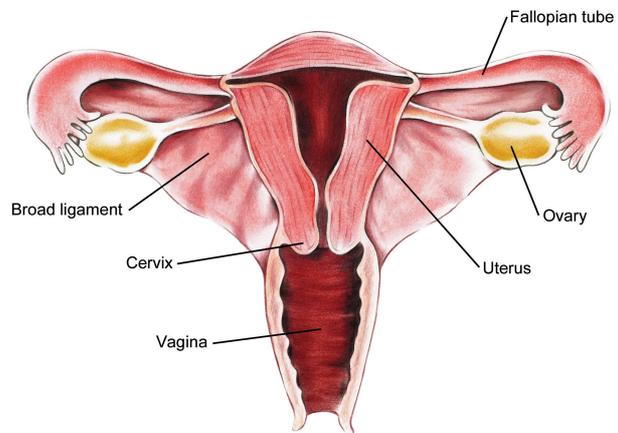


What is ovarian cancer?

Ovarian cancer begins in the ovaries. Women have two ovaries, one on each side of the uterus in the pelvis. The ovaries produce eggs (called ova). They are also the main source of a woman's female hormones, estrogen and progesterone. The eggs travel through the fallopian tubes to the uterus. Here they may be fertilized and develop into a fetus. Ovarian cancer begins in the ovaries. It can also begin in the fallopian tubes.



The ovaries contain three kinds of tissue:

- **Germ cells:** These cells make eggs (ova) inside of the ovary
- **Stromal cells:** These cells are inside the ovary, between germ cells. They make most of the female hormones (estrogen and progesterone)
- **Epithelial cells:** These cells cover the ovary. Most ovarian cancers start in this covering.

Many types of tumors can start in the ovaries. Some are benign (non-cancerous) and never spread beyond the ovary. Women with these types of tumors can be successfully treated by removing one ovary or the part of the ovary that has the tumor. Other types of tumors are cancerous (malignant) and can spread to other parts of the body. Their treatment is more complicated.

Tumors in the ovary are named for the kinds of cells the tumor started from and whether the tumor is benign or cancerous. There are three main types of tumors:

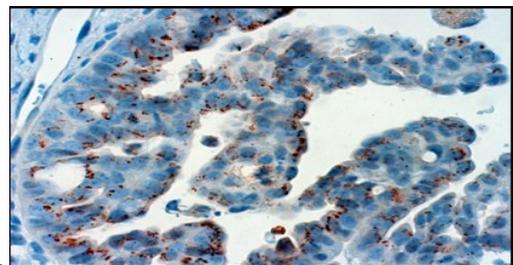
- **Germ cell tumors** start from the cells that produce the eggs
- **Stromal tumors** start from connective tissue cells that hold the ovary together and make the female hormones
- **Epithelial tumors** start from the cells that cover the outer surface of the ovary.

Types of Ovarian Cancer

Epithelial Ovarian Tumors

Epithelial ovarian tumors are further divided into 3 sub-groups:

- **Benign epithelial tumors:** These tumors do not spread and usually do not lead to serious illness.
- **Tumors of low malignant potential (LMP tumors):** These tumors do not clearly appear to be cancerous when looked at under the microscope. They are also known as *borderline tumors*. These tumors affect women at a younger age than other ovarian cancers. They grow and spread slowly and are much less serious than most ovarian cancers.



Primary Peritoneal Carcinoma

This condition is a cancer much like epithelial ovarian cancer but it starts outside of the ovaries. It grows from the cells that line the pelvis and abdomen. These cells look just like the cells along the surface of the ovaries. Women who have had their ovaries removed can

still get this type of cancer. Symptoms of this cancer are much like those of ovarian cancer. Treatment is also similar.

Germ Cell Tumors

About 1 in 20 ovarian cancers are germ cell tumors. Germ cells make the eggs. Most germ cell tumors are not cancer, although some can be. There are several sub-types of germ cell tumors.

Stromal Tumors

Stromal tumors can be either benign (non-cancerous) or cancerous. More than half are found in women over age 50. Some of these tumors make hormones. There are many different types of stromal tumors. Treatment depends on the type.



Ovarian cysts

An ovarian cyst is formed by fluid that collects inside an ovary. Many of these cysts are harmless. The fluid will most often be absorbed and the cyst will disappear in time without any treatment.

- A very small number of these cysts are cancerous. If the cyst is large or develops in childhood or after menopause, the doctor may suggest further tests or treatment.

Fallopian tube cancer

Fallopian tube cancer is very rare. It begins in the fallopian tube, and produces symptoms similar to ovarian cancer, except there may be more pelvic

pain. Treatment and prognosis is also similar to ovarian cancer.

- **Epithelial ovarian cancers:** Nearly 9 out of 10 ovarian cancers are epithelial ovarian cancer. These cancer cells have certain features that are visible under a microscope which allow doctors to further classify them.

Cancer

Ovarian cancer is the eighth most common cancer in women (not counting skin cancer). It ranks fifth as the cause of cancer death in women. The American Cancer Society estimates that there will be about 20,180 new cases of ovarian cancer in this country in 2006. About 15,310 women will die this year because of the disease. Around two-thirds of women with ovarian cancer are 55 or older. It is slightly more common in White women than African-American women.

The rate of ovarian cancer has gone down about 0.7% per year since 1985. A woman's risk of getting ovarian cancer during her lifetime is about 1 in 67. The risk of getting this cancer and dying from it is 1 in 95.

What causes ovarian cancer?

The cause of ovarian cancer is not yet known, but we do know some of the risk factors. These include smoking, age, and race. It is important to remember that while risk factors increase the odds of getting a disease, they do not guarantee it will occur.

Risk factors for epithelial ovarian cancer:

- **Age:** Most ovarian cancers happen after change of life (menopause). Half of all these

cancers are found in women over the age of 63.

- **Obesity:** A study from the ACS found a higher rate of death from ovarian cancer in women who were overweight. The risk went up by 50% in the heaviest women.
- **Menstrual periods:** There seems to be a link between the number of periods (menstrual cycles) in a woman's lifetime and her risk of getting ovarian cancer. Women who started having periods early (before 12 years of age) or who went through the change of life (menopause) after the age of 50 have a small increased risk of ovarian cancer. The same is true for women who have not had children, or had their first child after they were 30 years old.
- **Fertility drugs:** Some studies have found that long-time use of one fertility drug (clomiphene citrate), especially if no pregnancy took place, may increase the risk of LMP tumors. But infertility also increases the risk, even without the use of fertility drugs. Research in this area is now going on.
- **Family history:** Ovarian cancer risk is higher among women whose close blood relatives (mother, sister, daughter) have (or had) this disease. The relatives can be from either the mother's or father's side of the family. There is a higher risk if ovarian cancer happened at an early age. About 1 in 10 cases of ovarian cancers are linked to gene changes that can be found with certain tests. These changes are also linked to an increased risk of breast and colorectal cancer.
- **Breast cancer:** Women who have had breast cancer also have a higher risk of ovarian cancer.
- **Talcum powder:** Some studies have shown a slight increase in risk of ovarian cancer among women who used talcum powder on the genital area. Asbestos in the powder may explain the link. But these products have been free of asbestos for more than 20 years.
- **Estrogen replacement therapy (ERT):** Some studies suggest that women using estrogens after menopause may have an increased risk of ovarian cancer, but other studies have not found any effect. Most of these findings have been for women who used estrogen alone, not those taking combined estrogen and progesterone. The increased risk is less certain for women taking both drugs. Because of the small number of studies, doctors are not sure whether estrogens increase the risk of ovarian cancer.
- **Smoking and alcohol use:** Some studies have found an increased risk for one type of ovarian cancer (mucinous).

Can ovarian cancer be prevented?

Most women have one or more risk factors for ovarian cancer, but each risk factor increases the odds of developing the disease only slightly. To date, current knowledge of the disease and risk factors has not led to steps to prevent the disease.

Some of the actions listed below may reduce the risk of the most common type of ovarian cancer (epithelial) only slightly, while others may decrease it much more. If you are concerned about your risk, especially if you have a family history of cancer, you should discuss this information with your doctor.



- **Birth control pills:** Birth control pills reduce the risk of ovarian cancer, especially among women who use them for several years.
- **Tubal ligation or hysterectomy:** "Tying" the tubes as a method of birth control, when done after childbearing, may reduce the chance of ovarian cancer. Removing the uterus may also reduce the risk. But these surgeries should only be done for a valid medical reason and not

just for their effect on ovarian cancer risk.

- **Pregnancy and breast-feeding:** Having one or more children plus breast-feeding for a year or longer may decrease the risk of ovarian cancer. Although these measures slightly reduce the risk, they don't offer complete protection. Doctors do not suggest making these choices about when to have a child simply for the purpose of reducing ovarian cancer risk. Keep in mind that using the birth control pill has a greater impact on this risk.
- **Diet:** A number of studies have shown a lower rate of this cancer in women who ate a diet high in vegetables. The American Cancer Society recommends eating a wide variety of healthful foods, with many from plant sources. Eat at least 5 servings of fruits and vegetables every day. Limit the amount of red meats, especially those that are high in fat.
- **Aspirin and acetaminophen:** Some studies have shown that both aspirin and acetaminophen (Tylenol) reduce the risk of ovarian cancer. But there is some doubt about this. Women should not take these drugs simply to prevent this cancer. More research is needed.

Women with a family history of ovarian cancer might want to think about genetic counseling and perhaps genetic testing. Before asking for the test, a woman should discuss the benefits and possible drawbacks with her doctor. Genetic testing can determine if a woman carries certain gene changes that cause a higher risk of ovarian cancer.

Studies looking at whether the birth control pill could lower the risk of ovarian cancer have shown mixed results. For women at average risk, the pill does lower the risk. But for women at high risk because of gene changes, the results are mixed. More research is needed to make clear the pros and cons of the pill for women at high risk of ovarian or breast cancer.

Surgery to remove one or both ovaries is called oophorectomy. It can be done before a cancer develops in order to lower the risk. But whether or not a woman should have this surgery is open to question because it causes change of life (menopause) to take place early. Often, doctors suggest it only for certain women over the age of 40 who are at very high risk. While this operation lowers ovarian cancer risk a great deal, cancer can still form in the cells lining the pelvis where the ovaries were located.

How is ovarian cancer found?

About one fifth of ovarian cancers are found at an early stage. Finding the cancer early improves the chances that it can be treated successfully. Nine out of 10 women treated for early ovarian cancer will live longer than 5 years after the cancer is found. Unfortunately, there is no reliable test for finding this cancer early, but several large studies are in progress to learn how best to find ovarian cancer in its earliest stage.

Ways to Find Ovarian Cancer Early

Regular women's health exams: During a pelvic exam the doctor will feel the female organs to check their size and shape. But most ovarian tumors are hard to find early because the ovaries are deep within the body and the doctor cannot feel them easily. While the Pap test helps to find cervical cancer early, it is not really useful for finding ovarian cancer at an early stage.

- **See a doctor if you have symptoms:** Early cancers of the ovaries tend to cause somewhat vague symptoms. Keep in mind that these problems are often caused by something other than cancer. Symptoms might include:
 - Swelling of the stomach (abdomen) from a buildup of fluid
 - Unusual vaginal bleeding
 - Pelvic pressure

- Back or leg pain
- Problems such as gas, bloating, long-term stomach pain, constipation, or indigestion

By the time ovarian cancer is thought of as a possible cause of these symptoms, it may already have spread beyond the ovaries. Also, some types of ovarian cancer can quickly spread to the surface of nearby organs. Still, prompt attention to symptoms can improve the odds of finding the cancer early and treating it successfully. If you have any of the symptoms above, report them to your doctor right away.

- **Screening tests:** These tests and exams are used to find a disease such as cancer in people who don't have any symptoms. Women with a high risk of ovarian cancer (such as those with a strong family history of the disease) may be screened with ultrasound and with blood tests. But early studies of women at average risk of ovarian cancer show that these tests did not lower the number of deaths caused by ovarian cancer. For this reason, these tests are not used for routine screening of women who don't have strong risk factors.

If there is any reason to suspect ovarian cancer, the doctor will use one or more methods to find out if the disease is really present. One of the first steps will be a meeting with a doctor who has special training in treating women with this type of cancer (a gynecologic oncologist). Following are some of the tests that could be done:



- **Imaging Studies:** These tests can show whether there is a mass in the pelvis, but they cannot tell whether it is cancer.
 - **Ultrasound:** This test uses sound waves to create an image on a video screen. Because tumors and normal tissue reflect sound waves differently, this test may be useful in finding tumors and in telling whether a mass is solid or a fluid-filled cyst.
 - **CT scans (computed tomography):** These scans use an x-ray beam to take a series of pictures of the body from many angles. A computer combines the pictures to form a detailed image. CT scans are useful in showing how large the tumor is, whether lymph nodes are enlarged, and whether the tumor has spread to other organs. CT scans can also be used to guide a biopsy needle into a tumor in order to remove a sample of tissue.

CT scans take longer than regular x-rays. You will need to lie still on a table while they are being done. Also, some contrast dye will be injected or you may be asked to drink a contrast fluid.

- **Barium enema x-rays:** These can be done to see whether the cancer has spread to the large intestine or rectum. A chalky substance (barium sulfate) will be placed into the rectum and colon. The barium outlines the colon and

rectum on x-rays.

- **Colonoscopy:** After you have taken a laxative, the doctor inserts a tube into the rectum and into the colon. Through this, the doctor can see inside and spot any cancer. Because it is uncomfortable, you will be sedated. This test is also used to look for colorectal cancer.
- **MRI (magnetic resonance imaging):** Like a CT scan, MRIs display a cross-sectional picture of the body. But an MRI uses radio waves and strong magnets instead of x-rays. MRI scans are helpful in looking at the brain and spinal cord. These scans take longer than CT scans, often up to 30 minutes or more.
- **Chest x-rays:** These may be taken to see if the cancer has spread to the lungs.
- **PET (Positron emission tomography):** PET scans use a form of radioactive sugar (glucose) to look for the cancer. Cancers use sugar at a higher rate than normal tissues. This means that the radioactivity will tend to collect in the cancer which will make it visible on the scan. This test is sometimes useful to find ovarian cancer that has spread.
- **Other Tests**
 - **Laparoscopy:** This is another method that lets the doctor take pictures of the ovaries and other pelvic organs. A thin, lighted tube is placed through a small cut (incision) into the lower abdomen.
 - **Tissue sampling:** The only way to tell for certain if a growth in the pelvis is cancer involves removing a sample of tissue or fluid to see if cancer cells are present. This is called a biopsy and is often done at the time of surgery. It can also be done as a test separate from the surgery, such as during a laparoscopy.
 - **Blood tests:** These tests are done to make sure you have the right number of the different kinds of blood cells. The tests also measure kidney and liver function, and look for a substance called CA-125. CA-125 is a protein in the blood that may be higher than normal in some women with ovarian cancer. It is sometimes called a tumor marker for ovarian cancer.

Staging

Staging is the process of finding out how far the cancer has spread. This is very important because ovarian cancers at different stages are treated differently. Once a stage has been assigned, it doesn't change, even if the cancer spreads to other areas of the body or comes back later. Staging is usually done during surgery.

One goal of surgery is to obtain tissue samples and to remove all cancer tumors larger than about $\frac{1}{2}$ inch. Surgery and an examination of the tissues under a microscope will help the doctor decide the stage of the tumor. The AJCC/TNM system is used to stage the cancer. This system describes the cancer in terms of the extent of the tumor (T), whether or not it has spread to nearby lymph nodes (N), and whether it has spread to organs farther away (or metastasized, M).

Once the TNM groups have been decided, the information is combined to give a number from 1 to 4. The stage is expressed as a Roman numeral. In general, the lower the number, the less the cancer has spread. A higher number, such as stage IV (4), means a more serious cancer.

Summary of Ovarian Cancer Stages

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

Stage II: Cancer is in one or both ovaries and has spread to other organs in the pelvis, such as the bladder, colon, rectum, or uterus.

Stage III: The cancer is in one or both ovaries and has spread to the lining of the abdomen or to the lymph nodes.

Stage IV: This is the most advanced stage. The cancer has spread from one (or both) ovaries to distant organs, such as the liver or lungs, or there may be cancer cells in the fluid around the lungs.

Recurrent: The cancer has come back (recurred) after treatment.

The above stages can be further divided into sub-groups. Ask your doctor to explain the exact stage of your cancer in terms you can understand

How is ovarian cancer treated?

After the tests are done, your doctor will suggest one or more options for treatment. The choice of treatment depends largely on the type of cancer and the stage of the disease. If you have not had surgery yet, the exact stage may not be known. In that case, treatment is based on what is known.

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 limiting factor. Studies have shown that older women can take ovarian cancer treatments well. Be sure you understand all the risks and side effects of different treatments before you make a decision.

The main treatments for ovarian cancer are surgery, chemotherapy, and radiation therapy. In some cases 2 or even all 3 of these treatments will be used.

- **Surgery**



How much and what type of surgery a woman has depends on how far the cancer has spread, her general health, and whether or not she still hopes to have children.

There are several different types of surgery for ovarian cancer. If both ovaries or the uterus are removed, you will not be able to get pregnant. It also means that you will go through change of life if you haven't already. Most women will be in the hospital for 3 to 7 days after surgery. Recovery usually takes about 4 to 6 weeks.

If all of the tumor can't be removed, the surgeon might remove as much as possible in a procedure called debulking (or cytoreduction). Most doctors believe this greatly improves a woman's chance for survival.

Your surgeon should be experienced in ovarian cancer surgery. For this reason, many doctors refer their patients to doctors with special training called gynecologic oncologists. A gynecologic oncologist is a doctor who works with women who have cancer of the uterus, ovary, breast, or other part of the female system.

- **Chemotherapy**

Chemotherapy refers to the use of drugs to kill cancer cells. Usually the drugs are given into a vein or by mouth. Once the drugs enter the bloodstream, they spread throughout the body. This treatment is especially useful when cancer has spread beyond the ovaries.

The drugs can also be given directly into the abdomen. This approach aims the drugs right at the cancer cells and limits the amount reaching the rest of the body. This helps reduce side effects.

Chemotherapy is usually given in cycles of treatment followed by a rest period. Chemotherapy is prescribed by an oncologist (cancer doctor).

While chemotherapy drugs kill cancer cells, they also damage some normal cells, causing side effects. These side effects will depend on the type of drugs given, the amount taken, and how long treatment lasts. Temporary side effects might include the following:

- - Nausea and vomiting
 - Loss of appetite
 - Hair loss
 - Hand and foot rashes
 - Kidney or nerve damage
 - Mouth sores
 - Increased chance of infection (from a shortage of white blood cells)
 - Bleeding or bruising after minor cuts (from a shortage of platelets)
 - Tiredness (from low red blood cell counts)

Most side effects go away when treatment ends. Hair will grow back, although it may look different. Some side effects, such as menopause and infertility, can be permanent. Rarely, some cancer drugs may cause



another cancer to develop. The small chance that this might happen should be weighed against the positive effects of treating the ovarian cancer. Anyone who has problems with side effects should talk with their doctor or nurse as there are often ways to help.

- **Radiation Therapy**

Radiation therapy uses high energy x-rays to kill or shrink cancer cells. The radiation may come from outside the body or from radioactive materials placed directly into or near the tumor. However, radiation therapy is rarely used in this country as the main treatment for ovarian cancer.

Radiation therapy may cause side effects. The skin in the area treated may look and feel sunburned. The skin returns to



normal within 6 to 12 months. Many women also feel tiredness, nausea or diarrhea. Be sure to talk with the doctor about any side effects. Often there are ways to help.

Treatment for Epithelial Ovarian Cancer

The treatment for epithelial ovarian cancer depends on how far the cancer has grown. Usually the first option is surgery to remove one or both ovaries. The doctor may also advise surgery to remove other female organs. Treatment may include chemotherapy or radiation therapy for early stage cancers. For stage III and IV cancers, the tumor will also be debulked.

Chemotherapy is often given after surgery. If cancer returns after treatment, more surgery and chemotherapy may be given.

After treatment, blood tests will be done to see if your CA-125 tumor marker levels are normal.

The most common problems that can occur in women whose cancer has come back are fluid build-up and blockage of the intestinal tract. Numbing the skin and inserting a needle to draw off the fluid can relieve fluid build-up. This will often need to be done again from time to time. This can extend life and relieve symptoms for some women.

Dealing with the intestinal blockage can be harder. Often the cancer has grown so much that surgery doesn't fix the problem. Doctors can place a tube through the skin and into the stomach to relieve fluid build-up in the digestive tract. The goal is to relieve pain and keep the woman comfortable.

High dose chemotherapy with stem cell rescue (bone marrow transplant) has been used for women with cancer that has come back or not gone away at all. This approach has serious side effects. And it has not helped patients to live longer. It should only be done as part of a clinical trial.

Treatment for Low Malignant Potential (LMP) Tumors

For LMP (borderline) tumors, the ovary with the tumor and the fallopian tube on the affected side are usually removed. In certain cases, just the ovarian cyst with the tumor is removed. If the woman might want to become pregnant in the future, and if there appears to be no cancer beyond the one ovary, no further surgery is done at that time.

If the woman is not concerned about being able to have children, the ovaries, fallopian tubes, and the uterus are removed. Chemotherapy and radiation are not generally used at first for treatment of these tumors, although they may be used if the tumor comes back after surgery.

Treatment for Germ Cell Tumors of the Ovary

Women with benign germ cell tumors are cured by removing part or all of the ovary and the fallopian tube on the affected side. It's a good idea to consult with a specialist since these tumors are so rare.

The treatment for germ cell cancers of the ovary depends on the exact type and the stage of the cancer. Surgery will reveal the stage and which organs should be removed. Most women with germ cell cancers will also have chemotherapy.

Treatment for Stromal Cell Tumors

Most stromal cell tumors are confined to the ovary. They are treated by removing the ovary with the tumor. If the tumor returns, more surgery and chemotherapy may also be used. Rarely, radiation therapy may be used.

<http://www.metrohealth.org/body.cfm?id=1637>