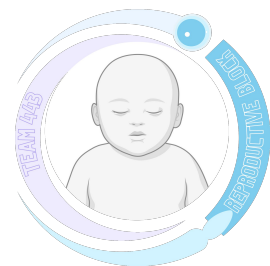
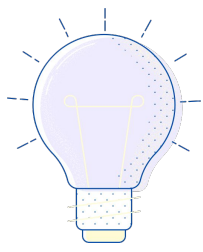
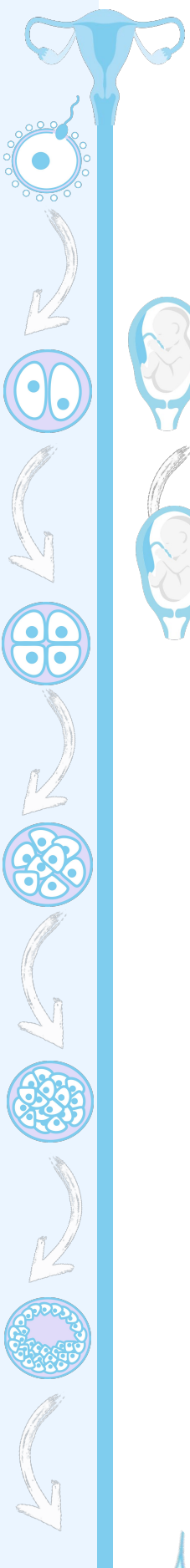




Ovarian Cysts And Tumors





Objectives



The pathology of the major types of ovarian cysts: follicular and luteal.



The classification and pathology of common ovarian tumors including surface epithelial, germ cell, stromal and metastatic neoplasms.



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IF YOU WANT TO READ [OSMOSIS SUMMARY](#)



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Editing File

Color index :

Main text (black)

Female Slides (Pink)

Male Slides (Blue)

Important (Red)

Dr's note (Green)

Extra Info (Grey)

Ovarian Cysts and Tumors

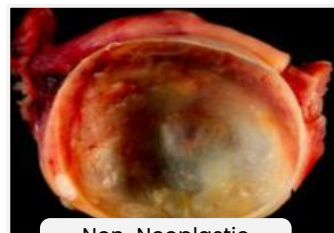
Overview

- Non neoplastic cysts are common but they are not serious problems.
- Inflammation of ovaries is rare. It is usually associated with salpingitis of fallopian tubes (salpingo-oophoritis).
- Frequently, the ovaries are affected by endometriosis: (the appearance of endometrial tissue outside the uterus).
- The most important medical problems in ovaries are the neoplasms.
- Death from ovarian cancers is more common than that of cervix and uterus together because ovarian tumors grow silently and are usually diagnosed late, which make them so dangerous.

Non-Neoplastic Cysts of Ovary

Non Neoplastic Cyst are more common than the neoplastic ones. They usually cause no problems. Non neoplastic cyst can rupture and cause acute pain and intra abdominal hemorrhage. non-neoplastic cysts are as follows:

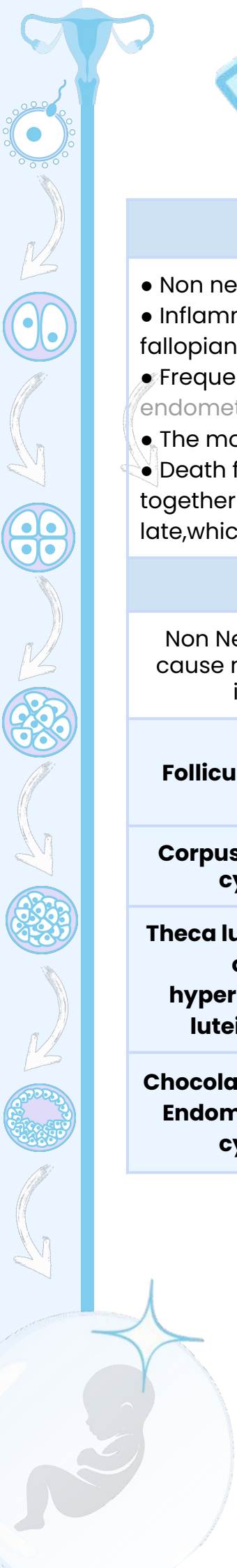
Follicular Cyst	Arise from the ovarian follicles and are due to distension of unruptured Graafian follicle
Corpus luteum cyst	Results from hemorrhage into a persistent mature corpus luteum
Theca lutein cyst or hyperreactio luteinalis	Are thin walled cysts lined by luteinized theca cells. They are associated with high levels of circulating gonadotropins (e.g.pregnancy, hydatidiform mole, etc)
Chocolate cyst or Endometriotic cyst	The ovary is the most frequent site of endometriosis. And chocolate cyst is a blood filled cyst of the ovary. It is due to endometriosis in the ovary with hemorrhage

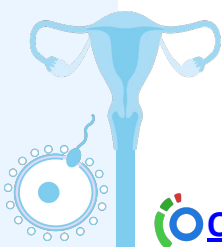


Non-Neoplastic Cysts of ovary



Ovarian Cysts and Tumors

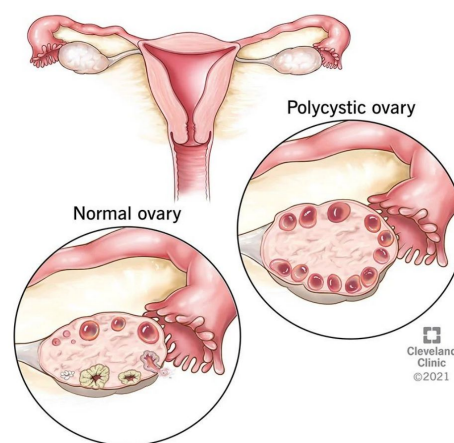




Ovarian Cysts and Tumors

Polycystic ovarian syndrome

Definition		Polycystic ovarian syndrome (formerly called Stein-Leventhal syndrome) is a complex endocrine disorder characterized by hyperandrogenism, menstrual abnormalities, polycystic ovaries, chronic anovulation, and decreased fertility
Clinical Presentation		It usually comes to attention after menarche in teenage girls or young adults who present with oligomenorrhea, hirsutism, infertility, and sometimes with obesity
Morphology	Gross	The ovaries are usually twice the normal size, gray-white with a smooth outer cortex, and studded with subcortical cysts 0.5 to 1.5 cm in diameter.
	Microscopic	Histologic examination shows a thickened, fibrotic ovarian capsule overlying innumerable cystic follicles lined by granulosa cells with a hyperplastic luteinized theca interna. There is a conspicuous absence of corpora lutea in the ovary.



Deep Focus Question



Which of the following is a common presentation in women with polycystic ovarian syndrome?

- A. Oligomenorrhea, obesity, and hirsutism
- B. Alopecia, dysmenorrhea, and weight loss
- C. Fatigue, body aches, and menorrhagia
- D. Repeated ectopic pregnancies and chronic pelvic pain

Answer: A



Ovarian Tumors

1

One of the leading causes of cancer deaths in women.

Most of the patients already have metastasis at the time of diagnosis.

Ovarian cancers grow silently and go undetected in the early stage when it is still curable.

2

3

The WHO Histological Classification for ovarian tumors divides ovarian neoplasms into primary & metastatic (secondary)

Ovarian tumor classification

Primary tumors

There are three main primary types of ovarian tumors based on the origin of the tumor cell. They are:

1) Surface epithelial ovarian tumors (65%):

Derived from the cells on the surface of the ovary. This is the most common form of primary ovarian cancer. Occurs in adults

2) Germ cell tumors (15%):

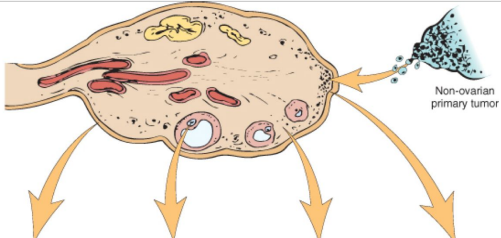
Derived from the from the ovarian follicles. Occurs mainly in children, teens and young women. They are less common as compared to epithelial ovarian tumors

3) Sex cord stromal tumors (10%)

Derived from the ovarian stroma. Uncommon and this class of tumors often produces steroid hormones

Metastatic or Secondary tumors (5%)

Cancers from other organs can also spread to the ovaries



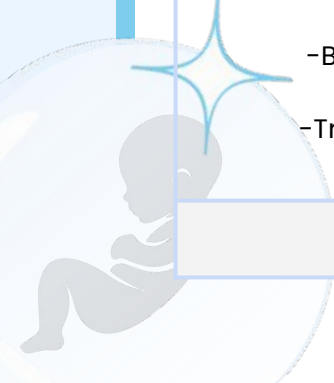
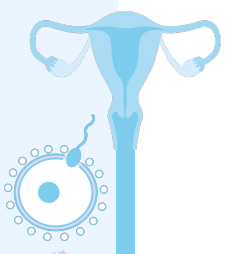
ORIGIN	SURFACE EPITHELIAL CELLS (Surface epithelial-stromal cell tumors)	GERM CELL	SEX CORD-STROMA	METASTASIS TO OVARIES
Overall frequency	65%-70%	15%-20%	5%-10%	5%
Proportion of malignant ovarian tumors	90%	3%-5%	2%-3%	5%
Age group affected	20+ years	0-25+ years	All ages	Variable
Types	<ul style="list-style-type: none"> Serous tumor Mucinous tumor Endometrioid tumor Clear cell tumor Brenner tumor Cystadenofibroma 	<ul style="list-style-type: none"> Teratoma Dysgerminoma Endodermal sinus tumor Choriocarcinoma 	<ul style="list-style-type: none"> Fibroma Granulosa-theca cell tumor Sertoli-Leydig cell tumor 	

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Various ovarian neoplasms and their frequency and age distribution. Downloaded from: Robbins & Cotran Pathologic Basis of Disease

Ovarian Tumors

Surface Epithelial Tumors	Germ cells tumor
<p>Serous Tumors: small columnar to cuboidal epithelial cell, prominent nuclei (hyperchromatic), bilateral</p> <ul style="list-style-type: none"> - Benign (cystadenoma), cyst filled with watery fluid, most common - Borderline tumors (serous borderline tumor) - Malignant (serous adenocarcinoma) 	<p>Teratoma</p> <ul style="list-style-type: none"> - Immature (malignant) OR - Mature (benign): Solid OR Cystic (dermoid cyst) - Monodermal (e.g., struma ovarii, carcinoid).
<p>Mucinous Tumors: columnar epithelial cell with clear cytoplasm, unilateral</p> <ul style="list-style-type: none"> - Benign (cystadenoma), cyst filled with mucus - Borderline tumors (mucinous borderline tumor) - Malignant (mucinous adenocarcinoma) 	<p>Dysgerminoma</p>
<p>Endometrioid Tumors</p> <ul style="list-style-type: none"> - Benign (cystadenoma) - Borderline tumors (endometrioid borderline tumor) - Malignant (endometrioid adenocarcinoma) 	<p>Yolk sac tumor (endodermal sinus tumor)</p>
<p>Clear Cell Tumors: (large epithelial cell with clear cytoplasm)</p> <ul style="list-style-type: none"> - Benign - Borderline tumors - Malignant (clear cell adenocarcinoma) 	<p>Choriocarcinoma very aggressive</p>
<p>Transitional cell tumors</p> <ul style="list-style-type: none"> - Brenner tumor - Brenner tumor of borderline malignancy - Malignant Brenner tumor - Transitional cell carcinoma (non-Brenner type) 	<p>Embryonal carcinoma</p>
<p>Other</p>	<p>Mixed germ cell tumors</p>
	<p>Sex Cord /Stromal Tumors</p>
	<p>Almost always benign:</p> <p>Fibromas Fibrothecoma thecomas</p>
	<p>With Malignant Potential:</p> <ul style="list-style-type: none"> - Granulosa cell tumors - Sertoli-Leydig cell tumors
	<p>Other</p>



Surface epithelial Ovarian Tumors

Overview

Neoplasms derived from the cells on the surface of the ovary. Account for majority of all primary ovarian tumors: 65–70% of overall tumors and 90% of malignant ovarian cancer. Occur in adults >20

Pathogenesis

Females Slides



The majority of ovarian tumors arise from the **fallopian tube** or **epithelial cysts** in the cortex of the ovary .

⦿ Studies have shown that many of the tumors thought to arise from the coelomic epithelium that covers the surface of the ovary are now thought to arise from the fimbriated end of the fallopian tube .

⦿ **The epithelium lining the cortical cysts may be derived from displaced ovarian surface epithelium or the lining of fallopian tube.**

These can become metaplastic or undergo neoplastic transformation to give rise to a number of different epithelial tumors.

Risk factor

Females Slides

⦿ **Nulliparity, family history, and germline mutations in certain tumor suppressor genes.**

⦿ Of interest, prolonged use of oral contraceptives reduces the risk.

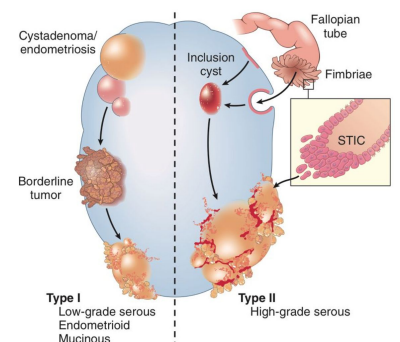
⦿ Around 5% to 10% of ovarian cancers are familial, and most of these are associated with mutations in the **BRCA1** or **BRCA2** tumor suppressor genes. mutations in BRCA1 and BRCA2 also are associated with hereditary breast cancer.

⦿ The average lifetime risk for ovarian cancer is approximately 30% in BRCA1 carriers; the risk in BRCA2 carriers is somewhat lower.

Figure

Females Slides

Fig. 19.15 Derivation, of various ovarian neoplasms. Type I tumors progress from benign tumors through borderline tumors that may give rise to a low-grade carcinoma. Type II tumors arise from inclusions cysts/fallopian tube epithelium via intraepithelial precursors that are often not identified. They demonstrate high-grade features and are most commonly of serous histology. STIC, serous tubal intraepithelial carcinoma.



Deep Focus Question

Which of the following is NOT one of the types of epithelial-derived ovarian tumors?

- Serous
- Germ cell
- Mucinous
- Endometrioid
- Brenner

Answer: B

Surface epithelial Ovarian Tumors

The subtypes of the surface epithelial tumors are:

Serous Tumors

Mucinous Tumors

Endometrioid Tumors

Clear cell Tumors

Transitional /
Brenner cell Tumor

Others

All surface epithelial tumors are further divided into:

01

Benign:

They do not spread and invade other tissues.

02

Malignant:

They are carcinomas and have potential to metastasize beyond the ovary.

03

Borderline/ intermediate/ tumors of low malignant potential:

This is a gray zone. They are 'semi-malignant'. These appear to be low grade cancers with limited invasive potential. They have better prognosis than malignant. These tumors may seed or implant into the peritoneum.

Serous Tumors

IMPORTANT

Overview

Serous tumors are the most common of the ovarian epithelial tumors overall, and also make up the greatest fraction of malignant ovarian tumors.

- ⊙ Usually cystic filled with clear serous fluid and often bilateral.
- ⊙ Benign lesions are usually encountered in patients between 30 and 40 years of age, and malignant serous tumors are more commonly seen between 45 and 65 years of age.

Females Slides Morphology

Gross:


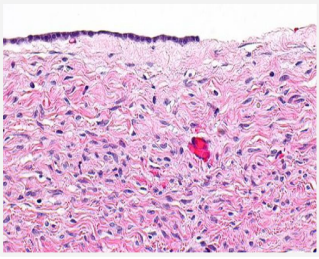
- ⊙ Most serous tumors are large, spherical to ovoid, cystic structures up to 30 to 40 cm in diameter.
- ⊙ About 25% of the benign tumors are bilateral.
- ⊙ In the benign tumors, the serosal covering is smooth and glistening. By contrast, the surface of adenocarcinomas often has nodular irregularities representing areas in which the tumor has invaded the serosa.
- ⊙ On cut section, small cystic tumors may have a single cavity, but larger ones frequently are divided by multiple septa into multiloculated masses. The cystic spaces usually are filled with a **clear serous fluid**. Protruding into the cystic cavities are papillary projections, which are more prominent in malignant tumors

Microscopic: Psammoma bodies are commonly seen.

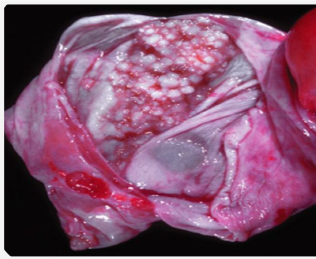
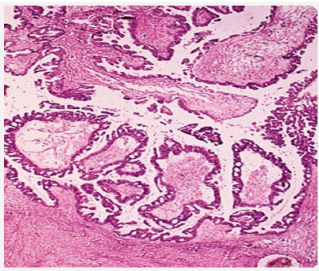
Surface epithelial Ovarian Tumors

Serous Tumors are subdivided into:

Benign serous cystadenomas (60%)


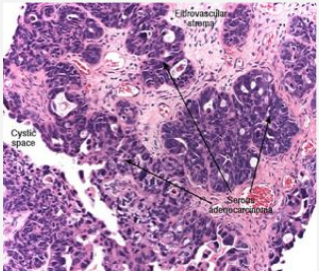
Gross	males Slides	Microscopic	Females Slides
are commonly large, cystic and thin-walled, and unilocular. They are lined by serous cells and contain thin, clear yellow fluid.		single layer of columnar epithelial cells that line the cyst or cysts. The cells often are ciliated. Psammoma bodies: (concentrically laminated calcified concretions) are common.	

Borderline (15%)

Gross	males Slides	Microscopic	Females Slides
cystic with thin wall and smooth surface, but often have multiple papillary excrescences (grape-like clusters) finger like projection, protruding into the lumen in places.		borderline tumors, which exhibit cytologic atypia and typically no stromal invasion	

Malignant serous cystadenocarcinoma (25%)

- Is the commonest malignant ovarian tumor, forming about a third of all cancers of the ovary & Treatment: surgery, chemotherapy and radiotherapy. Prognosis; poor.

Gross	males Slides	Microscopic	Females Slides
The tumors are partly cystic and partly solid with prominent excrescences (projections), often with necrosis and hemorrhage. - These tumors usually present with ascites due to abdominal metastases.		In high-grade carcinoma the cells are markedly atypical, the papillary formations are usually complex and multilayered, and by definition nests or sheets of malignant cells invade the ovarian stroma.	

Surface epithelial Ovarian Tumors

Females Slides

Serous Tumors (Continued)

Types and gene association

- ⦿ There are two types of serous carcinomas, low-grade and high-grade. The former arise from benign or borderline lesions and progress slowly in a stepwise manner to become invasive carcinoma.
- ⦿ These low-grade tumors are associated with mutations in genes encoding signaling proteins, such as **KRAS**, a member of the **RAS** gene family.
- ⦿ The high-grade serous tumors develop rapidly. many of these high-grade lesions arise in the fimbriated end of the fallopian tube via serous tubal intraepithelial carcinoma, rather than ovarian coelomic epithelium.
- ⦿ **TP53 mutations** in high-grade serous cancers, being present in over 95% of cases.
- ⦿ Other frequently mutated genes include the **tumor suppressors NF1 and RB, as well as BRCA1 and BRCA2** in familial ovarian cancers.

Prognosis

- ⦿ In general, malignant serous tumors spread throughout the peritoneal cavity and to regional lymph nodes, including periaortic lymph nodes; distant lymphatic and hematogenous metastases are infrequent.
- ⦿ The prognosis for patients with high-grade serous carcinoma is poor, even after surgery and chemotherapy, and depends heavily on the stage of the disease at diagnosis.

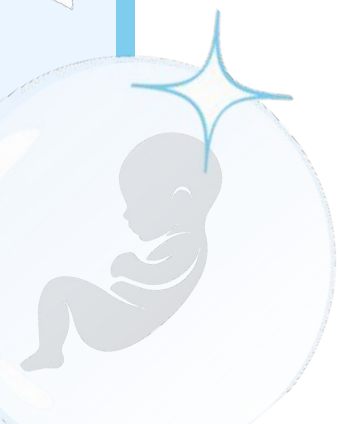
Deep Focus Question



Which of the following statements about papillary serous cystadenoma is INCORRECT?

- A. Histologically, it contains psammoma bodies.
- B. It is the most common form of malignant ovarian tumor.
- C. It is well-encapsulated and well-differentiated.
- D. It is frequently bilateral.

Answer: B



Surface epithelial Ovarian Tumors

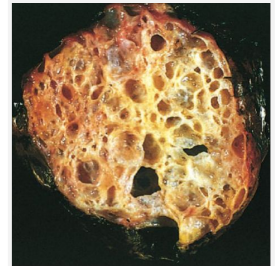
Mucinous Tumors

Overview

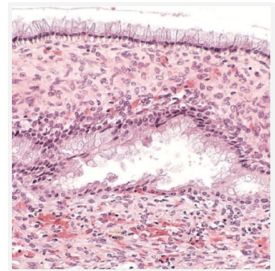
- Mucinous tumors form about 25% of all ovarian neoplasms. The tumor cells are **mucin-producing cells** (which are either endocervical type or intestinal type cells).
- **Less likely to be malignant** (80% are benign, 10% are borderline, 10% malignant).
- **Bilaterality is uncommon.**

Morphology

- Mucinous tumors can be very large.
- **They are typically cystic and multilocular and filled with thick sticky, viscous mucoid fluid.**
- Mucin-producing epithelial cells line the cyst
- Malignant tumors are characterized by solid areas of growth, piling up (stratification) of lining cells, cytologic atypia, and stromal invasion.
- Compared with serous tumors, mucinous tumors are much less likely to be bilateral; this feature is sometimes useful in differentiating mucinous tumors of the ovary from metastatic mucinous adenocarcinoma from a gastrointestinal tract primary (**the so-called "Krukenberg tumor"**), which more often produces bilateral ovarian masses.



A



B

Ovarian mucinous cystadenoma. (A) Mucinous cystadenoma with multicystic appearance and delicate septa. Note the presence of glistening mucin within the cysts. (B) Columnar cell lining of mucinous cystadenoma.

Endometrioid Tumors

Overview

- They have tubular gland that **resemble the endometrium.**
- Endometrioid tumors form 10 to 20% of all ovarian tumors.
- Most of the endometrioid tumors are **malignant** (carcinomas).
- Some endometrioid tumors are accompanied by an endometrial carcinoma in the uterus and/or endometriosis in the ovaries

Transitional Cell / Brenner tumor

Overview

Tumor cell are transitional cell type. Most are **benign.**

Other Ovarian Tumors

Neoplasm	Peak Incidence	Usual Location	Morphologic Features	Behavior
Germ Cell Origin				
Dysgerminoma	Second to third decade of life Occur with gonadal dysgenesis	Unilateral in 80% - 90%	Counterpart of testicular seminoma Sheets or cords of large clear cells Stroma may contain lymphocytes and occasional granulomas	All malignant but only one-third metastasize; all radiosensitive; 80% cure rate
Choriocarcinoma	First 3 decades of life	Unilateral	Identical to placental tumor Two types of epithelial cells: cytotrophoblast and syncytiotrophoblast	Metastasizes early and widely Primary focus may degenerate, leaving only metastases Resistant to chemotherapy
Sex Cord Tumors				
Granulosa-theca cell	Most postmenopausal, but may occur at any age	Unilateral	Composed of mixture of cuboidal granulosa cells and spindled or plump lipid-laden theca cells Granulosa elements may recapitulate ovarian follicle as Call-Exner bodies	May elaborate large amounts of estrogen Granulosa element may be malignant (5%-25%)
Thecoma-fibroma	Any age	Unilateral	Yellow (lipid-laden) plump thecal cells	Most hormonally inactive About 40% produce ascites and hydrothorax (Meigs syndrome) Rarely malignant
Sertoli-Leydig cell	All ages	Unilateral	Recapitulates development of testis with tubules or cords and plump pink Sertoli cells	Many masculinizing or defeminizing Rarely malignant
Metastases to Ovary				
From any part of the body	Older ages	Mostly bilateral	Anaplastic tumor cells, cords, glands, dispersed through fibrous background Cells may be "signet ring" mucin-secreting	Primaries are gastrointestinal tract (Krukenberg tumors), breast, and lung



Sex Cord-Stromal tumors

Definition

Almost always **Benign**: Thecoma, Fibroma and Fibrothecoma.
With **Malignant** Potential: Granulosa Cell tumor, Sertoli-Leydig cell tumor.

Thecoma-Fibroma

Characteristics

IMPORTANT

- ⊙ Occur at any age.
- ⊙ Unilateral.
- ⊙ Almost always **Benign** and unilateral.
- ⊙ They can be pure fibroma, thecoma or mixture of Characteristics. both (fibrothecoma).
- ⊙ Pure theca cell tumor (thecoma) produce estrogen, while Fibromas do not except when mixed with thecomas.
- ⊙ About 40% cases are **associated with ascites and hydrothorax** and this combination is called as **Meigs Syndrome**: (fibroma or fibrothecoma, with ascites and hydrothorax).



Morphology

- ⊙ Solid tumors (fibroma).
- ⊙ Vary in color from white to yellow (thecoma).
- ⊙ Fibromas are whiter, harder with whorled cut surface.

Granulosa Cell Tumor

IMPORTANT

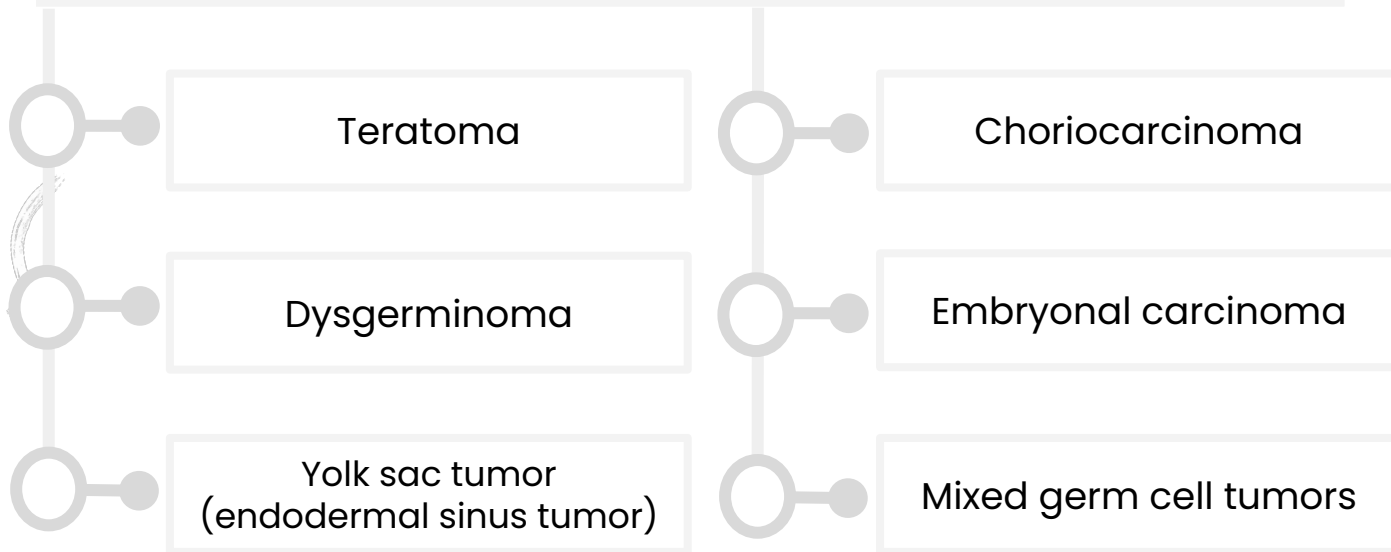
- ⊙ Unilateral, solid and cystic.
 - ⊙ 5 to 25% show malignant behavior.
 - ⊙ **Produce estrogen.**
 - ⊙ Can be associated with **endometrial hyperplasia and carcinoma.**
 - ⊙ 2 forms: adult and juvenile
- 1. The Adult form:** is more common in postmenopausal women and present with abnormal vaginal bleeding.
- 2. The juvenile form:** first three decades, can present with isosexual precocity.

Sertoli-Leydig Cell Tumor

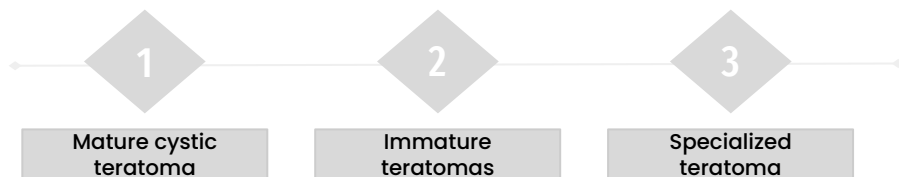
- ⊙ Rare tumors of low malignant potential.
- ⊙ All ages.
- ⊙ Unilateral yellowish solid tumor.
- ⊙ **Produces androgens and present with virilization** in 1/3 of cases (oligomenorrhea, amenorrhea, loss of female secondary sex characteristics with hirsutism, clitoromegaly, deepening of voice).

Germ Cell Tumors

Classification of Ovarian Germ Cell Tumors (GCT)



all ovarian GCTs are considered malignant except mature teratoma.



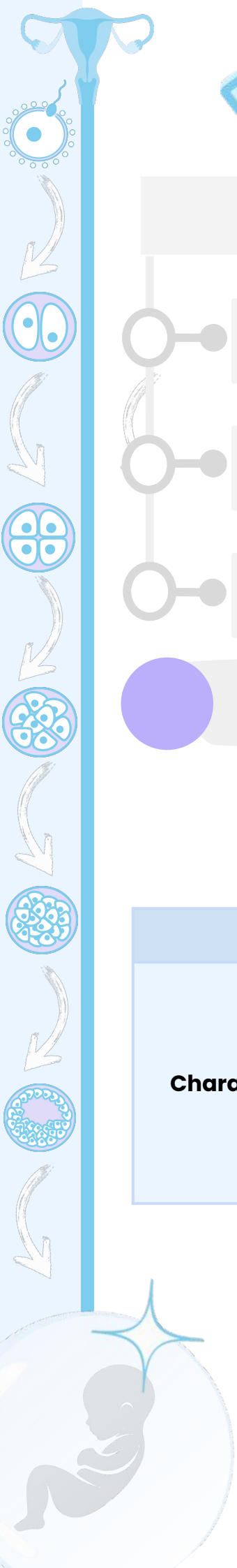
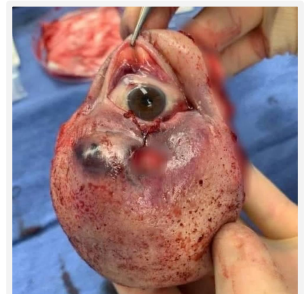
Teratoma

Characteristics

- Teratomas constitute 15% to 20% of ovarian tumors.
- A distressing feature of these germ cell tumors is their predilection to arise in the first 2 decades of life; to make matters worse, the younger the person, the greater the likelihood of malignancy.
- **More than 90% of these germ cell neoplasms, however, are benign mature cystic teratomas; the immature, malignant variant is rare.**

Clinical Note

An Eye tissue extracted From Ovarian Teratoma !



Germ Cell Tumors

1

2

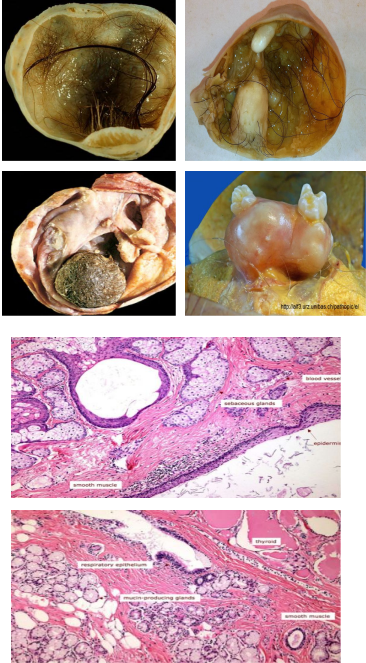
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Mature cystic teratoma

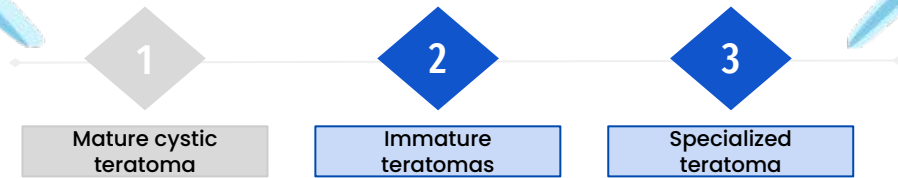
Immature teratomas

Specialized teratoma

Mature cystic teratoma

<p>Overview</p>	<ul style="list-style-type: none"> It is a benign neoplasm that typically occurs during reproductive years composed of mature elements of the ectoderm, endoderm and mesoderm It is a cystic tumor, filled with sebaceous material and hair and occasionally teeth. 	
<p>Epidemiology</p>	<ul style="list-style-type: none"> Is the most common ovarian germ cell tumor and the most common type of ovarian teratoma Most are discovered in young women as ovarian masses or are found incidentally on abdominal radiographs or scans because they contain foci of calcification produced by toothlike structures contained within the tumor. 	
<p>Morphology</p>	<ul style="list-style-type: none"> About 90% are unilateral Histology: skin, hair, sebaceous glands, and mature neural tissue predominate; cartilage, bone, respiratory and intestinal epithelium are common. Are marked by the presence of mature tissues derived from all three germ cell layers: ectoderm, endoderm, and mesoderm. Usually these tumors contain cysts lined by epidermis with adnexal appendages—hence the common designation dermoid cysts. On cut section, they often are filled with sebaceous secretion and matted hair that, when removed, reveal a hair-bearing epidermal lining . 	
<p>clinical manifestation</p>	<ul style="list-style-type: none"> Sometimes there is a nodular projection from which teeth protrude. Occasionally, foci of bone and cartilage, nests of bronchial or gastrointestinal epithelium, or other tissues are present. 	
<p>Prognosis</p>	<ul style="list-style-type: none"> Complications include torsion, rupture, infection etc. For unknown reasons, these neoplasms sometimes produce infertility and are prone to undergo torsion (in 10%–15% of cases), which constitutes an acute surgical emergency. (torsion means when the cyst twist over itself leading to interruption of blood supply so the patient usually present with acute abdominal pain & surgical emergency) Malignant transformation, usually to a squamous cell carcinoma, is seen in about 1% of cases. 	

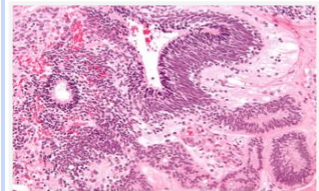
Germ Cell Tumors



Immature teratoma

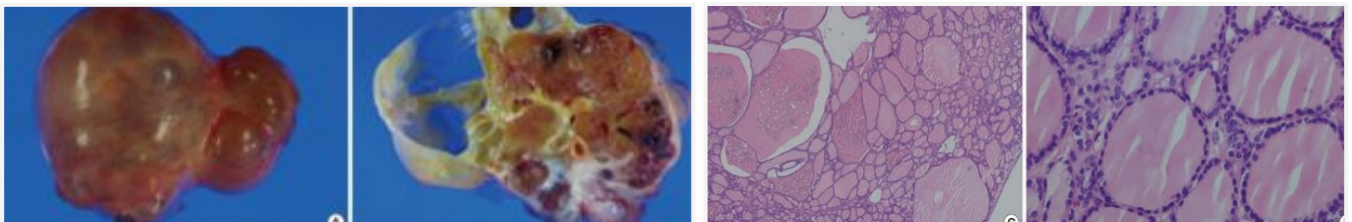
Epidemiology	<ul style="list-style-type: none"> Are found early in life, the mean age at clinical detection being 18 years. Occur in children & young adults.
Morphology	<p>Grossly:</p> <ul style="list-style-type: none"> They typically are unilateral bulky and appear solid on cut section. <p>Microscopically:</p> <ul style="list-style-type: none"> they often contain areas of necrosis. uncommonly, cystic foci are present that contain sebaceous secretion, hair, and other features similar to those of mature teratomas. On microscopic examination, the distinguishing feature is the presence of immature elements or minimally differentiated cartilage, bone, muscle, nerve, or other tissues. Similar to mature teratoma but in addition they contain immature or embryonal tissue especially immature neuroepithelial cells.
Prognosis	<ul style="list-style-type: none"> They are graded based on the amount of immature tissue. As with other tumors, the prognosis depends on grade and stage

IMPORTANT



Specialized \ monodermal teratoma

- A rare subtype of teratoma is composed entirely of specialized tissue (one tissue element).
- The most common example is **struma ovarii**, which is composed entirely of **mature thyroid tissue** that may actually produce hyperthyroidism. The thyroid tissue can subdivided sometimes become malignant.
- These tumors appear as small, solid, unilateral **brown ovarian masses**.
- Other specialized teratomas include ovarian carcinoid, which in rare instances produces carcinoid syndrome.
- Sometimes a carcinoid tumor can arise from it



IMPORTANT

Germ Cell Tumors

Dysgerminoma

- Uncommon & malignant.
- Occur between 10 to 30 years of age.
- Placental-like alkaline phosphatase (PLAP) positive.
- Morphology:

Gross: unilateral and solid mass.

Microscopically: look like its counterpart in testis (**Seminoma**) and brain (germinoma).

- Highly sensitive to radiation therapy.

Endodermal sinus tumor

- known as yolk sac tumor.
- Under 30 years of age.
- Can be pure or a component of a mixed germ cell tumor.
- **Associated with elevated serum alpha-fetoprotein and alpha-1-antitrypsin. +ve alpha-fetoprotein immunostain.**
- **Histopathology: Schiller-Duval bodies.**
- Radioresistant but responds well to chemotherapy.

Embryonal carcinoma

- Rare, aggressive, highly malignant.
- 2nd and 3rd decade (children and young adults).
- Similar to that seen in testis, usually a component of a mixed germ cell tumor (GCT).
- CD30 immunostain positive.
- Morphology: Unilateral, solid, hemorrhagic and necrotic.
- Radioresistant but responds to chemotherapy.

Choriocarcinoma

- Rare, aggressive, highly malignant, metastasizes to the lungs, liver, bone etc.
- Similar to that seen in testis, usually a component of a mixed germ cell tumor (GCT).
- **Elevated serum beta hCG levels, +ve HCG immunostain.**
- Morphology: unilateral, solid, hemorrhagic tumor, composed of **malignant cytotrophoblast and syncytiotrophoblast.**
- Radioresistant AND chemoresistant.

Metastatic carcinoma in ovary

- Accounts for approximately 5% of ovarian tumors.
- Older ages, mostly Bilateral and sometimes very large.
- Primary tumor from Gastrointestinal tract (Most common), breast and lung.
- **One of the most classic forms of metastatic carcinoma involving the ovaries is The Krukenberg tumor.**

Composed of signet ring cells in a fibrous background

The most common sites of origin is the GIT (stomach, colon and appendix).

Summary

- Tumors may arise from epithelium, sex cord–stromal cells, or germ cells.
- Epithelial tumors are the most common malignant ovarian tumors and are more common in women older than 40 years of age.
- The major types of epithelial tumors are serous, mucinous, and endometrioid. Each has a benign, malignant, and borderline (low malignant potential) counterpart.
- Sex cord–stromal tumors may display differentiation toward granulosa, Sertoli, Leydig, or ovarian stromal cell type. Depending on differentiation, they may produce estrogens or androgens.
- Germ cell tumors (mostly cystic teratomas) are the most common ovarian tumor in young women; a majority are benign.
- Germ cell tumors may differentiate toward oogonia (dysgerminoma), primitive embryonal tissue (embryonal), yolk sac (endodermal sinus tumor), placental tissue (choriocarcinoma), or multiple fetal tissues (teratoma).

Deep Focus Question



You have heard Psammoma bodies twice before if you can remember where?

- A. CNS , Meningioma
- B. CNS , MEDULLOBLASTOMA
- C. Endocrine , papillary thyroid carcinoma
- D. Endocrine, medullary carcinoma
- E. GI , Hepatocellular Carcinoma

Answer: A & C

Keywords

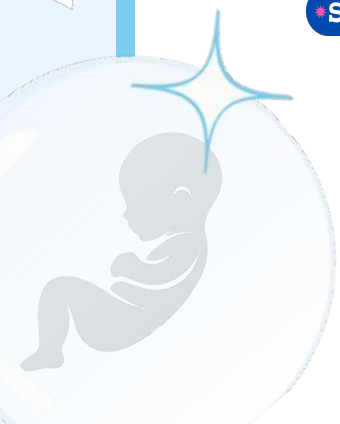
Follicular cyst	<ul style="list-style-type: none"> • from the ovarian follicle • unruptured Graafian follicle 						
Corpus luteum cyst	<ul style="list-style-type: none"> • hemorrhage into a persistent mature corpus luteum 						
Theca lutein cyst	<ul style="list-style-type: none"> • high levels of circulating gonadotropins • pregnancy 						
Polycystic Ovarian Syndrome	<ul style="list-style-type: none"> • Stein-Leventhal syndrome • hyperandrogenism, menstrual abnormalities, polycystic ovaries, chronic anovulation, and decreased fertility • oligomenorrhea, hirsutism , obesity • cystic follicles 						
Epithelial Ovarian Tumors	<ul style="list-style-type: none"> • from the fallopian tube or epithelial cysts • Fimbriated end of the fallopian tube. • Nulliparity, family history, and germline mutations • oral contraceptives reduces the risk. • mutations in the BRCA1 or BRCA2 tumor suppressor genes. 						
	<table border="1"> <tr> <td>Serous Tumors</td> <td> <ul style="list-style-type: none"> • large, spherical to ovoid , most common • bilateral • benign tumors : smooth and glistening • adenocarcinomas : nodular irregularities • clear serous fluid • Psammoma bodies • Malignant : invade the ovarian stroma. • borderline : no stromal invasion • also KRAS & RAS gene family association • TP53 mutations In high grades • NF1 and RB, as well as BRCA1 and BRCA2 in familial ovarian cancers. </td> </tr> <tr> <td>Mucinous Tumors</td> <td> <ul style="list-style-type: none"> • mucin-producing cells (are either endocervical type or intestinal type cells). • Mostly benign • Bilaterality is uncommon. • cystic and multilocular and filled with thick sticky, viscous mucoid fluid. • If it arise from GI called Krukenberg tumor : signet ring cells </td> </tr> </table>	Serous Tumors	<ul style="list-style-type: none"> • large, spherical to ovoid , most common • bilateral • benign tumors : smooth and glistening • adenocarcinomas : nodular irregularities • clear serous fluid • Psammoma bodies • Malignant : invade the ovarian stroma. • borderline : no stromal invasion • also KRAS & RAS gene family association • TP53 mutations In high grades • NF1 and RB, as well as BRCA1 and BRCA2 in familial ovarian cancers. 	Mucinous Tumors	<ul style="list-style-type: none"> • mucin-producing cells (are either endocervical type or intestinal type cells). • Mostly benign • Bilaterality is uncommon. • cystic and multilocular and filled with thick sticky, viscous mucoid fluid. • If it arise from GI called Krukenberg tumor : signet ring cells 		
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Endometrioid Tumors	<ul style="list-style-type: none"> • resemble the endometrium • malignant Mostly • May accompanied with endometrial carcinoma 						
Sex Cord–Stromal tumors	<table border="1"> <tr> <td>Thecoma–Fibroma</td> <td> <ul style="list-style-type: none"> • Unilateral , Benign • Theca cell produce estrogen • associated with ascites and hydrothorax “ Meigs Syndrome ” </td> </tr> <tr> <td>Granulosa Cell Tumor</td> <td> <ul style="list-style-type: none"> • Unilateral • Produce estrogen Thus associated with endometrial hyperplasia and carcinoma </td> </tr> <tr> <td>Sertoli–Leydig Cell Tumor</td> <td> <ul style="list-style-type: none"> • low malignant potential. • Unilateral • Produces androgens and present with virilization : male characteristic </td> </tr> </table>	Thecoma–Fibroma	<ul style="list-style-type: none"> • Unilateral , Benign • Theca cell produce estrogen • associated with ascites and hydrothorax “ Meigs Syndrome ” 	Granulosa Cell Tumor	<ul style="list-style-type: none"> • Unilateral • Produce estrogen Thus associated with endometrial hyperplasia and carcinoma 	Sertoli–Leydig Cell Tumor	<ul style="list-style-type: none"> • low malignant potential. • Unilateral • Produces androgens and present with virilization : male characteristic
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Keywords

Germ cell tumors	Teratomas	Mature cystic teratoma	<ul style="list-style-type: none"> benign & unilateral composed of mature elements of the ectoderm, endoderm and mesoderm. Histology: skin, hair, sebaceous glands, and mature neural tissue cysts lined by epidermis with adnexal appendages
		Immature teratomas	<ul style="list-style-type: none"> malignant & unilateral Occur in children & young adults. immature elements or minimally differentiated cartilage, bone, muscle, nerve, or other tissues. neuroepithelial cells.
		Monodermal teratoma:	<ul style="list-style-type: none"> struma ovarii. which is composed entirely of mature The tumors are thyroid tissue
	Dysgerminoma	<ul style="list-style-type: none"> malignant Placental-like alkaline phosphatase (PLAP) positive. 	
	Endodermal sinus tumor	<ul style="list-style-type: none"> yolk sac tumor. elevated serum alpha-fetoprotein and alpha-1-antitrypsin. Schiller-Duval bodies. 	
	Embryonal carcinoma	<ul style="list-style-type: none"> component of a mixed germ cell tumor (GCT). CD30 immunostain positive. hemorrhagic and necrotic. 	
	Choriocarcinoma	<ul style="list-style-type: none"> aggressive, highly malignant, component of a mixed germ cell tumor (GCT). Elevated serum beta hCG levels, +ve HCG immunostain. malignant cytotrophoblast and syncytiotrophoblast. 	



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YOU VS MCQs



Question 1

Which ovarian tumor type is not derived from the cells on the surface of the ovary?

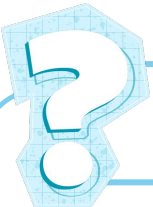
- Serous tumor
- Dysgerminoma
- Brenner tumor
- Endometrioid tumor



Question 2

Histopathology of an ovarian lesion in a 24 years old female showed a solid cystic tumor, cartilage, bone, squamous epithelium, primitive embryonal neuroepithelial cells?

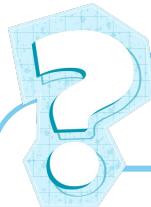
- Mature teratoma
- Monodermal teratoma
- Immature teratoma
- Malignant transformation teratoma



Question 3

Which of the following is a germ cell layer tumor of the ovary?

- Benign cystic teratoma
- Serous adenocarcinoma
- Mucinous cystadenoma
- Endometrioid tumors



Question 4

A women with ovarian mass , on histopathology it was similar to testicular seminoma

- Chorionic carcinoma
- mature teratoma
- Dysgerminoma
- serous cystadenocarcinoma

YOU VS MCQs



Question 5

Which of the following is associated with endometrial hyperplasia

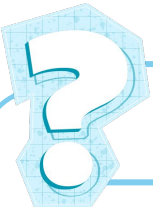
- Dysgerminoma
- Sertoli-leydig cell tumors
- Granulosa cell tumor
- Serous carcinoma



Question 6

Which of the following diseases is associated with BRCA2 mutations?

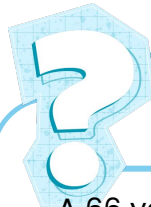
- Mucinous tumors
- Leiomyoma
- Fibrothecoma
- Sertoli-leydig cell tumors



Question 7

A 25 year old female was discovered to have a tumor with high levels of alpha-fetoprotein in the serum. What is most likely the diagnosis?

- Seminoma
- Embryonal carcinoma
- Thecoma
- Endodermal sinus tumor



Question 8

A 66 years old woman presented with large bulky ovarian masses. Histological examination of the ovarian mass shows numerous malignant signet ring cells. What is the diagnosis?

- Granulosa cell tumor
- Brenner tumor
- Krukenberg tumor
- Serous cystadenocarcinoma

Cases

1. A 30-year-old woman presents with a 5-month history of increasing abdominal girth and pelvic discomfort. Imaging studies reveal a mass replacing the left ovary. A multilocular tumor filled with thick, viscous fluid is removed (shown in the image). Tumor spaces are lined by mucinous, columnar epithelial cells, showing no evidence of atypia. There are no papillary structures and no evidence of stromal invasion. Which of the following is the appropriate pathologic diagnosis?



- | | | | |
|----------------------------------|--------------------------------|-------------------------|------------------------------|
| A. Endometrioid adenoma of ovary | B. Mucinous cystadenocarcinoma | C. Mucinous cystadenoma | D. Serous cystadenocarcinoma |
|----------------------------------|--------------------------------|-------------------------|------------------------------|

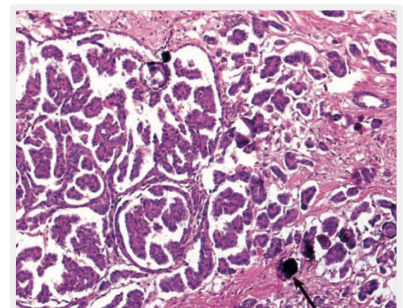
2. The ovarian tumor described in Question 1 most closely resembles which of the following patterns of müllerian-type differentiation?

- | | | | |
|-------------------------------------|--|--------------------------|-----------------------------|
| A. Epithelium of the fallopian tube | B. Glandular epithelium of the endometrium | C. Mucosa of the bladder | D. Mucosa of the endocervix |
|-------------------------------------|--|--------------------------|-----------------------------|

3. A 50-year-old woman who has a family history of breast cancer presents with a 6-month history of increasing abdominal girth. On close questioning, she volunteers a history of vague abdominal pain dating back 1 year. She has no children and has never been pregnant. Bimanual pelvic examination reveals a 10-cm right adnexal mass. Percussion of the abdomen indicates ascites. Aspiration cytology of the ascites fluid reveals malignant papillary structures with psammoma bodies. A mutation in which of the following genes is most likely associated with this patient's malignant disease?

- | | | | |
|----------|--------|-------|--------|
| A. BRCA1 | B. p53 | C. Rb | D. VHL |
|----------|--------|-------|--------|

4. The patient described in Question 3 undergoes surgery to have the mass removed. Histologic examination of the surgical specimen is shown in the image. The arrow points to a calcified focus (psammoma body). This neoplasm most likely originated from which of the following ovarian cells/tissues?



- | | | | |
|---------------|--------------------|-------------------------|-----------------------|
| A. Germ cells | B. Granulosa cells | C. Sertoli-Leydig cells | D. Surface epithelium |
|---------------|--------------------|-------------------------|-----------------------|



1-C / 2-D / 3-A / 4-D



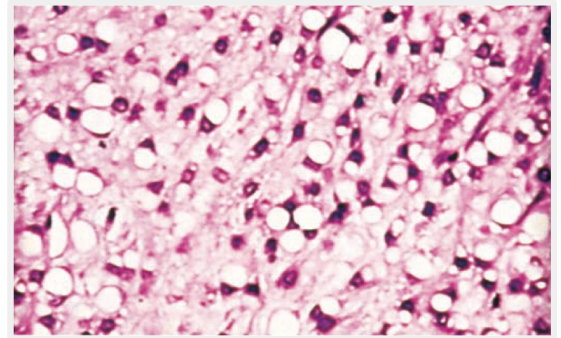
NEED EXPLANATION ? [CLICK HERE](#)

Cases

5. Which of the following statements best characterizes the endocrine status of the malignant cells in the patient described in Questions 3 and 4?

- | | | | |
|----------------------------------|--|---------------------------------------|-----------------------------------|
| A. They are hormonally inactive. | B. They cause polyuria and polydipsia. | C. They secrete polypeptide hormones. | D. They secrete steroid hormones. |
|----------------------------------|--|---------------------------------------|-----------------------------------|

6. A 40-year-old woman presents with 6 months of increasing abdominal girth. Gynecologic examination reveals large bilateral ovarian masses. The patient undergoes bilateral oophorectomy. The pathology report reads "Krukenberg tumor," and the histopathologic findings are shown in the image. Which of the following tests would likely provide the highest diagnostic yield?

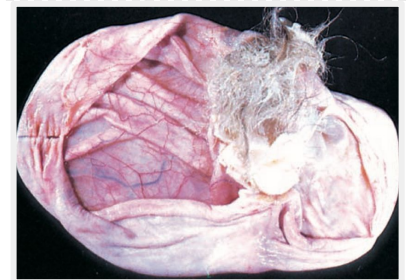


- | | | | |
|--------------------|---|--------------------|----------------------|
| A. Serum AFP level | B. Biopsy of the cervix and endometrial curettage | C. Serum hCG level | D. Gastric endoscopy |
|--------------------|---|--------------------|----------------------|

7. A 15-year-old girl presents with left lower abdominal pain. She has noted recent enlargement of her breasts. Her last menstrual period was 10 weeks ago. She denies having had sexual intercourse. Serum levels of hCG are markedly elevated. Which of the following is the most likely diagnosis?

- | | | | |
|--------------------|---------------------------|------------------------------|-----------------------|
| A. Choriocarcinoma | B. Mature cystic teratoma | C. Serous cystadenocarcinoma | D. Yolk sac carcinoma |
|--------------------|---------------------------|------------------------------|-----------------------|

8. A 20-year-old woman presents for a complete physical examination. During the pelvic examination, a 5-cm cystic mass is found in the region of the right ovary. Radiographs show focal calcifications in the mass. The tumor is removed, and the surgical specimen is shown in the image. Which of the following is the most likely diagnosis?



- | | | | |
|--------------------|-------------------------|------------------------------|--------------------|
| A. Mature teratoma | B. Mucinous cystadenoma | C. Serous cystadenocarcinoma | D. Teratocarcinoma |
|--------------------|-------------------------|------------------------------|--------------------|

9. A 43-year-old woman presents with a 6-month history of increasing abdominal girth. On physical examination, there is pronounced ascites. Pelvic examination reveals a left adnexal mass. A 6-cm ovarian tumor is removed. The tumor is solid and white. Histologically, it is composed of cells resembling normal ovarian stroma surrounded by collagen fibers. Which of the following is the appropriate diagnosis?

- | | | | |
|------------|-------------------------|--------------------------|------------------------------|
| A. Fibroma | B. Granulosa cell tumor | C. Papillary cystadenoma | D. Sertoli-Leydig cell tumor |
|------------|-------------------------|--------------------------|------------------------------|



5-A / 6-D / 7-A / 8-A / 9-A



NEED EXPLANATION ? [CLICK HERE](#)

Cases

10. A 25-year-old woman presents with a 6-month history of increasing facial hair, deepened voice, and amenorrhea. Physical examination confirms virilization. A CT scan reveals a left ovarian mass. The tumor is surgically removed. It measures 10 cm in diameter and has a yellowish-tan appearance on cross section. The tumor is malignant and consists of two distinct cell populations. Some cells form solid nests, whereas others are arranged in trabecular and gland-like structures. Which of the following is the appropriate diagnosis? (HARD)

- | | | | |
|-----------------|-------------------------|---------------------------|------------------------------|
| A. Dysgerminoma | B. Granulosa cell tumor | C. Mature cystic teratoma | D. Sertoli-Leydig cell tumor |
|-----------------|-------------------------|---------------------------|------------------------------|

11. A 25-year-old woman presents with a 6-month history of breast enlargement and menstrual irregularities. An endometrial biopsy 3 months previously showed complex hyperplasia without atypia. A CT scan of the pelvis reveals a left ovarian mass, which is subsequently removed. The surgical specimen is solid and yellow, and measures 8 cm in diameter. Histologically, it is composed of lipid-laden theca cells. Following removal of this neoplasm, a marked decrease in serum levels of which of the following hormones would be expected in this patient?

- | | | | |
|---------------------------|-------------|-----------------|--------------|
| A. Chorionic gonadotropin | B. Estrogen | C. Progesterone | D. Prolactin |
|---------------------------|-------------|-----------------|--------------|

12. A 34-year-old woman presents with increasing abdominal girth of 3 months in duration. Physical examination reveals a left ovarian mass and mild ascites. The ovarian mass is removed, and the pathology report states "yolk sac carcinoma." Which of the following provides the best serologic marker to monitor the course of disease in this patient after surgery?

- | | | | |
|-------------------------|----------------------|---------------------------------|---|
| A. Alkaline phosphatase | B. Alpha-fetoprotein | C. Human chorionic gonadotropin | D. Sex hormones (estrogen/progesterone) |
|-------------------------|----------------------|---------------------------------|---|



10-D / 11-B / 12-B



NEED EXPLANATION? [CLICK HERE](#)

Cases

EXTRA CASES MAY REQUIRE EXTRA INFO

1. A 50-year-old woman comes to the clinic due to fatigue and difficulty breathing. The patient is generally healthy, but over the past few months, she has experienced progressive fatigue and dyspnea. She also has noticed an increase in her weight without changes in her diet. Her last menstrual cycle was 2 years ago; since then, she has had some mild hot flashes that have resolved without treatment. The patient's last Pap smear 2 years ago was normal, and she has no history of a sexually transmitted disease or abnormal uterine bleeding. Family history is noncontributory. Vitals are within normal limits. On physical examination, heart sounds are normal. There are decreased breath sounds at the lung bases bilaterally and dullness to percussion. Abdominal examination reveals shifting dullness but no peritoneal signs. On pelvic examination, a right-sided, non-tender adnexal mass is noted but the rest of the exam is within normal limits. On ultrasound examination, a calcified hypoechoic mass is observed. Based on these features alone, which of the following is the most likely diagnosis?

- | | | | |
|--------------------|------------|-------------------------|---------------------------|
| A. Choriocarcinoma | B. Fibroma | C. Granulosa cell tumor | D. Mature cystic teratoma |
|--------------------|------------|-------------------------|---------------------------|

2. A 25-year-old woman comes to the clinic due to increased facial hair growth. The patient states that over the past 6 months, hair started growing on her face and abdomen. She also describes mild pelvic discomfort that has minimal impact on her daily routine. Medical history is notable for a chlamydia infection at age 20, which was managed with antibiotics, and asthma, for which the patient takes albuterol and inhaled corticosteroids. She is sexually active with her partner of 6 months and uses condoms for contraception. The patient's last Pap smear 6 months ago was normal. Menstrual cycles occur at regular 28 days intervals and last for 3 days of mild flow. Vitals are within normal limits. BMI is 30 kg/m². Physical examination shows coarse dark hair on the chin and abdomen. On vaginal examination, clitoromegaly is noted. Which of the following is the most likely etiology?

- | | | | |
|-------------------------------------|------------|-------------------------|------------------------------|
| A. Polycystic ovary syndrome (PCOS) | B. Thecoma | C. Granulosa cell tumor | D. Sertoli-Leydig cell tumor |
|-------------------------------------|------------|-------------------------|------------------------------|

4. A 28-year-old primigravida at 24 weeks gestation comes to the clinic due to abnormal facial hair growth. The patient has received consistent prenatal care and takes prenatal vitamins regularly. At the first prenatal appointment, ultrasound confirmed a twin intrauterine pregnancy with 2 normal fetal heartbeats. The patient's medical history is unremarkable. Menarche was at age 14, and the patient's menstrual cycle occurred every 28 days, lasting for 3-4 days. During the past few weeks, the patient noticed hair growth on her chin, upper lip, and abdomen. She has also experienced mild abdominal discomfort, which she assumed to be normal. Vitals signs are within normal limits. On physical examination, dark hair is noted on the face and abdomen. Pelvic examination reveals bilateral adnexal masses. Abdominal ultrasound shows a normal twin intrauterine pregnancy and bilateral multiseptated cystic adnexal masses. Which of the following is the most likely diagnosis?

- | | | | |
|-------------------------------------|-----------------------|------------------------|---------------------|
| A. Polycystic ovary syndrome (PCOS) | B. Theca lutein cysts | C. Corpus luteal cysts | D. Follicular cysts |
|-------------------------------------|-----------------------|------------------------|---------------------|

Cases

EXTRA CASES MAY REQUIRE EXTRA INFO

4. A 55-year-old woman comes to the clinic due to uterine bleeding and breast tenderness. Over the past 2 months, the patient has noted occasional bloody spotting on her underwear which requires using multiple pads throughout the day. In addition, she noticed her breasts have become tender and mildly swollen. She has no urinary symptoms. Menopause occurred 5 years ago. The patient's last Pap smear 1 year ago was normal. Family history is remarkable for breast cancer in her mother at age 65 and diabetes mellitus in her father. The patient does not smoke or use alcohol or illicit drugs. Vitals are within normal limits. On physical examination, both breasts appear engorged but without expressible discharge. Vaginal examination is normal other than minimal blood in the vaginal vault. Pelvic examination reveals a left-side adnexal mass. Laboratory tests show the following: The patient's mass is most likely predominantly composed of which of the following cell types?

Laboratory value	Result
Serum	
CA 125	-
Inhibin	-
anti mullerian hormone (AMH)	-
Alpha-fetoprotein (AFP)	-
LDH	-
Estradiol (E2)	+
Testosterone	-
hCG	-

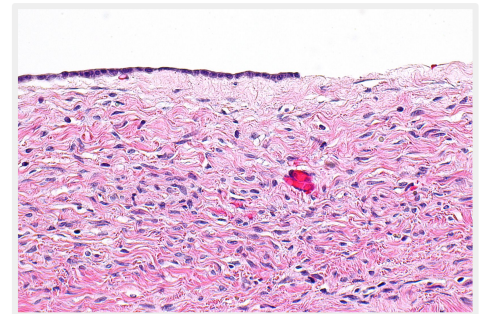
A. Fibroblasts

B. Granulosa cells

C. Undifferentiated germ cells

D. Theca cells

5. A 35-year-old woman comes to the emergency department due to abdominal pain that started suddenly several hours ago. Two hours ago, the patient felt a sudden, sharp pain in the lower abdomen during a routine workout at the gym. Since then, she has felt nauseated and vomited twice. Medical history is unremarkable. She denies any trauma or history of similar symptoms, vaginal bleeding, unprotected sexual intercourse, or history of sexually transmitted diseases. Temperature is 37°C (98.6°F), pulse is 98/min, respirations are 16/min and blood pressure is 127/74 mmHg. On physical examination, there is no guarding, but severe, right adnexal tenderness is noted. Urine pregnancy test is negative. Doppler ultrasound confirms the diagnosis of ovarian torsion and a thin-walled, unilocular cystic mass filled with anechoic fluid is visualized. The patient subsequently undergoes ovarian cystectomy and detorsion. The results of the histopathological examination are shown: Which of the following is the most likely diagnosis?



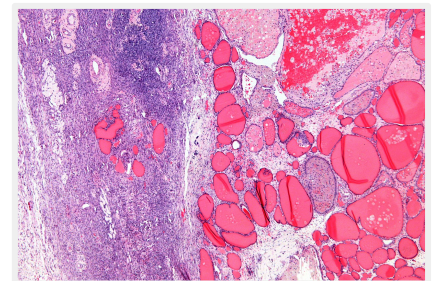
A. Mucinous cystadenoma

B. Endometrioma

C. Serous cystadenoma

D. Mature cystic teratoma

6. A 30-year-old woman comes to the clinic due to intermittent sensations that her heart is racing. Over the past 2 months, the patient has experienced palpitations and lost 2.7 kg (6 lbs) without changes in her diet. The patient also notes she is sweating more than usual, which often makes her change her clothes to avoid embarrassment. Last menstrual cycle was 8 weeks ago, but it previously occurred every 28 days. The patient is sexually active with her partner, and they use condoms consistently. Temperature is 37.7°C (99.8°F), pulse is 110/min and irregular, and blood pressure is 135/85 mmHg. On physical examination, the thyroid gland is normal and nontender without nodules. The breasts appear normal. Pelvic examination shows a normal-sized uterus. A right-sided adnexal mass is palpated. Laboratory studies reveal TSH levels of 0.1 µU/mL. She subsequently undergoes laparoscopic unilateral salpingo-oophorectomy. The results of the pathohistological analysis are shown below:



A. Sertoli-Leydig cell tumor

B. Yolk sac tumor

C. Choriocarcinoma

D. Teratoma

Pathology Team

Leader

لمى العتيبي

Leader

زياد العتيبي



سديم يحيى



الجوهرة الوهبي



رغد المصلح



هياء العجمي



عائشة إبراهيم



ريناد صالح الشهري



ألين الكلية



ريماس المحمود



شادن الهزاني



دانه المحيسن



مريم الغنام



لؤي الحديثي



ساره الدوسري



الدانه عبدالله



محمد العرفج



فيصل الشويعر



هدى الجدعان



ساره الشهراني



رند ابا الخيل



محمد السلامة



ليان الرويلي



أفنان الأحمري



وجد المطيري



عبدالمحسن الدايل



ساره العجاي



هيا الزير



ريوف الأحمري



أريج القريني



رغد الحامد



محمد معشي



سلطان البقمي



عبدالله الزامل



مشعل الدخيل



يزيد المطيري



شوق الخليفة



رزان السطيحي



سلمى السعدون



ريما القرني



عروب المحمود