Ovarian Cancer

This guide provides an overview of lung cancer: how it starts, its risk factors, symptoms, diagnosis, and treatment options. Knowing more about the disease can help you cope better, take informed decisions, and make the course of treatment as manageable as possible.

What is ovarian cancer?

- Ovaries are a pair of egg producing organs in the reproductive system. They are in the pelvis between the hip bones, one on each side of the uterus, a hollow pear shaped organ where a fetus grows.
- Each ovary is about the size and shape of an almond and is connected to the uterus by a fallopian tube and a muscle ligament.
- The ovaries make eggs and hormones, which regulate puberty and menstruation.
- Cancer starts when normal healthy cells in the ovaries become abnormal because of damage or mutations in the genes, which carry information on the role of cells. This causes abnormal cells to start to grow and multiply uncontrollably, forming a mass called a tumor. A tumor can be benign—non cancerous—or malignant—cancerous and can spread to other areas.
- Tumors can invade and damage normal cells and stop an organ from working. Ovarian cancer cells can break out of the ovaries’ wall and grow unto other surrounding tissues and form new tumors on their surface: these are called seeds or implants, in the uterus or the internal surface of the abdomen called the peritoneum. Cancer cells can also spread through the blood or the lymph system: fluid that carries white blood cells that help fight infections. When tumors also spread to other parts of the body: this is called metastasis.
• Women who have a close family member, mother daughter or sister who have ovarian cancer are at a higher risk for the disease. Women who also have a family history of breast or colorectal cancer might also have an increased disease risk.

• In its early phases, ovarian cancer often develops without given obvious warning signals: Therefore it is important to be aware of any risks, symptoms or signs of the disease to be able to find it as early as possible when it is the most treatable.

Types of ovarian cancer:

- Most cases of ovarian cancer are epithelial carcinomas: they start in the cells that cover the ovaries called epithelial cells.
- Germ cell tumors: start in egg producing cells of the ovaries, occur more often in younger women
- Stromal tumors: start in hormone producing cells of the ovaries.

Another rarer type of ovarian cancer is borderline ovarian cancer or low malignant potential tumor: epithelial cells that grow slowly, are not obviously malignant and may be less aggressive.

What are symptoms of ovarian cancer?

Ovarian cancer causes few symptoms especially in its early stages.

Symptoms often start when the cancer has already grown larger, is more advanced and has spread in the abdomen or pelvis

It is usually hard to find ovarian cancer early because symptoms are similar to those caused by many other conditions that are not cancer.
Symptoms can be caused by another health issue and include:

Digestion issues: Indigestion, feeling bloated, constipation, having gas, nausea, diarrhea

Abdominal or pelvic: pressure, pain or swelling

Feeling full fast & trouble eating

Frequent or urgent need to urinate

Unusual vaginal bleeding: heavy periods, bleeding between periods, bleeding after menopause

Tighter waistline without weight gain

Unexplained lack of energy

Low back pain

If these symptoms are frequent and continue you should consult with a physician.

What are causes of ovarian cancer?

In most cases the exact cause of ovarian cancer is not clear. But these factors increase the risk of developing the cancer:

- Family history of cancer: Having a close relative, mother sister or daughter who has had ovarian, breast or colon cancer increases the likelihood of developing ovarian cancer disease. This risk is higher if when you have more relatives like a grandmother, aunt who also was affected, on the maternal or paternal side of the family.
- Genetic mutations: Ovarian cancer is linked to mutations in genes of the cells, passed from parent to child, causing cells to become abnormal and form tumors:
- Genes called BRCA1 and BRCA2, which also increase the risk of breast cancer
- Genes causing Lynch syndrome: A genetic condition which can lead to colon cancer and predisposes to ovarian and uterine cancers
- These diseases have a common genetic predisposition: Three hereditary patterns have been found: ovarian cancer alone, ovarian and breast cancer and ovarian and colon cancer.
- Other genetics mutations
  - Age: Ovarian cancer is more frequent in women older than 55 years, it is more common after a woman reaches menopause.
  - Previous cancer: Having had breast, uterus colorectal or cervical cancer predisposes to a higher risk of ovarian cancer because of a similar genetic predisposition that causes these diseases
  - Reproductive history: Women who have never been pregnant have an increased risk of ovarian cancer.
  - History of endometriosis: Having endometriosis, a condition where tissue from the lining of the uterus grows outside the uterus, may increase the risk for ovarian cancer
  - Obesity: Obese women have a higher chance of getting ovarian cancer than other women. Surviving the disease is less likely too for obese women, the heavier the woman is the higher the risk.
  - Smoking: Women who smoke or who have smoked in the past have a higher chance of developing a certain type of ovarian cancer

How is ovarian cancer diagnosed?

- Abdominal and pelvic exam: Checking for any lumps or unusual changes in the size, shape or position of the uterus, cervix and ovaries. The exam is also done by using a speculum widening instrument to view the vagina and cervix for any abnormalities. Signs of ovarian cancer include: a pelvic mass, build up of fluid in the abdomen, swollen enlarged abdomen.
- Family and medical history: Taking a history of symptoms, medical conditions, treatments you have had, and medications you are taking. Taking family’s medical history: history of cancer, ovarian, breast or colon cancer: These may show that you have an inherited risk for ovarian cancer. If the physician considers you might have inherited a genetic predisposition to cancer, genetic screening might be recommended.

- Imaging tests: For the abdomen, pelvis and gastrointestinal tract help view the tumor, determine its size, locate it and find out if it has spread beyond the ovaries:
  - Ultrasound of abdomen: The first imaging test done for ovarian cancer: Sound waves bounce off organs with the echoes producing images of areas inside the body. The test creates a picture of pelvic organs: uterus, ovaries fallopian tubes and checks for their size shape and location. The test is done either through a transabdominal ultrasound guided on the skin of your abdomen or a transvaginal ultrasound inserted through the vagina.
- **CT scan abdomen chest & pelvis**: Creates a 3 dimensional image of areas inside the body by taking detailed images from different angles using an x-ray, finds out if disease has spread outside the ovaries, if lymph nodes are enlarged.
- **MRI**: Test that creates detailed images of areas inside the body by using radio waves and magnets, helpful in checking if there is any disease in the chest. Sometimes a dye might be injected for better detail.
- **PET scan**: A rotating scanner takes detailed images of areas inside the body, while an injected sugary fluid highlights cancerous cells that absorb sugar more than normal.
ones. This helps find out small areas of disease, or if lumps found throughout the bodies are cancerous or not.

- Blood test: Complete blood count, blood chemistry and liver function tests. These tests help find out if: blood levels are normal, if organs are working properly, cancer or other conditions can cause abnormal levels of chemicals in the blood.

- Tumor markers:

- CA 125 blood test: A test that measures the level of a tumor marker in the blood for ovarian cancer. CA 125 is a protein substance made by ovarian cancer cells, high levels might reveal a sign of cancer or help in checking treatment progression. Other tumor marker such as CA19-9, Alpha-Feto-Protein, Beta HCG, LDH, Alkaline Phosphatase and others may be also useful in certain cases of ovarian cancer.

- Biopsy: Surgery to collect a sample of tissue might be done if diagnostic tests suggest you might have cancer, and studied under the microscope to confirm presence of disease cells. These can be obtained by collecting fluid from the abdomen via introducing a needle with ultrasound guidance or obtained during CT scanning. Biopsies can also be obtained using a laparoscope (a small scope introduced through a small incision in the belly button to look inside the abdomen and to take biopsies of abnormal tissue)

**How can I prepare for appointments & tests?**

Knowing that you have lung cancer can be overwhelming. You might need to know a lot of information. It is helpful to prepare for your doctor’s appointments. (Blue box)

Here are some tips to get ready:

- Write down symptoms you are having: Their start date, frequency and severity

- Write down key personal information or medical history that might be relevant: as recent life changes, medical history of disease, any diagnosis of pelvic disease or procedures you have had and any relevant family history: family members who have had ovarian or breast cancer, other cases of cancer in your family

- List all the medications you are taking
Gather medical records: If you have any imaging or laboratory tests done at a different medical center, bring all the results with you to your appointment.

- Write down questions you would want to ask your doctor:
  - When will the results be ready?
  - Will I need any additional testing?
  - What is causing my symptoms?
  - How can they be relieved?
  - Where is the disease located exactly?
  - If I still want to have children, what options are available to me? Am I a candidate for fertility preserving surgery?
  - How does treatment affect my ability to have children, what options are available to me?
  - At which stage is my ovarian cancer?
  - When is my next follow-up visit?
  - What are my treatment options and their side effects?
  - When do I need to start treatment? How long will it last?
  - Where will I receive treatment?
  - Will I be able to go back home or do I have to stay at the Medical Center?
  - Will treatment affect my daily life?
  - When would I be able to practice normal activities?
  - How often will I need checkups after treatment?
  - What can I do to stop my cancer from recurring?
  - Will I benefit if I quit smoking now?
  - Have a relative or close friend accompany you during appointments to help you remember the questions you want to ask and the discussion.

How is ovarian cancer staged?

- Staging finds out where the disease has spread. It is used to plan treatment and is determined using:
  - Diagnostic imaging that find out where the disease is and how far it spread

  Surgical staging: Tissues removed during surgery depend on how far and your physician suspects the disease might have spread: lymph nodes, pelvis, abdomen, diaphragm (muscles below the rib), the omentum (fatty layer covering organs in the abdomen),
peritoneum (tissue lining the inside of the abdomen), ascites (abnormal fluid build-up in the abdomen).

**Stage I:** Tumor is in one or both ovaries and disease has not spread to other organs or tissues

**Stage II:** Disease is in one or both ovaries and has spread to nearby organs or tissues in the pelvis: like the fallopian tubes or uterus.

**Stage III:** Cancer is in one or both ovaries and has spread outside the pelvis to the peritoneum lining the inside of the abdomen and covering the organs, and/or to nearby lymph nodes

**Stage IV:** Cancer has spread to other areas in the body beyond the pelvis and abdomen, such as the lungs and liver.

---

**Stage I**
Tumor limited to one or both ovaries. Tumor may be found on ovarian surface.
What affects treatment options and recovery from ovarian cancer?

Recovery and treatment options depend on the following:

- Stage of the cancer: Ovarian cancer is most treatable when found early
- Type of the cells in the tumor
- Size of the tumor spread.
- Whether all of the tumor can be removed by surgery.
- Patient’s age and general health.
- Whether disease has just been diagnosed or has come back.
How is ovarian cancer treated?

Surgery is used as the initial treatment for ovarian cancer, which is also used to stage the tumor.

**Surgery:**

- Used to remove as much of cancer tumor growth as possible
- Less extensive surgery is possible if the disease is found out early
- Removing as much tumor from your abdomen is called surgical debulking: removing part or all of organs and tissues where cancer might have spread: like the liver, diaphragm, omentum, peritoneum
- Usually the surgery that is done is called a laparotomy: a vertical incision on your abdomen from the belly button to the pelvic bone to open it.
- Early stage disease may be treated through smaller laparoscopy surgery: small incisions on your abdomen instead of a big one, through which a thin lighted laparoscope instrument with a lens and tools are inserted to view and remove the tumor.
- Different types of surgery might be done depending on where the disease has spread:
  - Bilateral salpingo-oophorectomy: Removal of both ovaries and both fallopian tubes
  - Unilateral salpingo-oophorectomy: Removal of one ovary & its fallopian tube, this type of surgery is a fertility preserving surgery that allows a later pregnancy, it is only possible if cancer is present in one ovary in early stage ovarian cancer.
  - Hysterectomy: removal of the uterus with the cervix: through an abdominal cut called total abdominal hysterectomy or total laparoscopic hysterectomy if a laparoscopy method is used. Hysterectomy is usually done when both ovaries & their fallopian tubes are removed and is called radical hysterectomy, or when just one ovary & its fallopian tube removed.
- Lymph node biopsy: Lymph nodes are also frequently removed during surgery to check for any disease.

Side effects of surgery can include: Depend on type of surgery:
- Surgery that removes two ovaries: will cause menopause, menstruation will stop leading to an inability to become pregnant. 
  Menopause symptoms include: hot flashes, vaginal dryness, trouble in concentration, mood swings, night sweats. 
  Consult with your physician about managing menopause after treatment for ovarian cancer

- Side effects of surgery can include: 
  - Pain at surgery site 
  - Leg swelling 
  - Difficulty urinating 
  - Constipation 

Tell your physician about any symptom you are experiencing, it is part of getting treated for cancer.

**Chemotherapy:**

- Treatment uses medications that fight cancer cells. Chemotherapy drugs attack all cells that grow fast in the body: normal ones and cancer.

- Chemotherapy treatment is sometimes one drug or a combination of two or more medications together, with specific dose and duration, this is called a chemotherapy regimen.

- Chemotherapy is given in cycles of treatment periods followed by a rest period, to allow the body to recover. The length of cycles depends on the type of drugs used.

- Chemotherapy may be given at an outpatient facility or during a stay at the hospital, the time it takes depends on the type of drugs used.

- For ovarian cancer, in most cases surgery will be done first then treatment with chemotherapy. It may be given after surgery to get rid of any remaining cancer cells. When it is given after the main surgery it is called adjuvant therapy

- When treatment is given before surgery it is called neoadjuvant chemotherapy. In some cases of advanced disease it might be given initially, if the tumor cannot be safely removed by surgery, to help shrink the disease.
For ovarian cancer, chemotherapy drugs can be given in liquid form injected slowly into a vein, called intravenous chemotherapy or as a direct injection into your abdomen, called intraperitoneal chemotherapy.

- Intravenous chemotherapy goes through the bloodstream to treat disease throughout the body.

- When it is given before surgery it is usually intravenous chemotherapy.

- Intraperitoneal therapy is given through a thin catheter tube that is placed inside the body during surgery, it is a regional treatment that delivers drugs directly to the cancer in peritoneal cavity and the abdomen.

- The type of chemotherapy used depends on these factors
  - Overall health status and ability to do daily activities
  - How well the kidneys are working: specially for a combination of intravenous and intraperitoneal therapy: Measured by a blood test
  - Neuropathy risk: Nerve problem causing pain, tingling and numbness in hands and feet

- Chemotherapy is also used to shrink and slow the growth of cancer and relieve pain or other symptoms of ovarian cancer

- Side effects of chemotherapy depend on drug type, how the drug is given, dose and length of treatment
- Generally chemotherapy given in the abdomen causes more side effects, as do drugs given in combination.
- You should talk to your physician about any side effect that concerns you, preventing and treating them is part of cancer treatment.

**Targeted therapy:**
Is a new type of cancer treatment using medications that help stop the growth and spread of cancer cells without harming normal cells, it is sometimes added to chemotherapy for ovarian cancer treatment.

- Given by infusion

- Types of therapy used include the drug Avastin (Bevacizumab): stops the growth of cancer blood vessels.
• Side effects depend on the dose and might include: High blood pressure, low white blood cell count, loss of appetite, diarrhea, mouth sores, headaches, and rarely bleeding and blood clots.

What follow-up care should I expect?

After treatment observation and follow-up tests follow and include:

Testing is done every 2 months the first 2 years, then every 6 months for the next 3 years, then once every year.

• Physical and pelvic exam and medical history
• Blood tests: CA-125 cancer antigen, other tumor markers, complete blood count and chemistry profiles
• Imaging tests: CT, MRI, PET of chest, abdomen and pelvis as needed
• Genetic testing if not done previously

How is ovarian cancer that returns treated?

Recurrence treatment depends on the type of relapse and whether you have had chemotherapy and usually includes:

• If no previous chemotherapy was given: Surgery then chemotherapy

• Biochemical relapse - high CA-125 in the blood- and previous chemotherapy: Clinical trial of a new chemotherapy regimen, or observation and following up for symptoms of progression of disease, or start chemotherapy treatment for recurrence

• Symptoms and imaging showing relapse and previous chemotherapy: Depending on whether relapse has happened before or after 6 months after finishing treatment:
  • Less than 6 months: Clinical trial or chemotherapy different than initial treatment, or observation with follow up tests
  • After 6 months: Chemotherapy which may be similar to the initial treatment or recurrence treatment.
  • Surgery may be performed in cases of recurrence.
Are there ways to prevent ovarian cancer?

There are no certain ways to prevent ovarian cancer but some can reduce your risk of developing the disease:

- **Genetic testing for inherited risk**: If you have a family history of ovarian, breast or colon cancer this might suggest cancer risk runs in your family

  - Having a close relative, mother sister daughter who was affected by these cancers puts you at risk, the risk increases if you have more than one family member affected, like a grandmother or aunt from either side of your parents.
  - These diseases have a common genetic predisposition. You might have inherited a genetic mutation, passed from a parent to child, that puts you at risk for disease.
  - Based on your family history of disease, your physician will determine if it is recommended to do genetic testing to find out if you carry any of these genetic mutations causing a high risk of ovarian cancer:
    - BRCA1 or BRCA2 genes: causing breast and ovarian cancer
    - Genes causing Lynch syndrome: a hereditary condition causing colorectal cancer.

- **Gynecologic surgery**: For women who have a high risk of ovarian cancer and carry genetic mutations, these procedures might be an option to reduce the chance of developing the disease.

  These procedures should be discussed with your physician and depend on your reproductive expectations:

  - Whether planning a future pregnancy
  - Weighing the risk of developing ovarian cancer with the side effects associated with each procedure.

- **Removing the ovaries and fallopian tubes**: Called preventive salpingo-oophorectomy Surgery to remove the ovaries and fallopian tubes before any cancer is suspected or diagnosed. With this surgery women will not be able to have children as it causes early menopause.

- **Removing the fallopian tubes alone**: may decrease the chance of developing ovarian cancer especially in patients with a familial breast cancer syndrome such as BRCA1 or BRCA2 mutation carrier

- **A tubal ligation** (closing and tying the fallopian tubes) and **hysterectomy** (surgery to remove the uterus): Might also reduce cancer risk, these procedures are only done when there is a genetic screening has proven a risk to develop ovarian cancer.
• **Birth control pills:** Women who have used oral contraceptives seem to have a decreased risk of ovarian cancer.

• **Pregnancy and breastfeeding:** Are linked to a lower risk of getting ovarian cancer, the risk decreases with each pregnancy, breastfeeding especially for one year or more.

• **Lifestyle factors:** Regular exercise, a healthy diet and avoiding smoking can be protective, they lower the risk but that does not mean the risk of developing the disease will not happen.

### What could be helpful for coping and support?

The health care team as well as the palliative and supportive care team are here to help you during and after treatment. These tips can help you manage the course of the disease, treatment, and follow up.

• **Learn about the disease:** It is very important to know enough information about lung cancer, its treatment options, and the possible side effects to set your expectations and manage the course of disease. It will also help in taking essential decisions more easily.

• **Talk to your doctor and nurses:** Voice any of your concerns and talk about what you are experiencing. Do not wait until you feel you are overwhelmed.

• **Share your concerns:** Try to keep a good support network around you to share your concerns. Sharing concerns or questions related to the disease and treatment with your significant others might be of great help in coping with lung cancer. Patients who are going through the same experience can be of great support as well.

• **Keep a schedule of follow-up tests and go to each appointment:** Ask your doctor about the expected schedule of appointments and tests you need to go through. Keep a good record of your treatment course and plan, along with test results and your list of medications.

• **Don’t smoke:** Quitting smoking, tobacco arghileh or pipe improves your chances of treatment. Any smoking will prevent treatment from being as effective as it possibly can and will increase the likelihood of disease of returning. Ask your doctor for strategies to quit smoking and how to be referred to the stopping smoking clinic.

• **Avoid second-hand smoke:** If you live with someone who smokes ask them to stop, they should do so outside the house as a minimum precaution, also avoid areas and places where there’s tobacco smoke including arghileh of course.
• **Eat healthy** Take care of yourself by keeping a balanced diet that includes cereals, whole grains, vegetables, and fruits. Limit your intake of red and processed meat. Eating an appropriate amount of food and getting enough calories during and after treatment will help you maintain energy and feel better. It can also help you in maintaining a healthy weight during and after treatment. Maintaining good nutrition is important since treatment side effects can cause loss of appetite, fatigue and nausea. Please refer to the “Nutrition Tips for Cancer Patients” handout for more information.

• **Drink in moderation:** If you drink alcohol, limit your daily intake to one drink (for females) and two drinks (for males).

• **Exercise:** Exercise can help you feel better, have more energy, rebuild strength, and improve your appetite. It can help relieve cancer-related fatigue. Any type of exercise, no matter how long it is can be good. If you have been inactive, you can start slowly and build up your activity level. It is recommended to walk for 15 to 30 minutes every day even if you are using oxygen. This will improve your heart and lung function. Talk to your doctor before starting any type of exercise.

• **Stay active:** Having lung cancer does not mean you cannot continue doing the things you normally like to do. If you feel well enough, stay active as much as you can. Try to get enough rest and sleep. Balance between rest and activities. Practicing your regular activities will help you stay connected to your normal life, maintain a sense of normalcy, and have a break from treatment.

• **Set reasonable goals:** If you are working, setting goals that are easier to reach is helpful to keep you having a sense of purpose and feel in control, working for example half the time instead of a full schedule.

• **Get enough rest and sleep:** It is important to recover from treatment and helps you cope

(Images included are for illustration purposes and could be modified)

**References:** NCCN, National cancer institute, American cancer society, the Mayo clinic, WebMD, Memorial Sloan Kettering cancer center, centre for disease control