across, are present in the abdomen. Cancer has not spread to the lymph nodes.

Stage IIIC: The cancer is in one or both ovaries, and one or both of the following are present:

- Cancer has spread to lymph nodes (any T, N1, M0)
- Deposits of cancer larger than 2 cm (about 3/4 inch) across are seen in the abdomen **(**T3c, N0, M0).

Stage IV (any T, any N, M1)**:** This is the most advanced stage of ovarian cancer. In this stage the cancer has spread to the inside of the liver, the lungs, or other organs located outside of the peritoneal cavity. (The peritoneal cavity, or abdominal cavity is the area enclosed by the peritoneum, a. membrane that lines the inner abdomen and covers most of its organs.). Finding ovarian cancer cells in the fluid around the lungs (called pleural fluid) is also evidence of stage IV disease.

Recurrent ovarian cancer: This means that the disease has come back (recurred) after completion of treatment.

Survival by stage

The numbers below are based on patients diagnosed from 1995 to 1998. These numbers come from the American College of Surgeons, National Cancer Data Base.

Stage	Relative 5-Year Survival Rate
IA	92.7%
IB	85.4%
IC	84.7%
IIA	78.6%
IIB	72.4%
IIC	64.4%
IIIA	50.8%
IIIB	42.4%
IIIC	31.5%
IV	17.5%

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 take into account that people will die of other causes and compare the observed survival with that expected for people without ovarian cancer. That means that relative survival only talks about deaths from ovarian cancer.

How is ovarian cancer 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.

After the diagnostic tests are done, your cancer care team will recommend 1 or more treatment options. Consider the options without feeling rushed. If there is anything you do not understand, ask to have it explained. The choice of treatment depends largely on the type of cancer and the stage of the disease. In patients who did not have surgery as their first

treatment, the exact stage may not be known. Treatment then is based on other available information.

Other factors that could play a part in choosing the best treatment plan might include your general state of health, whether you plan to have children, and other personal considerations. Age alone is not a determining factor since several studies have shown that older women tolerate ovarian cancer treatments well. Be sure you understand all the risks and side effects of the various therapies before making a decision about treatment.

The main treatments for ovarian cancer are surgery, chemotherapy, and radiation therapy. In some cases 2 or even all of these treatments will be recommended.

Surgery

How much surgery you have depends on how far your cancer has spread and on your general health. For women of childbearing age who have certain kinds of tumors and whose cancer is in the earliest stage, it may be possible to treat the disease without removing both ovaries and the uterus.

Staging

Surgery for ovarian cancer has two main goals. The first goal is to *stage* the cancer - to see how far the cancer has spread from the ovary. Usually this means removing the uterus (the operation called a hysterectomy), both ovaries, and both fallopian tubes (when the ovaries and fallopian tubes are removed the operation is called a bilateral salpingo-oophorectomy). In addition, the *omentum* is also removed (an omentectomy). The omentum is a layer of fatty tissue that covers the abdominal contents like an apron, and ovarian cancer sometimes spreads to this tissue. Some lymph nodes in the pelvis and abdomen are taken out to see if they contain cancer spread from the ovary. If there is fluid in the pelvis or abdominal cavity, it will also be removed for analysis. The surgeon may "wash" the abdominal cavity with salt water (saline) and send that fluid for analysis. All the tissue and fluid samples taken during the operation are sent to a lab to be examined for cancer cells. Staging is very important because ovarian cancers at different stages are treated differently. If the staging isn't done correctly, the doctor may not give the right treatment.

Debulking

The other important goal of surgery is to remove as much of the tumor as possible -- this is called *debulking.* Debulking is very important in any patient with ovarian cancer that has already spread widely throughout the abdomen at the time of surgery. The aim of debulking surgery is to leave behind no tumors larger than 1 cm. Patients who have had successful debulking surgery have a better outlook than those left with larger tumors after surgery.

It is important that your surgeon is experienced in ovarian cancer surgery. Many gynecologists and surgeons are not trained to do the staging and debulking procedures that are necessary in treating ovarian cancer. For this reason, experts recommend that patients see a *gynecologic oncologist* for surgery. Gynecologic oncologists are specialists who have training and experience in treating ovarian cancer, and know how to stage and debulk ovarian cancer properly. Women with ovarian cancer who don't have the right surgery the first time may need to go back to the operating room for more surgery later to stage and debulk the cancer.

Removing both ovaries and/or the uterus means that you will not be able to become pregnant. It also means that you will go into menopause if you have not done so already. Most women will stay in the hospital for 3 to 7 days after the operation and can resume their usual activities within 4 to 6 weeks.

Chemotherapy

Systemic chemotherapy uses drugs that are injected into a vein (IV) or given by mouth. These drugs enter the bloodstream and reach all areas of the body, making this treatment potentially useful for cancers that have metastasized (spread). For some cases of ovarian cancer, chemotherapy may be injected through a catheter directly into the abdominal cavity. This is called intraperitoneal (IP) chemotherapy. Drugs given this way are also absorbed into the bloodstream, so IP chemotherapy is also a type of systemic chemotherapy. See below for more information.

Chemotherapy drugs kill cancer cells but also damage some normal cells. Therefore, your doctor will be careful to avoid or minimize side effects, which depend on the type of drugs, the amount taken, and the length of treatment.

Temporary side effects might include nausea and vomiting, loss of appetite, loss of hair, hand and foot rashes, and mouth sores. Some of the drugs used in treating ovarian cancer can cause kidney and nerve damage.

Because chemotherapy can damage the blood-producing cells of the bone marrow, patients may have low blood cell counts. This can result in:

- an increased chance of infection (caused by a shortage of white blood cells)
- bleeding or bruising after minor cuts or injuries (caused by a shortage of blood platelets)
- fatigue (caused by low red blood cell counts)

Most side effects disappear once treatment is stopped. Hair will grow back after treatment ends, although it may look different. There are remedies for many of the temporary side effects of chemotherapy. For example, there are very good drugs that can be given to prevent

and treat nausea and vomiting. For more information about chemotherapy and its side effects, please see the American Cancer Society document, *Understanding Chemotherapy: A Guide for Patients and Families.*

Side effects that may be permanent include premature menopause and infertility (inability to become pregnant).

Rarely, some cancer treatment drugs may cause acute myeloid leukemia a life-threatening cancer of white blood cells. This is called a secondary malignancy. Your health care team knows which drugs can cause this problem and will discuss this possibility with you. Their positive effects against ovarian cancer offset the small chance that any of these drugs will cause leukemia.

The typical course of chemotherapy for epithelial ovarian cancer involves 6 cycles. A cycle is a schedule that allows regular doses of a drug, followed by a rest period. Different drugs have varying cycles; your oncologist (cancer doctor) will prescribe the particular cycle or schedule for your chemotherapy.

These drugs are usually given intravenously in a 3- to 4-week cycle. If chemotherapy treatment is chosen, you will probably receive a combination of drugs. Most oncologists in the United States believe that combination chemotherapy is more effective in treating ovarian cancer than one drug alone.

Combination therapy using a platinum compound, such as cisplatin or carboplatin, and a taxane, such as paclitaxel (Taxol®) or docetaxel (Taxotere®), is the standard approach. For IV chemotherapy, most doctors favor carboplatin over cisplatin because it has fewer side effects and is just as effective.

In *intraperitoneal (IP) chemotherapy* the chemotherapy drugs are injected into the abdominal cavity through a thin tube or catheter. The tube can be placed during the staging/debulking surgery, but sometimes it is placed later, after surgery. If it is done after surgery, many doctors place it using laparoscopy. The catheter is usually connected to a "port," which is placed under the skin against a bony structure of the abdominal wall, such as a rib or pelvic bone. A port is a half dollar-sized disk topped with a pliable diaphragm. A needle is placed through the skin and the diaphragm to give medicines like chemotherapy. Over time, there can be problems with the catheter. -- it may become plugged or infected or even damage the bowel.

Giving chemotherapy this way has the advantage of giving a concentrated dose of chemotherapy to the cancer cells in the abdominal lining. The chemotherapy drugs given this way also get absorbed into the bloodstream and reach cancer cells outside of the abdominal cavity. IP chemotherapy works well, but the side effects can be more severe than with regular chemotherapy. In a recent study of women with advanced ovarian cancer, women getting the IP chemotherapy had more abdominal pain, nausea, vomiting, and other side effects than the women getting chemotherapy through the vein. These side effects actually made some

women stop their treatment early. Still, the women getting intraperitoneal chemotherapy lived longer than the women getting regular chemotherapy. IP chemotherapy is currently only given to some of the women with advanced cancer.

Although epithelial ovarian cancer tends to respond to chemotherapy, the cancer cells may eventually begin to grow again. Tumor recurrence can be treated with additional cycles of the same chemotherapy used the first time. In some cases, different drugs are used. Some of these are topotecan, anthracyclines such as doxorubicin (Adriamycin) and liposomal doxorubicin (Doxil), gemcitabine, cyclophosphamide, vinorelbine (Navelbine), hexamethylmelamine, ifosfamide, and etoposide.

Different drug combinations are often used to treat germ cell tumors and are described in the section on treatment of germ cell tumors.

Radiation therapy

Radiation therapy uses high energy x-rays to kill cancer cells. These x-rays may be given in a procedure that is much like having a diagnostic x-ray. In the past radiation was used more often, but now radiation therapy is only rarely used in this country as the main treatment for ovarian cancer.

External beam radiation therapy: In this procedure, radiation from a machine outside the body called a linear accelerator is focused on the cancer. This is one type of radiation therapy recommended for treatment of ovarian cancer. Treatments are given 5 days a week for several weeks. Each treatment lasts only a few minutes and is similar to having a diagnostic x-ray test. As with a diagnostic x-ray, the radiation passes through the skin and other tissues before it reaches the tumor. The actual time of exposure to radiation is very short, and most of the appointment is spent getting the patient precisely positioned so that the radiation is aimed accurately at the cancer.

During the course of external beam radiation therapy, skin in the treated area may look and feel sunburned. This gradually fades, returning to a normal appearance in 6 to 12 months. Because the abdomen and pelvis are sensitive to radiation, many women also notice tiredness, nausea, or diarrhea. If you are having side effects from radiation, discuss them with your cancer care team. There may be things you can do to obtain relief.

Brachytherapy: Radiation therapy also may be given as an implant of radioactive materials, called brachytherapy, placed near the cancer. This is rarely done for ovarian cancer.

Radioactive phosphorus: This is a solution of radioactive phosphorus that is instilled into the abdomen. The radioactive phosphorus gets into cancer cells lining the surface of the abdomen and kills them. It has little immediate side effects but can cause scarring of the

intestine and lead to digestive problems, including bowel blockage. This was used in the past, but is no longer part of the standard treatment for ovarian cancer.

Clinical trials

You 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 deciding 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 one way to get state-of-the art cancer care. Still, they are not right for everyone.

Here we will give you a brief review of clinical trials. Talking to your health care team, your family, and your friends can help you make the best treatment choice for you.

What are clinical trials?

Clinical trials are carefully controlled research studies that are done with patients. These studies test whether a new treatment is safe and how well it works in patients, or they may test new ways to diagnose or prevent a disease. Clinical trials have led to many advances in cancer prevention, diagnosis, and treatment.

The purpose of clinical trials

Clinical trials are done to get a closer look at promising new treatments or procedures in patients. A clinical trial is only done when there is good reason to believe that the treatment, test, or procedure being studied may be better than the one used now. Treatments used in clinical trials are often found to have real benefits and may go on to become tomorrow's standard treatment.

Clinical trials can focus on many things, such as:

- new uses of drugs that are already approved by the US Food and Drug Administration (FDA)
- new drugs that have not yet been approved by the FDA
- non-drug treatments (such as radiation therapy)
- medical procedures (such as types of surgery)
- herbs and vitamins
- tools to improve the ways medicines or diagnostic tests are used
- medicines or procedures to relieve symptoms or improve comfort

- combinations of treatments and procedures
-
- Researchers conduct studies of new treatments to try to answer the following questions:
-
- Is the treatment helpful?
- What's the best way to give it?
- Does it work better than other treatments already available?
- What side effects does the treatment cause?
- Are there more or fewer side effects than the standard treatment used now?
- Do the benefits outweigh the side effects?
- In which patients is the treatment most likely to be helpful?

Phases of clinical trials

There are 4 phases of clinical trials, which are numbered I, II, III, and IV. We will use the example of testing a new cancer treatment drug to look at what each phase is like.

Phase I clinical trials: The purpose of a phase I study is to find the best way to give a new treatment safely to patients. The cancer care team closely watches patients for any harmful side effects.

For phase I studies, the drug has already been tested in lab and animal studies, but the side effects in patients are not fully known. Doctors start by giving very low doses of the drug to the first patients and increase the doses for later groups of patients until side effects appear or the desired effect is seen. Doctors are hoping to help patients, but the main purpose of a phase I trial is to test the safety of the drug.

Phase I clinical trials are often done in small groups of people with different cancers that have not responded to standard treatment, or that keep coming back (recurring) after treatment. If a drug is found to be reasonably safe in phase I studies, it can be tested in a phase II clinical trial.

Phase II clinical trials: These studies are designed to see if the drug works. Patients are given the best dose as determined from phase I studies. They are closely watched for an effect on the cancer. The cancer care team also looks for side effects.

Phase II trials are often done in larger groups of patients with a specific cancer type that has not responded to standard treatment. If a drug is found to be effective in phase II studies, it can be tested in a phase III clinical trial.

Phase III clinical trials: Phase III studies involve large numbers of patients -- most often those who have just been diagnosed with a specific type of cancer. Phase III clinical trials may enroll thousands of patients.

Often, these studies are randomized. This means that patients are randomly put in one of two (or more) groups. One group (called the control group) gets the standard, most accepted treatment. Another group (or more than one group) will get the new treatment being studied. All patients in phase III studies are closely watched. The study will be stopped early if the side effects of the new treatment are too severe or if one group has much better results than the others.

Phase III clinical trials are usually needed before the FDA will approve a treatment for use by the general public.

Phase IV clinical trials: Once a drug has been approved by the FDA and is available for all patients, it is still studied in other clinical trials (sometimes referred to as phase IV studies). This way more can be learned about short-term and long-term side effects and safety as the drug is used in larger numbers of patients with many types of diseases. Doctors can also learn more about how well the drug works, and if it might be helpful when used in other ways (such as in combination with other treatments).

What it will be like to be in a clinical trial

If you are in a clinical trial, you will have a team of experts taking care of you and watching your progress very carefully. Depending on the phase of the clinical trial, you may receive more attention (such as having more doctor visits and lab tests) than you would if you were treated outside of a clinical trial. Clinical trials are specially designed to pay close attention to you.

However, there are some risks. No one involved in the study knows in advance whether the treatment will work or exactly what side effects will occur. That is what the study is designed to find out. While most side effects go away in time, some may be long-lasting or even life threatening. Keep in mind, though, that even standard treatments have side effects. Depending on many factors, you may decide to enter (enroll in) a clinical trial.

Deciding to enter a clinical trial

If you would like to take part in a clinical trial, you should begin by asking your doctor if your clinic or hospital conducts clinical trials. There are requirements you must meet to take part in any clinical trial. But whether or not you enter (enroll in) a clinical trial is completely up to you.

Your doctors and nurses will explain the study to you in detail. They will go over the possible risks and benefits and give you a form to read and sign. The form says that you

understand the clinical trial and want to take part in it. This process is known as giving your informed consent. Even after reading and signing the form and after the clinical trial begins, you are free to leave the study at any time, for any reason. Taking part in a clinical trial does not keep you from getting any other medical care you may need.

To find out more about clinical trials, talk to your cancer care team. Here are some questions you might ask:

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

How can I find out more about clinical trials that might be right for me?

The American Cancer Society offers a clinical trials matching service for patients, their family, and friends. You can reach this service at 1-800-303-5691 or on our Web site at http://clinicaltrials.cancer.org.

Based on the information you give about your cancer type, stage, and previous treatments, this service can put together a list of clinical trials that match your medical needs. The service will also ask where you live and whether you are willing to travel so that it can look for a treatment center that you can get to.

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.

For even more information on clinical trials, the American Cancer Society has a document called *Clinical Trials: What You Need to Know.* You can read this on the Web site, www.cancer.org, or have it sent to you by calling 1-800-ACS-2345.

Complementary and alternative therapies

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that are different from mainstream (standard) medical treatment. These methods can include vitamins, herbs, and special diets, or methods such as acupuncture or massage—among many others. You may have a lot of questions about these treatments. Here are some you may have thought of already:

- How do I know if a non-standard treatment is safe?
- How do I know if it works?
- Should I try one or more of these treatments?
- What does my doctor know/think about these methods? Should I tell the doctor that I'm thinking about trying them?
- Will these treatments cause a problem with my standard medical treatment?
- What is the difference between "complementary" and "alternative" methods?
- Where can I find out more about these treatments?

The terms can be confusing

Not everyone uses these terms the same way, so it can be confusing. The American Cancer Society uses *complementary* to refer to medicines or methods that are used *along with* your regular medical care. *Alternative* medicine is a treatment used *instead of* standard medical treatment.

Complementary methods: Complementary treatment methods, for the most part, are not presented as cures for cancer. Most often they are used to help you feel better. Some methods that can be used in a complementary way are meditation to reduce stress, acupuncture to relieve pain or peppermint tea to relieve nausea. There are many others. Some of these methods are known to help, while others have not been tested. Some have been proven not be helpful. A few have even been found harmful. However, some of these methods may add to your comfort and well-being.

There are many complementary methods that you can safely use right along with your medical treatment to help relieve symptoms or side effects, to ease pain, and to help you enjoy life more. For example, some people find methods such as aromatherapy, massage therapy, meditation, or yoga to be useful.

Alternative treatments: Alternative treatments are those that are used instead of standard medical care. These treatments have not been proven safe and effective in clinical trials. Some of these methods may even be dangerous and some have life-threatening side effects. The biggest danger in most cases is that you may lose the chance to benefit from standard

treatment. Delays or interruptions in your standard medical treatment may give the cancer more time to grow.

Deciding what to do

It is easy to see why people with cancer may consider alternative methods. You want to do all you can to fight the cancer. Sometimes mainstream treatments such as chemotherapy can be hard to take, or they may no longer be working.

Sometimes people suggest that their method can cure your cancer without having serious side effects, and it's normal to want to believe them. But the truth is that most non-standard methods of treatment have not been tested and proven to be effective for treating cancer.

As you consider your options, here are 3 important steps you can take:
Talk to your doctor or nurse about any method you are thinking about using.
Check the list of "red flags" below.
Contact the American Cancer Society at 1-800-ACS-2345 to learn more about complementary and alternative methods in general and to learn more about the specific methods you are thinking about.

Red flags

You can use the questions below to spot treatments or methods to avoid. A "yes" answer to any one of these questions should raise a "red flag."

- Does the treatment promise a cure for all or most cancers?
- Are you told not to use standard medical treatment?
- Is the treatment or drug a "secret" that only certain people can give?
- Does the treatment require you to travel to another country?
- Do the promoters attack the medical or scientific community?

The decision is yours

Decisions about how to treat or manage your cancer are always yours to make. If you are thinking about using a complementary or alternative method, be sure to learn about the method and talk to your doctor about it. With reliable 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.

Treatment of invasive epithelial ovarian cancers by stage

Stage I: The first step in treating stage I ovarian cancer is surgery to stage the cancer and remove the tumor (see the section "Surgery" for details).

In **stages IA and IB** (T1a or T1b, N0, M0), cancer was found inside one or both ovaries, without spread to lymph nodes or other organs. The treatment after surgery depends on the way the cancer looks under the microscope (called the tumor grade).
If the tumor is grade 1, the cancer cells look a lot like normal ovarian cells. The outlook is good for grade 1 tumors, and most patients require no treatment after surgery. If someone with a grade 1, Stage IA, ovarian cancer wants to be able to have children after treatment, the initial surgery may be changed. Instead of removing the uterus, both ovaries, and both fallopian tubes, the surgeon may offer the option of removing only the affected ovary and fallopian tube.

For a grade 2 cancer (meaning the cancer has some similarities to normal ovarian cells), patients are either watched closely after surgery without further treatment, or they are treated with chemotherapy. The chemotherapy used most commonly is carboplatin and paclitaxel (Taxol) for 3-6 cycles.

Grade 3 cancers do not look very much like normal ovarian tissue under the microscope. The treatment of these tumors usually includes chemotherapy (like the chemotherapy that is given for grade 2).

Stage IC (T1c, N0, M0)**:** For stage IC ovarian cancer, standard staging surgery is still the first treatment. After surgery, chemotherapy is recommended, usually 3 to 6 courses of treatment with carboplatin and paclitaxel.

Stage II (including IIA, IIB, IIC): For all stage II cancers, treatment starts with surgery for staging and debulking (see the section "Surgery" for details). The surgeon will try to remove as much of the tumor in the pelvis as is possible.

After surgery, chemotherapy is recommended for at least 6 cycles. Some women with stage II ovarian cancer are treated with intraperitoneal (IP) chemotherapy instead of intravenous (IV) chemotherapy.

Stage III and IV: Stages IIIA, IIIB, and IIIC are given the same treatments as stage II cancers. First, the cancer is surgically staged and the tumor is debulked (like stage II). The uterus, both fallopian tubes, both ovaries, and omentum (fatty tissue from the upper abdomen near the stomach and intestines) are removed. The surgeon will also try to remove as much of the tumor as possible. The goal is to leave behind no tumor larger than 1 cm. When this goal is reached, the cancer is said to have been "optimally debulked." Sometimes tumor is

growing on the intestines, and in order to remove the cancer, part of the intestine will have to be removed. The smaller the remaining tumor, the better the outlook will be.

After recovery from surgery, combination chemotherapy is given. The combination used most often is carboplatin (or cisplatin) and a taxane, such as paclitaxel (Taxol®), given IV (into a vein) for 6 cycles.

Another option is to give intraperitoneal (IP) chemotherapy after surgery (instead of IV chemotherapy). This was discussed in more detail in the section "Chemotherapy." IP chemotherapy is usually only considered if the cancer was optimally debulked - it may not work as well if a lot of tumor is left in the abdomen. Intraperitoneal chemotherapy seems to work better than IV chemotherapy, but it also causes worse side effects. These side effects can make it hard for someone to continue their treatment. For that reason, IP chemotherapy may not be for everyone. Still, it is an option for women with advanced ovarian cancer to consider.

After surgery, and during and after chemotherapy, blood tests will be done to determine if you have normal levels of a tumor marker called CA-125. A CT scan may also be done to evaluate your response to treatment.

In the past, many experts recommended a "second look" operation (laparoscopy/laparotomy) to see if the cancer was all gone after chemotherapy. But "second-look" operations have not been shown to have any real benefit. Because of this, they are not usually recommended as a standard part of ovarian cancer care but may be done as part of a clinical trial. In a clinical trial of new treatments, the second-look operation may be worthwhile to help determine how effective the new treatment is.

For laparoscopy, a small opening is made below the navel and a slender tube with a light is placed so the doctor can inspect the abdominal cavity to see how successful treatment has been.

Laparotomy requires an incision or surgical opening long enough to allow the surgeon to look inside the pelvis and abdomen and take biopsy samples. Based on the results of the "second-look" surgery, your cancer care team can decide if you need more chemotherapy.

For some patients, the doctor will recommend something called *consolidation therapy.* Consolidation therapy consists of additional treatment given after the initial therapy to help prevent recurrences. One study showed a slight benefit to an additional year of paclitaxel. Several clinical trials are investigating using other therapies as "consolidation" therapies.

Recurrent or persistent ovarian cancer: Recurrent tumors are those that come back after the initial treatment. Persistent tumors are those that never disappeared even after treatment. Advanced epithelial ovarian cancer often comes back months or years after the initial treatment.

Sometimes, more surgery is recommended. Most patients with recurrent or persistent ovarian cancer are treated with some form of chemotherapy. Which chemotherapy drugs are used depends on what was used the first time and how well it worked (how long the cancer stayed away). The longer it takes for the cancer to come back after treatment, the better the chance that additional chemotherapy will work. If it has been at least 6 months since any chemotherapy, the patient may be treated with carboplatin/paclitaxel (again). Giving carboplatin with a different drug called gemcitabine is also an option.

If the cancer comes back in less than 6 months (or if it never went away at all), different chemotherapy drugs usually will be tried. Some women may receive several different chemotherapy regimens over several years. Many chemotherapy drugs can be used to treat ovarian cancer. Altretamine, bevacizumab, cyclophosphamide, docetaxel, gemcitabine, ifosfamide, irinotecan, liposomal doxorubicin, melphalan, oxaliplatin, topotecan, and vinorelbine are all active against ovarian cancer. In addition, some patients benefit from hormonal treatment with drugs like anastrozole, letrozole, or tamoxifen. Someone who didn't initially receive chemotherapy can be treated with the same drugs that are used for newly diagnosed cancer -- usually carboplatin and paclitaxel (Taxol).

A clinical trial for new treatments may provide important advantages for women with recurrent or persistent ovarian cancer. Ask your cancer care team for information about suitable clinical trials for your type of cancer.

High-dose chemotherapy with stem cell rescue (sometimes known as bone marrow transplant) has been used for women with recurrent or persistent ovarian cancer. This treatment has very serious side effects, however, and has not been proven to help patients live longer. It is best done as part of a clinical trial that is studying improvements to this procedure.

One of the most common problems that can occur in women with recurrent ovarian cancer is fluid accumulation in the abdomen (this is called ascites). Fluid in the abdomen can be treated with a procedure called *paracentesis*. After the skin is numbed, a needle is used to withdraw the fluid, usually about 2 to 4 quarts, into a bottle. This will often need to be repeated from time to time. Sometimes chemotherapy injected directly into the abdomen will be recommended. All these treatments can extend life and relieve symptoms for some patients. Often, however, their effects are temporary, and the cancer returns or persists.

Blockage of the intestinal tract can also be a problem in women with recurrent ovarian cancer. Dealing with the intestinal blockage can be difficult. Often, the cancer within the abdomen has grown so much that surgery cannot fix the problem. To help make the patient comfortable, doctors may place a tube through the skin and into the stomach in order to help relieve obstruction of the digestive tract. This tube can help with pain, nausea, and vomiting..

Treatment for epithelial tumors of low malignant potential

These tumors are also called LMP tumors, atypical proliferating tumors, or borderline tumors. When seen on ultrasound and CT scan, these tumors look the same as invasive epithelial ovarian cancers. To know for certain that the tumor is not an invasive epithelial ovarian cancer, a biopsy must be done. A biopsy sample is usually taken during surgery. Surgery for LMP tumors is similar to the surgery for invasive ovarian cancer (see the previous sections that discussed treatment of ovarian cancer).

For women who have finished having children, the uterus, fallopian tubes, and ovaries are removed. Surgical staging is done to see if the tumor has spread outside of the ovary. This involves removing the omentum and some lymph nodes, and doing washings of the abdomen and pelvis. If the patient wants to be able to become pregnant in the future, only the ovary with the tumor and the fallopian tube on that side is removed. Rarely, just the ovarian cyst containing the tumor is removed. These patients still should have surgical staging to see if the tumor has spread. If the tumor is only in one ovary, the patient is usually observed without further treatment. Experts recommend follow-up visits at least every 6 months for the first 5 years after diagnosis. Chemotherapy and radiation therapy are not generally the first treatments used for tumors that have not spread outside the ovary.

If the tumor has spread outside of the ovary when it is first diagnosed, the surgeon will remove as much of it as possible (debulk it). Treatment after surgery depends on something called invasion. Invasion is when one kind of cell grows into areas that they don't belong. Part of what makes a cancer cell dangerous is its ability to invade other tissues. When LMP tumors spread, they can form tumor implants on the lining of the abdomen (the peritoneum) and on the surface of organs in the abdomen and pelvis. When these implants are growing into the peritoneum or the organs, they are said to be *invasive*. If the tumors don't grow into the abdominal lining or organs, they are called *non-invasive*.

Patients with non-invasive spread from an LMP tumor are usually observed without further treatment after debulking surgery. If the tumor implants are invasive, then chemotherapy may be offered. The chemotherapy given is usually the same as the chemotherapy used for invasive ovarian cancer. Observation is often recommended for LMP tumors because they grow very slowly and even when they have spread they are rarely fatal.

If the tumor comes back after initial surgery, further debulking surgery may be considered. Chemotherapy and, rarely, radiation therapy are also options for recurrent LMP tumors.

Treatment for germ cell tumors of the ovary

Benign germ cell tumors

Women with benign (non-cancerous) germ cell tumors such as mature teratomas (dermoid cysts) are cured by removing the part of the ovary (ovarian cystectomy) containing the tumor or by removing the entire ovary.

Malignant germ cell tumors

As with epithelial ovarian cancers, it is a good idea to consult with a gynecologic oncologist for treating malignant germ cell tumors, especially because these are so uncommon. Less than 5% of all ovarian cancers are germ cell tumors.

Surgery: Most types and stages of germ cell cancers of the ovary are treated the same way. In general, all patients with malignant germ cell tumors will have the same staging surgery that is done for epithelial ovarian cancer. If the patient is still interested in having children, the cancerous ovary and the fallopian tube on the same side are removed, but the uterus, the ovary, and the fallopian tube on the opposite side can be left behind. This is not an option when the cancer is in both ovaries. If the patient has finished having children, complete staging including removal of both ovaries, both fallopian tubes, and the uterus is generally recommended.

Sometimes, the doctor might consider removing only a part of one ovary to allow a woman to maintain her ovarian function. Even when both ovaries need to be removed, a patient may wish to keep her uterus to allow future pregnancy through the use of in-vitro fertilization. Consulting a gynecologic oncologist is advised in these cases.

If cancer has spread beyond the ovaries (stage IC and higher), debulking may be done as a part of the initial surgery. This involves removing as much cancer as possible without damaging or removing essential organs.

For stage IA dysgerminoma and stage I, grade 1, immature teratoma, surgery is usually the only treatment needed. Patients with these germ cell cancers are watched closely after surgery. If the cancer comes back later, the patient is usually given chemotherapy.

Chemotherapy: Most patients with germ cell cancer will need to be treated with combination chemotherapy for at least 3 cycles. The combination used most often is called PEB (or BEP), and includes the chemotherapy drugs cisplatin (Platinol), etoposide, and bleomycin. Dysgerminomas are usually very sensitive to chemotherapy, and can sometimes be treated with the less toxic combination of carboplatin and etoposide. Other drug combinations may be used as part of a clinical trial or to treat cancer that has recurred (come back). Germ cell cancers can cause elevated blood levels of the tumor markers human chorionic gonadotropin (HCG) and/or alpha-fetoprotein (AFP). If these are elevated before treatment starts, they are rechecked during chemotherapy (usually before each cycle). If the chemotherapy is working, the levels will go down to normal. If the levels stay up, it can be a sign that a different treatment is needed.

Radiation therapy: In the past, radiation therapy was often used for treating dysgerminomas. However, results with current combination chemotherapy are as good or better. For younger women who want to keep the option of future pregnancy and who have had only one ovary removed, chemotherapy is less damaging to the remaining ovary and less likely to cause problems in becoming pregnant. For these reasons, radiation therapy is rarely used as the main treatment for dysgerminoma.

Radiation rarely may be given in addition to chemotherapy to treat recurrent disease.

Stage IA dysgerminoma

If dysgerminoma is limited to one ovary, the patient may be treated by removing only that ovary and the fallopian tube on the same side, without chemotherapy after surgery. This approach requires close follow-up so that any recurrence can be found early and treated. Most patients in this stage will not have their cancer recur and will not need to have any chemotherapy.

Grade 1 immature teratoma

A grade 1 immature teratoma is made up mostly of non-cancerous tissue, and only a few cancerous areas seen under the microscope look immature (look like fetal organs). These tumors rarely come back after being removed. If careful staging has determined that a grade 1 immature teratoma is limited to one or both ovaries, the patient may be treated by removing the ovary or ovaries containing the cancer and the fallopian tube or tubes. If implants (tumor deposits) are found outside the ovary but they appear mature under a microscope (look like adult tissues), no chemotherapy is needed after surgery.

Recurrent or persistent germ cell tumors

Recurrent tumors are those that reappear after initial treatment. Persistent tumors are those that never disappeared even after treatment. Sometimes increased blood levels of the tumor markers HCG and AFP will be the only sign that a germ cell cancer is still there (or has come back).

Treatment for recurrent or persistent germ cell tumors may include chemotherapy or, rarely, radiation therapy. For chemotherapy, a combination of drugs is used most often. PEB (cisplatin, etoposide, and bleomycin) may be used if the patient did not receive this combination of drugs before. For patients who had already been treated with PEB, other

combinations are used. These include paclitaxel (Taxol), ifosfamide, and cisplatin (TIP), a combination called VeIP (vinblastine, ifosfamide, and cisplatin), the combination of etoposide (or VP-16), ifosfamide, and cisplatin (called VIP), and many others. For recurrent or persistent germ cell cancer, a clinical trial for new treatments may provide important advantages. Ask your cancer care team for information about clinical trials for your type of cancer.

Treatment for stromal tumors of the ovary

Stromal tumors start from connective tissue cells, which hold the ovary together and produce hormones. Cells of stromal tumors often produce estrogen and progesterone (female hormones). Less often, they produce androgens (male hormones). Epithelial and germ cell tumors are more common than stromal tumors.

Surgery

Most stromal tumors are confined to the ovary and are cured with surgery to remove the ovary containing the tumor. The other ovary can be biopsied if the doctor strongly suspects cancer is there, too. Stromal tumors rarely spread beyond the ovary. If they do, the surgical treatment includes removing the involved ovary and as much tumor as possible (debulking).

Chemotherapy

Chemotherapy is a treatment option for stromal cell cancers that have spread outside the ovary (stages II, III, and IV). It may also be offered to patients with high-risk stage I tumors -- this includes very large tumors (at least 10 cm to 15 cm), tumors that have ruptured, and high-grade tumors. However, observation without chemotherapy is often recommended since these tumors often do not respond to chemotherapy as well as epithelial ovarian cancers do. Stromal cell cancers can be treated with the same chemotherapy that is used for germ cell cancers. The combination of carboplatin and paclitaxel (Taxol) is also used.

Radiation therapy

This may be helpful in treating advanced disease when it is limited to a specific area.

Hormone therapy

Leuprolide (Lupron) is a drug that turns-off the natural signal that tells the ovaries to make estrogen. Sometimes this signal encourages stromal tumors to grow, and stopping the signal can inhibit growth of the tumor. The drug tamoxifen, which acts like an anti-estrogen, has also helped some women with stromal cell cancers. Hormone therapy is usually only used for stromal tumors that have come back after treatment.

Treatment of Stromal Tumors by Stage

Stage I

All stage I tumors are treated with surgery. Most patients with stage I tumors are watched closely after the operation and do not require further treatment. Some stage I tumors are more likely to come back after surgery. These cancers are said to be at *high-risk* for recurrence. Features that make a stage I tumor high-risk include very large tumors, tumors where the cyst broke open (ruptured), and poorly-differentiated tumors (also called high grade -- the cancer cells do not look very much like normal tissue when examined under the microscope). Patients with high-risk stage I stromal cancers have 3 options after surgery: observation (being watched closely), chemotherapy, or (rarely) radiation therapy

Stages II, III, and IV

After surgery for staging and debulking, treatment with chemotherapy is usually given. Rarely, radiation therapy is an option as well.

Relapse/Recurrence

Stromal cell cancers may come back years later. Even so, their prognosis (outlook) may still be good because they grow so slowly. Repeat surgery may be performed. Any of the chemotherapy regimens for initial treatment can also be used for treatment of relapse. Hormone therapy is also an option to treat recurrence. Because there really isn't a standard treatment for recurrent stromal cancer, treatment as part of a clinical trial is also a good option. Radiation therapy may sometimes be helpful for recurrent cancer.

For tumors that produce hormones, the hormone levels may be watched after surgery to check for increased levels in the blood that could suggest a return of the tumor. Serum inhibin may also be followed in estrogen-secreting tumors.

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 19 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 American Cancer Society collaborates with the NCCN to produce a version of some of these treatment guidelines, written specifically for patients and their families. These less-technical versions are available on both the NCCN Web site (www.nccn.org) and the ACS Web site (www.cancer.org). A print version can also be requested from the ACS at 1-800-ACS-2345.

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 ovarian cancer?

It is important for you to have honest, open discussions with your cancer care team. They want to answer all of your questions, no matter how trivial you might think they are. Here are some questions to consider:

- What type of ovarian cancer do I have?
- Has my cancer spread beyond the ovaries?
- What are the cell type, microscopic grade, and stage of my cancer? What does that mean in my case?
- What treatments are appropriate for me? What do you recommend? Why?
- What are the risks or side effects that I should expect?
- What are the chances my cancer will recur (come back) with the treatment programs we have discussed?
- What should I do to be ready for treatment?
- Should I follow a special diet?
- Will I be able to have children after my treatment?
- What is my expected prognosis, based on my cancer as you view it?

- Will I need a wig?
- What do I tell my children, husband, parents, and other family members?

In addition to these sample questions, be sure to write down some of your own. For instance, you might want specific information about anticipated recovery times so that you can plan your work schedule. You may also want to ask about second opinions or about experimental programs or clinical trials for which you may qualify.

What will happen after treatment for ovarian cancer?

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 keep 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.

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.

It is also important to keep medical insurance. Even though no one wants to think of their cancer coming back, it is always a possibility. If it happens, the last thing you want is to have to worry about paying for treatment.

Follow-up for ovarian cancer usually includes a careful general physical exam and blood tests for tumor markers that help recognize recurrence. The choice of which tumor marker blood tests to check depends on the type of cancer a woman has. CA-125 is the tumor marker used in follow-up of women with epithelial ovarian cancers. For women with germ cell

tumors, blood tests for alpha-fetoprotein (AFP) and/or human chorionic gonadotropin (HCG) are done. Checking levels of hormones like estrogen, testosterone, and inhibin is sometimes helpful for women with stromal cancers.

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 drugs can have long-term side effects, a list of your drugs (particularly chemotherapy drugs), drug doses, and when you took them

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-ACS-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, "Cancer Related Fatigue and Anemia Treatment Guidelines for Patients."

- 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 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-ACS-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 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 ovarian cancer research and treatment?

Risk factors and causes

Scientists continue to study the genes responsible for familial ovarian cancer. This research is beginning to yield clues about how these genes normally work and how disrupting their action can lead to cancer. This information eventually is expected to lead to new drugs for preventing and treating familial ovarian cancer.

Research in this area has already led to better ways to detect high-risk genes and assess a woman's ovarian cancer risk. A better understanding of how genetic and hormonal factors (such as oral contraceptive use) interact may also lead to better ways to prevent ovarian cancer.

Prevention

New information about how much BRCA1 and BRCA2 gene mutations increase ovarian cancer risk is helping women make practical decisions about prevention. For example, mathematical models have been developed that help estimate how many years of life an average woman with a BRCA mutation might gain by having both ovaries removed to prevent a cancer from developing. However, it is important to remember that although doctors can predict the average outcome of a group of many women, it is still impossible to accurately predict the outcome for any individual woman.

Other studies are testing new drugs for ovarian cancer risk reduction

Researchers are constantly looking for clues such as lifestyle, diet, and medicines that may alter the risk of ovarian cancer.

Early detection

Accurate methods for detecting ovarian cancer early could have a great impact on the cure rate. Researchers are testing new ways to screen women for ovarian cancer, and a national repository for blood and tissue samples from ovarian cancer patients is being established to aid in these studies. One method being tested is looking at the pattern of proteins in the blood (called proteomics) to find ovarian cancer early.

Two large studies of screening are in progress now. One is in the United States, and the other is in the United Kingdom. Both studies look at using the CA-125 blood test along with ovarian (transvaginal) ultrasound to find ovarian cancer. These studies have found early cancers in some women. But it is not known whether the outcomes of these women have been improved compared with women who haven’t undergone screening.

Treatment

Treatment research includes testing the value of currently available methods as well as developing new approaches to treatment.

New chemotherapy combinations that may help cancers resistant to current treatments are constantly being investigated.

For cancers to grow, blood vessels must develop to nourish the cancer cells. This process is called angiogenesis. Drugs have been developed that are useful in stopping cancer growth by preventing new blood vessels from forming. One drug, called bevacizumab (Avastin) has been able to shrink or slow the growth of advanced ovarian cancers. In general, bevacizumab has been even more effective in other cancers when it was combined with chemotherapy. Trials that test the effectiveness of bevacizumab given along with chemotherapy are going on now. If you have advanced ovarian cancer, consider entering this trial.

Other targeted therapies are being studied including inhibitors of growth factors, which stimulate the growth of the cancer cells. One such inhibitor called erlotinib has been tested. Although it wasn't very effective by itself, the researchers intend to combine it with chemotherapy in the hope that it will be more effective.

Another approach is to develop tumor vaccines that program the immune system to better recognize cancer cells. Also, antibodies that specifically recognize and attack ovarian cancer cells are being developed. Perhaps some or all of these approaches along with chemotherapy will lead to cures for this disease.

Consolidation therapy -- treatment following first line therapy to prevent recurrence -- is undergoing clinical trials. Some of these trials are using chemotherapy, growth factor inhibitors and monoclonal antibodies. Monoclonal antibodies are like the antibodies our bodies make to fight infection. These, however, are made in the laboratory and are directed against specific sites on the cancer cell. Studies are on-going.

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-ACS-2345.

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

Caring for the Patient With Cancer at Home (also available in Spanish)

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

Understanding Chemotherapy: A Guide for Patients and Families (also available in Spanish)

Understanding Radiation Therapy: A Guide for Patients and Families (also available in Spanish)

NCCN Ovarian Cancer Treatment Guidelines for Patients (also available in Spanish)

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

Couples Confronting Cancer: Keeping Your Relationship Strong

National organizations and Web sites*

In addition to the American Cancer Society (1-800-ACS-2345), other sources of patient information and support include:

Gilda Radner Familial Ovarian Cancer Registry
Toll-free number: 1-800-OVARIAN (1-800-682-7426)
Web site: www.ovariancancer.com

Gilda's Club Worldwide
Toll-free number: 1-888-445-3248 (1-888-GILDA 4 U)
Web site: www.gildasclub.org

Gynecologic Cancer Foundation
Toll-free number: 1-800-444-4441
Web site: www.thegcf.org

National Cancer Institute
Toll-free number: 1-800-422-6237 (1-800-4-CANCER)
TYY: 1-800-332-8615
Web site: www.cancer.gov

National Ovarian Cancer Coalition

Toll-free number: 1-888-682-7426 (1-888-OVARIAN)
Web site: www.ovarian.org

Office of Women's Health
Toll-free number: 1-800-994-9662 (1-800-994-WOMAN)
TDD: 1-888-220-5446
Web site: www.4woman.gov

Ovarian Cancer National Alliance
Telephone number: 1-202-331-1332
Web site: www.ovariancancer.org

*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-ACS-2345 or visit www.cancer.org.

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