What is Ovarian cancer?

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

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

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

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

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

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

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

No matter where a cancer may spread, it is named (and treated) based on the place where it started. For example, breast cancer that has spread to the liver is still breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bone is still prostate cancer, not bone cancer.

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

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

CAUSES, RISK FACTORS, AND PREVENTION

What are the risk factors for ovarian cancer?

A risk factor is anything that changes your chance of getting a disease like 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 woman 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 don't apply to other less common types of ovarian cancer like 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 63 years of age or older.

Obesity

Various studies have looked at the relationship of obesity and ovarian cancer. Overall, it seems that obese women (those with a body mass index of at least 30) have a higher risk of developing ovarian cancer.

Reproductive history

Women who have been pregnant and carried it to term before age 26 have a lower risk of ovarian cancer than women who have not. The risk goes down with each full-term pregnancy. Women who have their first full-term pregnancy after age 35 or who never carried a pregnancy to term have a higher risk of ovarian cancer.

Breastfeeding may lower the risk even further.

Birth control

Women who have used oral contraceptives (also known as *birth control pills* or *the pill*) have a lower risk of ovarian cancer. The lower risk is seen after only 3 to 6 months of using the pill, and the risk is lower the longer the pills are used. This lower risk continues for many years after the pill is stopped.

A recent study found that the women who used depot medroxyprogesterone acetate (DMPA or Depo-Provera CI®), an injectable hormonal contraceptive had a lower risk of ovarian cancer. The risk was even lower if the women had used it for 3 or more years.

Gynecologic surgery

Tubal ligation (having your tubes tied) may reduce the chance of developing ovarian cancer by up to two-thirds. A hysterectomy (removing 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" (described in the section, "What is ovarian cancer?"). 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 (compared to fertile women) even if they don't use fertility drugs. This might be in part because they haven't carried a pregnancy to term or used birth control pills (which are protective).

Androgens

Androgens are male hormones. Danazol, a drug that increases androgen levels, was linked to an increased risk of ovarian cancer in a small study. In a larger study, this link was not confirmed, but women who took androgens were found to have a higher risk of ovarian cancer. Further studies of the role of androgens in ovarian cancer are needed.

Estrogen therapy and hormone 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 risk also gets higher the more relatives you have with ovarian cancer. Increased risk for ovarian cancer can also come from your father's side.

A family history of some other types of cancer such as colorectal and breast cancer is linked to an increased risk of ovarian cancer. This is because these cancers can be caused by an inherited mutation (change) in certain genes that cause a family cancer syndrome that increases the risk of ovarian cancer.

Family cancer syndromes

About 5 to 10% of ovarian cancers are a part of family cancer syndromes resulting from inherited changes (*mutations*)in certain genes.

Hereditary breast and ovarian cancer syndrome

This syndrome is caused by inherited mutations in the genes *BRCA1* and *BRCA2*, as well as possibly some other genes that have not yet been identified. This syndrome is linked to a high risk of breast cancer as well as ovarian, fallopian tube, and primary peritoneal cancers. The risk of some other cancers, such as pancreatic cancer andprostate cancer, are also increased.

Mutations in *BRCA1* and *BRCA2* are also responsible for most inherited ovarian cancers. When these genes are normal they help prevent cancer by making proteins that keep cells from growing abnormally (they act as *tumor suppressors*). But if you have inherited a mutation (defect) in 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 a *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 less than 2%.

PTEN tumor hamartoma syndrome

In this syndrome, also known as Cowden disease, people are primarily affected with thyroid problems, thyroid cancer, and breast cancer. Women also have an increased risk of ovarian cancer. It is caused by inherited mutations in the*PTEN* gene.

Hereditary nonpolyposis colon cancer

Women with this syndrome have a very high risk of colon cancer and also have an increased risk of developing cancer of the uterus (endometrial cancer) and ovarian cancer. Many different genes can cause this syndrome. They include*MLH1*, *MLH3*, *MSH2*, *MSH6*, *TGFBR2*, *PMS1*, and *PMS2.* An abnormal copy of any one of these genes reduces the body's ability to repair damage to its DNA. The lifetime risk of ovarian cancer in women with hereditary nonpolyposis colon cancer (HNPCC) is about 10%. Up to 1% of all ovarian epithelial cancers occur in women with this syndrome. 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 called *sex cord tumor with annular tubules* (SCTAT). This syndrome is caused by mutations in the gene *STK11*.

MUTYH-associated polyposis

People with this syndrome develop polyps in the colon and small intestine and have a high risk of colon cancer. They are also more likely to develop other cancers, including cancers of the ovary and bladder. This syndrome is caused by mutations in the gene *MUTYH*.

Personal history of breast cancer

If you have had breast cancer, you might 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 affect breast cancer risk. The risk of ovarian cancer after breast cancer is highest in those women with a family history of breast cancer. A strong family history of breast cancer may be caused by an inherited mutation in the *BRCA1* or *BRCA2* genes and hereditary breast and ovarian cancer syndrome, which is linked to an increased risk of 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 might explain the association with ovarian cancer in some studies. Since the 1970s, however, body and face powder products have been required by law to be asbestos-free. 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 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 2 ½ cups 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 amount of red meat and processed meats you eat. Even though the effect of these dietary recommendations on ovarian cancer risk remains uncertain, following them 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 isn't consistent. Women who don't 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

Smoking doesn't increase the risk of ovarian cancer overall, but it is linked to an increased risk for the mucinous type.

Drinking alcohol is not linked to ovarian cancer risk.

EARLY DETECTION, DIAGNOSIS, AND STAGING

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. A pelvic exam can be useful because it can find some reproductive system cancers at an early stage, but 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.

The Pap test is effective in early detection of cervical cancer, but it isn't a test for ovarian cancer. Rarely, ovarian cancers are found through Pap tests, but usually they are at an advanced stage.

See a doctor if you have symptoms

Early cancers of the ovaries often cause no symptoms. When ovarian cancer causes symptoms, they tend to be symptoms that are more commonly caused by other things. These symptoms include abdominal swelling or bloating (due to a mass or a buildup 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. These symptoms can be more severe when they are caused by ovarian cancer, but that isn't always true. What is most important is that they are a change from how a woman usually feels.

By the time ovarian cancer is considered as a possible cause of these symptoms, it usually has 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, like cancer, in people who don't 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. There has been a lot of research to develop a screening test for ovarian cancer, but there hasn't been much success so far. The 2 tests used most often to screen for ovarian cancer are *transvaginal ultrasound* (TVUS) and the *CA-125* blood test.

TVUS is a test that uses sound waves to look at the uterus, fallopian tubes, and ovaries by putting an ultrasound wand into the vagina. It can help find a mass (tumor) in the ovary, but it can't actually tell if a mass is cancer or benign. When it is used for screening, most of the masses found are not cancer.

CA-125 is a protein in the blood. In many women with ovarian cancer, levels of CA-125 are high. This test can be useful as a tumor marker to help guide treatment in women known to have ovarian cancer, because a high level often goes down if treatment is working.

But checking CA-125 levels has not been found to be as useful as a screening test for ovarian cancer. The problem with using this test for screening is that common conditions other than cancer can also cause high levels of CA-125. In women who have not been diagnosed with cancer, a high CA-125 level is more often caused by one of these other conditions and not ovarian cancer. Also, not everyone who has ovarian cancer has a high CA-125 level. When someone who is not known to have ovarian cancer has an abnormal CA-125 level, the doctor might repeat the test (to make sure the result is correct). The doctor could also consider ordering a transvaginal ultrasound test.

In studies of women at average risk of ovarian cancer, using TVUS and CA-125 for screening led to more testing and sometimes more surgeries, but did not lower the number of deaths caused by ovarian cancer. For that reason, no major medical or professional organization recommends the routine use of TVUS or the CA-125 blood test to screen for ovarian cancer.

Some organizations state that these tests may be offered to screen women who have a high risk of ovarian cancer due to an inherited genetic syndrome (discussed in the section "Do we know what causes ovarian cancer?"). Still, even in these women, it's not clear that using these tests for screening lowers their chances of dying from ovarian cancer.

Better ways to screen for ovarian cancer are being researched. Hopefully, improvements in screening tests will eventually lead to a lower 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 is coming back.

Researchers continue to look for new tests to help diagnose ovarian cancer early but currently there are no reliable screening tests.

TREATING 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.

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.

TALKING WITH YOUR DOCTOR

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?
- What treatments do you recommend for me? Why?
- What risks or side effects should I expect?
- What are the chances my cancer will recur (come back) with the treatments 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?

- Will I lose my hair?
- 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.

AFTER TREATMENT

What will happen after treatment for ovarian cancer?

For some people with ovarian cancer, treatment may remove or destroy the 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 for those who have had cancer.

It may take a while before your fears lessen. But it may help to know that many cancer survivors have learned to live with this uncertainty and are leading full lives. Our document *Living With Uncertainty: The Fear of Cancer Recurrence*gives more detailed information on this.

For other people, the cancer never goes away completely. These women may be treated with chemotherapy on and off for years. Learning to live with cancer that does not go away can be difficult and very stressful. It has its own type of uncertainty. Our document *When Cancer Doesn't Go Away* gives more information about this.

Follow-up care

When treatment ends, your doctors will still want to watch you closely. It is very important to go to all of your follow-up appointments. During these visits, your doctors will ask questions about any problems you may have and may do exams and lab tests or x-rays and scans to look for signs of cancer or treatment side effects. Almost any cancer treatment can have side effects. Some may last for a few weeks to months, but others can last the rest of your life. This is the time for you to talk to your cancer care team about any changes or problems you notice and any questions or concerns you have.

Follow-up for ovarian cancer usually includes a careful general physical exam and blood tests for tumor markers that help recognize recurrence. For epithelial ovarian cancer, it is not clear if checking for CA-125 levels and treating you before you have symptoms will help you live longer. Treatment based only on CA-125 levels and not symptoms can increase side effects, so it is important to discuss the pros and cons of CA-125 monitoring and quality of life with your doctor.

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 most often to follow-up women with epithelial ovarian cancers. Others, such as CA 19-9, CEA, and HE-4, are used most often in patients whose CA-125 levels never went up.

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

After your cancer treatment is finished, you will probably need to still see your cancer doctor for many years. So, ask what kind of follow-up schedule you can expect.

It is important to keep health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

Should your cancer come back, our document *When Your Cancer Comes Back: Cancer Recurrence* can give you information on how to manage and cope with this phase of your treatment.

Seeing a new doctor

At some point after your cancer diagnosis and treatment, you may find yourself seeing a new doctor who does not know anything about your medical history. It is important that you be able to give your new doctor the details of your diagnosis and treatment. Gathering these details soon after treatment may be easier than trying to get them at some point in the future. Make sure you have this information handy:

- A copy of your pathology report(s) from any biopsy or surgery
- If you had surgery, a copy of your operative report(s)
- If you were hospitalized, a copy of the discharge summary that every doctor must prepare when patients are sent home from the hospital
- If you had radiation therapy, a copy of the treatment summary
- If you had drug therapy (such as chemotherapy, hormone therapy, or targeted therapy), a list of your drugs, drug doses, and when you took them
- Copies of x-rays and imaging tests (these can be put on a DVD)

The doctor may want copies of this information for his records, but always keep copies for yourself.

WHAT`S NEW IN OVARIAN CANCER RESEARCH?

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 and fallopian tubes removed to prevent a cancer from developing. Studies have shown that fallopian tube cancers develop in women with *BRCA* gene mutations more often than doctors had previously suspected. 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.

Recent studies suggest that many primary peritoneal cancers and some ovarian cancers (such as high-grade serous carcinomas) actually start in the fallopian tubes. According to this theory, the early changes of these cancers can start in the fallopian tubes. Cells from these very early fallopian tube cancers can become detached and then stick to the surface of the peritoneum or the ovaries. For reasons that are still not understood, these cancer cells may grow more rapidly in their new locations.

This theory has important implications for preventing ovarian cancer because having the ovaries removed early can cause problems from lack of estrogen, such as bone loss, cardiovascular disease, and menopause symptoms. Some experts have suggested recently that some women who are concerned about their ovarian cancer risk (especially those with a strong family history and/or *BRCA* gene mutations) consider having just their fallopian tubes removed first. They then can have their ovaries removed when they are older. This approach lets women keep their ovaries functioning for longer, but because of that, it might not help breast cancer risk as much. This is an active area of research.

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 ways to detect 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.

From time to time, lab companies have marketed unproven tests to look for early ovarian cancer. Because these tests had not yet been shown to help find early cancer, the US Food and Drug Administration (FDA) told the companies to stop selling them. So far, this occurred with 2 different tests looking at protein patterns: OvaSure and OvaCheck. Both were taken off the market at the request of the FDA.

Two large studies of screening have been completed. One was in the United States, and the other was in the United Kingdom. Both studies looked at using the CA-125 blood test along with ovarian (transvaginal) ultrasound to find ovarian cancer. In these studies, more cancers were found in the women who were screened. Some of these were found at an early stage. But the outcomes of the women who were screened were not better than the women who weren't screened. - the screened women did not live longer and were not less likely to die from ovarian cancer.

Diagnosis

A test called OVA1 is meant to be used in women who have an ovarian tumor. It measures the levels of 4 proteins in the blood. The levels of these proteins, when looked at together, are used to put women with tumors into 2 categories − low risk and high risk. The women labeled low risk are not likely to have cancer. The women called "high risk" are more likely to have a cancer, and so should have surgery by a specialist (a gynecologic oncologist). This test is NOT a screening test − it is only meant for use in women who have an ovarian tumor.

Treatment

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

Chemotherapy

New chemotherapy (chemo) drugs and drug combinations are being tested. The drugs trabectedin (Yondelis®) and belotecan have shown promise in some studies.

When the drugs cisplatin and carboplatin stop working, the cancer is said to be *platinum resistant*. Studies are looking for ways (like other drugs) to make these cancers sensitive to these drugs again.

Although carboplatin is preferred over cisplatin in treating ovarian cancer if the drug is to be given IV, cisplatin is used in intraperitoneal (IP) chemotherapy. Studies are looking at giving carboplatin for IP chemo.

Another approach is to give IP chemo during surgery using heated drugs. This, known as heated intraperitoneal chemotherapy or HIPEC, can be effective, but is very toxic. It still needs to be studied and compared with standard IP chemo to see if it actually works better.

Targeted therapy

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. Each type of targeted therapy works differently, but they all attack the cancer cells' inner workings − the programming that makes them different from normal, healthy cells. Bevacizumab (Avastin) is the targeted therapy that has been studied best in ovarian cancer, but other drugs are also being looked at, as well.

Pazopanib (Votrient®) is a targeted therapy drug that, like bevacizumab, helps stop new blood vessels from forming. It has shown some promise in studies.

Poly (ADP-ribose) polymerases (PARPs) are enzymes that have been recently recognized as key regulators of cell survival and cell death. Drugs that inhibit PARP-1 help fight cancers caused by mutations in *BRCA1* and *BRCA2*. In one study, the PARP inhibitor olaparib was also able to shrink tumors in ovarian cancer patients who did not have*BRCA* mutations. Clinical trials of this type of drug are being done to see who will benefit most from them.

Vintafolide (EC145) is a newer drug that targets the folic acid receptor. This receptor is found on some ovarian cancers. In one study, it helped stop the growth of cancers that had the folic acid receptor.

Immunotherapy

Another approach is to develop tumor vaccines that program the immune system to better recognize cancer cells. Also, monoclonal antibodies that specifically recognize and attack ovarian cancer cells are being developed. These antibodies are man-made versions of the antibodies our bodies make to fight infection. They can be designed to home in on certain sites on the cancer cell. Farletuzumab is a monoclonal antibody that is directed against the folic acid receptor, which is on the surface of some ovarian cancer cells. It has shown promise in treating ovarian cancer in early studies. Another monoclonal antibody being studied in ovarian cancer is called catumaxomab. It binds to a protein that is in some cancer cells and some immune system cells. When it is administered into the abdominal cavity, it can help treat fluid buildup (ascites) that can occur when cancer is present.

Source: American Cancer Society®