

Other Germ Cell Tumors

Ovarian embryonal carcinoma · polyembryoma · mixed germ cell tumors

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Learning objectives

- Define the three entities grouped under “other germ cell tumors”.
- Use differentiation patterns to recognize the constituents of mixed ovarian tumors.
- Contrast embryonal carcinoma with dysgerminoma and extraembryonic elements.
- Apply morphology and markers without overinterpreting source-limited findings.

The scope of “other germ cell tumors”

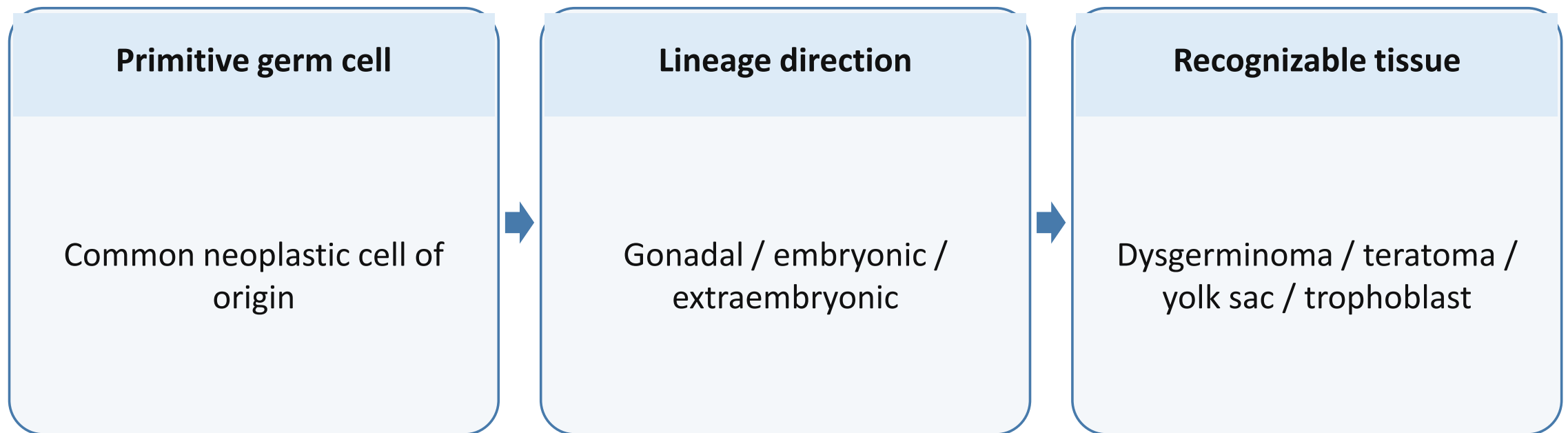
Entity	Core definition	Key diagnostic idea
Embryonal carcinoma	Malignant primitive embryonal neoplasm	Morphologically similar to testicular embryonal carcinoma
Polyembryoma	Malignant tumor containing embryoid bodies	An uncommon embryoid pattern
Mixed germ cell tumor	Combination of more than one germ-cell subtype	Identify each constituent independently

Location within ovarian tumor taxonomy

- Ovarian germ cell tumors are a distinct family from epithelial and sex cord–stromal tumors.
- The germ-cell family includes mature and immature teratomas, dysgerminoma, yolk sac tumor, choriocarcinoma and rarer types.
- The “other” heading encompasses uncommon pure neoplasms and tumors with multiple germ-cell components.

Differentiation explains the ovarian germ-cell spectrum

Teaching schematic: Classification follows the line of differentiation expressed by tumor cells.



Major ovarian germ-cell differentiation patterns

Pattern	Tumor	Recognizable hallmark
Germ-cell / oogonial	Dysgerminoma	Primitive uniform cells; lymphocyte-rich septa
Embryonic tissue	Teratoma	Mature or immature tissue derivatives
Yolk-sac lineage	Yolk sac tumor	Schiller–Duval body; AFP-associated droplets
Placental lineage	Choriocarcinoma	Trophoblast; hCG production
Primitive embryonal	Embryonal carcinoma	Markedly atypical embryonal-type epithelium

How common are ovarian germ-cell tumors?

- As a family they account for approximately 15%–20% of ovarian tumors.
- Most are benign mature cystic teratomas in patients of reproductive age.
- The less common malignant germ-cell neoplasms become particularly relevant in children and younger adults.
- These background proportions do not describe the frequency of embryonal carcinoma or polyembryoma individually.

Pure and mixed describe composition

Pure germ-cell tumor

- One histologically recognized germ-cell tumor type is identified.
- The designation does not by itself specify stage or prognosis.

Mixed germ-cell tumor

- Two or more distinct germ-cell histologies coexist.
- Each component must be described; One component should not be assumed to represent the entire mass.

A conceptual map of a mixed tumor

Dysgerminoma

Teratoma

Yolk sac

Choriocarcinoma

Interpretation

- Different histologic regions can coexist in one ovarian mass.
- The schematic does not represent a patient specimen.
- Each region requires its own morphologic interpretation.

Three questions to ask at initial review

- Is the neoplasm composed of one histologic population or multiple populations?
- If primitive cells are present, do their cytologic and architectural features resemble embryonal carcinoma or dysgerminoma?
- Do differentiated areas support yolk-sac, trophoblastic, or teratomatous elements?
- Can every proposed component be supported by histology and appropriate ancillary findings?

Embryonal carcinoma: Definition

- A highly malignant germ-cell neoplasm composed of primitive embryonal elements.
- The ovarian form is as histologically similar to testicular embryonal carcinoma.
- The detailed features below are drawn from that testicular morphologic comparator—not from an ovarian outcome series.

Primitive embryonal versus oogonial differentiation

Embryonal carcinoma

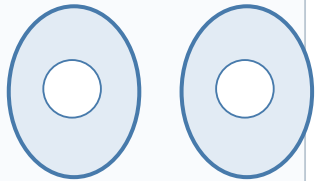
- Primitive epithelial-like cells with substantial nuclear atypia.
- Architectural patterns can include tubules, alveoli, papillae and sheets.

Dysgerminoma

- More uniform large cells with clear cytoplasm and recognizable borders.
- Fibrous septa are commonly populated by lymphocytes.

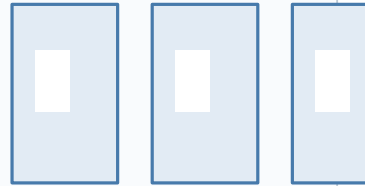
Embryonal carcinoma: Architectural vocabulary

Tubular



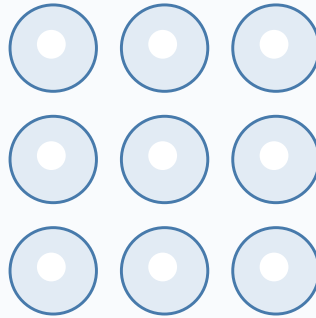
Schematic

Alveolar / cleft-like



Schematic

Solid



Schematic

Interpretation

- Alveolar or tubular arrangements may be present.
- Papillary folding and solid areas may occur.
- Original pattern schematic; Not H&E evidence.

Embryonal carcinoma: Cytologic profile

- Large epithelial-appearing cells show pronounced anaplasia.
- Nuclei are hyperchromatic, with multiple prominent nucleoli.
- Cell and nuclear sizes and shapes vary considerably (pleomorphism).
- Cell borders are commonly indistinct, unlike the crisp borders in typical dysgerminoma.

Atypia and cellular turnover

- The comparator frequently contains mitotic figures.
- Tumor giant cells may accompany the high-grade epithelial-like component.
- Necrosis and hemorrhage can accompany aggressive tumor growth.
- These changes support concern but do not independently establish an ovarian subtype.

Embryonal morphology: Architecture and cytology

Architectural clues

- Alveolar and tubular patterns
- Papillary folds
- Solid sheets with cleft-like spaces

Cytologic clues

- Large anaplastic epithelial cells
- Hyperchromasia and prominent nucleoli
- Pleomorphism; Indistinct borders; Mitoses

Gross examination: Comparator evidence

- Testicular embryonal carcinoma is often variegated on sectioning because of necrosis and hemorrhage.
- Robbins does not provide a separate gross specification for ovarian embryonal carcinoma in this heading.
- In an ovarian mixed tumor, gross heterogeneity is a reason to correlate distinct regions with microscopy—not proof of any one lineage.

IHC patterns in the Robbins testicular comparator

Marker	Embryonal carcinoma	Seminoma comparator
OCT3/4	Typically positive	Typically positive
SALL4	Typically positive	Not specified here in this contrast
Cytokeratin	Typically positive	Typically negative
KIT	Typically negative	Typically positive
Podoplanin	Typically negative	Typically positive

How to transfer comparator IHC cautiously

- The positive and negative stain patterns on the preceding slide are stated for testicular tumors.
- Ovarian dysgerminoma is independently described as expressing OCT3, OCT4, NANOG and KIT.
- The ovarian embryonal carcinoma paragraph itself gives no standalone sensitivity estimates or required panel.
- Use this cross-gonadal comparison as a teaching clue, not an unqualified ovarian diagnostic rule.

Primitive ovarian germ-cell differential

Feature	Embryonal carcinoma*	Dysgerminoma
Nuclear morphology	Marked pleomorphism; prominent nucleoli	More uniform, central regular nuclei
Cell borders	Often indistinct	Well defined
Growth pattern	Alveolar / tubular / sheets	Sheets or cords with fibrous septa
Inflammation	No defining septal feature given	Lymphocyte-rich stroma common
Reference caveat	*Morphology from testicular analogue	Ovarian description in Ch. 22

Do not diagnose from “primitive” appearance alone

- A primitive-looking ovarian germ-cell tumor is not automatically embryonal carcinoma.
- Evaluate epithelial-like architecture, pleomorphism, cell borders and septal lymphocytes together.
- Consider whether a sample is part of a heterogeneous, mixed neoplasm.
- If morphology and markers conflict, revisit sampling and interpretation before committing to a lineage.

What the source establishes about behavior

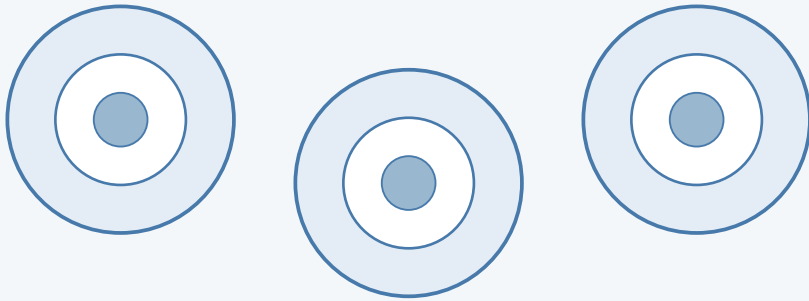
- Robbins explicitly calls ovarian embryonal carcinoma highly malignant.
- The ovarian subsection provides neither an isolated stage-specific survival estimate nor a distinctive molecular driver.
- The testicular comparator is described as more aggressive than seminoma and commonly showing vascular–lymphatic invasion.
- Do not transpose numerical prognostic estimates from testis to ovary.

Polyembryoma: The essential identity

- Polyembryoma as a malignant ovarian germ-cell tumor.
- Its defining descriptive feature is the presence of embryoid bodies.
- The source does not supply detailed ovarian gross findings, an IHC signature or outcome rates for this entity.

Embryoid bodies: Simplified concept

Abstract embryoid forms



NOT diagnostic histology

Interpretation

- The central teaching term is “embryoid body.”
- Arrangement is deliberately stylized, not a validated microscopic image.
- Recognizing the rare entity requires actual histologic assessment.

Polyembryoma and embryonal carcinoma are distinct labels

Embryonal carcinoma

- Defined as a highly malignant tumor of primitive embryonal elements.
- Robbins supplies a testicular histologic analogue with cytologic detail.

Polyembryoma

- Defined by embryoid bodies in an ovarian germ-cell malignancy.
- The supplied passage gives no equivalent detailed morphologic or marker profile.

Polyembryoma: Evidence-based diagnostic restraint

- The presence of the word “embryoid” does not make polyembryoma synonymous with embryonal carcinoma.
- The descriptive source is too limited to build a validated multi-feature diagnostic algorithm for polyembryoma.
- A pattern suggestive of embryoid bodies should prompt precise morphology review, not an invented immunostain rule.
- No specific prevalence or survival percentage is provided here.

Why rare categories matter in mixed tumors

- A rare ovarian germ-cell phenotype may be focal rather than the dominant gross appearance.
- The label must correspond to demonstrable tissue architecture, not merely a broad “primitive germ-cell” impression.
- A mixed diagnosis is more informative when individual tumor components are explicitly identified.
- These are diagnostic-reasoning principles; The source does not prescribe a sampling count.

Mixed germ-cell tumor: Source definition

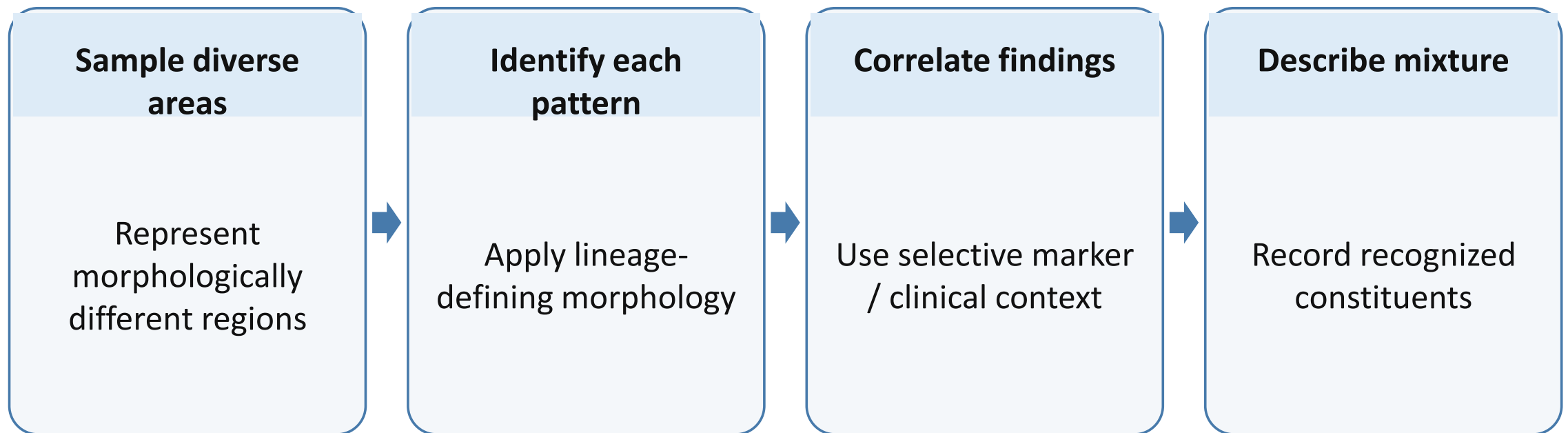
- A tumor containing more than one distinct germ-cell tumor type.
- Dysgerminoma, teratoma, yolk sac tumor and choriocarcinoma as possible components.
- “Mixed” communicates histologic composition; It is not synonymous with a specific marker pattern.

Four components explicitly listed

Component	Differentiation	Signature to seek
Dysgerminoma	Germ-cell/oogonial	Uniform clear cells; lymphocyte-rich fibrous septa
Teratoma	Somatic tissue differentiation	Mature or immature tissues; immature neuroepithelium
Yolk sac tumor	Extraembryonic yolk sac	Schiller–Duval bodies; AFP-associated globules
Choriocarcinoma	Trophoblastic / placental	Cytotrophoblast + syncytiotrophoblast; hCG

Mixed tumor: From gross regions to component diagnosis

Schematic diagnostic workflow; The source gives no mandatory block count.



Why heterogeneity creates sampling risk

- A solid and pale region may not have the same histology as a hemorrhagic or cystic region.
- Dysgerminoma is often soft and fleshy; Teratomas may contain recognizable differentiated tissues.
- Embryonal or trophoblastic elements may coexist in a tumor with another dominant pattern.
- Thus a small selected sample may not capture the complete histologic mixture.

Morphology-directed tissue evaluation

Pale, solid area

- Consider dysgerminoma-type architecture.
- Check for uniform cells and lymphocytic septa.

Cystic / tissue-rich area

- Look for differentiated tissue types.
- Determine whether immature neuroepithelium is present.

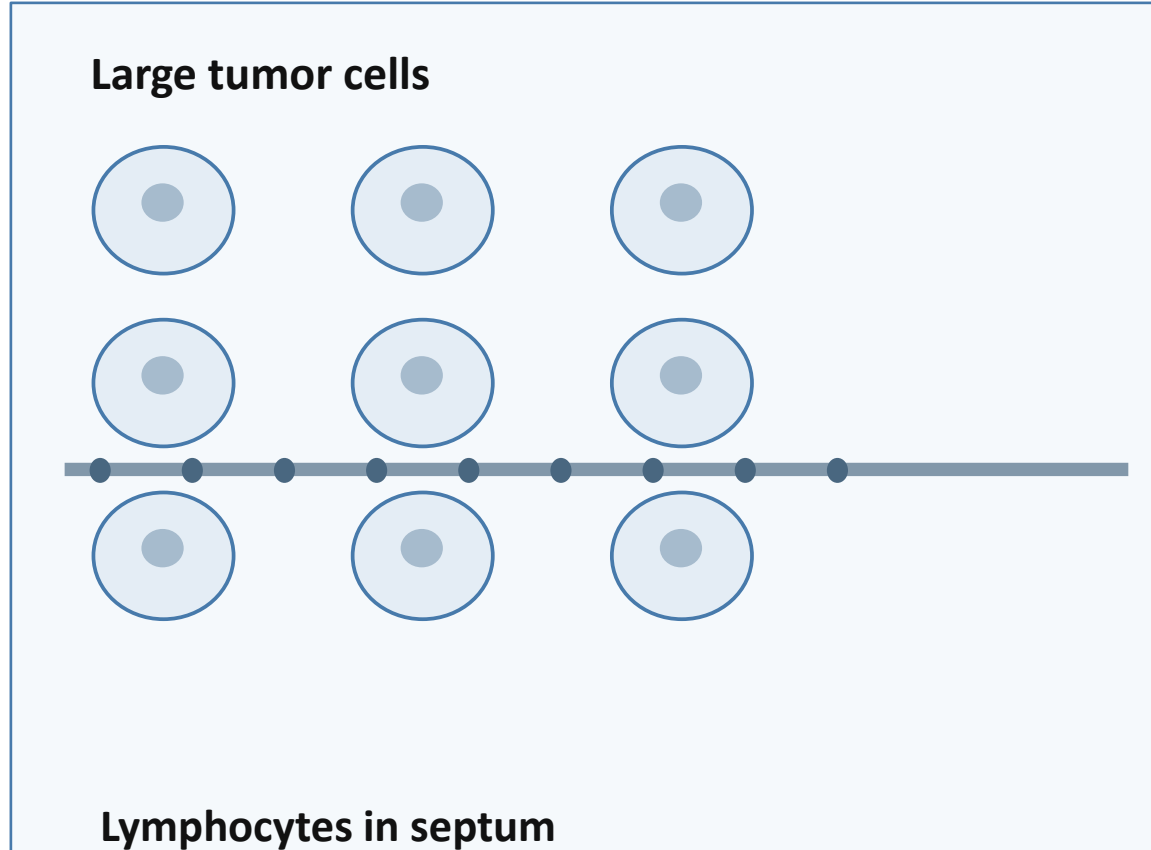
Hemorrhagic / variegated area

- Review for primitive or trophoblastic elements.
- Do not classify from gross color alone.

Dysgerminoma: Recognizable histology

- Sheets or cords of large vesicular cells with clear cytoplasm and distinct boundaries.
- Nuclei are centrally located and relatively regular.
- Scant fibrous septa are infiltrated by lymphocytes; Granulomas may also occur.
- Dysgerminoma as the ovarian counterpart of testicular seminoma.

Dysgerminoma architecture: Schematic



Interpretation

- Large tumor cells arranged in lobules or sheets.
- Lymphocytes are concentrated within intervening fibrous septa.
- Native drawing; Not a photomicrograph.

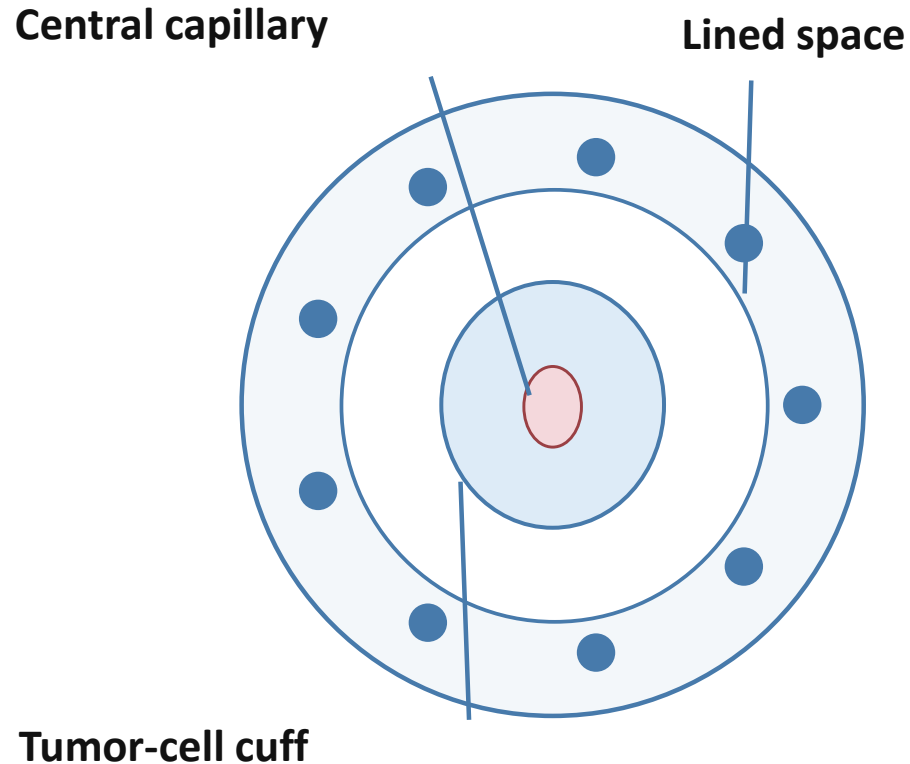
Dysgerminoma: Lineage-related markers

- The pluripotency-associated transcription factors OCT3, OCT4 and NANOG.
- Expression of KIT is a notable characteristic; The book discusses activating KIT alterations.
- These findings provide context when separating dysgerminoma from other primitive germ-cell patterns.
- The histologic distribution and architectural pattern remain indispensable.

Yolk sac tumor: Extraembryonic lineage

- A malignant ovarian germ-cell tumor showing yolk-sac differentiation.
- The tumor produces α -fetoprotein (AFP), also found in intracellular or extracellular hyaline globules.
- A Schiller–Duval body is a recognizable glomerulus-like architectural clue.
- Yolk sac tumor may represent one constituent of a mixed ovarian neoplasm.

Schiller–Duval body: Native schematic



Interpretation

- A central capillary lies within a projection of tumor cells.
- A surrounding space is lined by additional tumor cells.
- The complete architecture resembles a primitive glomerulus.

Yolk sac tumor: Morphology beyond one structure

- Schiller–Duval bodies are characteristic, but assessment must not rely on their presence in every section.
- Hyaline globules can occur within and outside the tumor cells.
- In the Robbins male-gonadal comparator, reticular and papillary patterns also occur.
- Use these analogies cautiously when reviewing ovarian mixed tumor morphology.

Choriocarcinoma: An extraembryonic component

- Ovarian choriocarcinoma exhibits trophoblastic differentiation analogous to the placenta.
- Most ovarian lesions coexist with another germ-cell tumor; Pure lesions are extremely rare.
- These tumors elaborate chorionic gonadotropins and can disseminate hematogenously.
- The source contrasts their unfavorable therapy response with gestational choriocarcinoma.

Choriocarcinoma: Two trophoblastic cell types

Cytotrophoblast

- More regular mononuclear cells.
- Polygonal with distinct borders and relatively clear cytoplasm.

Syncytiotrophoblast

- Large multinucleated cells with eosinophilic, vacuolated cytoplasm.
- Contains hCG detectable with immunohistochemistry.

Teratomatous components: Maturity matters

- Mature cystic teratomas commonly contain skin with adnexal structures and multiple differentiated tissue types.
- Immature teratomas include embryonal or fetal-type tissue, especially primitive neuroepithelium.
- The histologic grade of ovarian immature teratoma is based on the amount of immature neuroepithelium.
- Mature and immature elements must not be conflated in a mixed tumor description.

How components differ morphologically

Histology	Architecture	Additional clue
Dysgerminoma	Uniform sheets / cords	Fibrous septa with lymphocytes
Embryonal carcinoma*	Tubules / alveoli / papillae / sheets	Pleomorphic high-grade nuclei
Yolk sac tumor	Glomeruloid and variable patterns	AFP-associated hyaline globules
Choriocarcinoma*	Cytotrophoblast with syncytiotrophoblast	Hemorrhage; hCG production
Teratoma	Diverse somatic tissues	Neuroepithelial immaturity when present

Interpret serum products by component

Product	Relevant component	Interpretive limitation
AFP	Yolk sac differentiation	Marker supports a component, not the full mixture
hCG	Trophoblastic differentiation	Dysgerminoma may also have syncytiotrophoblasts
No single elevation	Possible diverse components	Cannot exclude mixed germ-cell histology

A shared marker does not establish one diagnosis

OCT3/4 positivity

- Staining in embryonal carcinoma (testicular comparator).
- The ovarian dysgerminoma section also identifies OCT3/OCT4 expression.

Resolve with pattern

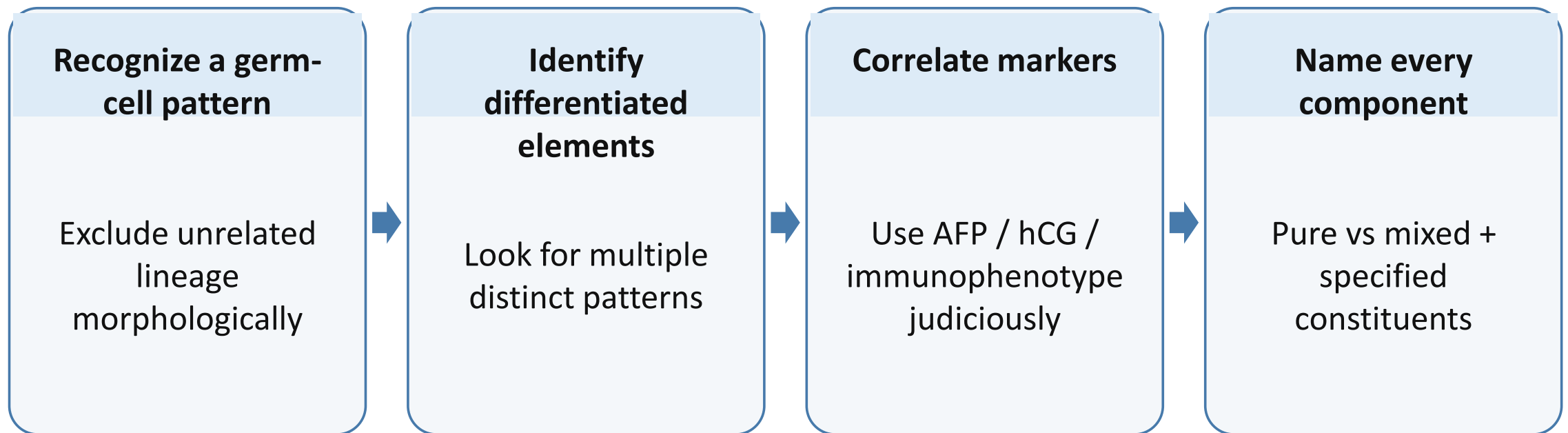
- Assess cell borders, cytologic atypia and septal architecture.
- For the embryonal comparator, cytokeratin/KIT profiles add differential context.

Morphology and lineage evidence must agree

Candidate	Positive morphologic support	Helpful corroboration
Dysgerminoma	Uniform clear cells; lymphocyte-rich septa	OCT3/4 and KIT
Yolk sac tumor	Schiller–Duval body; hyaline globules	AFP production / staining
Choriocarcinoma	Two trophoblastic cell types	hCG production
Immature teratoma	Immature neuroepithelium	Amount of immature tissue relates to grade
Embryonal carcinoma	High-grade primitive epithelium*	Comparator: OCT3/4, SALL4, CK positivity

A disciplined classification sequence

Teaching workflow built from the Robbins descriptions; Not an official diagnostic protocol.



Reporting a mixed ovarian germ-cell tumor

- Name the constituent germ-cell tumor types supported by histology.
- Document any mature or immature teratomatous differentiation distinctly.
- Communicate relevant malignant elements rather than labeling the tumor generically as “germ-cell.”
- The supplied pages do not specify a required proportion cutoff for labeling a mixed component.

What a mixed diagnosis communicates—and what it does not

It communicates

- More than one neoplastic germ-cell differentiation pattern.
- The identity of recognized constituent tumor types.
- A rationale for examining heterogeneity.

It does not automatically convey

- A uniform serum AFP or hCG level.
- One fixed prognosis for all possible mixtures.
- A single predetermined chemotherapy protocol.

Behavior varies across ovarian germ-cell subtypes

- Pure mature cystic teratoma is generally benign, although malignant transformation can occur rarely.
- Dysgerminoma is malignant but can be highly responsive to chemotherapy.
- Yolk sac tumor is malignant, and the Robbins text links outcome to stage under combination chemotherapy.
- Ovarian choriocarcinoma is described as aggressive; Do not generalize its course to every mixed tumor.

Stage, grade and histologic type are different variables

- Stage addresses how far a neoplasm has spread, not which germ-cell lineage it resembles.
- Ovarian immature teratoma grade is tied to the proportion of immature neuroepithelium.
- Mixed histology describes component identity; It is not interchangeable with immature teratoma grade.
- Avoid assigning unprovided survival estimates to embryonal carcinoma, polyembryoma or uncharacterized mixtures.

Case application 1: Primitive solid tumor

Illustrative case (hypothetical)

An ovarian mass in a young adult contains broad sheets of large tumor cells. Cells have clear cytoplasm and sharply outlined membranes; Lymphocytes occur in fibrous septa.

Discussion

- Which ovarian germ-cell tumor has this defining pattern?
- What morphologic findings oppose the embryonal carcinoma comparator?

Case 1: Diagnostic justification

- Dysgerminoma has regular centrally situated nuclei and clear, well-demarcated cytoplasm.
- Its stroma commonly consists of fibrous septa with lymphocytes.
- Embryonal carcinoma's testicular analogue has indistinct borders and greater pleomorphism.
- A marker panel is interpreted after—not instead of—these architectural observations.

Case application 2: Focal glomeruloid structure

Illustrative case (hypothetical)

A partly heterogeneous ovarian germ-cell mass contains a microscopic focus with a central capillary surrounded by tumor cells inside a space lined by tumor cells. Hyaline droplets are also present.

Discussion

- What specific germ-cell component should be identified?
- Which tumor product supports this lineage?

Case 2: A component can be focal

- The described architecture is a Schiller–Duval body, characteristic of yolk sac differentiation.
- Hyaline droplets provide a second morphologic clue.
- AFP is associated with yolk sac tumor cells, but its presence does not define every part of a heterogeneous tumor.
- Other regions must be characterized before deciding whether the final diagnosis is pure or mixed.

Case application 3: Trophoblastic focus

Illustrative case (hypothetical)

An ovarian germ-cell tumor contains an area with mononuclear cells intermingled with large multinucleated eosinophilic cells; The clinical record notes raised chorionic gonadotropin.

Discussion

- Which differentiated component is suggested?
- Why must the remaining mass still be examined?

Case 3: HCG does not identify the whole tumor

- Choriocarcinoma has intimately mixed cytotrophoblast and syncytiotrophoblast.
- The syncytiotrophoblastic component is associated with hCG production.
- Some dysgerminomas also contain syncytiotrophoblastic giant cells and may elevate hCG.
- Therefore both the morphology of the focus and the remainder of the specimen matter.

Case application 4: Embryoid architecture

Illustrative case (hypothetical)

A rare ovarian germ-cell malignancy is described in a pathology consultation as containing embryoid bodies. No detailed immunophenotype is supplied in the assigned textbook section.

Discussion

- Which uncommon named entity is present in the Robbins differential?
- What additional claims should not be made from this source alone?

Case 4: Limits of a one-sentence entity definition

- Polyembryoma is classified as malignant in the assigned Robbins passage.
- Embryoid bodies are the stated defining morphologic feature.
- Additional detailed criteria and modern taxonomic distinctions require a separately identified, verified source.
- Restrained diagnosis is preferable to a falsely precise description.

Contrast: Mature and immature teratomatous tissue

Mature teratoma

- Differentiated skin, glandular, cartilage, bone, neural or thyroid elements may be present.
- Mature cystic teratomas are usually benign.

Immature teratoma

- Embryonal / fetal-type elements, notably primitive neuroepithelium.
- Proportion of immature neuroepithelium is used for grade.

Synthesis: Five discriminating observations

- Uniform clear cells and inflammatory septa point toward dysgerminoma.
- Markedly atypical primitive epithelial patterns favor the embryonal comparator.
- A glomeruloid Schiller–Duval body points to yolk sac differentiation.
- Biphasic trophoblast and hCG support choriocarcinomatous differentiation.
- Mixed tumors require explicit accounting of multiple components.

Source-limited facts versus reasoned application

Directly stated in Robbins	Reasoned diagnostic application
Embryonal carcinoma is highly malignant	Seek aggressive primitive epithelial morphology
Polyembryoma contains embryoid bodies	Avoid inventing absent subtype-specific criteria
Mixed tumors contain varied germ-cell types	Examine heterogeneous regions for components
AFP / hCG associate with specific lineages	Do not let one serum marker define the whole mass

End-of-lecture diagnostic synthesis

- The “other germ cell tumor” grouping contains two uncommon named primitive tumors and mixed neoplasms.
- Mixed histology is determined by identifying the individual germ-cell components—not by serum products alone.
- Embryonal carcinoma, polyembryoma and germ-cell lineages must be distinguished morphologically.
- Interpret testicular analogies and unquantified ovarian findings with appropriate source caveats.

Primary reference and evidence boundaries

- Robbins, Cotran & Kumar: Pathologic Basis of Disease, 11th ed. (2026), Chapter 22, pp. 929–931.
- Additional morphologic comparator: Chapter 21, “Embryonal Carcinoma,” pp. 883–884.
- Ovarian entity definitions were prioritized; specific comparator facts are flagged where applicable.
- Conceptual native schematics are not actual microscopic or gross images.