Treating Ovarian Cancer

General treatment information

After the diagnostic tests are done, your cancer care team will recommend 1 or more treatment options. The main treatments for ovarian cancer are:

- Surgery
- Chemotherapy
- Hormone therapy
- Targeted therapy
- Radiation therapy

Often, 2 or more different types of treatments are used.

Consider the options without feeling rushed. If there is anything you don't understand, ask to have it explained. The choice of treatment depends largely on the type of cancer and the stage of the disease. The exact stage may not be known in patients who did not have surgery as their first treatment. 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 isn't 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.

Thinking about taking part in a clinical trial

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-the art cancer treatment. In some cases they may be the only way to get access to

newer treatments. They are also the best way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service at 1-800-303-5691 for a list of studies that meet your medical needs, or see Clinical Trials to learn more.

Considering complementary and alternative methods

You may hear about alternative or complementary methods that your doctor hasn't mentioned to treat your cancer or relieve symptoms. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods refer to treatments that are used along with your regular medical care. Alternative treatments are used instead of a doctor's medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be dangerous.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision. SeeComplementary and Alternative Medicine to learn more.

Help getting through cancer treatment

Your cancer care team will be your first source of information and support, but there are other resources for help when you need it. Hospital- or clinic-based support services are an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab, or spiritual help.

The American Cancer Society also has programs and services – including rides to treatment, lodging, support groups, and more – to help you get through treatment. Call our National Cancer Information Center at 1-800-227-2345 and speak with one of our trained specialists on call 24 hours a day, every day.

The treatment information given here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed

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

Surgery for Ovarian Cancer

Surgery is the main treatment for most ovarian cancers. 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.

For epithelial ovarian cancer, surgery has 2 main goals: staging and debulking (this is discussed in detail further on). It's important that this surgery is done by someone who's experienced in ovarian cancer surgery.

Experts recommend that patients see a gynecologic oncologist for surgery. Gynecologic oncologists are specialists who have training and experience in treating, staging, and debulking ovarian cancer. If your cancer isn't properly staged and debulked, you may need to have more surgery later. It has been shown that gynecologic oncologists are more likely than general surgeons and gynecologists to stage and debulk ovarian cancer optimally (see below).

For other types of ovarian cancer (germ cell tumors and stromal tumors), the main goal of surgery is to remove the cancer.

Staging epithelial ovarian cancer

Surgery for ovarian cancer has 2 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 (this operation is called a *hysterectomy*), along with both ovaries and fallopian tubes (this is called a *bilateral salpingo-oophorectomy* or BSO). 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 biopsied (taken out to see if the cancer has 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. He or she may also remove tissue samples from different areas inside the abdomen and pelvis. 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 be able to decide on the best treatment.

Debulking epithelial ovarian cancer

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. This is called *optimally debulked*. Patients whose tumors have been optimally debulked, have a better outlook than those left with larger tumors after surgery (called *sub-optimally debulked*).

Sometimes the surgeon will need to remove a piece of colon to debulk the cancer properly. In some cases, a piece of colon is removed and then the 2 ends that remain are sewn back together. In other cases, though, the ends can't be sewn back together right away. Instead, the top end of the colon is attached to an opening (stoma) in the skin of the abdomen to allow body wastes to get out. This is known as a *colostomy.* Most often, this is only temporary, and the ends of the colon can be reattached later in another operation. For more information, see our document Colostomy Guide.

Debulking surgery might also mean removing a piece of the bladder. If this occurs, a catheter (to empty the bladder) will be placed during surgery. This will be left in place until the bladder recovers enough to be able to empty on its own. Then, the catheter can be removed.

Debulking may also require removing the spleen and/or the gallbladder, as well as part of the stomach, liver, and/or pancreas.

If both ovaries and/or the uterus are removed, you will not be able to become pregnant. It also means that you will go into menopause if you haven't 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.

Surgery for ovarian germ cell tumors and ovarian stromal tumors

Most ovarian germ cell tumors are treated with a hysterectomy and bilateral salpingo-oophorectomy. If the cancer is in only one ovary and the patient still wants to be able to have children, only the ovary containing the cancer and the fallopian tube on the same side are removed (leaving behind the other ovary and fallopian tube and the uterus).

Ovarian stromal tumors are often confined to just one ovary, so surgery may just remove that ovary. If the cancer has spread, more tissue may need to be removed. This could mean a hysterectomy and bilateral salpingo-oophorectomy and even debulking surgery.

- References

See all references for Ovarian Cancer

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Chemotherapy for Ovarian Cancer

Chemotherapy (chemo) is the use of drugs to treat cancer. Most often, chemo is a systemic treatment the drugs are given in a way that lets them enter the bloodstream and reach all areas of the body. Systemic chemo can be useful for cancers that have metastasized (spread). Most of the time, systemic chemo uses drugs that are injected into a vein (IV) or given by mouth. For some cases of ovarian cancer, chemotherapy may also be injected through a catheter (thin tube) 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 chemo. This is discussed in more detail later in this section.

Chemotherapy for epithelial ovarian cancer

Chemo for ovarian cancer is most often a combination of 2 or more drugs, given IV every 3- to 4-weeks. Giving combinations of drugs rather than just one drug alone seems to be more effective in the initial treatment of ovarian cancer.

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

The typical course of chemo for epithelial ovarian cancer involves 3 to 6 cycles. A cycle is a schedule of regular doses of a drug, followed by a rest period. Different drugs have

varying cycles; your doctor will let you know what schedule planned for your chemo.

Epithelial ovarian cancer often shrinks or even seems to go away with chemo, but the cancer cells may eventually begin to grow again. If the first chemo seemed to work well and the cancer stayed away for a long time (at least 6 to 12 months), it can be treated with additional cycles of the same chemotherapy used the first time. In some cases, different drugs may be used. Some of the other chemo drugs that are helpful in treating ovarian cancer include (in alphabetical order):

- Albumin bound paclitaxel (nab-paclitaxel, Abraxane®)
- Altretamine (Hexalen®)
- Capecitabine (Xeloda®)
- Cyclophosphamide (Cytoxan®)
- Etoposide (VP-16)
- Gemcitabine (Gemzar®)
- Ifosfamide (Ifex®)
- Irinotecan (CPT-11, Camptosar®)
- Liposomal doxorubicin (Doxil®)
- Melphalan
- Pemetrexed (Alimta®)
- Topotecan
- Vinorelbine (Navelbine®)

The different drug combinations used to treat germ cell tumors are described later on in the section Treatment for Germ Cell Tumors of the Ovary.

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.

Common temporary side effects include:

- Nausea and vomiting
- Loss of appetite
- Loss of hair
- Hand and foot rashes
- Mouth sores

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

- 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, drugs can be given to prevent and treat nausea and vomiting. For more information about chemotherapy and its side effects, please see the Chemotherapy section of our website.

Some chemo drugs may have long-term or even permanent side effects. For example, cisplatin can cause kidney damage. To help prevent this, doctors give lots of IV fluid before and after this drug is given. Both cisplatin and the taxanes can cause nerve damage (called *neuropathy*). This can lead to problems with numbness, tingling, or even pain in the hands and feet. Cisplatin can also damage the nerves to the ear, which can lead to hearing loss (called *ototoxicity*). Other drugs can have other side effects, so ask your doctor what side effects to expect from the drugs that you will receive. Most side effects improve once treatment is stopped, but some can last a long time and may never go away completely.

Chemo can also cause early menopause and infertility (inability to become pregnant), which may be permanent. This is rarely an issue in the treatment of epithelial ovarian cancer, since most women have both ovaries removed as a part of treatment.

Rarely, some chemo drugs can permanently damage bone marrow. This can later cause a bone marrow cancer such as myelodysplastic syndrome or even acute myeloid leukemia. 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 another cancer.

Intraperitoneal chemotherapy

In intraperitoneal (IP) chemotherapy for ovarian cancer, in addition to giving the chemo drug paclitaxel IV, the drugs cisplatin and paclitaxel are injected into the abdominal cavity through a catheter (thin tube). The tube can be placed during the staging/debulking surgery, but sometimes it is placed later. If it is done later, it can be placed by a surgeon using laparoscopy, or by an interventional radiologist under x-ray guidance. The catheter is usually connected to a *port*, a half dollar-sized disk topped with a pliable diaphragm. The port is placed under the skin against a bony structure of the abdominal wall, such as a rib or pelvic bone. A needle can be placed through the skin and into the port to give chemo and other drugs. Over time, problems may rarely

occur with the catheter. it may become plugged or infected or even damage the bowel.

Giving chemo this way gives the most concentrated dose of the drugs to the cancer cells in the abdominal cavity. This chemo also gets absorbed into the bloodstream and so can reach cancer cells outside the abdominal cavity. IP chemotherapy works well, but the side effects are often more severe than with regular chemo. In a 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 chemo through the vein. These side effects actually made some women stop their treatment early. Still, the women getting IP chemotherapy lived longer than the women getting regular chemo.

IP chemotherapy currently is only given to some of the women with ovarian cancer that has spread to the inside of the abdomen. It was only studied in women whose cancer had not spread outside the abdomen (stage III) and who had no tumors larger than 1 cm after surgery (optimally debulked). Also, because it can be so toxic, women must have normal kidney function and be in good overall shape for their doctor to be willing to try IP chemo. They also cannot have a lot of adhesions or scar tissue inside their abdomen because this can prevent the chemo from spreading well.

Germ cell tumors

Patients with germ cell cancer often need to be treated with combination chemo. 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 if the cancer isn't responding to treatment or to treat cancer that has recurred (come back). These include:

- TIP: paclitaxel (Taxol), ifosfamide, and cisplatin
- VeIP: vinblastine, ifosfamide, and cisplatin
- VIP: etoposide (VP-16), ifosfamide, and cisplatin

Chemo for germ cell tumors has some of the same risks and side effects as the chemo for epithelial ovarian cancer. These include:

- Nausea and vomiting
- Loss of appetite
- Loss of hair
- 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)

Other possible side effects include kidney damage from cisplatin. To help prevent this, doctors give lots of IV fluid before and after this drug is given. Both cisplatin and the taxanes can cause nerve damage (called *neuropathy*). This can lead to problems with numbness, tingling, or even pain in the hands and feet. Cisplatin can also damage the nerves to the ear, which can lead to hearing loss (called *ototoxicity*). Rarely, bleomycin can lead to lung damage, so doctors may test lung function before using this drug. Ifosfamide can cause hemorrhagic cystitis (irritation and bleeding of the bladder lining). This can usually be prevented by giving the drug mesna with the ifosfamide.

Other other side effects can occur depending on what drugs are used, so ask your doctor what side effects to expect from the drugs that you will receive.

Most side effects improve once treatment is stopped, but some can last a long time and may never go away completely.

Chemo can also cause early menopause and infertility (inability to become pregnant), which may be permanent. This can be a particular concern for young women treated for germ cell tumors.

Rarely, some chemo drugs can permanently damage bone marrow. This can later cause a bone marrow cancer such as myelodysplastic syndrome or even acute myeloid leukemia. 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

Stromal tumors

Ovarian stromal tumors are not often treated with chemotherapy, but when they are, the combination of carboplatin plus paclitaxel or PEB (cisplatin/Platinol, etoposide, and bleomycin) is most often used.

Chemo for stromal tumors has some of the same risks and side effects as the chemo for epithelial ovarian cancer. These include

- Nausea and vomiting
- Loss of appetite
- Loss of hair
- 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)

Other possible side effects include kidney damage from cisplatin. To help prevent this, doctors give lots of IV fluid before and after this drug is given. Both cisplatin and the taxanes can cause nerve damage (called *neuropathy*). This can lead to problems with numbness, tingling, or even pain in the hands and feet. Cisplatin can also damage the nerves to the ear, which can lead to hearing loss (called *ototoxicity*). will cause another cancer. Rarely, bleomycin can lead to lung damage, so doctors may test lung function before using this drug. Ifosfamide can cause hemorrhagic cystitis (irritation and bleeding of the bladder lining). This can usually be prevented by giving the drug mesna with the ifosfamide.

Other other side effects can occur depending on what drugs are used, so ask your doctor what side effects to expect from the drugs that you will receive.

Most side effects improve once treatment is stopped, but some can last a long time and may never go away completely.

Chemo can also cause early menopause and infertility (inability to become pregnant), which may be permanent.

Rarely, some chemo drugs can permanently damage bone marrow. This can later cause a bone marrow cancer such as myelodysplastic syndrome or even acute myeloid leukemia. 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

For more information about chemotherapy and its side effects, please see the Chemotherapy section of our website.

- References

See all references for Ovarian Cancer

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Targeted Therapy for Ovarian Cancer

Targeted therapy is a newer type of cancer treatment that uses drugs or other substances to identify and attack cancer cells while doing little damage to normal cells. These therapies attack the cancer cells' inner workings the programming that makes them different from normal, healthy cells. Each type of targeted therapy works differently, but all alter the way a cancer cell grows, divides, repairs itself, or interacts with other cells.

Bevacizumab

Bevacizumab (Avastin) belongs to a class of drugs known as *angiogenesis inhibitors*. In order for cancers to grow and spread, they need new blood vessels to form to nourish the tumors (called angiogenesis). This drug binds to a substance called VEGF that signals new blood vessels to form. This can slow or stop the growth of cancers.

In studies, bevacizumab has been shown to shrink or slow the growth of advanced epithelial ovarian cancers. Trials to see if bevacizumab works even better when given along with chemotherapy have shown good results in terms of shrinking (or stopping the growth of) tumors. But it doesn’t seem to help women live longer.

This drug is given as an infusion into the vein (IV) every 2 to 3 weeks.

Common side effects include high blood pressure, tiredness, bleeding, low white blood cell counts, headaches, mouth sores, loss of appetite, and diarrhea. Rare but possibly serious side effects include blood clots, severe bleeding, slow wound healing, holes forming in the colon (called perforations), and the formation of abnormal connections between the bowel and the skin or bladder (fistulas). If a perforation or fistula occurs it can lead to severe infection and may require surgery to correct.

PARP inhibitors

Olaparib (Lynparza) and **rucaparib (Rubraca)** are drugs known as a *PARP (poly(ADP)-ribose polymerase) inhibitors*. PARP enzymes are normally involved in one pathway to help repair damaged DNA inside cells. The *BRCA* genes (*BRCA1* and *BRCA2*) are also normally involved in a different pathway of DNA repair, and mutations in those genes can block that pathway. By blocking the PARP pathway, these drugs make it very hard for tumor cells with a mutated *BRCA* gene to repair damaged DNA, which often leads to the death of these cells.

These drugs are used to treat advanced ovarian cancer, typically after chemotherapy has been tried. Because these drugs rely on a blocked *BRCA* pathway to work, at this time they are only used in patients who have mutations in one of the *BRCA* genes. Only a small portion of women with ovarian cancer have mutated *BRCA* genes. If you are not known to have a *BRCA* mutation, your doctor will test your blood to be sure you have one before starting treatment with these drugs.

In studies, these drugs have been shown to help shrink or slow the growth of some advanced ovarian cancers for a time. So far, though, it's not clear if they can help women live longer.

These drugs are taken daily by mouth, as pills.

Side effects can include nausea, vomiting, diarrhea, fatigue, loss of appetite, taste changes, low red blood cell counts (anemia), belly pain, and muscle and joint pain. Rarely, some patients treated with these drugs have developed a blood cancer, such as myelodysplastic syndrome or acute myeloid leukemia.

Other targeted therapy drugs are being studied.

Our document Targeted Therapy has more information about these kinds of drugs.

- References

See all references for Ovarian Cancer

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Hormone Therapy for Ovarian Cancer

Hormone therapy is the use of hormones or hormone-blocking drugs to fight cancer. This type of systemic therapy is rarely used to treat epithelial ovarian cancer, but is more often used to treat ovarian stromal tumors.

Luteinizing-hormone-releasing hormone (LHRH) agonists

LHRH agonists (sometimes called *GnRH agonists*) switch off estrogen production by the ovaries. These drugs are used to lower estrogen levels in women who are premenopausal. Examples of LHRH agonists include goserelin (Zoladex®) and leuprolide (Lupron®). These drugs are injected every 1 to 3 months. Side effects can include any of the symptoms of menopause, such as hot flashes and vaginal dryness. If they are taken for a long time (years), these drugs can weaken bones (sometimes leading to osteoporosis).

Tamoxifen

Tamoxifen is a drug that is often used to treat breast cancer. It can also be used to treat ovarian stromal tumors and is rarely used to treat advanced epithelial ovarian cancer. Tamoxifen acts as an anti-estrogen in many tissues in the body, but as a weak estrogen in others. The goal of tamoxifen therapy is to keep any estrogens circulating in the woman's body from stimulating cancer cell growth. The anti-estrogen activity of this drug can lead to hot flashes and vaginal dryness. Because tamoxifen acts like a weak estrogen in some areas of the body, it does not cause bone loss but can increase the risk of serious blood clots in the legs.

Aromatase inhibitors

Aromatase inhibitors are drugs that block an enzyme (called *aromatase*) that turns other hormones into estrogen in post-menopausal women. They don't stop the ovaries from making estrogen, so they are only helpful in lowering estrogen levels in women after menopause. These drugs are mainly used to treat breast cancer, but can also be used to treat some ovarian stromal tumors that have come back after treatment. They include letrozole (Femara®), anastrozole (Arimidex®), and exemestane (Aromasin®). These drugs are taken as pills once a day.

Common side effects of aromatase inhibitors include hot flashes, joint and muscle pain, and bone thinning. The bone thinning can lead to osteoporosis and bone that break easily.

- References

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Radiation Therapy for Ovarian Cancer

Radiation therapy uses high energy x-rays or particles to kill cancer cells. These x-rays may be given in a procedure that is much like having a regular (diagnostic) x-ray. In the past radiation was used more often for ovarian cancer, at this time radiation therapy is only rarely used in this country as the main treatment for this cancer. It can be useful in treating areas of cancer spread.

External beam radiation therapy

In this procedure, radiation from a machine outside the body is focused on the cancer. This is the main type of radiation therapy used to treat 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 regular x-ray. As with a regular x-ray, the radiation passes through the skin and other tissues before it reaches the tumor. The actual time you are exposed to the radiation is very short, and most of the visit is spent getting precisely positioned so that the radiation is aimed accurately at the cancer.

Some common side effects include:

- Skin changes – the skin in the treated area may look and feel sunburned or even blister and peel
- Fatigue (tiredness)
- Nausea and vomiting
- Diarrhea
- Vaginal irritation, sometimes with a discharge (if the pelvis is being treated)

These side effects improve after treatment is stopped. Skin changes gradually fade, and the skin returns to normal in 6 to 12 months.

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

Radioactive phosphorus was used in the past, but is no longer part of the standard treatment for ovarian cancer. For this treatment, a solution of radioactive phosphorus is instilled into the abdomen. The solution gets into cancer cells lining the surface of the abdomen and kills them. It has few immediate side effects but can cause scarring of the intestine and lead to digestive problems, including bowel blockage.

More information on radiation therapy can be found in the radiation section of our website.

- References

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Treatment of Invasive Epithelial Ovarian Cancers, by Stage

The first step in treating most stages of ovarian cancer is surgery to remove and stage the cancer. Debulking is also done as needed (see the section about surgery for details).

Stage I

The initial treatment for stage I ovarian cancer is surgery to remove the tumor. Most often the uterus, both fallopian tubes, and both ovaries are removed (a hysterectomy with bilateral salpingo-oophorectomy) (this is discussed in the surgery section).

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 cells look under the microscope (called the *tumor grade*).

The tumor is grade 1 when 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 ovary containing the cancer along with the fallopian tube on the same side.

For a grade 2 cancer (meaning the cancer looks something like normal ovarian cells), patients are either watched closely after surgery without further treatment, or they are treated with chemotherapy (chemo). The chemo used most commonly is carboplatin and paclitaxel (Taxol) for 3-6 cycles, but cisplatin can be used instead of carboplatin, and docetaxel (Taxotere) can be used instead of paclitaxel.

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

Stage IC (**T1c, N0, M0)**: For stage IC ovarian cancer (including stage IC1, IC2, and IC3), standard surgery to remove the cancer is still the first treatment. After surgery, chemo is recommended, usually 3 to 6 cycles of treatment with carboplatin and paclitaxel.

Stage I fallopian tube cancer is treated the same way as stage I ovarian cancer.

Stage II (including IIA and IIB)

For all stage II cancers, treatment starts with surgery for staging and debulking. This includes a hysterectomy and bilateral salpingo-oophorectomy (see the section about surgery for details). The surgeon will try to remove as much of the tumor as is possible.

After surgery, chemo is recommended for at least 6 cycles. The combination of carboplatin and paclitaxel is most often used. Some women with stage II ovarian cancer are treated with intraperitoneal (IP) chemotherapy instead of intravenous (IV) chemotherapy. This was discussed in more detail in the section about chemotherapy.

Stage II fallopian tube cancers are also treated with surgery for staging and debulking, followed by chemo.

Stage III ovarian, fallopian tube, and primary peritoneal cancers

Stage III cancers (includes IIIA1, IIIA2, IIIB, and IIIC) are given similar 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. Sometimes pieces of other organs (like the bladder or liver) may have to be removed to remove the cancer (this was discussed in the section about surgery). The smaller the remaining tumor, the better the outlook will be.

After recovery from surgery, combination chemo 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 intra-abdominal (intraperitoneal or IP) chemo after surgery. This was discussed in more detail in the section about chemotherapy. Since IP chemo means giving the drug paclitaxel IV along with the drugs cisplatin and paclitaxel into the abdomen (IP), women who get IP chemo are actually getting both IV and IP chemo. IP chemo 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. IP chemo seems to work better than IV chemo, but it also causes worse side effects. These side effects can make it hard for someone to continue their treatment. For that reason, IP chemo may not be for everyone. Still, it is an option for women with advanced ovarian cancer to consider.

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

Patients who are too weak or ill to have full staging and debulking surgery sometimes get chemo as the first treatment. If the chemo works and the patient becomes stronger, surgery to debulk the cancer may be done, often followed by more chemo. Most often, 3 cycles of chemo are given before surgery, with at least 3 more after surgery (for a total of at least 6 cycles). Giving chemo before surgery is also sometimes an option for some women with advanced cancers that aren't likely to be able to be optimally debulked if the surgery is done first.

Second look surgery: In the past, many experts recommended another operation (laparoscopy/laparotomy) to see if the cancer was gone after chemo. This is known as a

second look surgery. These operations haven't been shown to have any real benefit, and so are no longer a standard part of ovarian cancer care. Still, they 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 (cut) or surgical opening long enough for the surgeon to look inside the pelvis and abdomen and take biopsy samples. Your cancer care team can decide if you need more chemo based on the results of the second-look surgery.

Consolidation therapy: For some patients, the doctor will recommend additional chemo after the cancer appears to be gone after the initial treatment. This is called *maintenance* or *consolidation therapy.* It is aimed at killing any cancer cells that were left behind after treatment but are too small to be seen with medical tests. The goal of consolidation therapy is to keep the cancer from coming back after treatment. One study showed that giving paclitaxel (every 4 weeks) for a year lengthened the time before the cancers came back, but didn't help the women live longer. Another study found no benefit, but the drug was given on a different schedule. This is still being studied in clinical trials.

Stage IV ovarian, fallopian tube, and primary peritoneal cancers

In stage IV, the cancer has spread to distant sites, like the inside the liver, the lungs, or bones. This stage isn't able to be cured with current treatment, but it can still be treated. The goals of treatment are to help patients feel better and live longer. Stage IV can be treated like stage III with surgery to remove the tumor and debulk the cancer, followed by chemo. Another option is to treat with chemo first. Then, if the tumors shrink from the chemo, surgery may be done, which is followed by more chemo. Most often, 3 cycles of chemo are given before surgery, with at least 3 more after surgery. Another option is to limit treatment to those aimed at improving comfort (but not at fighting the cancer). This type of treatment is called *palliative*, and is discussed later in more detail.

Recurrent or persistent ovarian cancer

Cancer is called *recurrent* when it come backs after treatment. Recurrence can be local (in or near the same place it started) or distant (spread to organs like the lungs or bone).Persistent tumors are those that never went away completely 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 chemo. Which chemo 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 chemo will work. If it has been at least 6 months since any chemo, the patient may be treated with carboplatin and paclitaxel (even if these drugs were given before). Giving carboplatin with another drug is also an option.

If the cancer comes back in less than 6 months (or if it never went away at all), different chemo drugs usually will be tried. Some women may receive several different chemo regimens over several years. Many chemo drugs can be used to treat ovarian cancer (see the section about chemotherapy). Treatment with targeted drugs might also be helpful. For example, bevacizumab (Avastin) may be given with chemo. For women with mutations in the *BRCA1* or *BRCA2* gene, a PARP inhibitor drug such as olaparib (Lynparza) or rucaparib (Rubraca) may be an option at some point. In addition, some patients benefit from hormonal treatment with drugs like anastrozole, letrozole, or tamoxifen. Someone who didn't initially receive chemo can be treated with the same drugs that are used for newly diagnosed cancer usually carboplatin and paclitaxel.

A clinical trial for new treatments might 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 *stem cell 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. More information about stem cell transplants is available on our website, or you can call 1-800-227-2345 for our document Stem Cell Transplant for Cancer.

Palliative treatments: Women with ovarian cancer can have a buildup of fluid in the abdomen. This is called *ascites*. It can be very uncomfortable but can be treated with a procedure called *paracentesis*. After the skin is numbed, a needle is used to withdraw the fluid, often several quarts, into a bottle. Often, ultrasound is used to guide the needle. Often the fluid builds up again, and this procedure needs to be repeated. Sometimes a catheter (a thin flexible tube) is placed into the abdomen and left there so that fluid can be removed as often as is needed without using a needle. Another option is to inject chemo directly into the abdomen to slow the buildup of fluid. Treatment with bevacizumab (Avastin) may also help slow fluid buildup. These treatments can relieve

symptoms for some patients and, rarely, might extend life. Often, however, their effects are temporary, and the cancer returns or persists.

Ovarian cancer can also block the intestinal tract. This is called *obstruction*, and can cause abdominal pain, nausea, and vomiting. Dealing with an intestinal blockage can be difficult. Often, the cancer has grown so much in the abdomen that surgery to unblock the intestine doesn't work. To help make the patient comfortable, doctors may place a tube through the skin and into the stomach to allow the stomach juices to drain, so that the digestive tract isn’t completely blocked. This can help with pain, nausea, and vomiting.

Sometimes a stent (a stiff tube) can be put into the large intestine to relieve a blockage. Since this option has a high risk of complications, you should discuss the risks and benefits with your doctor first.

In some patients, surgery can be done to relieve intestinal obstruction. This is often only offered to patients who are well enough to get additional treatments (like chemo) after surgery.

- References

See all references for Ovarian Cancer

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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 isn’t 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, with the goals of removing the tumor along with full staging and debulking (see the section about surgery for details).

For women who have finished having children, the uterus, both fallopian tubes, and both ovaries are removed. Surgical staging is done to see if the tumor has spread outside the ovary or pelvis. This means 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 part of the ovary containing the ovarian cyst with the tumor is removed (ovarian cystectomy). 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 (chemo) and radiation therapy are not generally the first treatments used for tumors that haven't spread outside the ovary.

If the tumor has spread outside 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* (when one kind of cell grows into organs or tissues where it doesn'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 (deposits) on the lining of the abdomen (the peritoneum) and on the surface of organs in the abdomen and pelvis. Most often, these implants are *non-invasive,* meaning they haven't grown into the abdominal lining or organs. When they are growing into the peritoneum or the organs, they are said to be *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, chemo may be offered. The chemo given is usually the same as that used for invasive ovarian cancer. Observation is often recommended for LMP tumors because they grow very slowly and even when they spread they are rarely fatal.

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

- References

See all references for Ovarian Cancer

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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 that has the tumor (ovarian cystectomy) 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 2% of all ovarian cancers are germ cell tumors.

Most types and stages of germ cell cancers of the ovary are treated the same way, with surgery and chemotherapy (chemo). The exceptions are stage I, grade 1, immature teratoma and stage IA dysgerminoma. Their treatment is discussed in detail later in this section.

Surgery: 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 isn't an option when the cancer is in both ovaries. If the patient has finished having children, complete staging including removing 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 keep 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 removes 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 chemo.

Chemotherapy: Most patients with germ cell cancer will need to be treated with combination chemo for at least 3 cycles. The combination used most often is PEB (or BEP), and includes the chemo drugs cisplatin, etoposide, and bleomycin. Dysgerminomas are usually very sensitive to chemo, and can sometimes be treated with the less toxic combination of carboplatin and etoposide. Other drug combinations may be used to treat cancer that has recurred (come back) or hasn't responded to treatment.

Germ cell cancers can elevate blood levels of the tumor markers human chorionic gonadotropin (HCG), alpha-fetoprotein (AFP), and/or lactate dehydrogenase (LDH). If the blood levels of these are elevated before treatment starts, they are rechecked during chemo (usually before each cycle). If the chemo 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.

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 chemo after surgery. This approach requires close follow-up so that if the cancer comes back it can be found early and treated. Most patients in this stage are cured with surgery and never need chemo.

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 chemo is needed after surgery.

Recurrent or persistent germ cell tumors

Recurrent tumors are those that come back 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 chemo or, rarely,

radiation therapy. For chemo, 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 (see the section about chemotherapy).

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.

- References

See all references for Ovarian Cancer

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Treatment for Stromal Tumors of the Ovary, by Stage

Stage I

All stage I tumors are treated with surgery to remove the ovary with the tumor. Most patients with stage I tumors are watched closely after the operation and don't 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 don't 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 (chemo), or (rarely) radiation therapy

Stages II, III, and IV

These cancers are treated with surgery to remove the ovary with the tumor. Surgery is also used to stage and debulk the cancer, as needed (this is discussed in the section

about surgery). This may be followed by chemo or hormone therapy. Often, the chemo used is what's used in the treatment of germ cell tumors (PEB: cisplatin, etoposide, and bleomycin). The combination of carboplatin and paclitaxel (Taxol) may also be used. Hormone treatment is most often used to treat advanced stromal tumors in women who cannot tolerate chemo, but who want to try treatment. This can mean treatment with a drug such as leuprolide (Lupron) and goserelin (Zoladex), the drug tamoxifen, or an aromatase inhibitor. Rarely, radiation therapy is an option as well.

Recurrence

Cancer that comes back after treatment is said to be *recurrent*. This can happen years later for stromal tumors. Even so, the prognosis (outlook) may still be good because they grow so slowly. Surgery may be repeated. Any of the chemo regimens used initially can also be used to treat a relapse. Hormone therapy is also an option to treat recurrence. There really isn't a standard treatment for recurrent stromal cancer, so 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 blood levels may be checked at regular intervals after surgery to check for increased levels that could suggest the tumor has returned. The level of inhibin can also go up with some stromal tumors and may be useful to in finding a recurrence

- References

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