About Ovarian Cancer

Get an overview of ovarian cancer and the latest key statistics in the US.

Overview and Types

If you have been diagnosed with ovarian cancer or are worried about it, you likely have a lot of questions. Learning some basics is a good place to start.

- What Is Ovarian Cancer?

Research and Statistics

See the latest estimates for new cases of ovarian cancer and deaths in the US and what research is currently being done.

- Key Statistics for Ovarian Cancer
- What's New in Ovarian Cancer Research?

What Is Ovarian Cancer?

- What are the ovaries?
- Epithelial ovarian tumors
- Ovarian germ cell tumors
- Ovarian stromal tumors

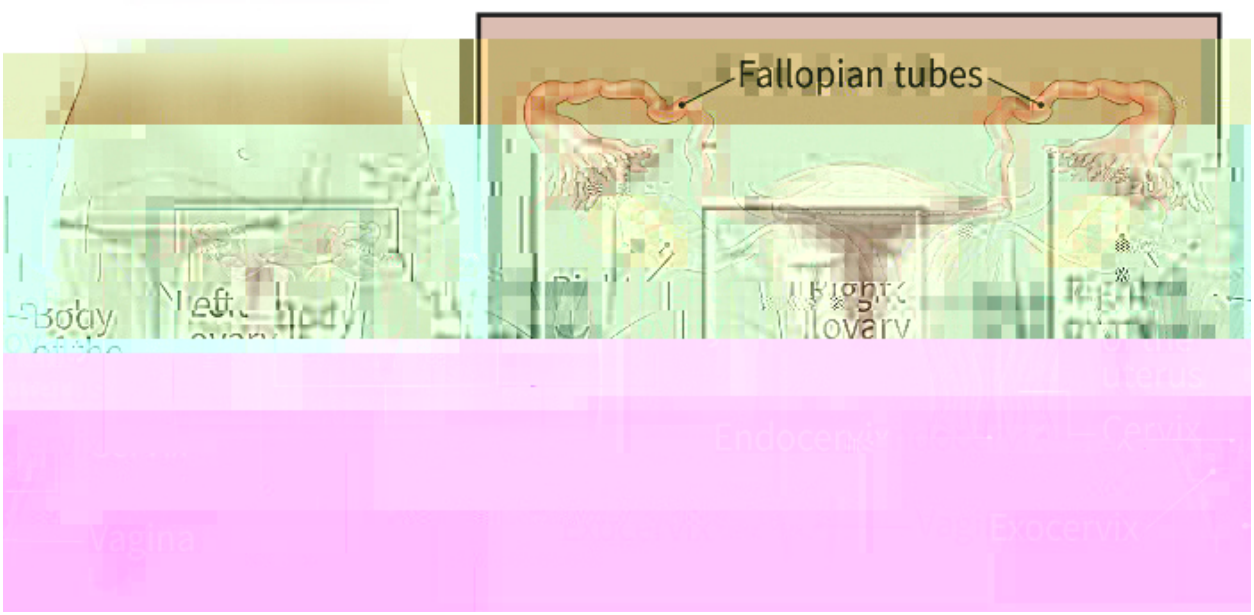
- Ovarian cysts

Cancer starts when cells in the body begin to grow out of control. Cells in nearly any part of the body can become cancer and can spread. To learn more about how cancers start and spread, see What Is Cancer?[1]

Ovarian cancers were previously believed to begin only in the ovaries, but recent evidence suggests that many ovarian cancers may actually start in the cells in the far (distal) end of the fallopian tubes.

What are the ovaries?

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



The ovaries are mainly made up of 3 kinds of cells. Each type of cell can develop into a different type of tumor:

- Epithelial tumors start from the cells that cover the outer surface of the ovary. Most ovarian tumors are epithelial cell tumors.
- Germ cell tumors start from the cells that produce the eggs (ova).

- Stromal tumors start from structural tissue cells that hold the ovary together and produce the female hormones estrogen and progesterone.

- Serous carcinomas (52%)
- Clear cell carcinoma (6%)
- Mucinous carcinoma (6%)
- Endometrioid carcinoma (10%)

Each ovarian cancer is given a grade, based on how much the tumor cells look like normal tissue:

- Grade 1 epithelial ovarian carcinomas look more like normal tissue and tend to have a better prognosis (outlook).
- Grade 3 epithelial ovarian carcinomas look less like normal tissue and usually have a worse outlook.

Other traits are also taken into account, such as how fast the cancer cells grow and how well they respond to chemotherapy, to come up with the tumor's *type:*

- Type I tumors tend to grow slowly and cause fewer symptoms. These tumors also seem not to respond well to chemotherapy. Low grade (grade 1) serous carcinoma, clear cell carcinoma, mucinous carcinoma and endometrioid carcinoma are examples of type I tumors.
- Type II tumors grow fast and tend to spread sooner. These tumors tend to respond better to chemotherapy. High grade (grade 3) serous carcinoma is an example of a type II tumor.

Other cancers that are similar to epithelial ovarian cancer

Primary peritoneal carcinoma

Primary peritoneal carcinoma (PPC) is a rare cancer closely related to epithelial ovarian cancer. At surgery, it looks the same as an epithelial ovarian cancer that has spread through the abdomen. In the lab, PPC also looks just like epithelial ovarian cancer. Other names for this cancer include *extra-ovarian* (meaning outside the ovary) *primary peritoneal carcinoma* (EOPPC) and *serous surface papillary carcinoma*.

PPC appears to start in the cells lining the inside of the fallopian tubes.

Like ovarian cancer, PPC tends to spread along the surfaces of the pelvis and abdomen, so it is often difficult to tell exactly where the cancer first started. This type of

cancer can occur in women who still have their ovaries, but it is of more concern for women who have had their ovaries removed to prevent ovarian cancer. This cancer does rarely occur in men.

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

Women with PPC usually get the same treatment as those with widespread ovarian cancer. This could include surgery to remove as much of the cancer as possible (a process called debulking that is discussed in the section about surgery[2]), followed by chemotherapy[3] like that given for ovarian cancer. Its outlook is likely to be similar to widespread ovarian cancer.

Fallopian tube cancer

This is another rare cancer that is similar to epithelial ovarian cancer. It begins in the tube that carries an egg from the ovary to the uterus (the fallopian tube). Like PPC, fallopian tube cancer and ovarian cancer have similar symptoms. The treatment for fallopian tube cancer is much like that for ovarian cancer, but the outlook (prognosis) is slightly better.

Ovarian germ cell tumors

Germ cells usually form the ova or eggs in females and the sperm in males. Most ovarian germ cell tumors are benign, but some are cancerous and may be life threatening. Less than 2% of ovarian cancers are germ cell tumors. Overall, they have a good outlook, with more than 9 out of 10 patients surviving at least 5 years after diagnosis. There are several subtypes of germ cell tumors. The most common germ cell tumors are *teratomas*, *dysgerminomas*, *end,3 comml g /F2 12 Tf 0oT 0 00 0 0 rg ( )Tjgerminomastera*

References

American Cancer Society. *Cancer Facts and Figures 2018*. Atlanta, GA: American Cancer Society; 2018.

Cannistra SA, Gershenson DM, Recht A. Ch 76 - Ovarian cancer, fallopian tube carcinoma, and peritoneal carcinoma. In: DeVita VT, Hellman S, Rosenberg SA, eds. *Cancer: Principles and Practice of Oncology*. 10th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2015.

Sundar S, Neal RD, Kehoe S. Diagnosis of ovarian cancer *BMJ* 2015; 351:h4443.

Last Revised: April 11, 2018

Key Statistics for Ovarian Cancer

The American Cancer Society estimates for ovarian cancer in the United States for 2024 are:

- About 19,680 women will receive a new diagnosis of ovarian cancer.
- About 12,740 women will die from ovarian cancer.

Ovarian cancer is one of the leading causes of cancer deaths among women.

A woman's risk of getting ovarian cancer during her lifetime is about 1 in 87. Her lifetime chance of dying from ovarian cancer is about 1 in 130. (These statistics don't count low malignant potential ovarian tumors.)

This cancer mainly develops in older women. About half of the women who are diagnosed with ovarian cancer are 63 years or older. It is more common in White women than Black women.

Ovarian cancer diagnoses have been slowly falling over the past few decades. The incidence rate declined by 1% to 2% per year from 1990 to the mid-2010s and by almost 3% per year from 2015 to 2019. This is likely due to more use of oral contraceptives and less use of menopausal hormone therapy.

Fewer women are dying of ovarian cancer as well, likely due to better treatments and fewer women being diagnosed. The rate of ovarian cancer deaths has decreased by 40% since 1975. Most of this progress has happened since the mid-2000s.

Visit the American Cancer Society's Cancer Statistics Center[1] for more key statistics.

Hyperlinks

1. cancerstatisticscenter.cancer.org/

References

American Cancer Society. *Cancer Facts & Figures 2024*. Atlanta: American Cancer Society; 2024.

Howlader N, Noone AM, Krapcho M, Miller D, Bishop K, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). Lifetime Risk (Percent) of Being Diagnosed with Cancer by Site and Race/Ethnicity; Males, 18 SEER Areas, 2012-2014SEER Cancer Statistics Review, 1975-2014, National Cancer Institute. Bethesda, MD, https://seer.cancer.gov/csr/1975_2014/, based on November 2016 SEER data submission, posted to the SEER web site, April 2017.

Last Revised: January 19, 2024

What's New in Ovarian Cancer Research?

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.

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

Being able to find ovarian cancer early could have a great impact on the cure rate. Researchers are testing new ways to screen women for ovarian cancer. One method being tested is looking at the pattern of proteins in the blood (called *proteomics*) to find ovarian cancer early.

Imaging

The use of new imagingng actonniques such assparg asieC MRIe tesng tesevaluat3"_____9 onwBt3

making ovarian cancer cells resistant.
- Developing drugs that can keep the cancer cells from becoming resistant to the chemo by blocking channels that pump chemotherapy out of the cancer cell.
- Trying to determine the details of certain cancer cells where the DNA is not damaged by chemotherapy which allows it to keep growing.

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. More studies are showing this to be beneficial and may improve how long a woman lives.

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 similar drugs, like pembrolizumab, are being looked at, as well.

Catumaxomab is a drug being studied specifically for people with malignant ascites (fluid buildup in the abdomen [belly] caused by cancer cells). It works by targeting 3 different cell types including tumor cells and white blood cells called T-cells.

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 (called PARP inhibitors) have been approved for patients with ovarian cancer caused by mutations in *BRCA1* and *BRCA2*. New evidence shows that ovarian cancers can also become resistant to treatment with PARP inhibitors. Research is trying to find ways to counteract this process.

Genetic therapies

For ovarian and breast cancers that are caused by the BRCA 1 mutation, it has been shown that low levels of the BRCA 1 mutation are associated with good responses to PARP inhibitors and platinum drugs, like cisplatin and carboplatin. New research shows that microRNA, very small pieces of RNA (substances that carry genetic messages for

2013;121(1):14-24.

Naumann RW, Coleman RL, Burger RA, et al. PRECEDENT: a randomized phase II trial comparing vintafolide (EC145) and pegylated liposomal doxorubicin (PLD) in combination versus PLD alone in patients with platinum-resistant ovarian cancer. *J Clin Oncol*. 2013 Dec 10;31(35):4400-6. Epub 2013 Oct 14.

Strumido et al. The potential role of miRNAs in therapy of breast and ovarian cancers associated with BRCA1 mutation Hereditary Cancer in Clinical Practice (2017) 15:15.

van Driel WJ, Koole SN, Sikorska K et al. Hyperthermic Intraperitoneal Chemotherapy in Ovarian Cancer. *N Engl J Med.* 2018 ;378(3):230-240.

Varga A, Piha-Paul SA, Ott PA et al. Pembrolizumab in patients (pts) with PD-L1–positive (PD-L1+) advanced ovarian cancer: Updated analysis of KEYNOTE-028. *J Clin Oncol.* 2017; 35(15): suppl, 5513-5513.

Last Revised: April 11, 2018

Written by