Ovarian Cancer

CREATED & REVIEWED, FEBRUARY 2018
Ovarian Cancer Stats

- Approximately 1 in 70 American women will develop ovarian cancer in her lifetime
- Ovarian cancer is the fifth leading cause of cancer death among American women
- Causes most deaths among gynecological cancers:
  - 60% of diagnoses are distant [stage 3 or 4]
  - Under 30% survival at 5 years for distant diagnoses
- When detected in early stages, there is an 85-90% chance of cure
Ovarian Cancer Stats

Percent of New Cases by Age Group: Ovarian Cancer

- <20: 1.3%
- 20-34: 3.8%
- 35-44: 6.9%
- 45-54: 18.6%
- 55-64: 24.2%
- 65-74: 21.3%
- 75-84: 15.9%
- >84: 8.0%

Ovarian cancer is most frequently diagnosed among women aged 55-64.

Median Age At Diagnosis: 63

SEER 18 2009-2013, All Races, Females
Ovarian Cancer Stats

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Number of New Cases per 100,000 Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Races</td>
<td>11.7</td>
</tr>
<tr>
<td>White</td>
<td>12.2</td>
</tr>
<tr>
<td>Black</td>
<td>9.4</td>
</tr>
<tr>
<td>Asian / Pacific Islander</td>
<td>9.5</td>
</tr>
<tr>
<td>American Indian / Alaska Native</td>
<td>9.5</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10.6</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>11.8</td>
</tr>
</tbody>
</table>

www.seer.cancer.gov
Ovarian Cancer Risk Factors

- **Age** - risk of developing ovarian, fallopian tube and peritoneal cancer increases with age
  - Most ovarian cancers develop after menopause
  - The average age of women diagnosed with these cancers is about 62 years
  - Age adjusted incidence (new cases) is 5X greater for women over 65
  - Hereditary cancers may be diagnosed earlier
    - i.e. for BRCA1 mutation carriers, average age is 53
Ovarian Cancer Risk Factors

• Genetics / Family History
  o Familial Cancer Syndromes
    ▪ 20-25% of women diagnosed with ovarian cancer have a hereditary tendency to develop the disease
    ▪ Most significant risk factor for ovarian cancer is an inherited genetic mutation in the BRCA1 or BRCA2 genes
      • These genes are responsible for about 10-15% percent of all ovarian cancers
        o Testing for BRCA mutations is now recommended by NCCN for all women diagnosed with ovarian cancer
    ▪ Lynch syndrome and Peutz-Jeghers syndrome are also associated with an increased risk of developing ovarian cancer
    ▪ Other genes linked to increased ovarian cancer risk include BRIP1, RAD51C and RAD51D
Ovarian Cancer Risk Factors

- **Reproductive History**
  - Women who have never had children or have unexplained infertility may have an increased risk of ovarian and fallopian tube cancer

- **Hormone Replacement Therapy (HRT)** - Long-term HRT use (more than 5 years) may increase the risk of ovarian cancer
  - Any use is associated with 20% increase in risk
  - Use > 5 years associated with highest risk
  - Risk may be higher with estrogen-only HRT
  - Most strongly associated with serous and endometroid cancers

- **Endometriosis**
  - Associated with increased risk of endometroid and clear cell cancers
Factors Reducing Ovarian Cancer Risk

- **Oral Contraceptive Use**
  - Women who have used oral contraceptives have a lower risk of ovarian cancer
    - May be reduced as much as 20% for every 5 years of use
    - Applies to endometroid, serous and clear cell cancer types
  - Benefits may be greatest with earliest, most recent use (younger women)

- **Pregnancy and breastfeeding**
  - First pregnancy may reduce risk more than subsequent pregnancies
Factors Reducing Ovarian Cancer Risk

- **Gynecologic Surgery**
  - Bilateral salpingo-oophorectomy (BSO) - removal of ovaries and fallopian tubes
  - Salpingectomy (removal of the fallopian tubes) and tubal ligation (having the tubes tied) may reduce the chance of developing ovarian cancer. This is an active area of research.
  - Hysterectomy - removing the uterus without removing the ovaries
    - May reduce the risk of getting ovarian cancer

- **Ovulation**
  - Some researchers believe that risk of developing ovarian cancer is proportional to the number of times a woman has ovulated during her lifetime
    - Women who continually ovulate throughout their lives without a break, for example, if they have never been pregnant or suppressed ovulation through birth control pills, they are at higher risk
    - So are women who start menstruating early and stop late
• Cancers originate from Epithelial, Stromal, or Germ Cells
  o Epithelial ovarian cancer – starts on the epithelium (the tissue that covers the ovary and lines the fallopian tube and peritoneum)
    ▪ 9 out of 10 women diagnosed have epithelial ovarian cancer
    ▪ New research suggests that many of these cancers originate in the lining of fallopian tubes rather than the ovaries
  o Germ cell ovarian cancer – starts in the eggs cells within the ovary
    ▪ Relatively uncommon, and typically affects younger women or teenage girls
  o Stromal or sex-cord ovarian cancer – starts in the cells that produce female hormones
Five Primary Subtypes of Epithelial Ovarian Cancers

The most common type of ovarian cancer, comprising more than 95% of cases, is ovarian carcinoma. Here are five main subtypes of ovarian carcinoma:

- **Serous** (high-grade or low-grade)
  - High-grade serous carcinoma is most common type affected an estimated 65-80% of patients
  - Low-grade serous carcinoma is less common and generally less aggressive than high-grade serous carcinomas
  - 50% of the time, serous carcinomas are bilateral
  - In 85% of cases, they have spread beyond the ovary at the time of diagnosis
  - The origin of serous cancer is often unclear
  - Many of these tumors develop in the fallopian tube
Five Primary Subtypes of Epithelial Ovarian Cancers

- **Endometrioid**
  - Comprise approximately 15-20% of epithelial ovarian cancers
  - Because they are typically low-grade, endometrioid adenocarcinomas have a good prognosis

- **Clear Cell**
  - Do not typically respond well to chemotherapy and may be related to endometriosis

- **Mucinous**
  - Mucinous tumors include mucinous adenocarcinoma and mucinous cystadenocarcinoma

- **Undifferentiated or Unclassifiable**
  - Those where the cell type cannot be determined make up about 10% of epithelial ovarian cancers and have a comparatively poor prognosis
Five Primary Subtypes of Epithelial Ovarian Cancers

A: high-grade serous CA  
B: low-grade serous CA  
C: clear cell CA  
D: mucinous CA  
E: low-grade endometrioid CA  

Different histotypes of epithelial ovarian cancer.  
Image credit: http://www.gynecologycancer.org/s/Histology-of-OVCA.jpg
Stage 1A cancer in one ovary

Stage 1B cancer in both ovaries

Stage 1C cancer in the ovary and on the surface of one ovary

Stage 2A

Stage 2C cancer cells also in the fluid of the abdomen

Stage 2B cancer has spread to the bowel or bladder

Stage 3A cancer cells are in the lining of the abdomen (only seen under a microscope)

Stage 3B tumours of 2cm or smaller are in the lining of the abdomen

Stage 3C cancer is in the lymph nodes

Stage 4 cancer has spread to other organs

Image Credits: Cancer Research UK
**Ovarian Cancer Staging**

There are 2 staging systems for ovarian cancer:

<table>
<thead>
<tr>
<th>FIGO stages of ovarian cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage</strong></td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>IA</td>
</tr>
<tr>
<td>IB</td>
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<tr>
<td>IC</td>
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<tr>
<td>IC1</td>
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<tr>
<td>IC2</td>
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<tr>
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<tr>
<td>II</td>
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<td>IIA</td>
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<tr>
<td>IIB</td>
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<tr>
<td>III</td>
</tr>
<tr>
<td>IIIA</td>
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<tr>
<td>IIIA1</td>
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<td>IIIA1(i)</td>
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<tr>
<td>IIIA1(ii)</td>
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<tr>
<td>IIIA2</td>
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<tr>
<td>IIIB</td>
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<tr>
<td>IIIC</td>
</tr>
<tr>
<td>IV</td>
</tr>
<tr>
<td>IVA</td>
</tr>
<tr>
<td>IVB</td>
</tr>
</tbody>
</table>
# Ovarian Cancer Staging

## AJCC/TNM stages of ovarian cancer

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>T</strong></td>
<td>Primary tumor</td>
</tr>
<tr>
<td>Tx</td>
<td>Cannot be assessed</td>
</tr>
<tr>
<td>T0</td>
<td>No evidence</td>
</tr>
<tr>
<td>T1</td>
<td>Tumor limited to ovary/ovaries</td>
</tr>
<tr>
<td>T1a</td>
<td>One ovary with intact capsule, no surface tumor, and negative ascites/peritoneal washings</td>
</tr>
<tr>
<td>T1b</td>
<td>Both ovaries with intact capsules, no surface tumor, and negative ascites/peritoneal washings</td>
</tr>
<tr>
<td>T1c</td>
<td>One or both ovaries with ruptured capsule or capsules, surface tumor, positive ascites/peritoneal washings</td>
</tr>
<tr>
<td>T2</td>
<td>Tumor is in ovaries and pelvis (extension or implantation)</td>
</tr>
<tr>
<td>T2a</td>
<td>Expansion to uterus or Fallopian tubes, negative ascites/peritoneal washings</td>
</tr>
<tr>
<td>T2b</td>
<td>Expansion in other pelvic tissues, negative ascites/peritoneal washings</td>
</tr>
<tr>
<td>T2c</td>
<td>Expansion to any pelvic tissue, positive ascites/peritoneal washings</td>
</tr>
<tr>
<td>T3</td>
<td>Tumor is in ovaries and has metastasized outside the pelvis to the peritoneum (including the liver capsule)</td>
</tr>
<tr>
<td>T3a</td>
<td>Microscopic metastasis</td>
</tr>
<tr>
<td>T3b</td>
<td>Macroscopic metastasis less than 2 cm diameter</td>
</tr>
<tr>
<td>T3c</td>
<td>Macroscopic metastasis greater than 2 cm diameter</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>Regional lymph node metastasis</td>
</tr>
<tr>
<td>Nx</td>
<td>Cannot be assessed</td>
</tr>
<tr>
<td>N0</td>
<td>No metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis present</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>Distant metastasis</td>
</tr>
<tr>
<td>M0</td>
<td>No metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Metastasis present (excluding liver capsule, including liver parenchyma and cytologically confirmed pleural effusion)</td>
</tr>
</tbody>
</table>
Ovarian Cancer Staging

The AJCC/TNM stages can be correlated with the FIGO stages:

<table>
<thead>
<tr>
<th>FIGO</th>
<th>T</th>
<th>N</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>T1</td>
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</tr>
<tr>
<td>IA</td>
<td>T1a</td>
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<td>M0</td>
</tr>
<tr>
<td>IB</td>
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<td>N0</td>
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<tr>
<td>IC</td>
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<td>M0</td>
</tr>
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<td>IIA</td>
<td>T2a</td>
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<td>M0</td>
</tr>
<tr>
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<td>T2b</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>IIC</td>
<td>T2c</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>III</td>
<td>T3</td>
<td>N0</td>
<td>M0</td>
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<tr>
<td>IIIA</td>
<td>T3a</td>
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<td>M0</td>
</tr>
<tr>
<td>IIIB</td>
<td>T3b</td>
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</tr>
<tr>
<td>IIIC</td>
<td>T3c</td>
<td>N0/N1</td>
<td>M0</td>
</tr>
<tr>
<td>IV</td>
<td>Any</td>
<td>Any</td>
<td>M1</td>
</tr>
</tbody>
</table>
Factors Affecting Treatment Options and Prognosis

Prognosis and treatment options may depend on the following:

- Type of ovarian cancer and how much cancer there is
- Stage and grade of the cancer
- Whether the patient has extra fluid in the abdomen that causes swelling
- Whether all of the tumor can be removed with surgery
- Whether there are changes in the $BRCA1$ or $BRCA2$ genes
- The patient’s age and general health status
- Whether the cancer has just been diagnosed or has recurred
Best Care for Ovarian Cancer

**Standard of care guidelines** established by NCCN, based on 2013 study by the Institute of Medicine:

- Most important factors in quality of care (adherence to standard of care):
  - Treatment by gynecologic oncologist
  - Treatment in a high volume facility
  - More than 50% of women not treated in line with standard of care guidelines

- Surgery
  - Complete staging
  - Optimal cytoreduction
  - Specialist Care

- Chemotherapy and Targeted Therapy
  - Taxane & Platinum
  - Route of Delivery – into the abdomen (IP) or through the vein (IV)
  - Adjuvants/additions to treatment – Biologics
  - Consolidation / Maintenance
  - Aggressive Individualized treatment of recurrence
Surgical Staging

Cancer is often staged twice:

- The **clinical stage** is based on tests done before surgery. It can provide a general idea about how far the cancer may have spread.
- The **pathogenic stage** is based on results of surgery and tests of tissue removed during surgery.
  - This is used to plan treatment.
Surgical Staging

Biopsy sites may include:

- Nearby lymph nodes
- Pelvis
- Abdomen
- Diaphragm
- Omentum - the layer of fatty tissue covering the abdominal organs
- Peritoneum - the tissue that lines the inside of the abdomen and pelvis, and covers most of the organs in this space
- Ascites - abnormal abdominal fluid
Surgical Treatment for Advanced Disease

- Significant survival advantage for women optimally cytoreduced*
- Procedures may include:
  - En bloc resection of uterus, ovaries & pelvic tumor
  - Omentectomy - a surgical procedure designed to remove the omentum, which is a thin fold of abdominal tissue that encases the stomach, large intestine and other abdominal organs. This fatty lining contains lymph nodes, lymph vessels, nerves and blood vessels
  - Selective lymphadenectomy - aka lymph node dissection, is the surgical removal of one or more groups of lymph nodes
  - Bowel resection
  - Removal of diaphragmatic & peritoneal implants
  - Splenectomy, appendectomy
Cytoreduction

- Cytoreduction - Literally means a reduction in the number of cells
- Cytoreductive surgery refers to a treatment of advanced ovarian cancer in which surgery attempts to remove as many cancerous cells as possible
- Cytoreduction can be defined in different ways depending on the extent of cytoreduction
  - Complete - This is when no visible disease is left, though microscope cells are almost certainly still present
  - Optimal - Nodules that are 1 cm or less are left over
  - Suboptimal - Nodules more than 1 cm are left over
Cytoreduction

Timing of Cytoreduction

Cytoreduction can be:

- Primary - The first part of cancer treatment
- Interval - Done after some chemotherapy has been given
- Secondary - Done after someone has had a recurrence of their cancer
- Tertiary - Done after several recurrences of the cancer

Secondary and tertiary debulking are only done under certain circumstances, usually when the surgeon feels that all disease can be removed without too much toxicity. Surgical decisions in ovarian cancer are individualized and should be made in conjunction with the patient and her gynecologic oncology surgeon.
Most Effective Initial Treatment

Chemotherapy

- Has been a general standard of care for ovarian cancer for decades, with variable protocols
- Recommended for all cancers diagnosed at stages 1C through 4
- Used after surgery to treat residual disease after surgery, if needed
- Route of Delivery – Intraperitoneal (IP) vs. Intravenous (IV)
  - Intraperitoneal [IP] chemotherapy may be more effective
  - IP chemotherapy may also have more adverse side effects, leading to early discontinuation of treatment
Most Effective Initial Treatment

Adjuvant vs. Neoadjuvant

- In some cases, chemotherapy occurs first, followed by surgery
  - This is called “neoadjuvant chemotherapy”
    - Common when a tumor cannot be completely removed or optimally debulked via surgery
    - Though not shown to increase survival, it can reduce the risk of complications after surgery
    - If a unilateral salpingo-oophorectomy or other surgery is performed, additional chemotherapy, called “adjuvant chemotherapy”, can be given
Recurrent and Metastatic Ovarian Cancer

Ovarian cancer has very high recurrence rate; treatment may include:

• Surgery
  o Resection, if feasible (may be done more than once)
• Additional chemotherapy
  o Depends on sensitivities of tumor
• Maintenance therapy
  o Use of targeted therapies to lengthen the time until recurrence
Recurrent and Metastatic Ovarian Cancer

Platinum-sensitive or platinum-resistant

- Platins are the drugs of choice for second-line chemotherapy, in combination with other cytotoxic agents
- If ovarian cancer recurs, it is categorized as platinum-sensitive, platinum-resistant or platinum-refractory, based on the time since the last recurrence treated with platins:
  - platinum-sensitive cancers recurred > 6 months after last treatment
  - platinum-resistant cancers recur within 6 months of last treatment
  - platinum-refractory- cancer progresses before cessation of treatment with a platinum agent
- Second-line chemotherapy is usually given when the cancer becomes symptomatic, because no difference in survival has been seen between treating asymptomatic (elevated CA-125) and symptomatic recurrences
Recurrent and Metastatic Ovarian Cancer

Platinum-sensitive Tumors

- Recurrence more than 6 months after completion of previous treatment with platinum drug
  - Repeat platinum combination therapy (carboplatin + taxane or other combination)
  - > one agent more effective than monotherapy
  - Maintenance therapy may be used
Recurrent and Metastatic Ovarian Cancer

Platinum Resistant Tumors

- Recurrence < 6 months after treatment with platinum drug
- No high-efficacy chemotherapy options
  - Single-drug regimens do not have high response rates but are used in some cases
  - Response rates may be poor with short remission periods
- Maintenance therapies may be used
Recurrence and Metastatic Ovarian Cancer

Radiation therapy

- Dysgerminomas (a type of germ cell tumor) can be treated with radiation
  - This can cause infertility and is being phased out in favor of chemotherapy
- Radiation therapy does not improve survival in people with well-differentiated tumors
- Radiotherapy can also be used in palliative care of advanced cancers
- A typical course of radiotherapy for ovarian cancer is 5 days a week for 3-4 weeks
- Common side effects of radiotherapy include diarrhea, constipation, and frequent urination
Recurrent and Metastatic Ovarian Cancer

**Hormonal therapy**

- Hormone therapy is the use of hormones or hormone-blocking drugs to fight cancer
- This type of systemic therapy is used to treat ovarian tumors that are hormone sensitive
- Luteinizing-hormone-releasing hormone (LHRH) agonists, Tamoxifen and Aromatase Inhibitors are hormonal therapies that may be used in these cases
Newer Therapies and Treatment Modalities

Most recurrent ovarian cancer treatment includes more than one agent. Newer therapies and current clinical trials include:

- **Anti-angiogenic therapy (Bevacizumab)**
  - May be used for single agent maintenance or in combination with other chemotherapies

- **PARP Inhibitors**
  - Most effective in women with germline BRCA mutations; drug uses fault in DNA homologous recombination (HR) process (DNA repair) in cancer cells to cause cell death
  - Effective in women with BRCA mutations as maintenance therapy
  - Also used for platinum sensitive and recurrent disease
Newer Therapies and Treatment Modalities

- **Immunotherapies**
  - A large number of studies are underway
  - Conventional imaging measures for solid tumors poses a challenge to measuring clinical outcomes to immunotherapy

- **Antibody-based therapies**
  - Based on CA125 – mixed or negative results as of 2016

- **Immune modulation**
  - Limited research in ovarian cancers
  - Heterogeneity of the disease creates wide spectrum of immune resistance mechanisms, complicating studies of this

- **Adaptive cellular therapies**
  - Results shown in other solid tumors
  - Ongoing trial with ovarian cancer patients
### Genetic Targets/Pathways in Ovarian Cancer Treatment

- A number of genetic alterations cause high genetic instability in ovarian cancer. Targeted therapies attempt to capitalize on these genetic pathways and defects.

- Several Targeted Treatments have been FDA approved as either a single agent or in combination with chemotherapy:
  - For recurrent disease (olaparib, bevacizumab, rucaparib), and as
  - Maintenance therapy following treatment for a recurrence (niraparib)

<table>
<thead>
<tr>
<th>High-grade serous</th>
<th>Low-grade serous</th>
<th>Endometrioid</th>
<th>Clear cell</th>
<th>Mucinous</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP53, BRCA1/2, NF1, CDK12, Homologous Recombination Repair genes</td>
<td>BRAF, KRAS, NRAS, ERBB2</td>
<td>ARID1A, PI3KCA, PTEN, PPP2R1A, MMR deficiency</td>
<td>ARID1A, PI3KCA, PTEN, CTNNB1, PPP2R1A</td>
<td>KRAS, ERBB2 ampl</td>
</tr>
</tbody>
</table>

Genetic Targets/Pathways in Ovarian Cancer Treatment

Image Credit: www.mdpi.com/1422-0067/14/4/8271/htm
Side Effects and Adverse Events

Chemotherapy
The following list from the American Cancer Society includes the most commonly reported symptoms, but it’s important to remember that not everyone gets all of the symptoms:

- Nausea and vomiting
- Hair loss
- Fatigue
- Increased chance of bruising and bleeding
- Anemia
- Infection
Side Effects and Adverse Events

Chemotherapy may also cause changes in other parts of the body:

- Intestinal problems (diarrhea)
- Appetite and weight changes
- Sore mouth, gums and throat
- Nerve and muscle problems (numbness and tingling in hands or feet)
- Dry and/or discolored skin and fingernails
- Kidney and bladder irritation
- Sexuality and fertility issues due to effects on reproductive organs

Certain drugs used in ovarian cancer treatment can cause some hearing loss or kidney damage. To help protect the kidneys while taking these drugs, patients may receive extra fluid intravenously.
Side Effects and Adverse Events

Hormone Therapy

Hormone therapies can result in:

- Symptoms of menopause, such as hot flashes and vaginal dryness
- Nausea and vomiting
- Fatigue
- Joint and muscle pain
- Weakened bones, sometimes leading to osteoporosis with long-term use

Note: Tamoxifen, Evista and similar therapies are not known to cause bone loss, but can increase the risk of serious blood clots in the legs.
Side Effects and Adverse Events

Radiation Therapy

Side effects of radiation therapy depend mainly on the treatment dose and the part of the body that is treated. Common side effects of radiation therapy to the abdomen are:

- Fatigue
- Loss of appetite
- Nausea and vomiting
- Urinary discomfort
- Diarrhea
- Skin changes on the abdomen.

Intraperitoneal radiation therapy for ovarian cancer may cause:

- Abdominal pain and bowel obstruction (a blockage of the intestine)
Side Effects and Adverse Events

PARP Inhibitors

Side effects of PARP inhibitors depend on whether they are used alone or in combination with other therapies, but overall they are generally well tolerated. Common side effects of PARP inhibitors are:

- Nausea
- Fatigue
- Gastrointestinal upset
- Anemia (decrease in red blood cells)
- Neutropenia (decrease in neutrophils, a type of white blood cell)
Side Effects and Adverse Events

Treatment-Related Toxicity

- Many of the current front-line and subsequent agents used in advanced ovarian cancer are associated with cumulative and/or irreversible toxicities that pose challenges in long-term planning.
- The irreversible effects associated with some of these therapies may render patients less tolerant to future treatments and lead to a cycle of diminishing treatment options with each remission and disease relapse.
- The potential for patients to experience cumulative toxicity must be carefully weighed against the goals of prolonging the disease-free interval and improving patient quality-of-life.
Side Effects and Adverse Events

Short- and Long-Term Considerations

- When selecting a therapeutic regimen, the short-term and cumulative long-term toxicity profiles of the treatment options must be taken into consideration.
- Because ovarian cancer management is an ongoing process, the cumulative and irreversible adverse effects of these agents must be weighed against their potential benefits.
Ovarian Cancer Survival

• Over the past several decades we have seen both declining incidence and age adjusted cancer death rates for ovarian cancer
  o However, progress for ovarian cancer is far less than for breast, colorectal or prostate cancers
• While ovarian cancer death rates have declined, a declining death rate in a population can reflect decreased incidence as well as improvements in prevention, early detection and treatment.
• The overall five-year survival rates for ovarian cancer have improved
  o Within the data there is evidence of unequal progress
    ▪ Five-year survival rates for African-American women have worsened
## Five-Year Survival Rates

<table>
<thead>
<tr>
<th>Invasive epithelial ovarian cancer</th>
<th>Ovarian stromal tumors</th>
<th>Germ cell tumors of the ovary</th>
<th>Fallopian tube carcinoma</th>
<th>Low malignant potential tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage</strong></td>
<td><strong>Relative five-year survival rate</strong></td>
<td><strong>Stage</strong></td>
<td><strong>Relative five-year survival rate</strong></td>
<td><strong>Stage</strong></td>
</tr>
<tr>
<td>I</td>
<td>90%</td>
<td>I</td>
<td>95%</td>
<td>I</td>
</tr>
<tr>
<td>IA</td>
<td>94%</td>
<td>II</td>
<td>78%</td>
<td>II</td>
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<td>IB</td>
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<td>III</td>
<td>65%</td>
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<td>73%</td>
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<tr>
<td>III</td>
<td>39%</td>
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<td>IIIA</td>
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<td>IIIIC</td>
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<td>IV</td>
<td>17%</td>
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The survival rates given above are for the different types of ovarian cancer, according to American Cancer Society. They come from the National Cancer Institute, SEER, and are based on patients diagnosed from 2004 to 2010.
Optimizing Current Care

- Encouraging preventive methods
- Identifying high-risk groups
- Improving awareness of symptoms
- Opportunities during cancer care
  - Aggressive initial surgical therapy
  - Best available initial treatment
  - Good supportive care including integrative approaches
  - Individualized treatment of recurrence
A New Era in Ovarian Cancer Therapy

- Improved
  - Risk Identification
  - Prevention Methods - Vitamins, Oral Contraceptives, Integrated approach
  - Screening with multi-modal approaches - risk assessment, symptom awareness, biomarker panels, imaging
- Shift from treatments based on organ & stage to individualized approaches targeted against specific molecular features of each tumor
- Largest area of research is in combination therapies – combining chemotherapy agents, PARP inhibitors, anti-angiogenesis and immunotherapy agents