

Uterine Corpus

Normal endometrial histology and functional disorders

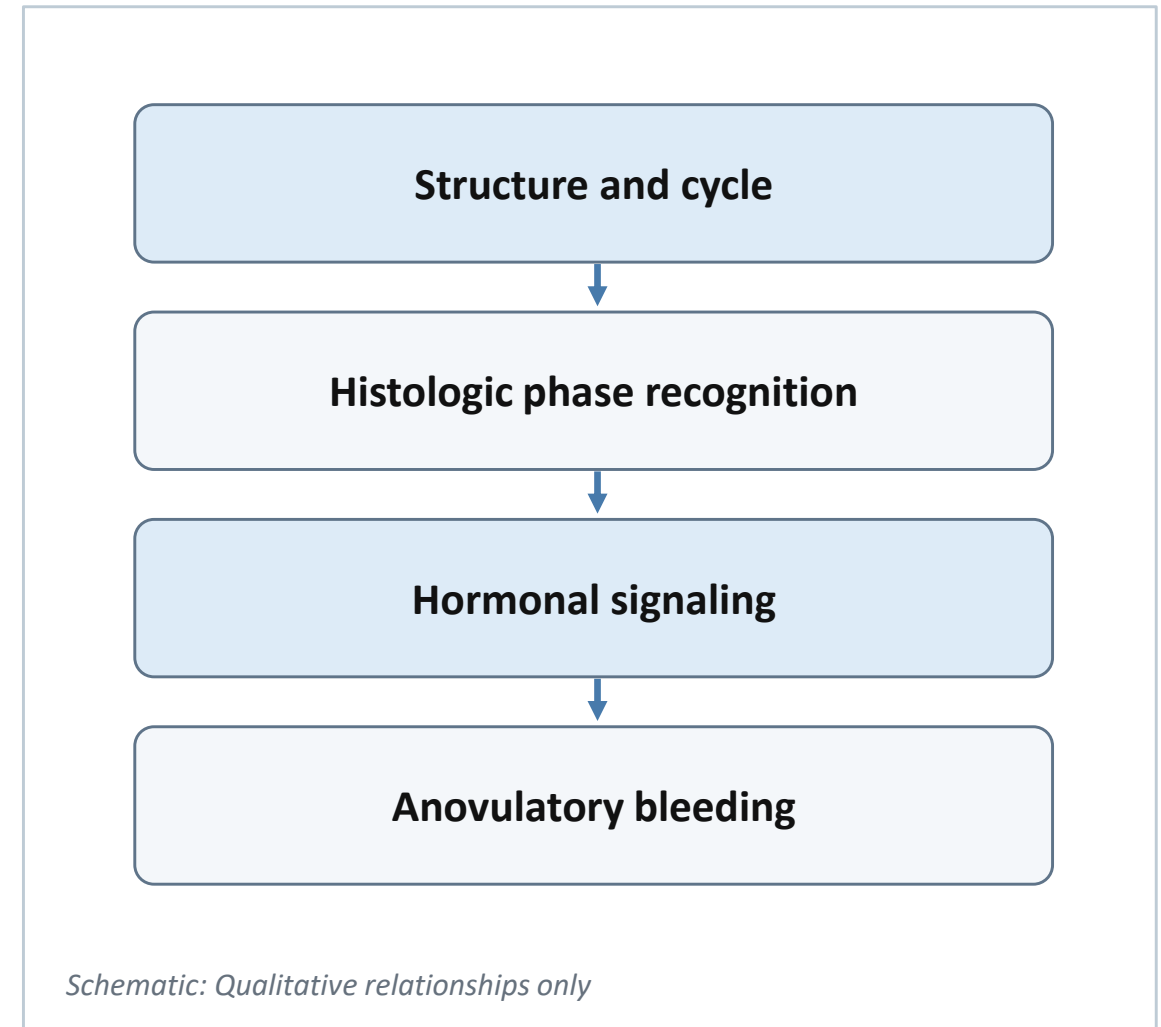
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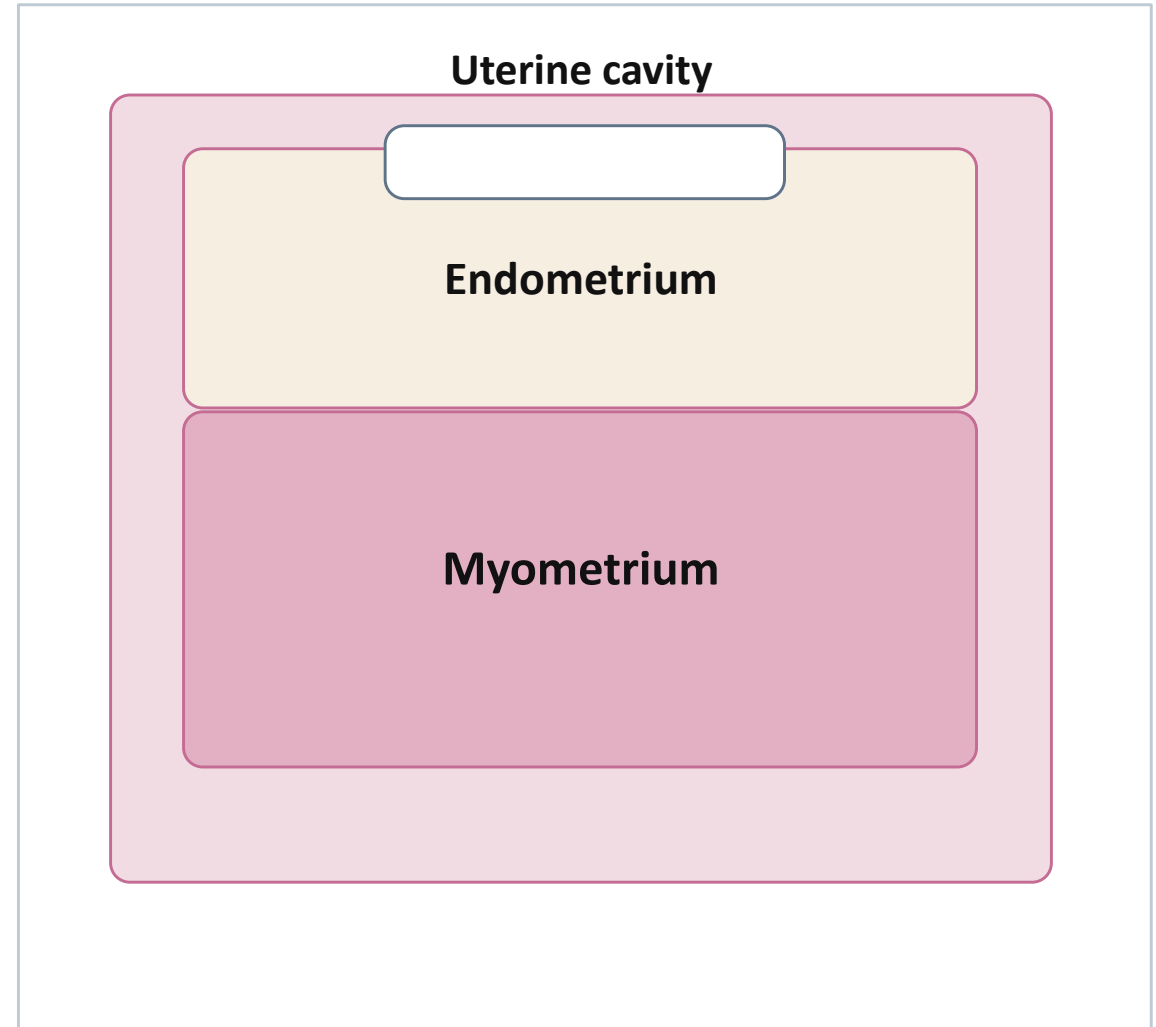
Learning goals

- Identify the histologic compartments of the uterine corpus.
- Recognize proliferative, secretory, and menstrual endometrium.
- Relate cyclic morphology to ovarian steroid signaling.
- Explain the pathogenesis and biopsy features of anovulatory bleeding.



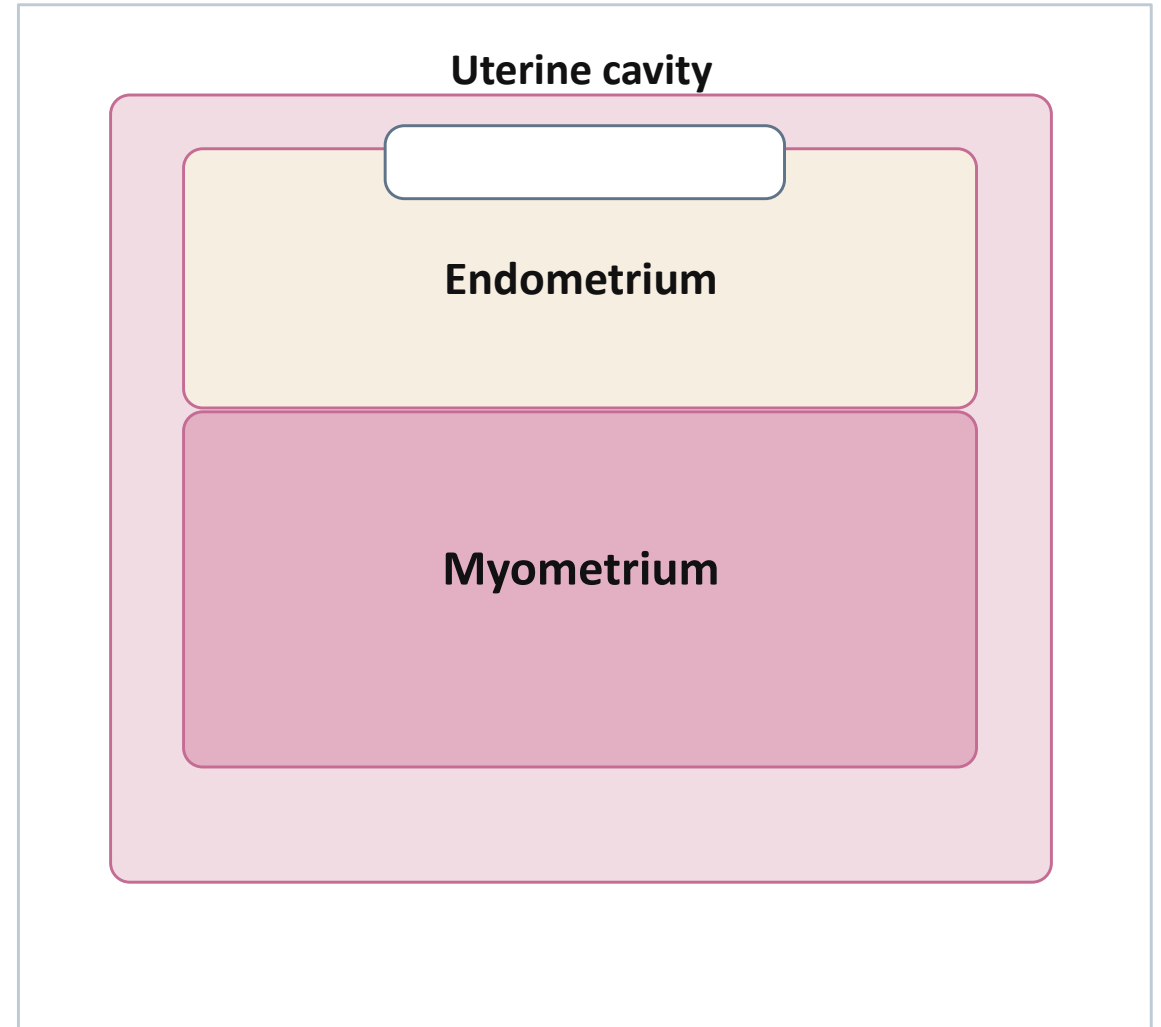
Two complementary uterine compartments

- Myometrium: Interwoven smooth muscle bundles forming the wall.
- Endometrium: Glands embedded in specialized cellular stroma lining the cavity.
- Their organization explains why hormone responses and disease patterns differ.



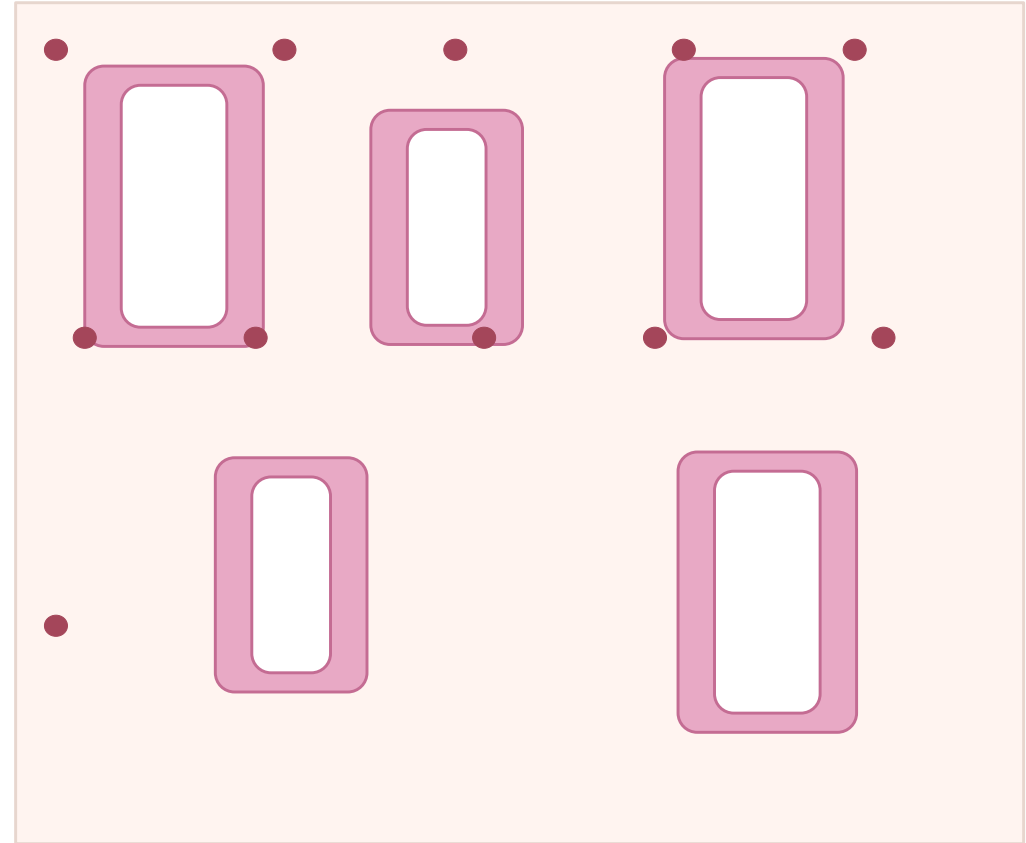
Myometrium: Structural smooth muscle

- Comprises tightly interwoven smooth muscle bundles.
- Forms the muscular wall surrounding the uterine cavity.
- Distinguished from the glandular and stromal endometrium.



Endometrium: Glands within stroma

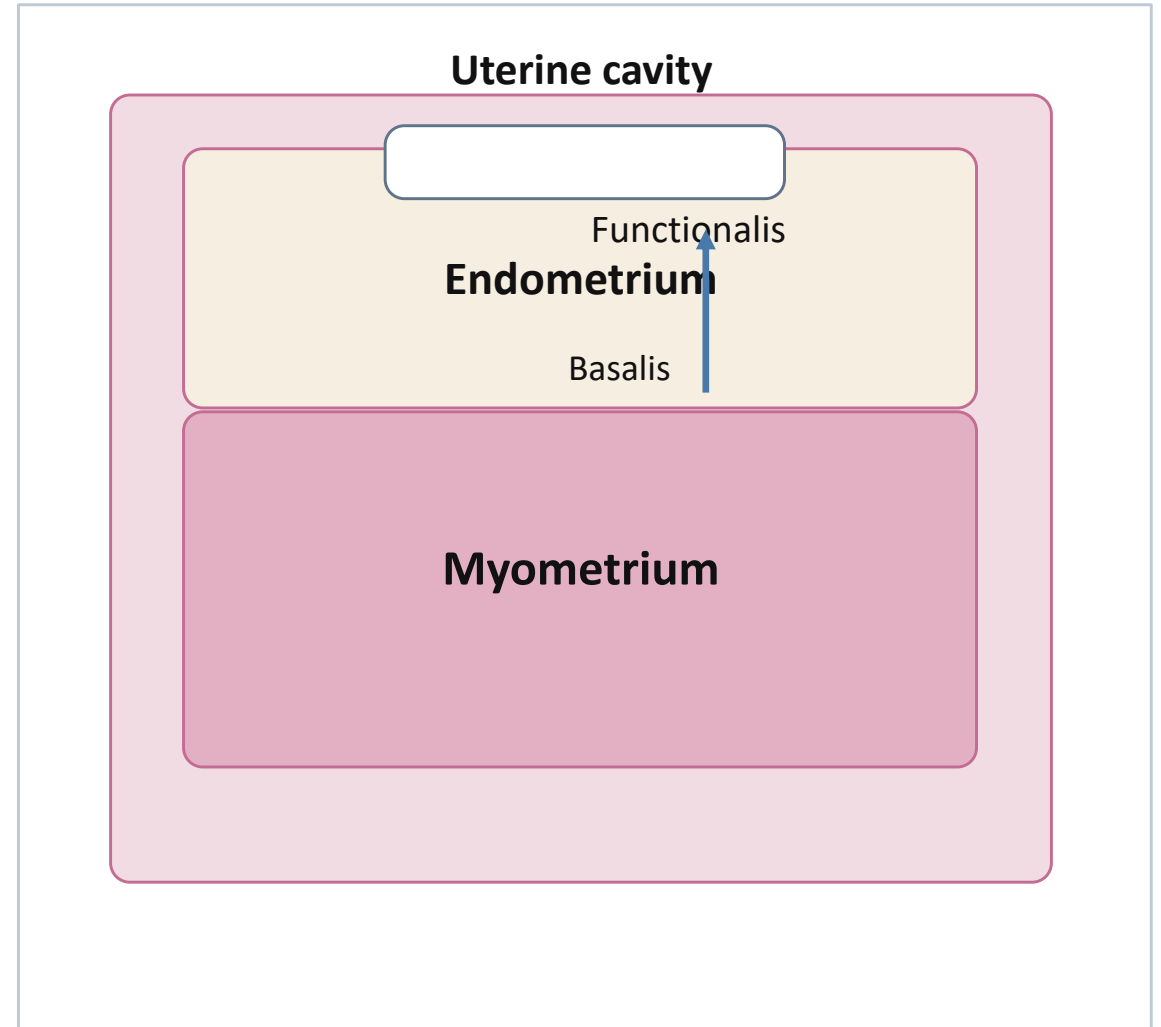
- Glands provide the epithelial compartment of the lining.
- A cellular stromal network supports glands and spiral arterioles.
- Both compartments undergo coordinated cycle-dependent changes.



SCHEMATIC • Proliferative: Tubular glands / cellular stroma

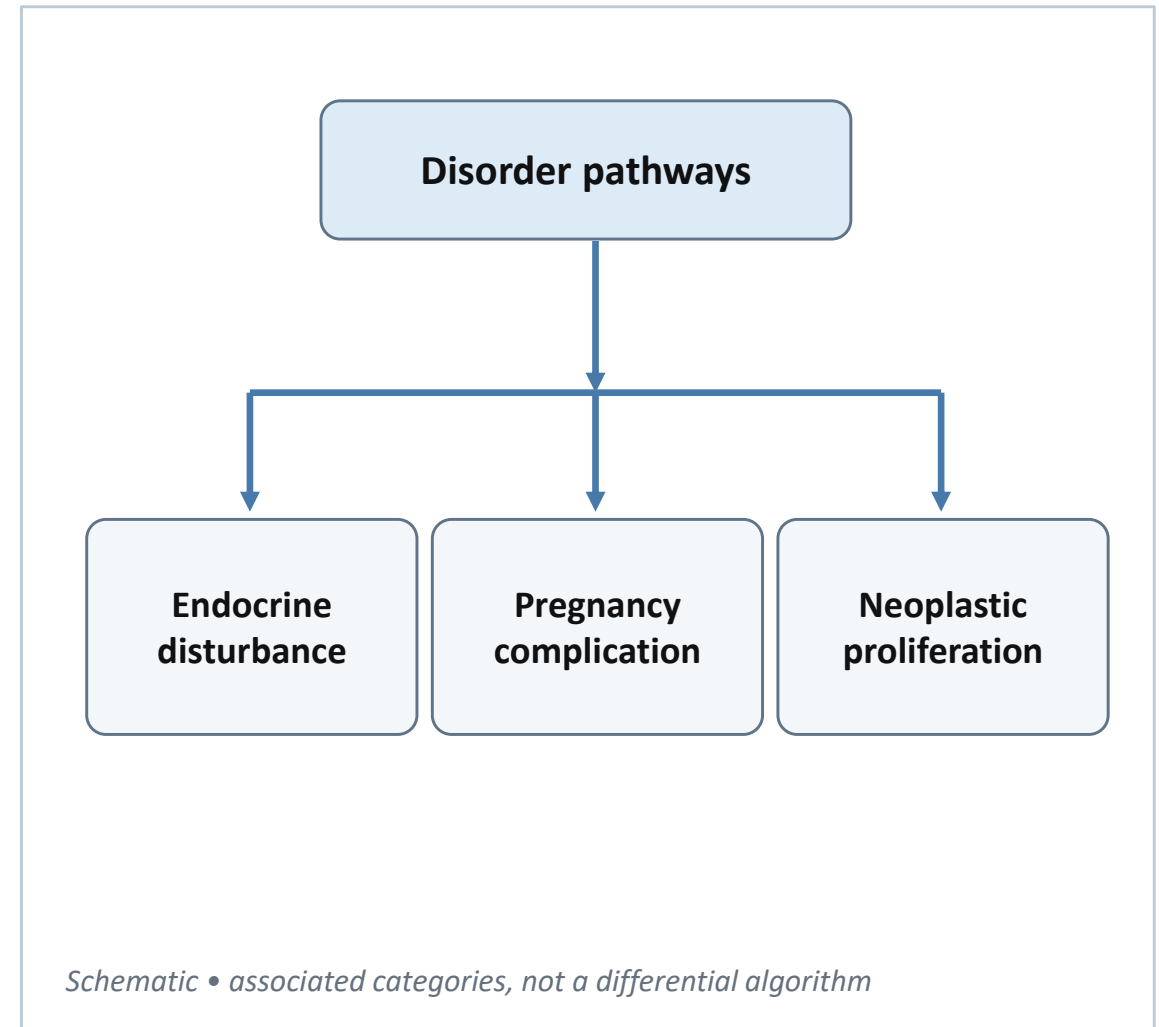
Two functional levels of endometrium

- Functionalis: Superficial layer shed during menstruation.
- Basalis: Deeper residual layer from which glands and stroma regrow.
- Cyclic regeneration depends on retention of the basalis.



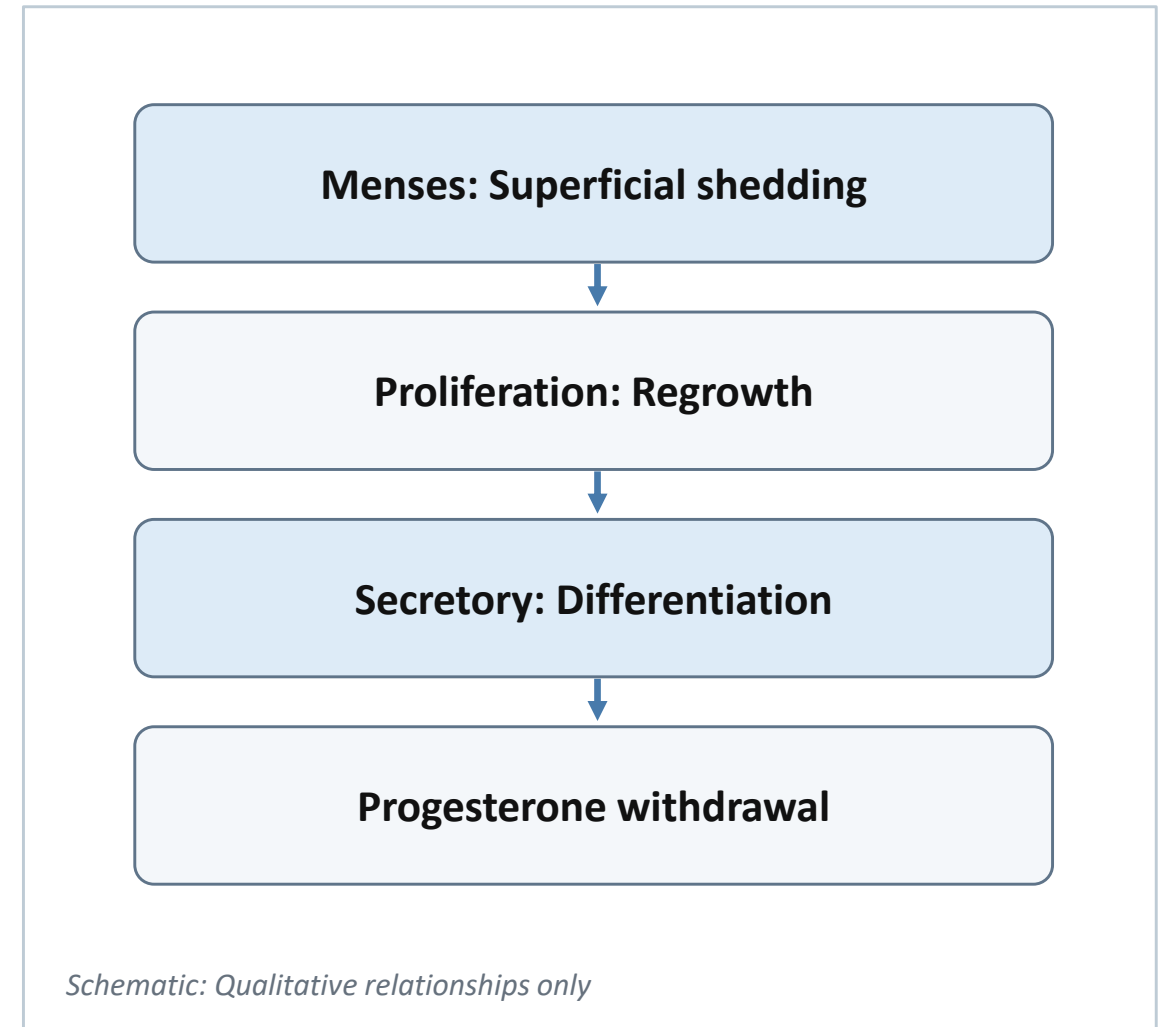
The corpus is affected by several disease pathways

- Endocrine imbalance produces altered cyclic maturation and bleeding.
- Pregnancy-related complications can disturb the uterine lining.
- Neoplastic proliferation may involve either glandular or smooth-muscle tissue.



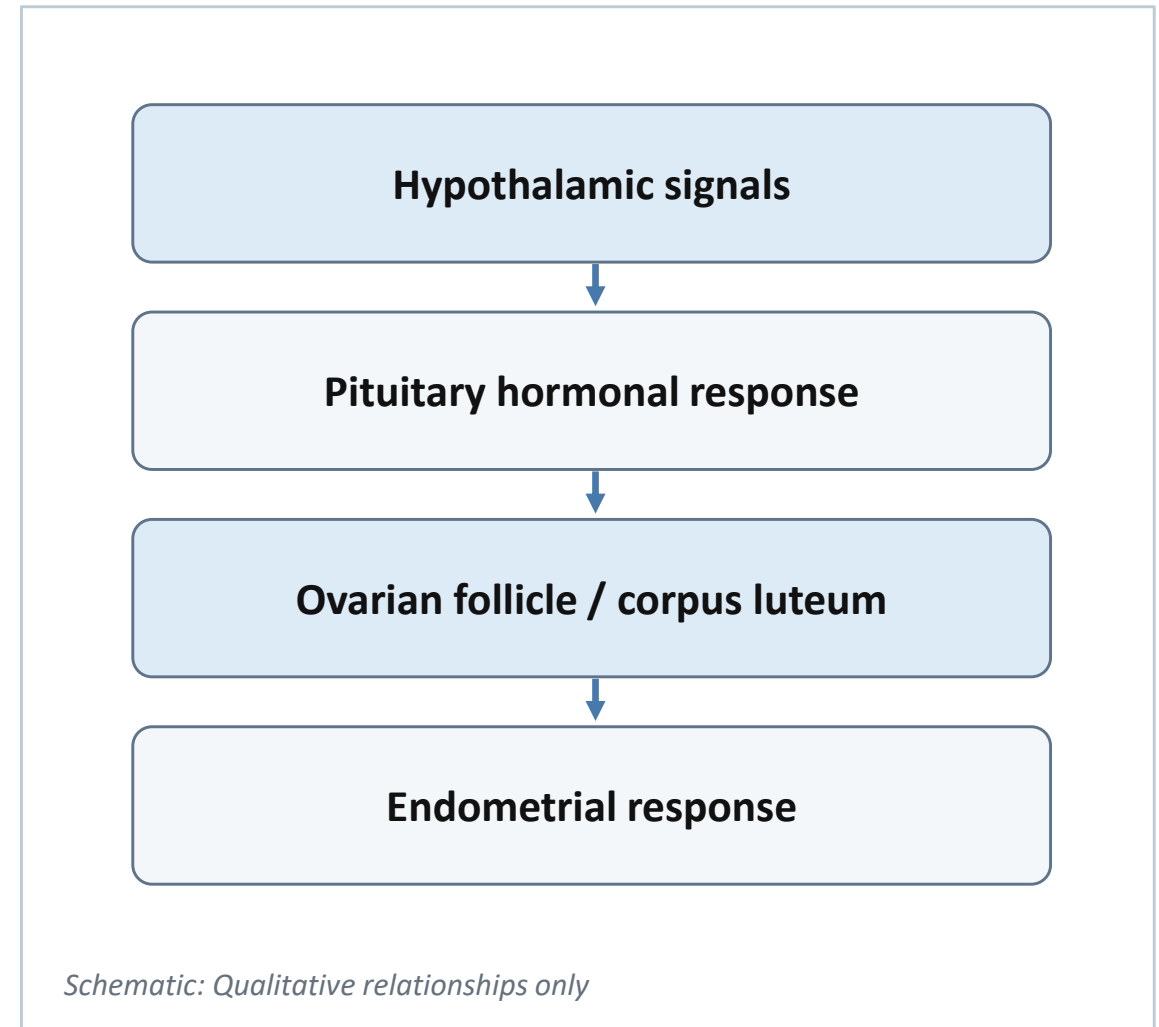
Normal histology is the interpretive reference

- Endometrial gland shape changes across the cycle.
- Epithelial activity changes from mitosis to secretion.
- Stromal edema and predecidualization develop after ovulation.



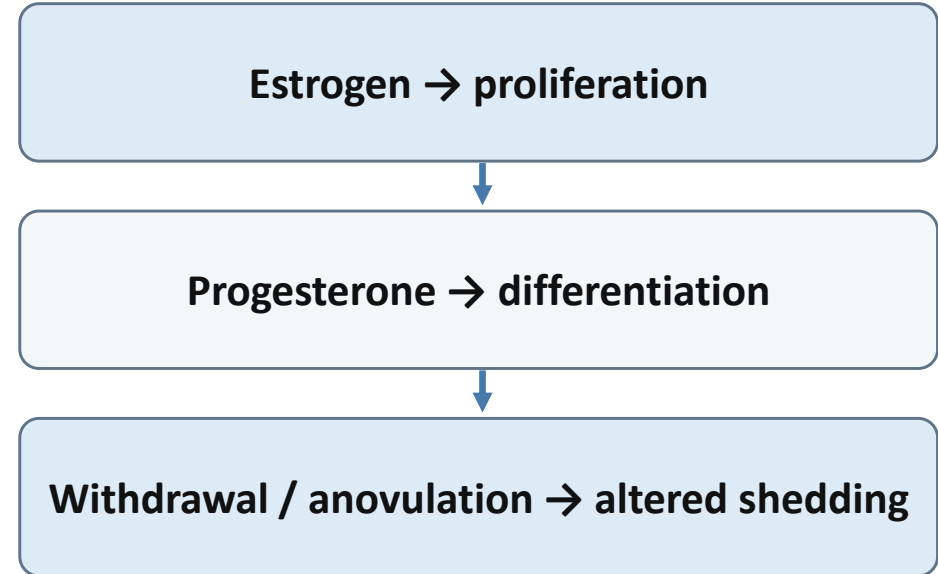
A coordinated hypothalamic–pituitary–ovarian axis

- Hypothalamic signals influence pituitary hormone secretion.
- Pituitary and ovarian factors regulate follicular maturation and ovulation.
- Ovarian steroid hormones determine endometrial morphology.



Steroid hormone exposure changes tissue phenotype

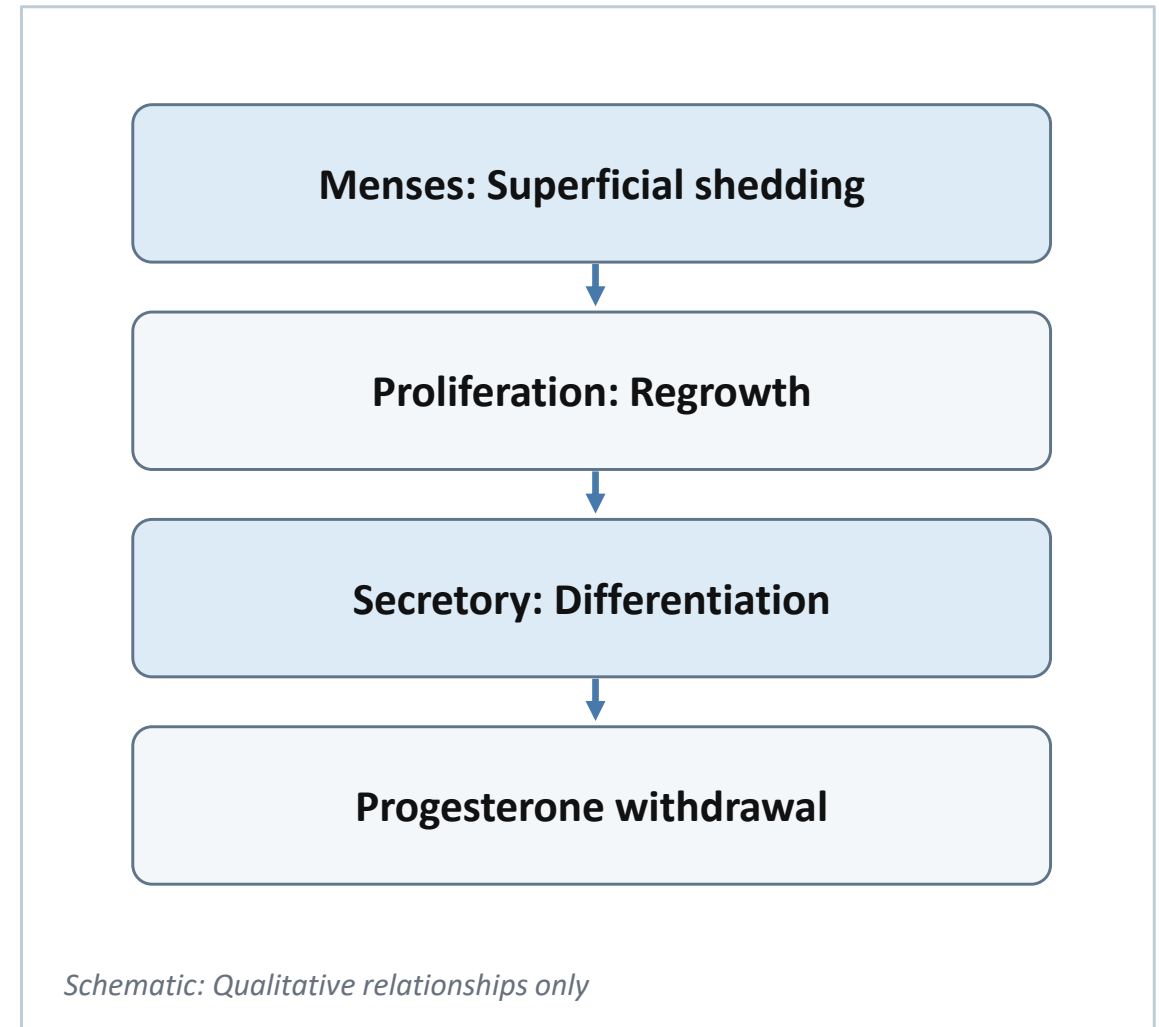
- Estrogen promotes proliferation of endometrial glands and stroma.
- Progesterone, following ovulation, promotes glandular and stromal differentiation.
- Withdrawal of progesterone precedes menstrual breakdown.



Schematic: Qualitative relationships only

A cyclical sequence, not a fixed morphology

- Menses removes the superficial functionalis.
- Proliferation reconstructs endometrium from the basalis.
- Postovulatory differentiation creates secretory features.
- Late luteal progesterone loss initiates another menses.



Endometrial appearance provides functional evidence

- Microscopic morphology reflects recent ovarian steroid activity.
- Typical secretory change supports a postovulatory progesterone effect.
- The pattern can aid evaluation of abnormal bleeding or infertility.

**Menses
Breakdown**

**Proliferative
Mitoses**

**Early secretory
Vacuoles**

**Late secretory
Predecidual stroma**

Normal menstrual-cycle patterns • conceptual

The four major morphologic patterns

- Menstrual: Stromal breakdown and shedding.
- Proliferative: Straight tubular glands with frequent mitoses.
- Early secretory: Subnuclear epithelial vacuoles.
- Late secretory: Serrated glands and predecidualized stroma.

**Menses
Breakdown**

**Proliferative
Mitoses**

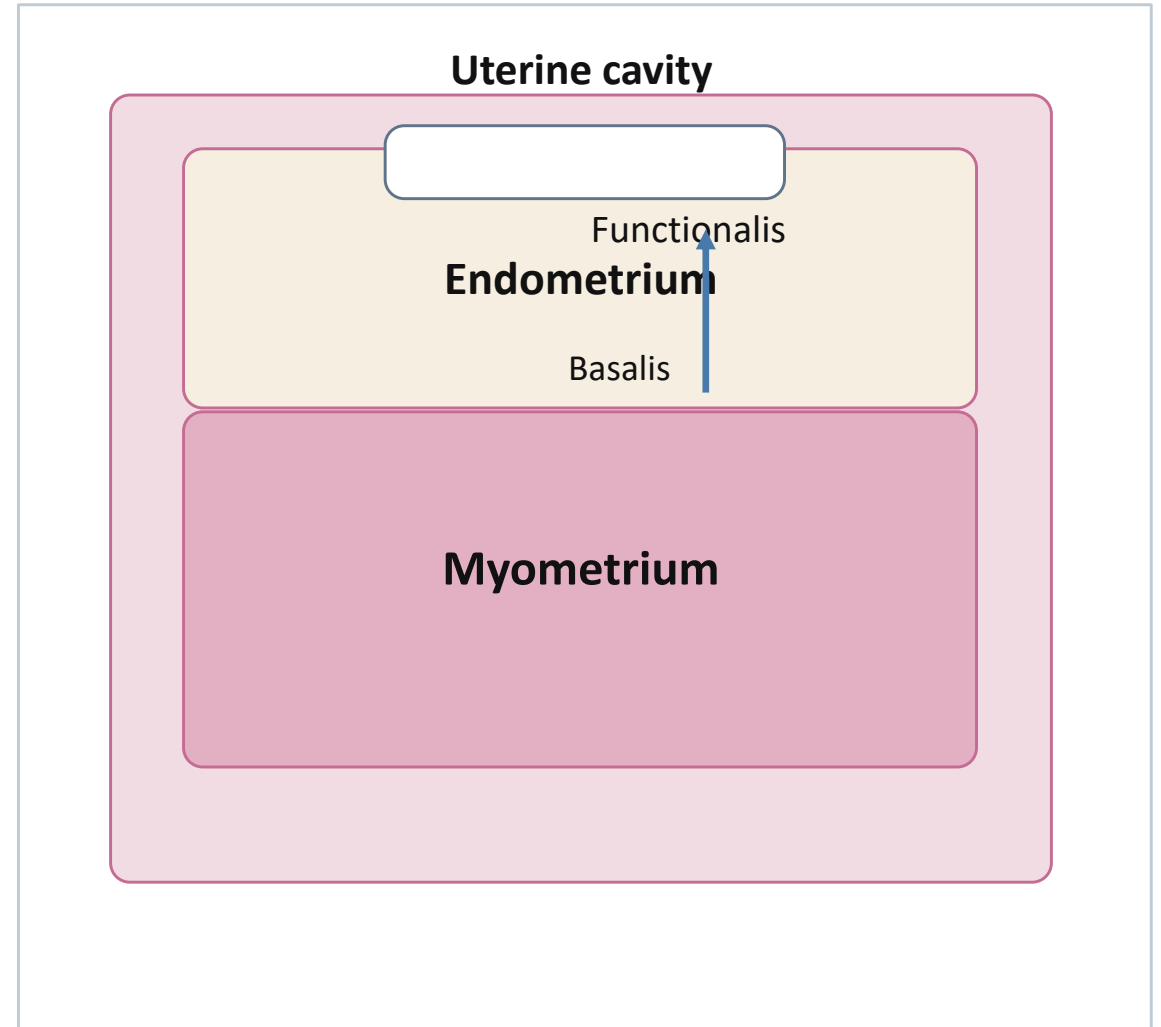
**Early secretory
Vacuoles**

**Late secretory
Predecidual stroma**

Normal menstrual-cycle patterns • conceptual

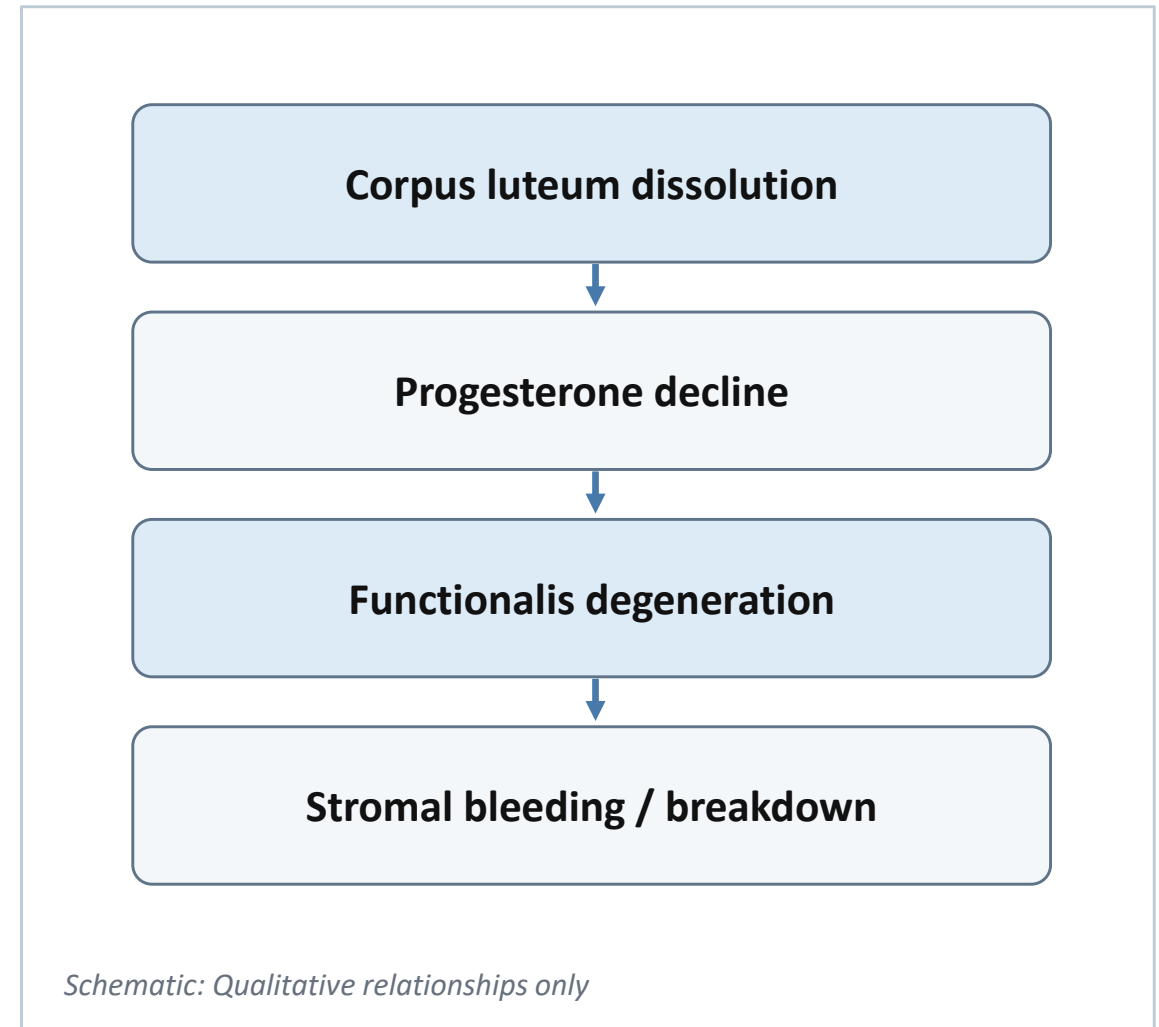
Menstruation sheds the functionalis

- The superficial endometrium is lost during menses.
- The deeper basalis remains to support the next cycle.
- The process resets glandular and stromal organization.



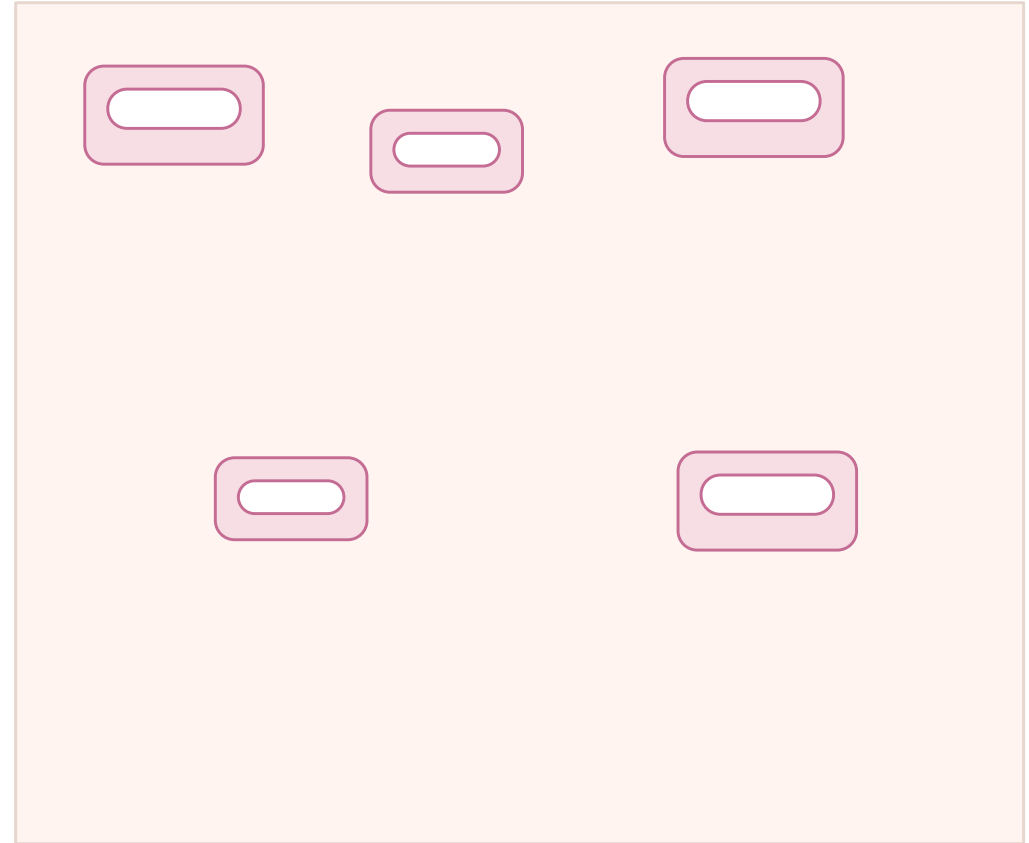
Progesterone withdrawal precedes breakdown

- The corpus luteum regresses when its hormonal support ends.
- Progesterone concentrations decrease.
- Functionalis degeneration, stromal bleeding, and breakdown follow.



Menstrual endometrium: Tissue-level clues

- Stromal hemorrhage accompanies degeneration.
- Fragmented glands and stromal breakdown may coexist.
- The pattern must be interpreted in relation to cycle timing.



SCHEMATIC • Menstrual: Gland and stromal breakdown

Not every leukocyte indicates inflammation

- Sparse neutrophils and lymphocytes may occur in late secretory endometrium.
- The source describes these cells as normal in that phase.
- Their presence alone should not be equated with endometritis.

Physiological

Sparse late-cycle
leukocytes

Phase-appropriate
context

Endometritis

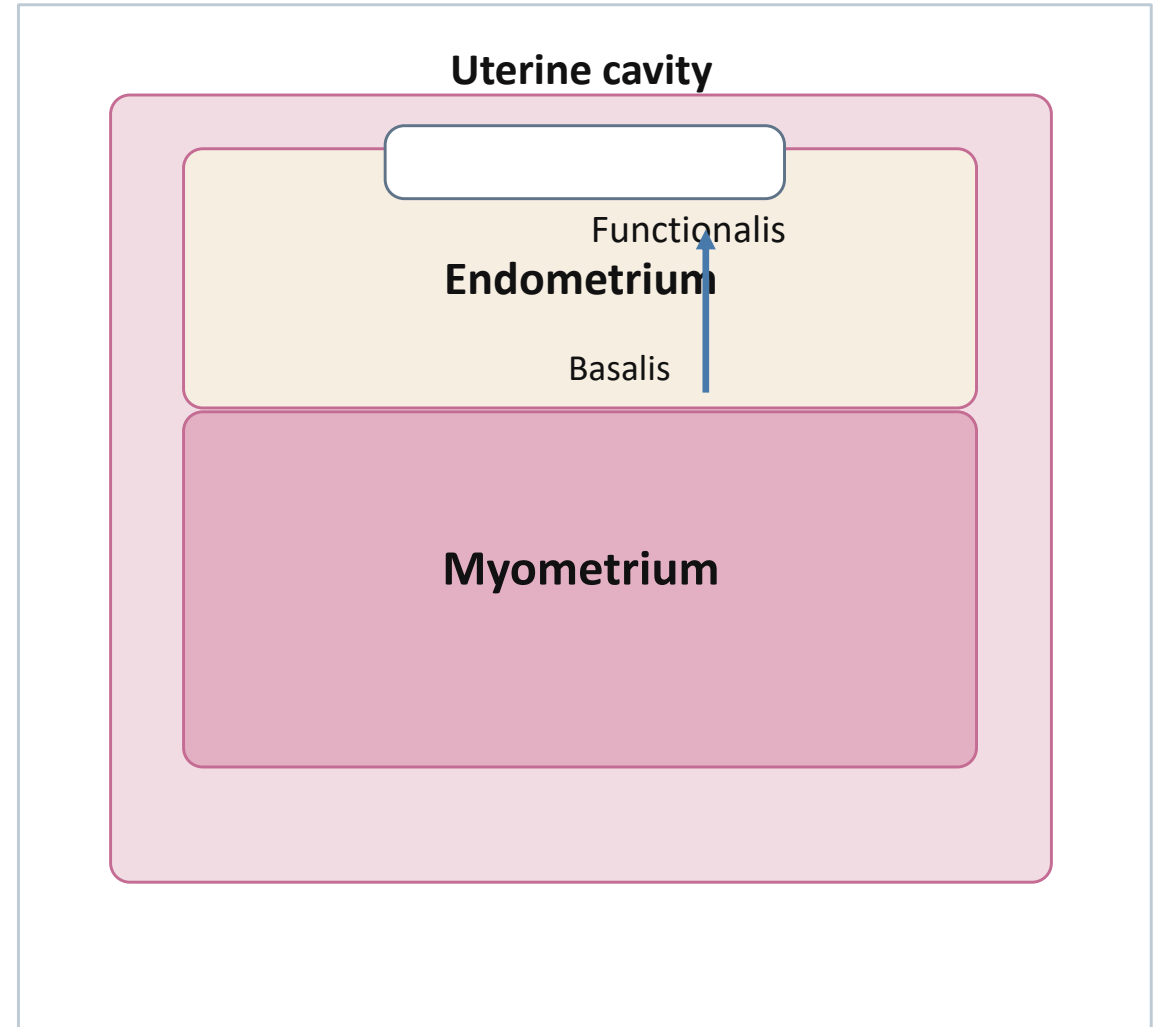
Requires specific
evidence

Separate disease topic

Comparison: Teaching schematic

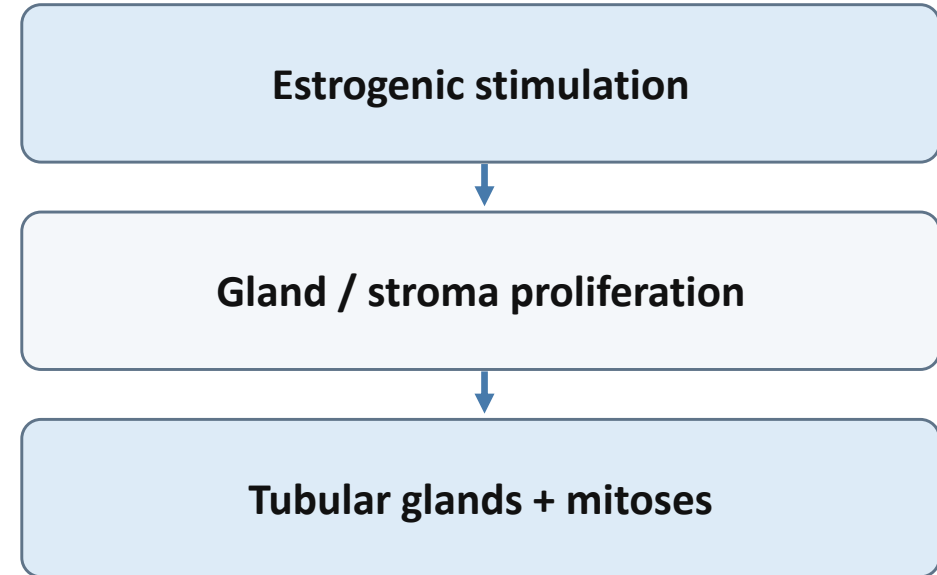
Regeneration begins in the basalis

- The retained deeper endometrium provides a regenerative substrate.
- Both glands and stroma increase after menstruation.
- Hormonal stimulation coordinates restoration of the functionalis.



The proliferative phase is a growth program

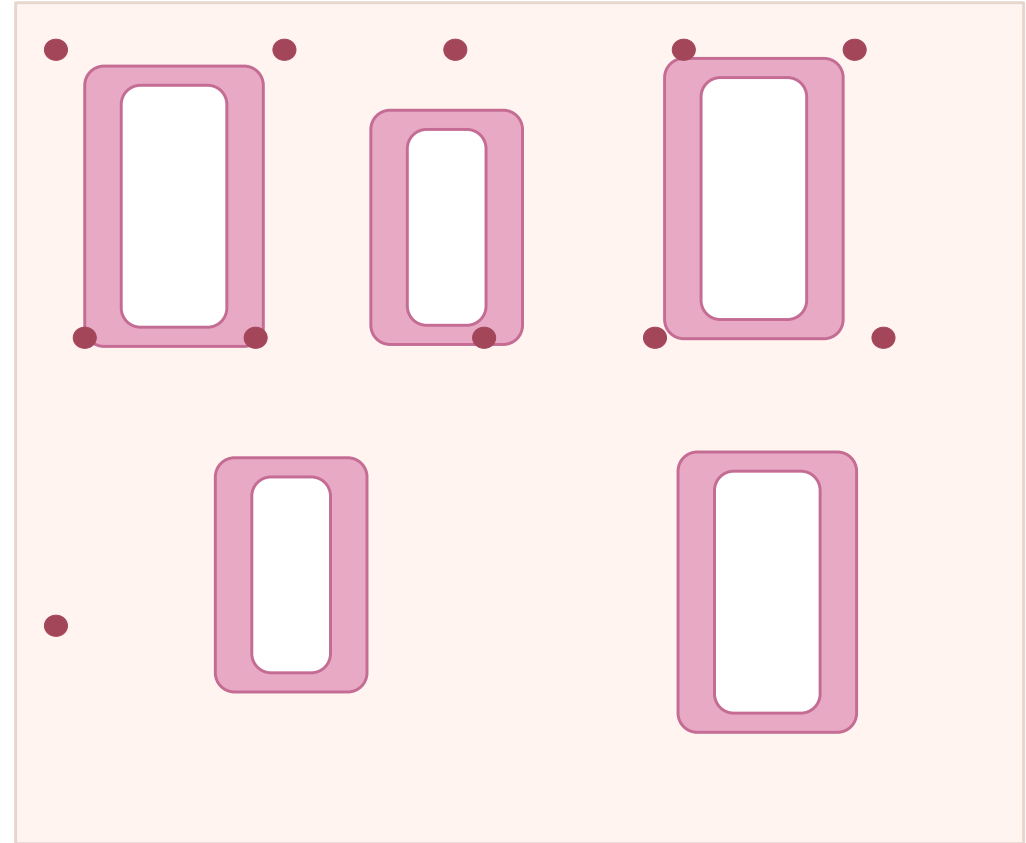
- Rapid glandular and stromal growth follows menstruation.
- Estrogen is the major proliferative stimulus.
- Glands and supporting stroma remain morphologically coordinated.



Schematic: Qualitative relationships only

Proliferative glands are predominantly tubular

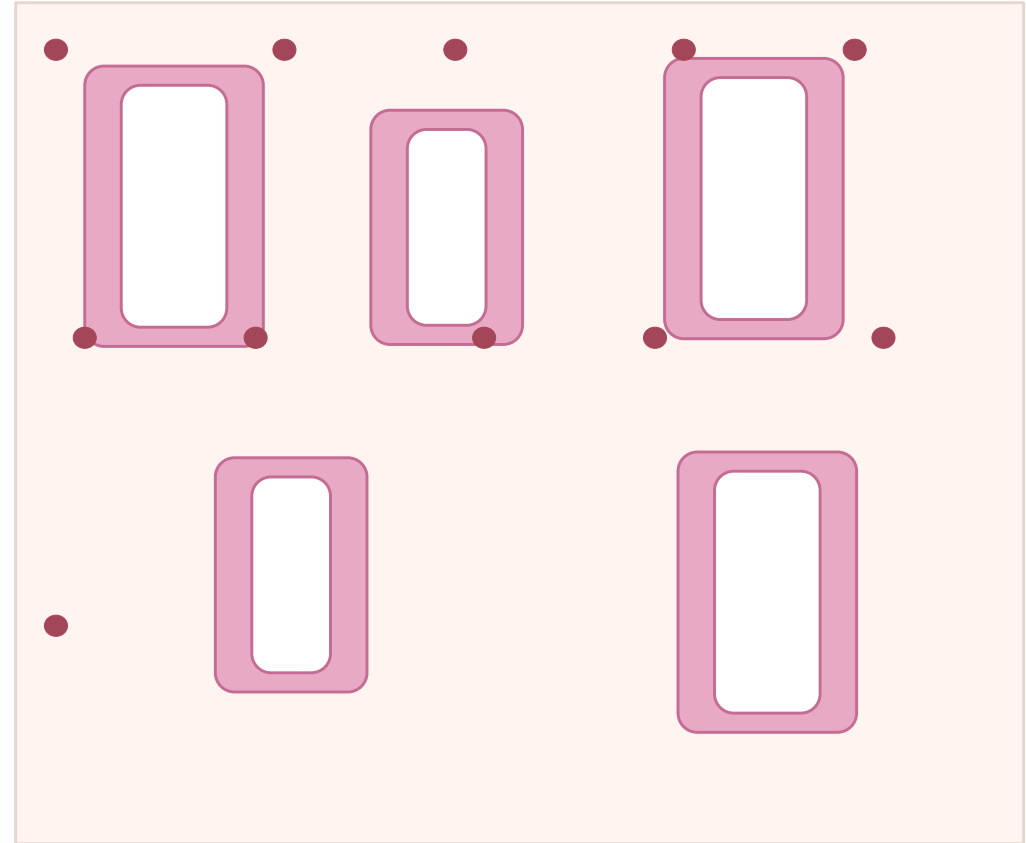
- Glands appear relatively straight rather than serrated.
- The epithelium consists of tall, regular pseudostratified columnar cells.
- No overt secretory vacuolation is expected.



SCHEMATIC • Proliferative: Tubular glands / cellular stroma

Proliferative epithelial mitoses are expected

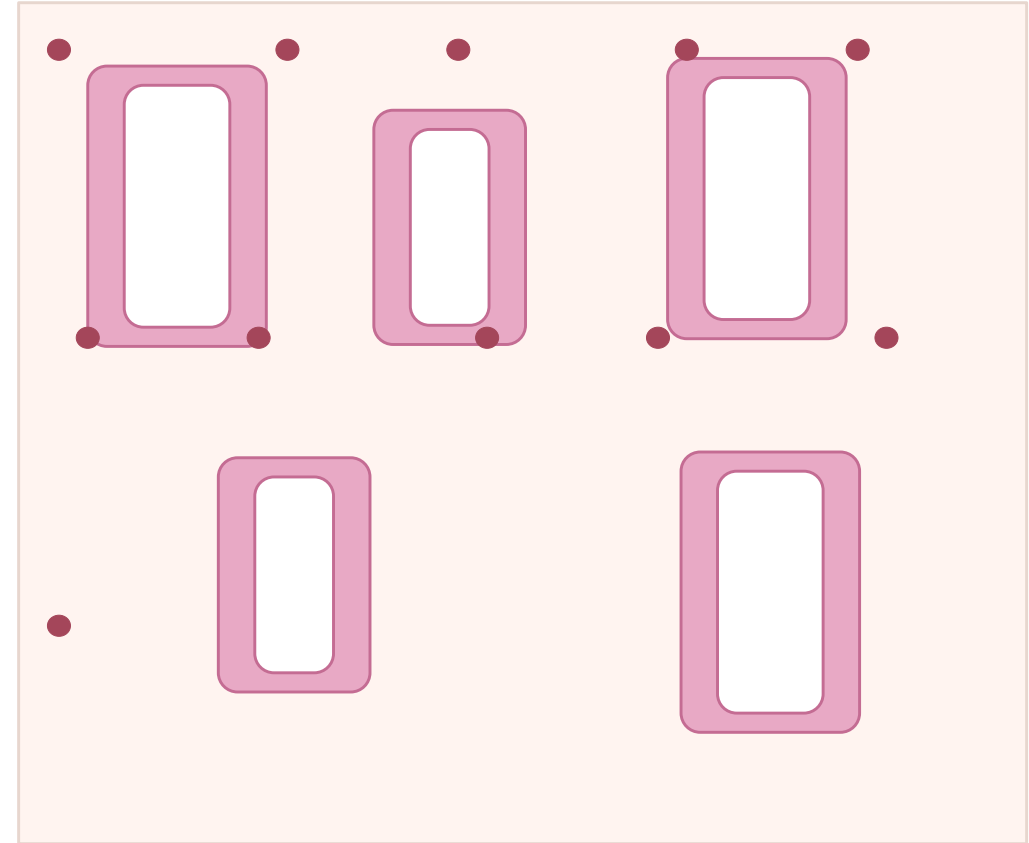
- Mitotic figures are numerous during active regrowth.
- Proliferation occurs within an otherwise regular glandular lining.
- Mitotic activity alone does not establish neoplastic change.



SCHEMATIC • Proliferative: Tubular glands / cellular stroma

Proliferative stroma also expands

- Spindle-shaped cells with scant cytoplasm form the cellular stroma.
- Stromal cells undergo mitotic activity alongside glandular epithelium.
- Growth is thus a two-compartment response.



SCHEMATIC • Proliferative: Tubular glands / cellular stroma

Absence of secretory activity is informative

- Proliferative glands lack conspicuous mucin secretion and vacuolation.
- A biopsy with active mitoses but no secretory differentiation suggests estrogenic dominance.
- Cycle history remains essential to interpretation.

Proliferative

Tubular glands

Mitoses

Secretory

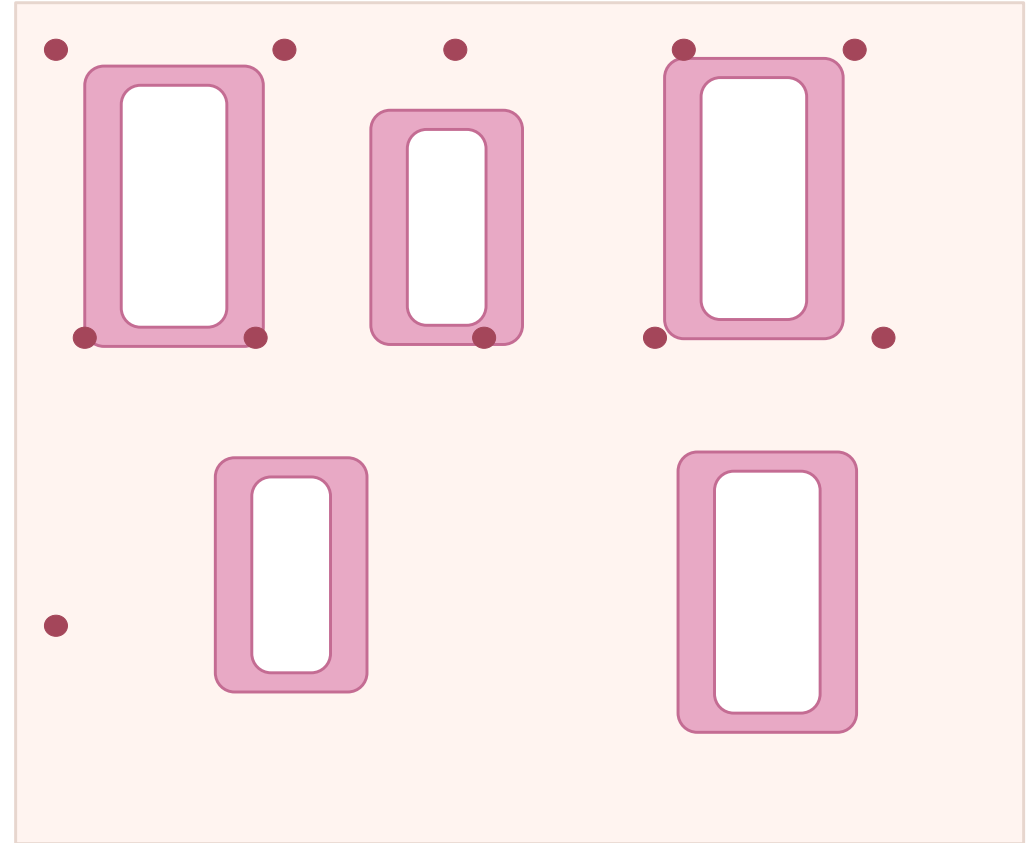
Vacuoles / tortuosity

Predecidual stroma

Comparison: Teaching schematic

Integrated proliferative-phase recognition

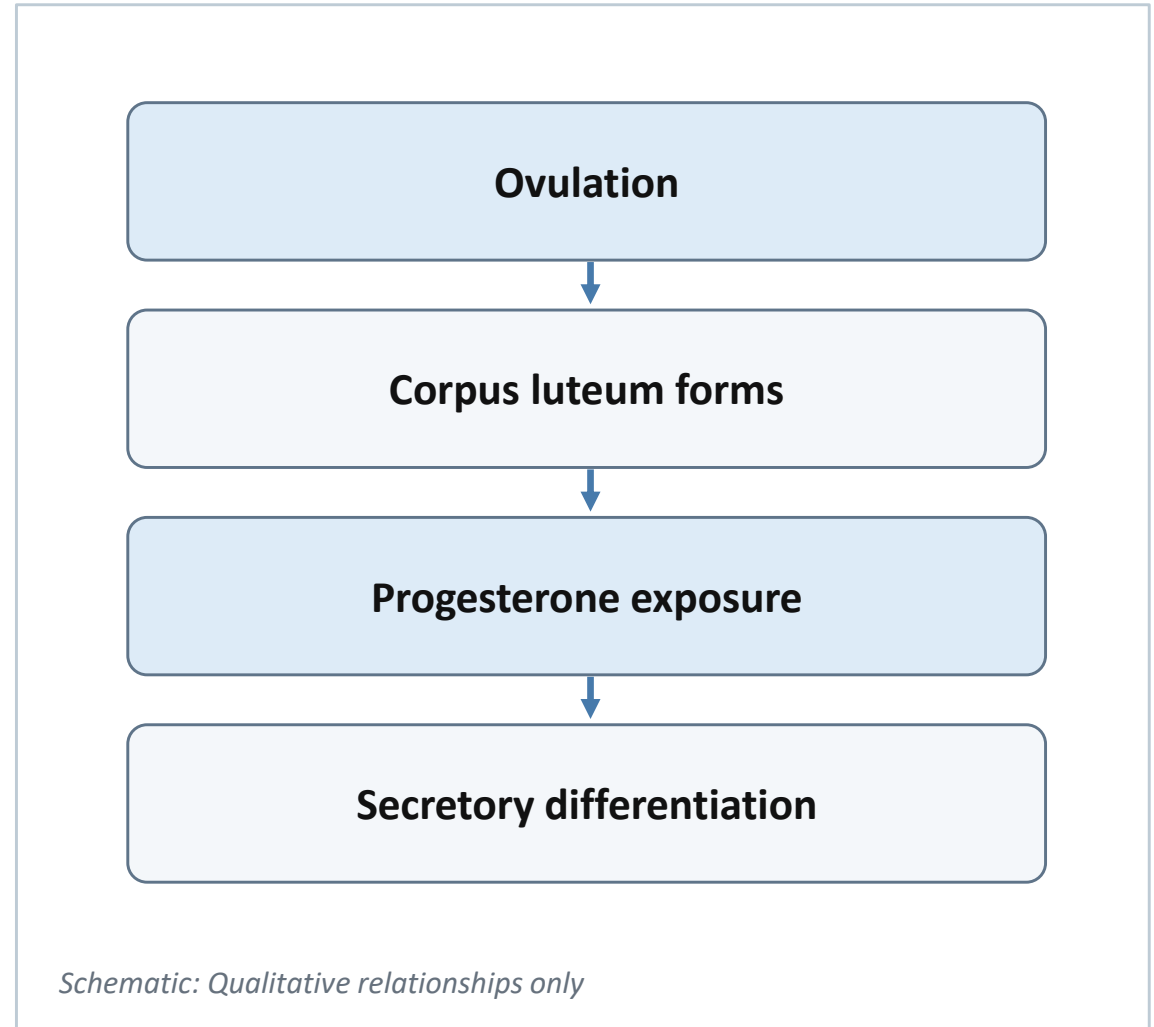
- Straight glands + pseudostratified epithelium.
- Frequent epithelial and stromal mitoses.
- Cellular stroma without progesterone-dependent predecidual change.



SCHEMATIC • Proliferative: Tubular glands / cellular stroma

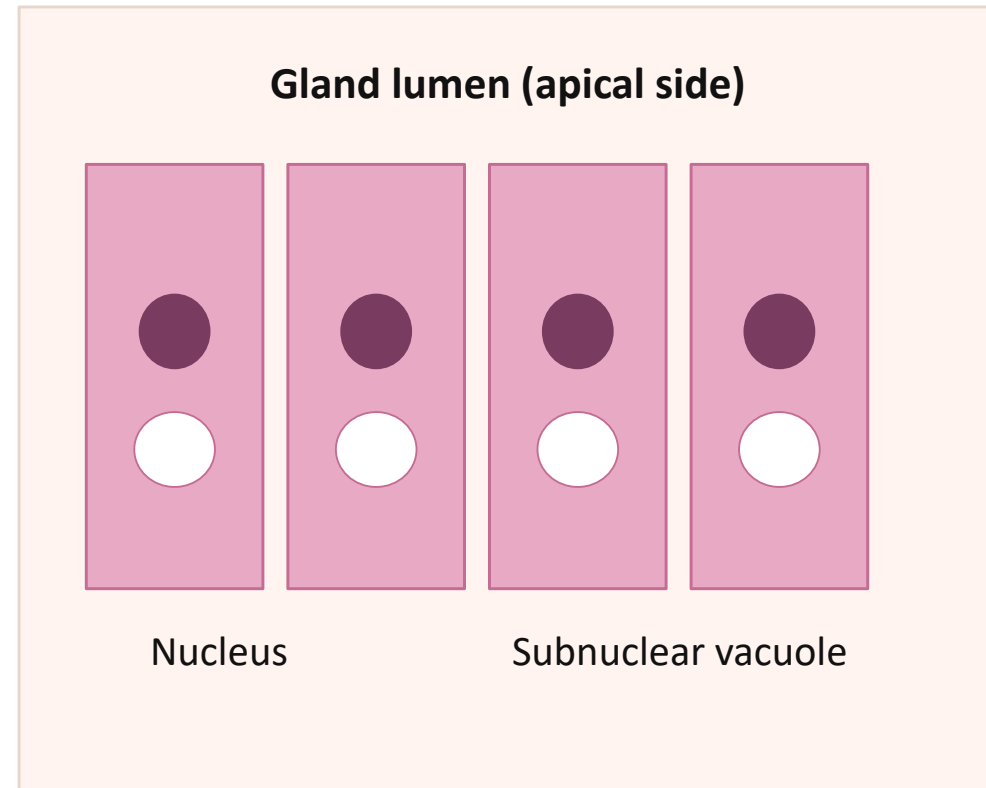
Ovulation changes the hormonal environment

- After ovulation, the corpus luteum produces progesterone.
- Proliferative growth gives way to differentiation.
- The first microscopic signs develop in glandular epithelial cells.



Early secretory change: Subnuclear vacuoles

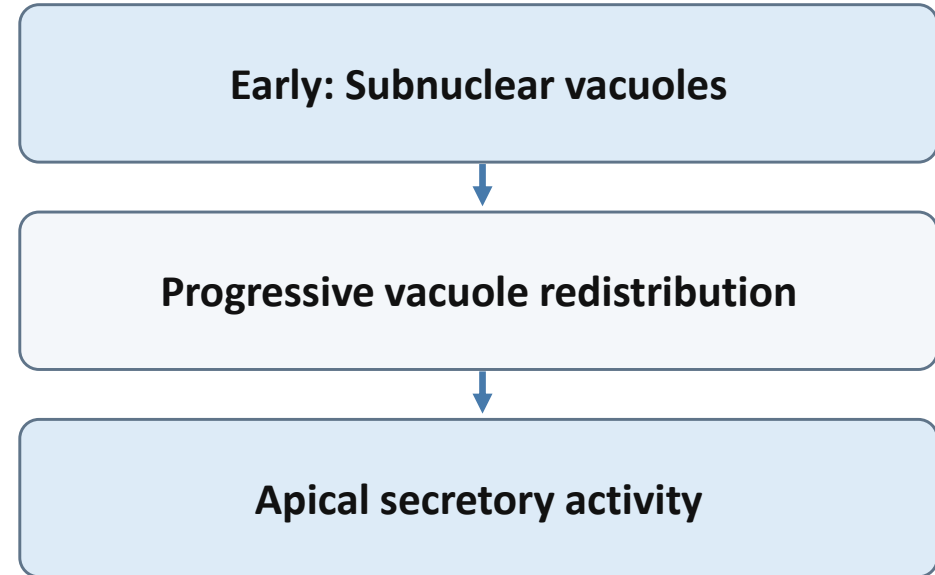
- Cytoplasmic vacuoles initially accumulate below glandular nuclei.
- This follows the emergence of postovulatory progesterone effects.
- Location of vacuoles is a useful phase-specific clue.



SCHEMATIC • enlarged epithelial cells; Not a micrograph

Secretory vacuoles migrate toward the lumen

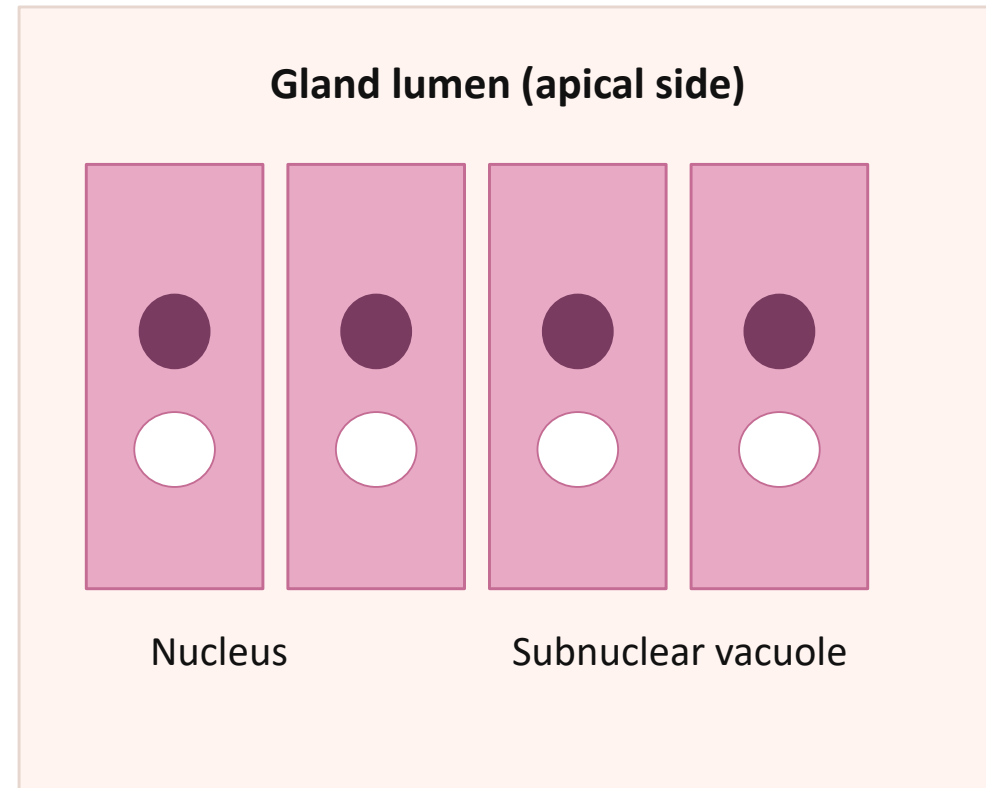
- Basally located vacuoles move toward the apical cell surface.
- The sequence accompanies increasing glandular secretory activity.
- It differs from the nonsecretory proliferative epithelium.



Schematic: Qualitative relationships only

Secretory activity predominates in the third week

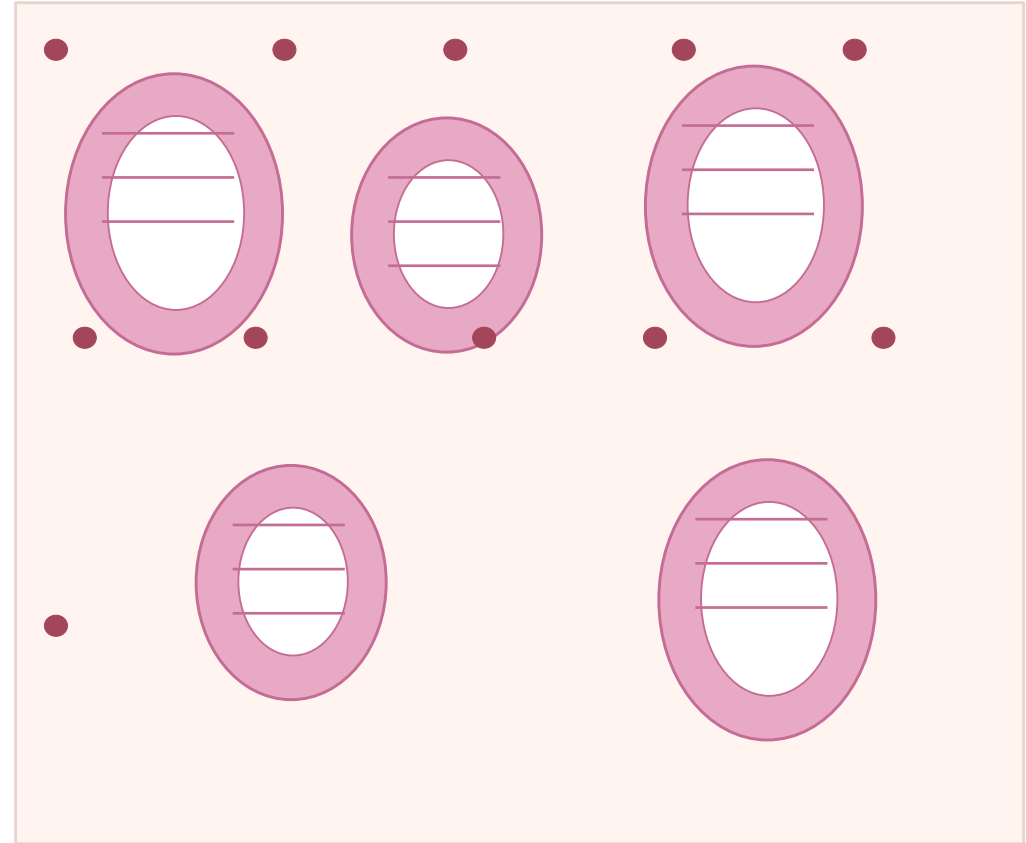
- The text describes the greatest secretory activity during week three.
- Epithelial vacuoles change location during gland maturation.
- Both hormonal context and morphology determine phase interpretation.



SCHEMATIC • enlarged epithelial cells; Not a micrograph

Late secretory glands acquire tortuosity

- Glandular profiles become more convoluted toward week four.
- A serrated or “sawtooth” luminal contour may emerge.
- Secretory exhaustion and gland shrinkage accentuate this shape.



SCHEMATIC • Late secretory: Tortuous, serrated glands

The serrated contour has a morphologic basis

- A gland changes from a relatively smooth tube to a tortuous structure.
- As secretion wanes and glands shrink, luminal folds become conspicuous.
- This appearance is characteristic of late secretory endometrium.

Proliferative

Tubular glands

Mitoses

Secretory

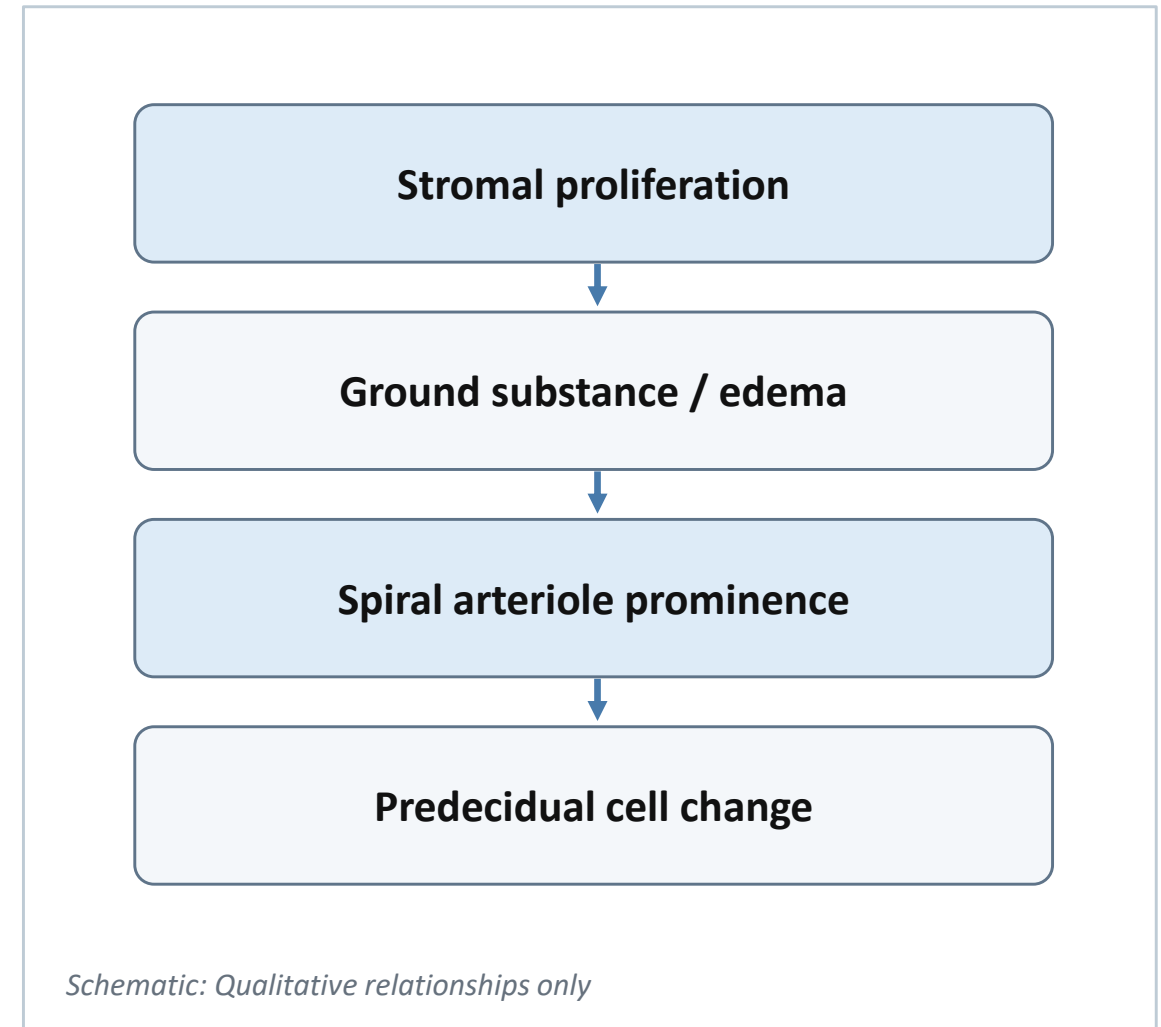
Vacuoles / tortuosity

Predecidual stroma

Comparison: Teaching schematic

Progesterone transforms the endometrial stroma

- Late secretory changes are particularly prominent in stroma.
- Edema increases as ground substance accumulates.
- Spiral arterioles become more conspicuous.



Stromal edema precedes predecidual change

- Extracellular ground substance and edema increase.
- Stromal cells subsequently enlarge and change cytoplasmic appearance.
- This sequence reflects hormone-dependent tissue maturation.

Earlier stroma

Spindle cells

Limited edema

Late secretory

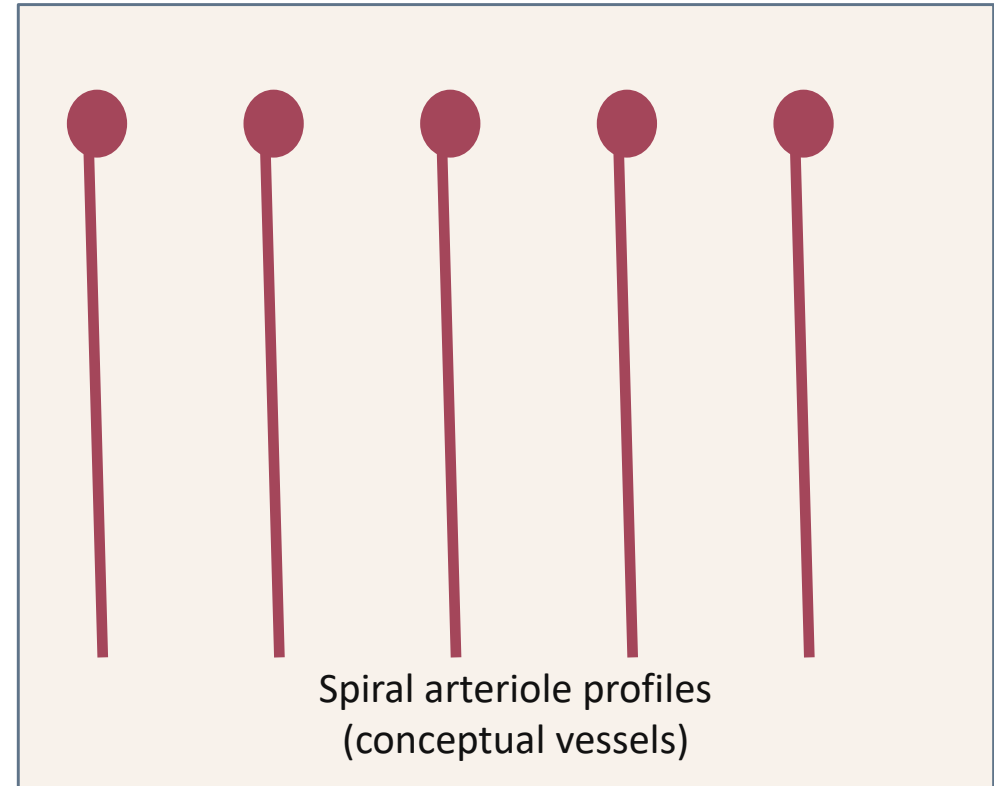
Stromal edema

Increasing ground
substance

Comparison: Teaching schematic

Spiral arterioles are a late-cycle clue

- Prominent spiral arterioles appear during the secretory phase.
- They occur alongside stromal edema and subsequent predecidualization.
- Vascular development is part of the coordinated tissue response.



Schematic • not a tissue section

Predecidualization changes stromal cells

- Stromal cells undergo hypertrophy.
- Cytoplasm becomes more eosinophilic.
- The change reflects progesterone-driven stromal differentiation.

Pre-ovulatory

Small spindle cells

Scant cytoplasm

Late secretory

Enlarged cells

Eosinophilic
cytoplasm

Comparison: Teaching schematic

Predecidual change spreads across functionalis

- Initially recognizable stromal transformation becomes more extensive.
- Changes spread through the functionalis in late secretory endometrium.
- This is physiological and must not be confused with abnormal stromal proliferation.

Pre-ovulatory

Small spindle cells

Scant cytoplasm

Late secretory

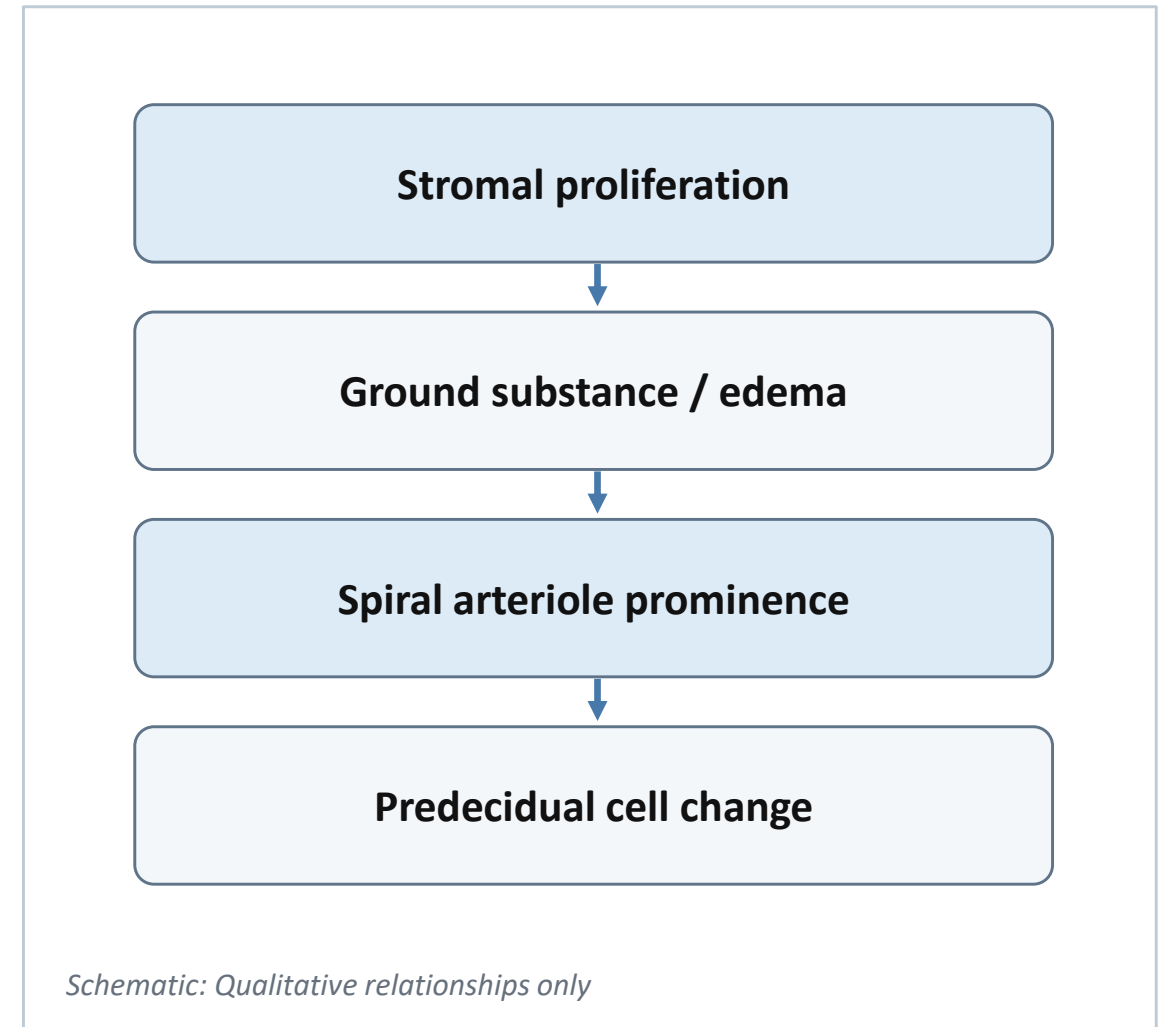
Enlarged cells

Eosinophilic
cytoplasm

Comparison: Teaching schematic

Late-cycle stromal mitoses can reappear

- A resurgence of stromal mitoses accompanies late secretory change.
- Mitoses must be interpreted by cell compartment and phase.
- Concurrent predecidual transformation supports a physiological response.



Late secretory leukocytes have physiological context

- Sparse neutrophils and lymphocytes may accompany predecidualization.
- These are normal findings description.
- The diagnosis of inflammation requires more than leukocytes alone.

Physiological

Sparse late-cycle
leukocytes

Phase-appropriate
context

Endometritis

Requires specific
evidence

Separate disease topic

Comparison: Teaching schematic

Integrated secretory-phase recognition

- Early: Subnuclear vacuoles in gland epithelium.
- Late: Serrated glands and prominent stromal changes.
- Edema, spiral arterioles, and predecidualization support progesterone effect.

**Menses
Breakdown**

**Proliferative
Mitoses**

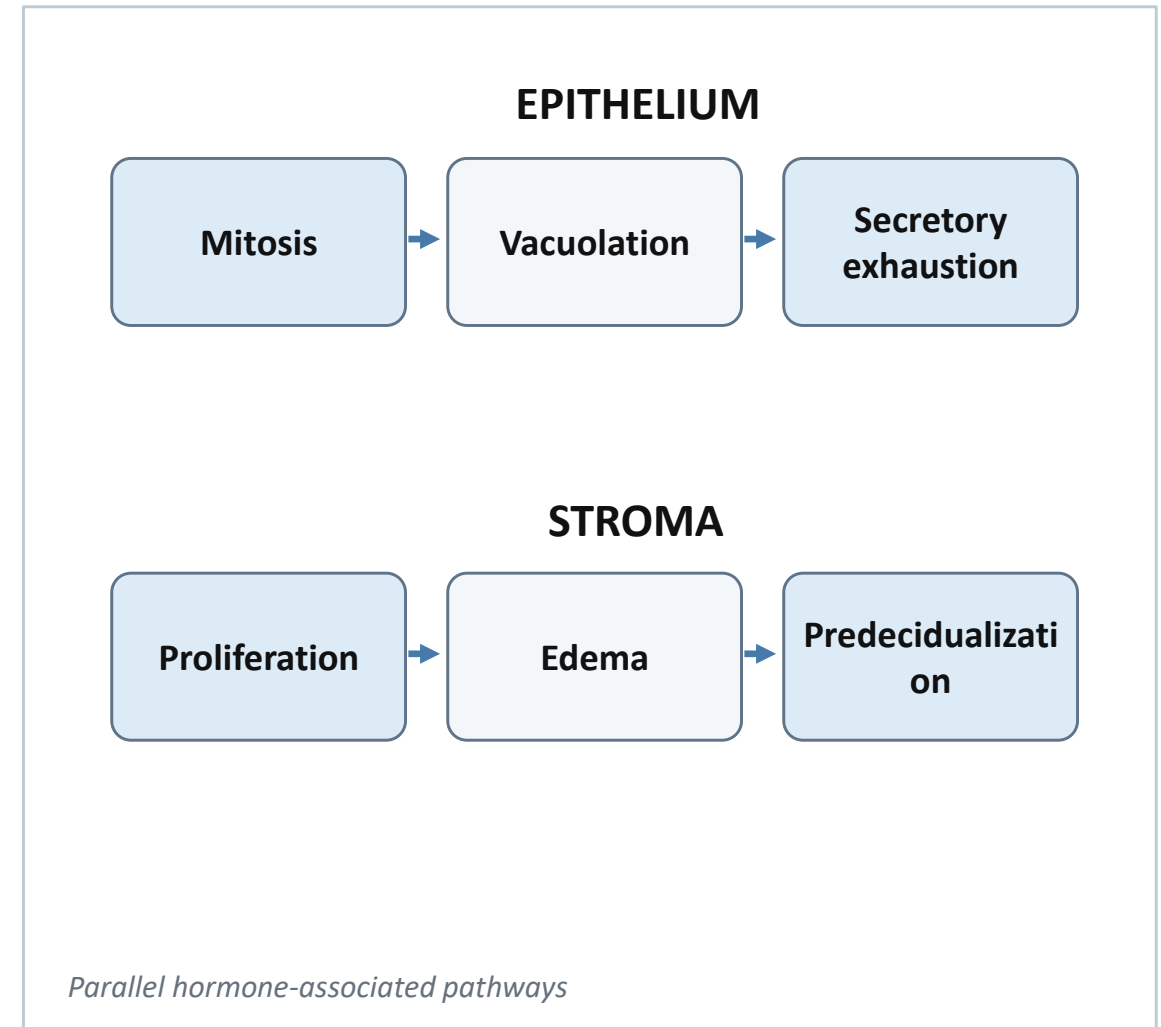
**Early secretory
Vacuoles**

**Late secretory
Predecidual stroma**

Normal menstrual-cycle patterns • conceptual

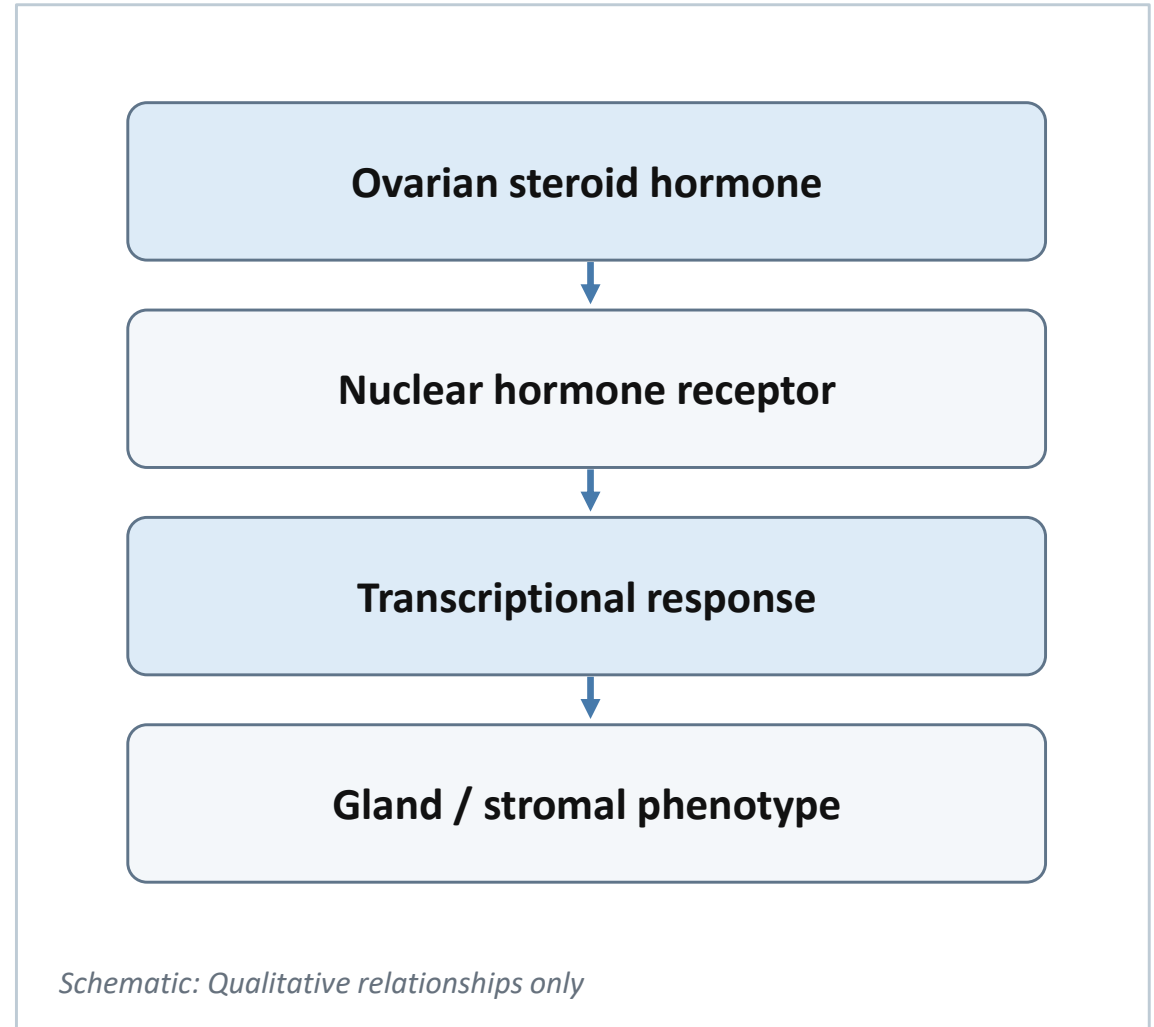
Morphology changes in two coordinated compartments

- Epithelial sequence: Mitosis → vacuolation → secretion → exhaustion.
- Stromal sequence: Proliferation → edema → predecidualization.
- A discordance requires careful cycle and sampling interpretation.



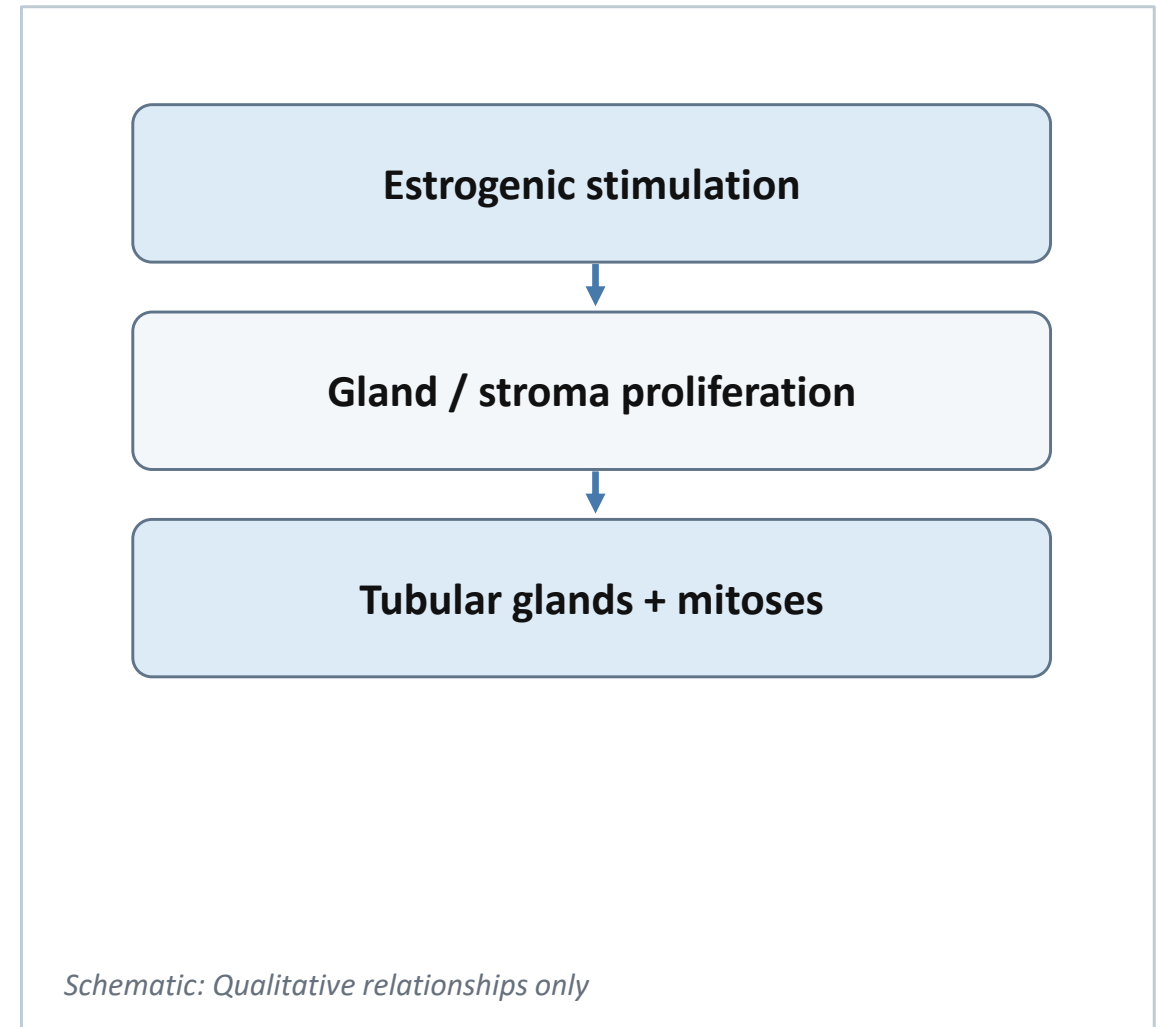
Ovarian steroids act through nuclear receptors

- Endometrial hormone effects are primarily receptor-mediated.
- Estrogen produces cellular proliferation and paracrine signaling.
- Progesterone shifts the tissue toward differentiation.



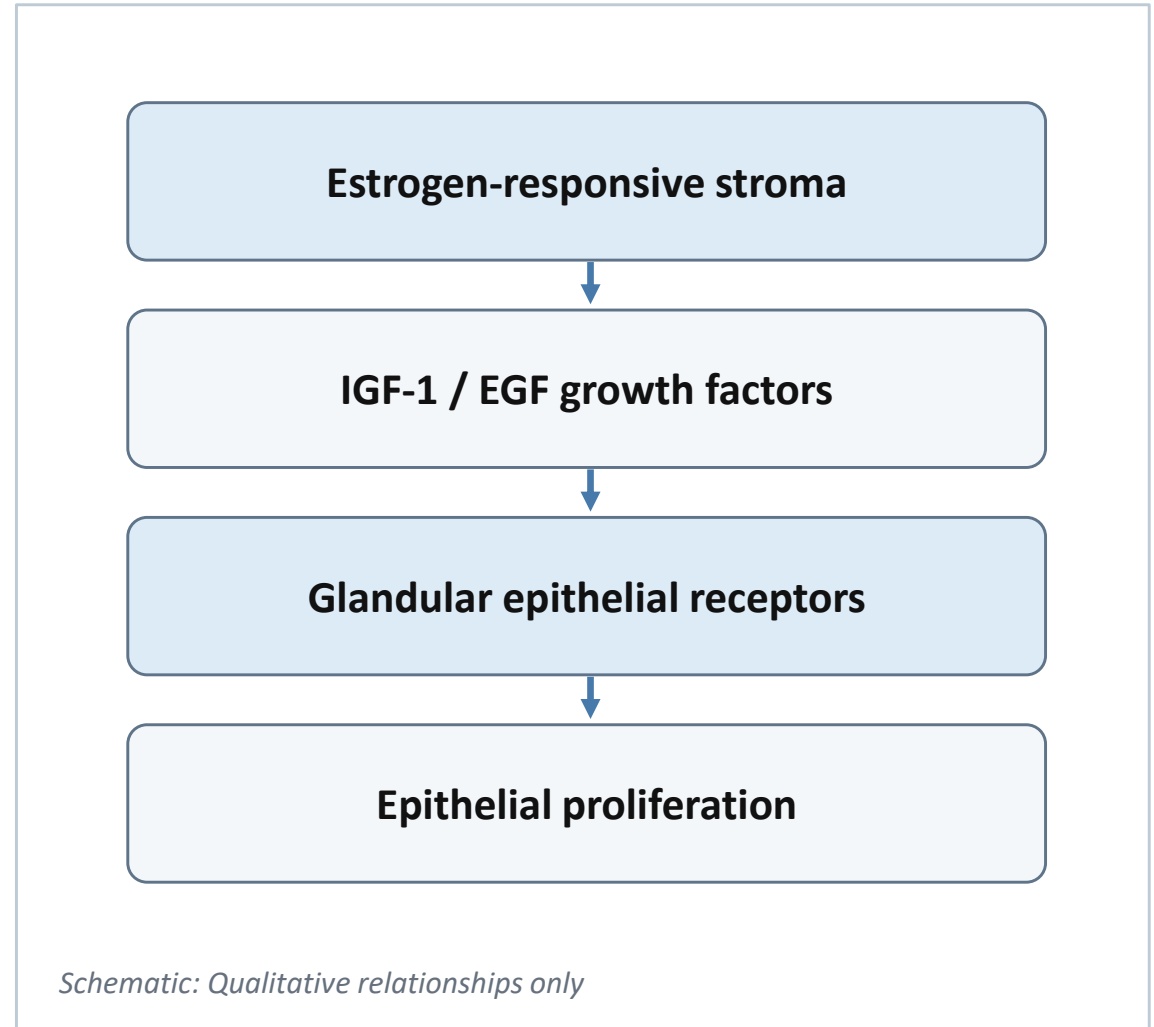
Estrogen stimulates both glands and stroma

- Estrogenic signaling drives proliferative regrowth.
- Stromal responses can amplify epithelial growth.
- Both compartments should be assessed in a proliferative-phase specimen.



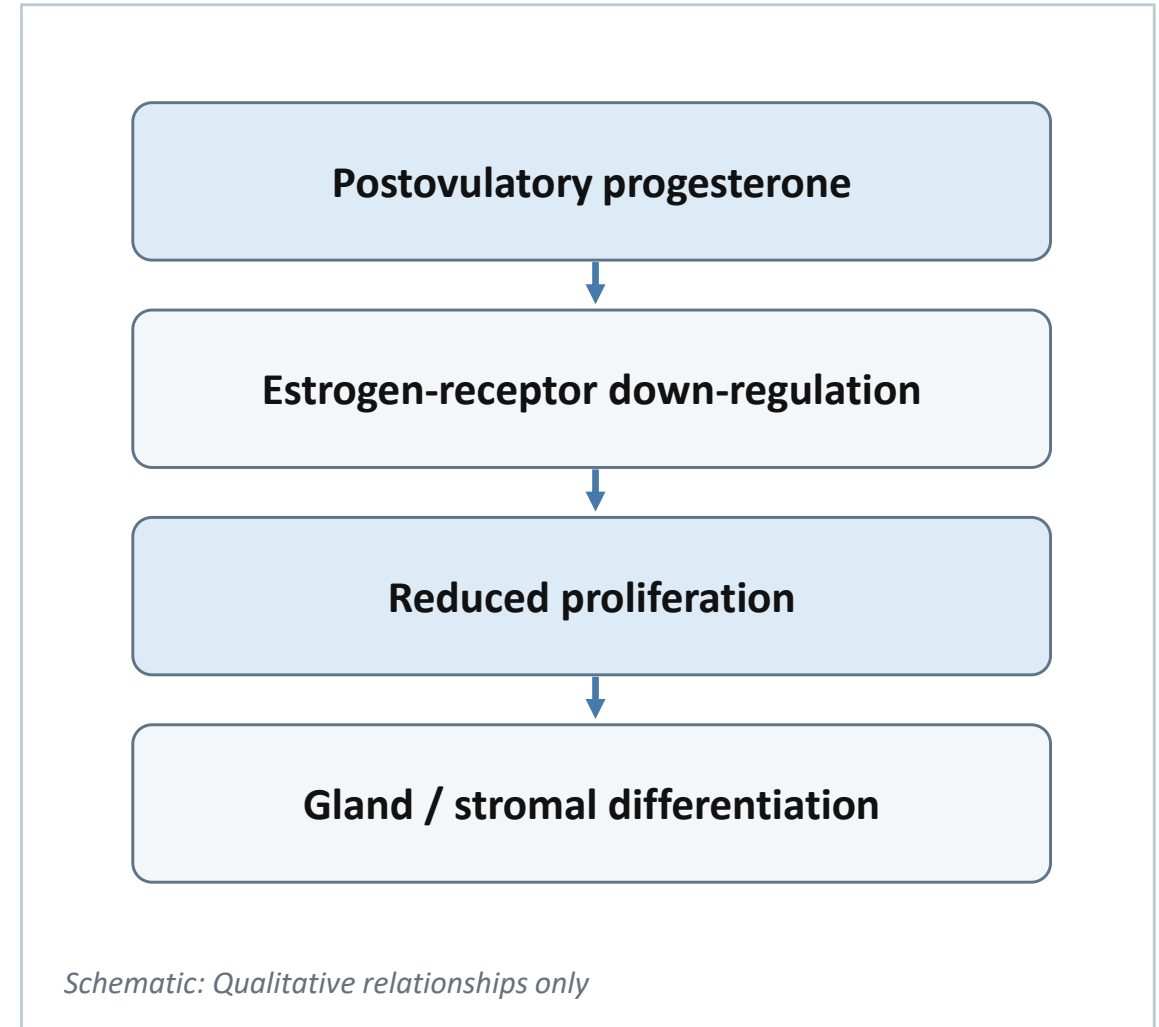
Stromal–epithelial cross-talk mediates growth

- Estrogen-stimulated stromal cells produce growth factors.
- The text names insulin-like growth factor-1 and epidermal growth factor.
- These ligands activate receptors on glandular epithelium.



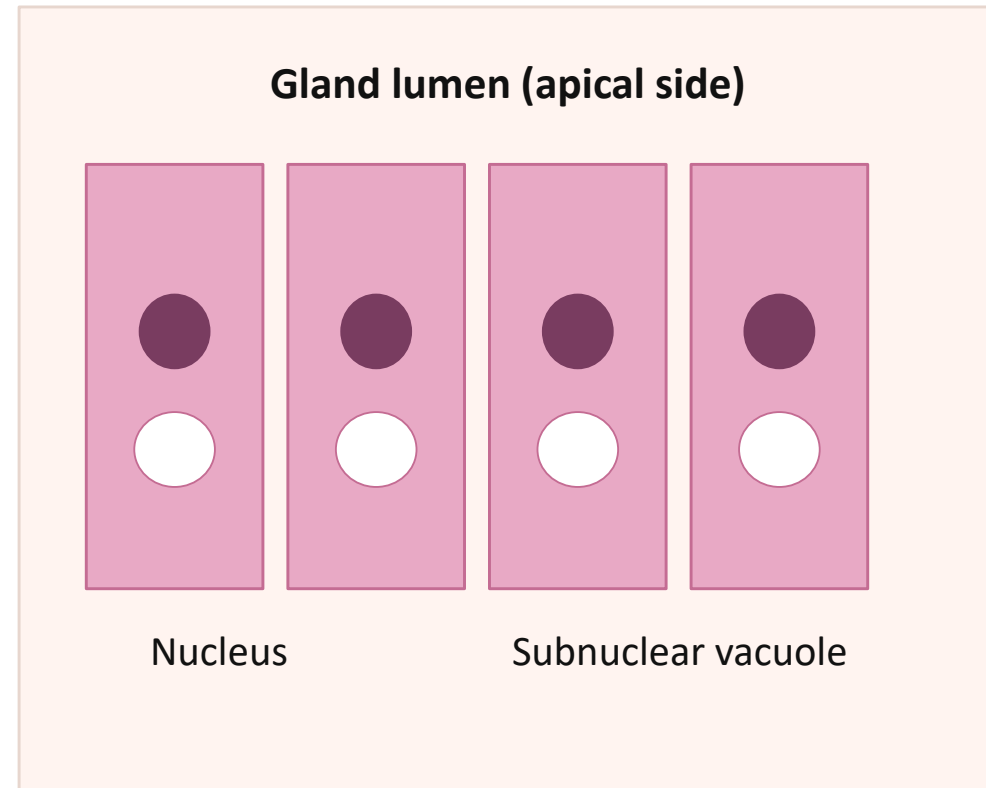
Progesterone attenuates estrogen responsiveness

- Progesterone down-regulates estrogen receptor expression.
- This occurs in glandular and stromal compartments.
- Reduced estrogen responsiveness suppresses further proliferation.



Progesterone promotes glandular differentiation

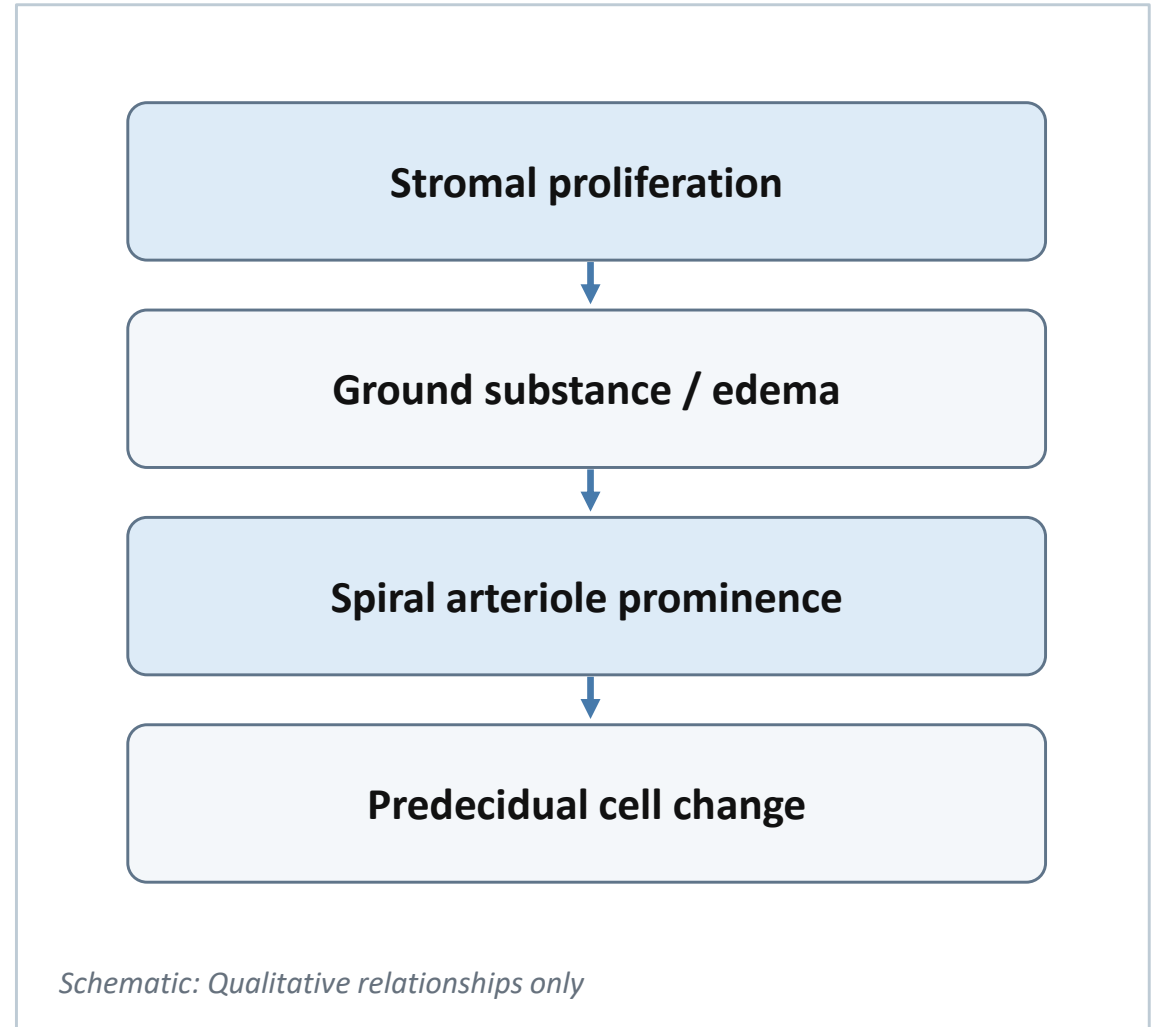
- Following ovulation, glands develop secretory morphology.
- Vacuoles and glandular tortuosity reflect the changing program.
- Differentiation, not continued rapid growth, dominates.



SCHEMATIC • enlarged epithelial cells; Not a micrograph

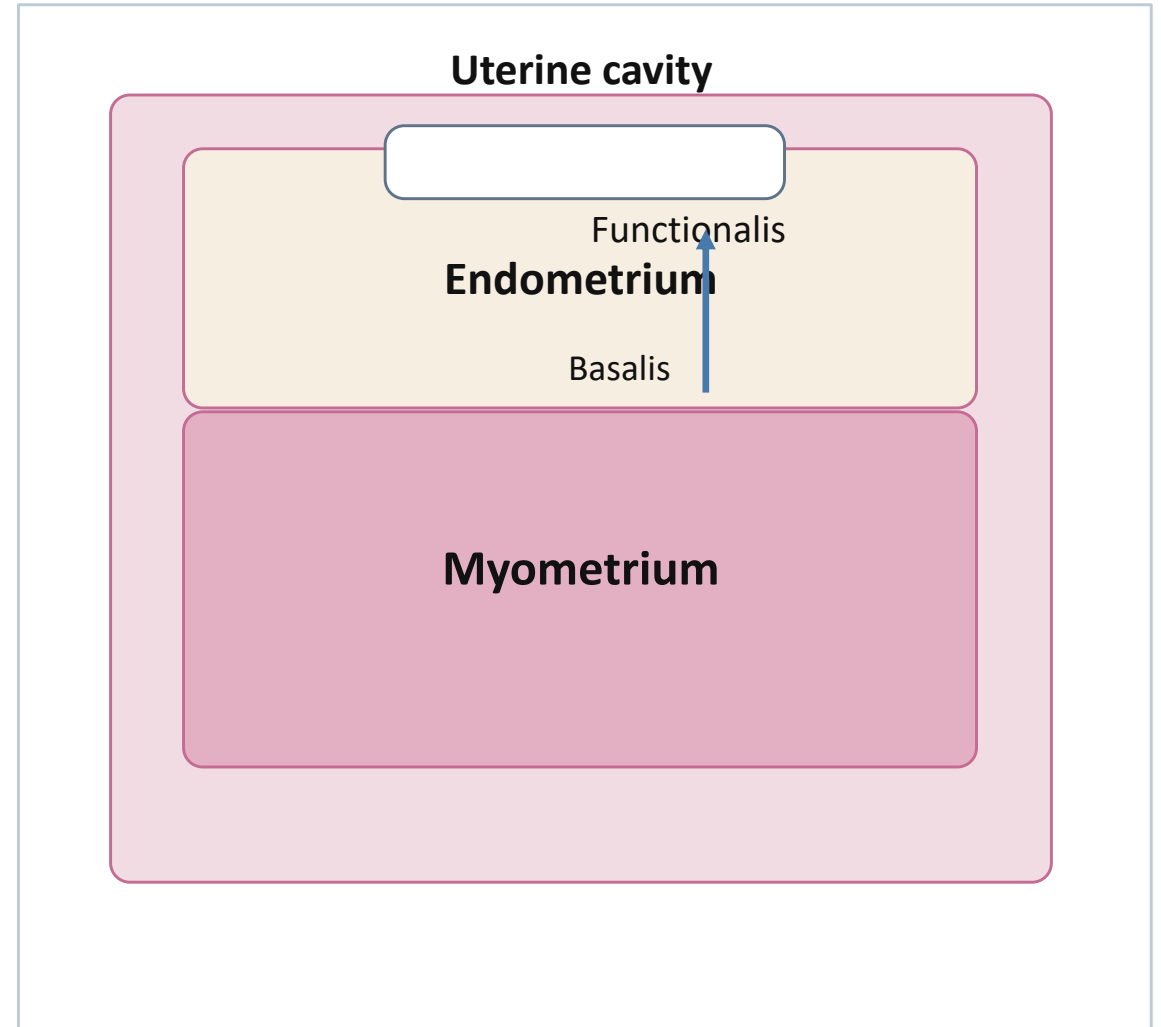
Progesterone promotes stromal differentiation

- Late secretory stroma accumulates edema and ground substance.
- Stromal cells undergo predecidualization.
- The morphological effect is readily recognized in tissue sections.



Endometrial stem cells may contribute to renewal

- Likely regenerative roles for stem cells.
- They may also participate in ectopic endometrial tissue and malignancy.
- These proposed contributions should not be treated as established causal proof.

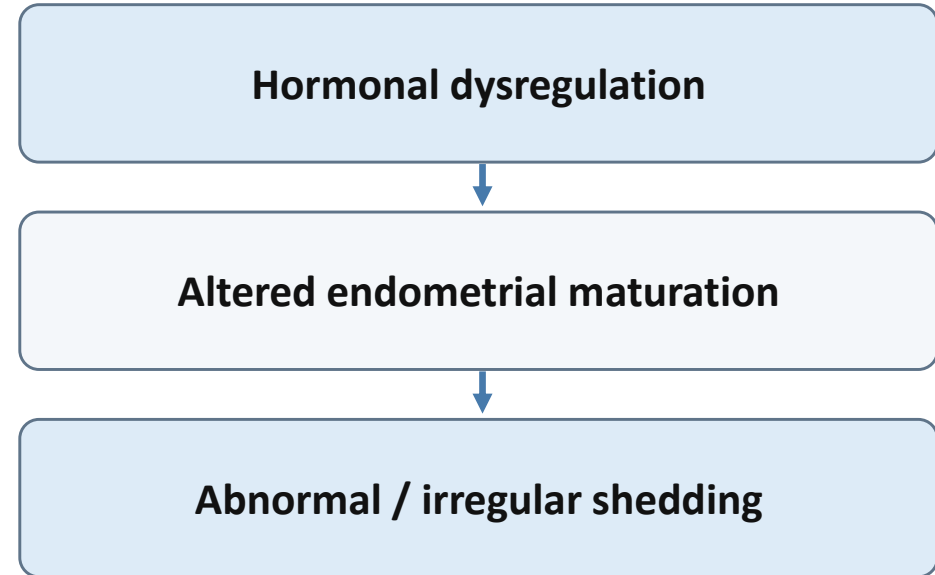


Cycle histology: A consolidated comparison

Phase	Glandular features	Stromal features
Menstrual	Gland breakdown / fragments	Hemorrhage and breakdown
Proliferative	Tubular; Mitotic; Nonsecretory	Spindle cells; Mitoses
Early secretory	Subnuclear vacuoles	Early luteal change
Late secretory	Tortuous / serrated	Edema; Predecidual cells

When abnormal bleeding lacks a structural lesion

- The textbook uses the term dysfunctional uterine bleeding.
- It denotes uterine bleeding without an underlying structural abnormality.
- Disruption of normal hormonal coordination is a frequent cause.



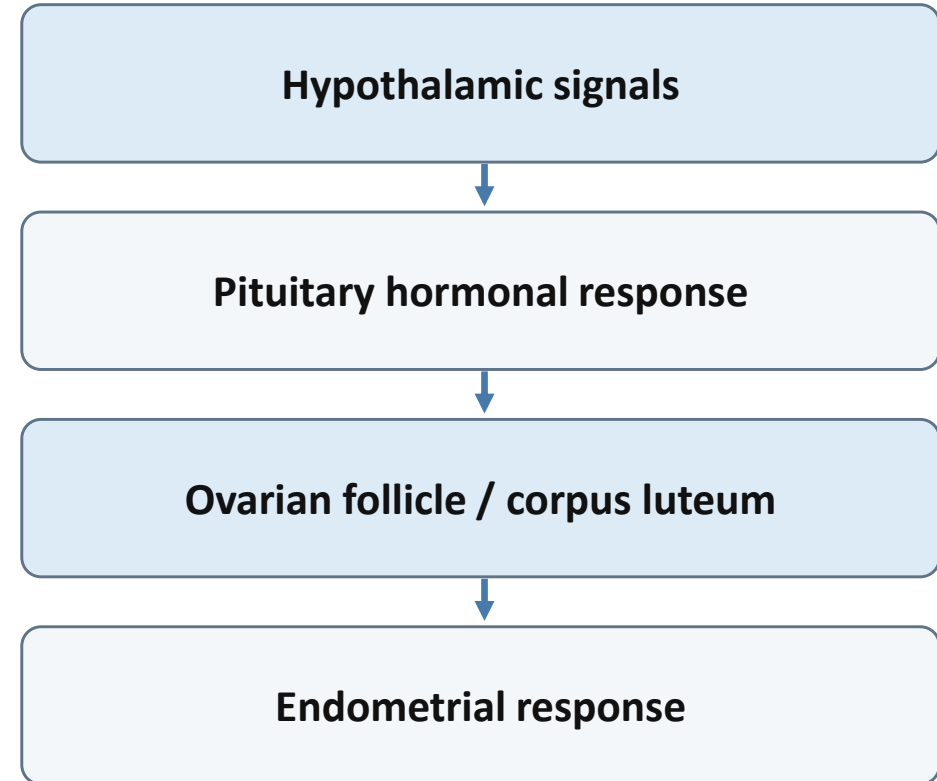
Schematic: Qualitative relationships only

Bleeding also has structural causes

Structural causes	Functional causes
Endometritis, polyps	Hormonal dysregulation
Submucosal leiomyomas	Anovulatory cycles
Endometrial neoplasms	Endocrine / ovarian disturbance

Physiological coordination is necessary

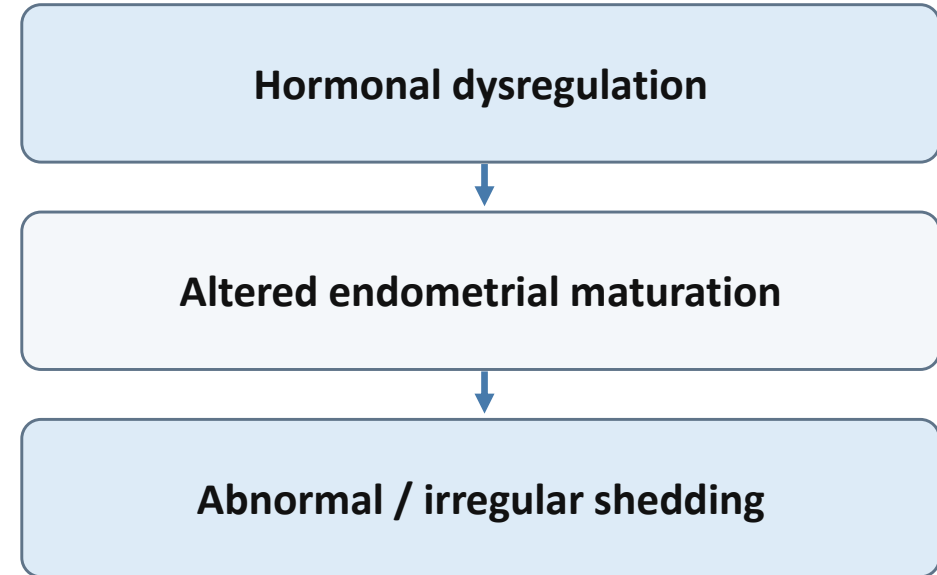
- Normal cycles require appropriate timing of hormonal signals.
- Abnormal release or response can alter proliferation and shedding.
- Functional bleeding represents disturbed regulation rather than a single lesion.



Schematic: Qualitative relationships only

Anovulation is the commonest functional mechanism

- Anovulation is failure to ovulate.
- The source identifies it as the most frequent cause of dysfunctional bleeding.
- The absence of normal luteal progesterone is central to the mechanism.



Schematic: Qualitative relationships only

Anovulatory bleeding clusters at transition ages

- It is especially common around menarche.
- It also occurs in the perimenopausal period.
- These settings are associated with altered ovulatory hormonal regulation.

Menarche: Ovulatory transitions



Reproductive intervals

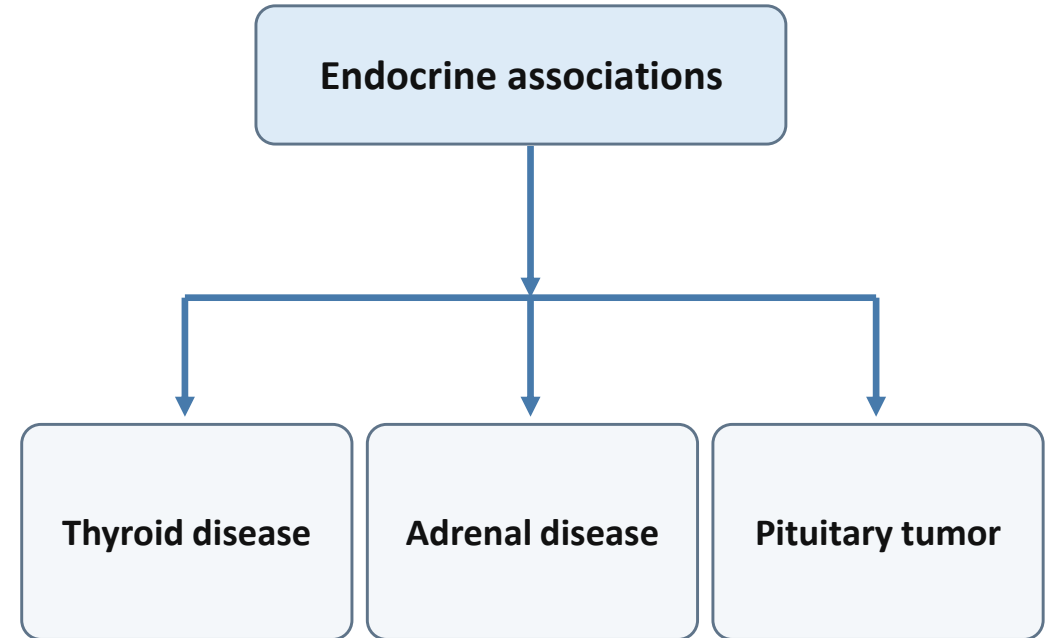


Perimenopause: Ovulatory transitions

Schematic: Qualitative relationships only

Endocrine disease can impair ovulation

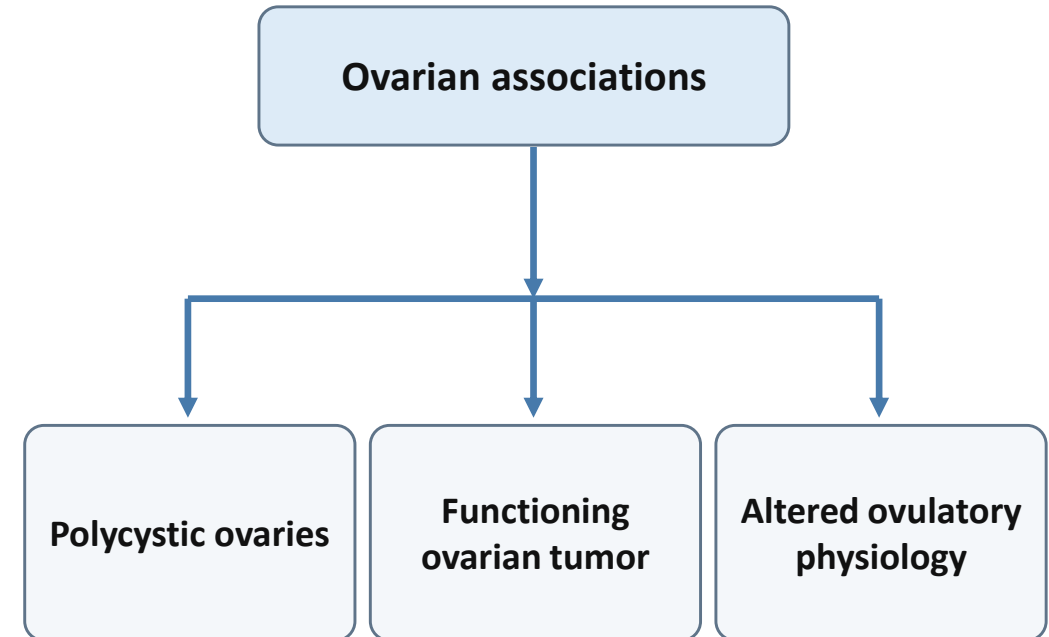
- Associated disorders include thyroid disease.
- Adrenal disease and pituitary tumors are additional causes.
- The ultimate endometrial response reflects abnormal ovarian steroid exposure.



Schematic • associated categories, not a differential algorithm

Ovarian abnormalities can impair ovulation

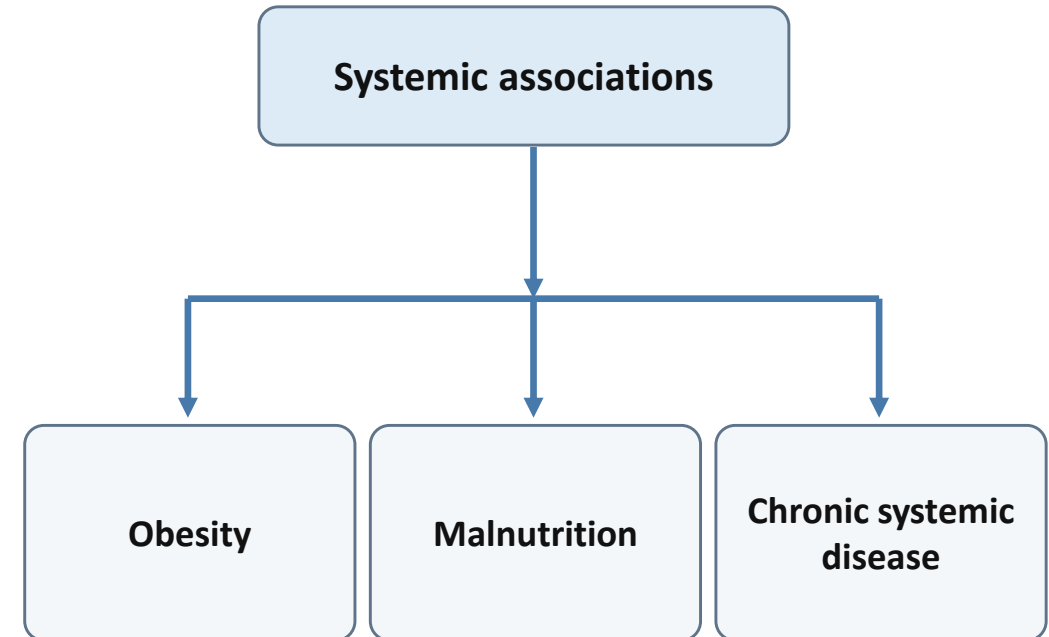
- Polycystic ovaries are a recognized setting of anovulation.
- Functioning ovarian tumors, including granulosa cell tumors, are cited.
- Clinical etiology must be distinguished from the downstream biopsy pattern.



Schematic • associated categories, not a differential algorithm

Metabolic and systemic disturbances matter

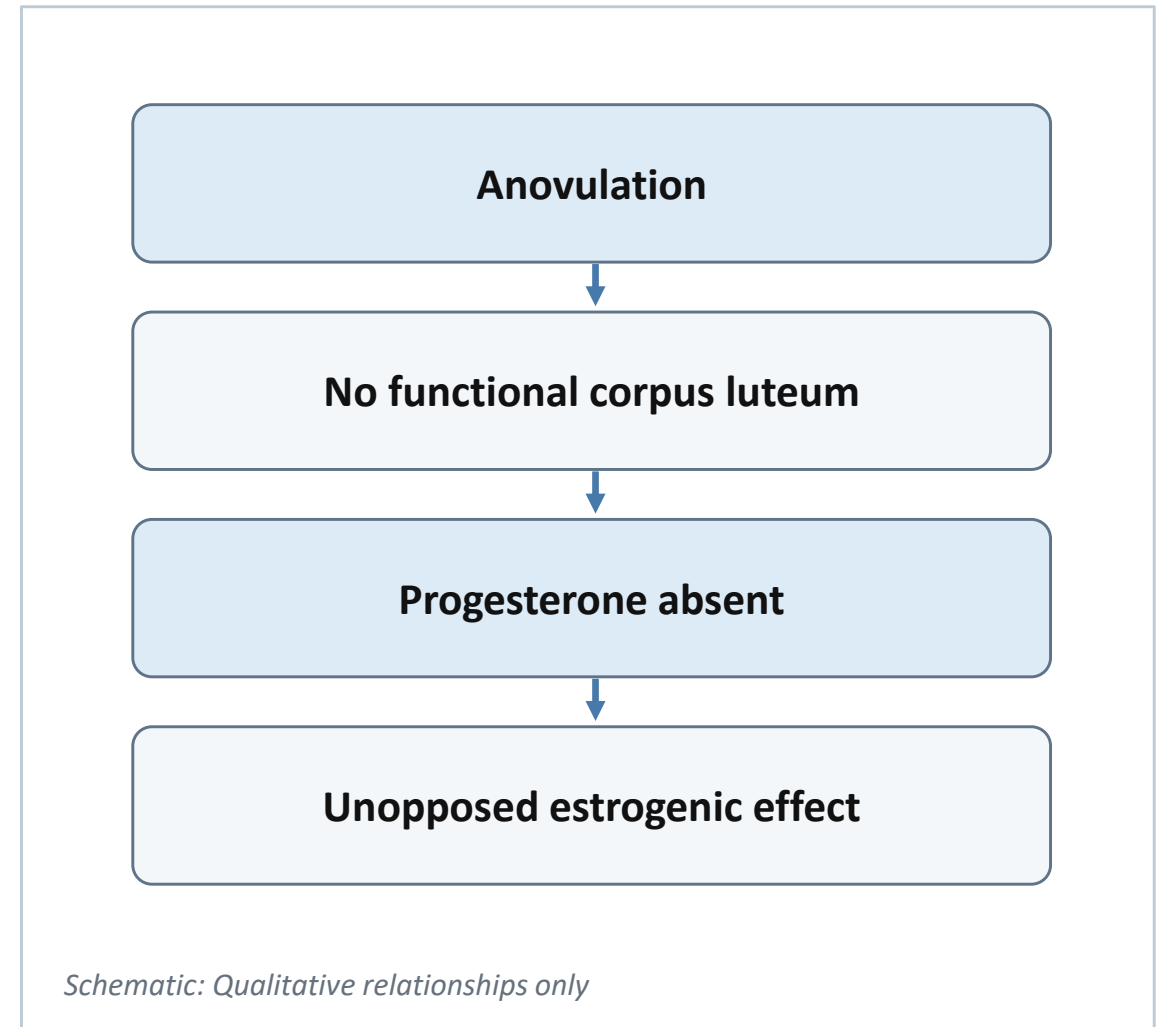
- Obesity and malnutrition are named in the source.
- Other chronic systemic diseases may disturb ovulation.
- A uterine biopsy documents an endometrial response, not the full endocrine cause.



Schematic • associated categories, not a differential algorithm

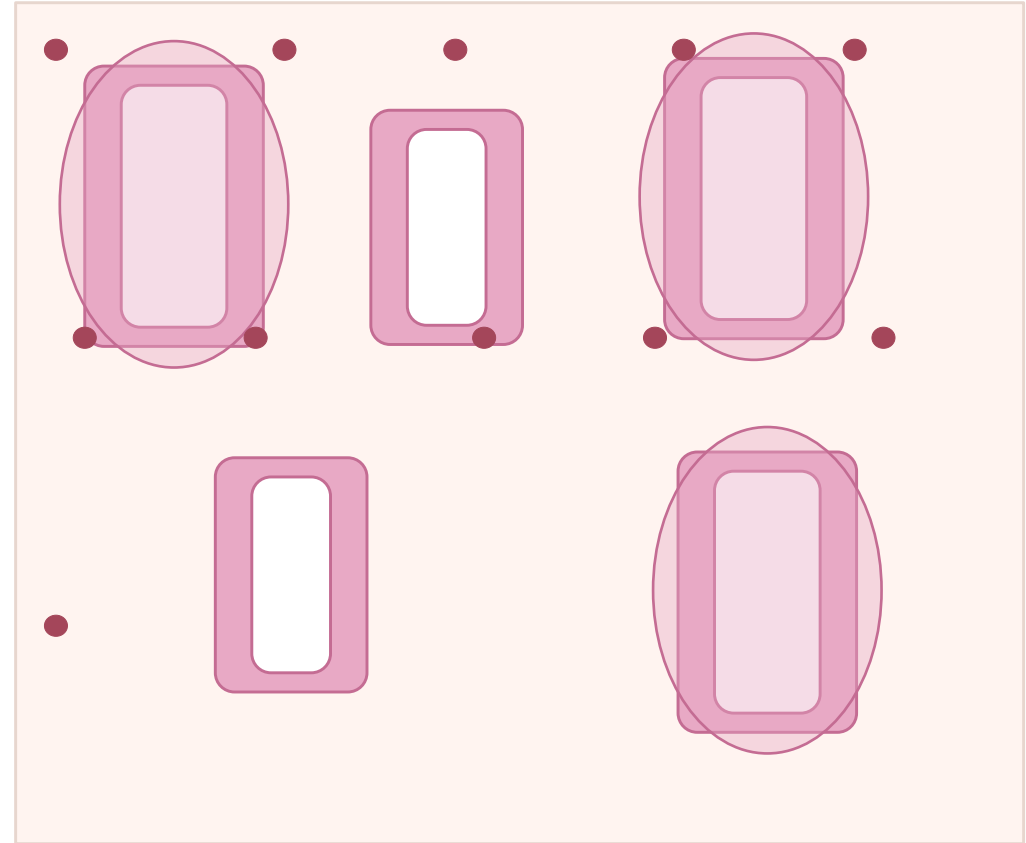
Anovulation removes the luteal progesterone phase

- Failure of ovulation prevents formation of a functional corpus luteum.
- Normal progesterone-dependent maturation does not occur.
- Estrogenic stimulation is therefore not opposed in the usual cyclic manner.



Unopposed estrogen changes gland architecture

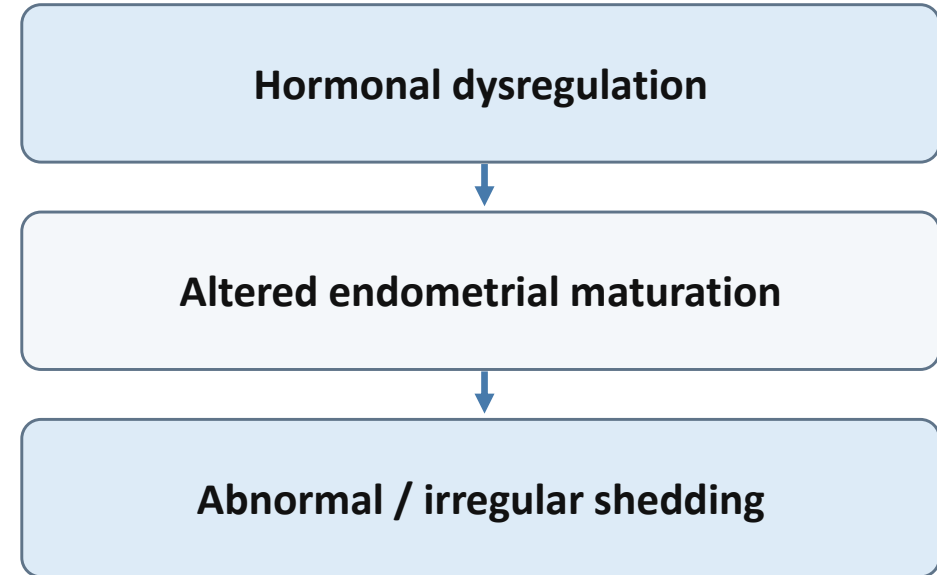
- Persistent estrogenic effects maintain proliferative epithelium.
- Endometrial glands may become cystically dilated.
- These mild changes can regress after a later ovulatory cycle.



SCHEMATIC • Anovulatory: Cystic dilatation (simplified)

Repeated anovulation can lead to bleeding

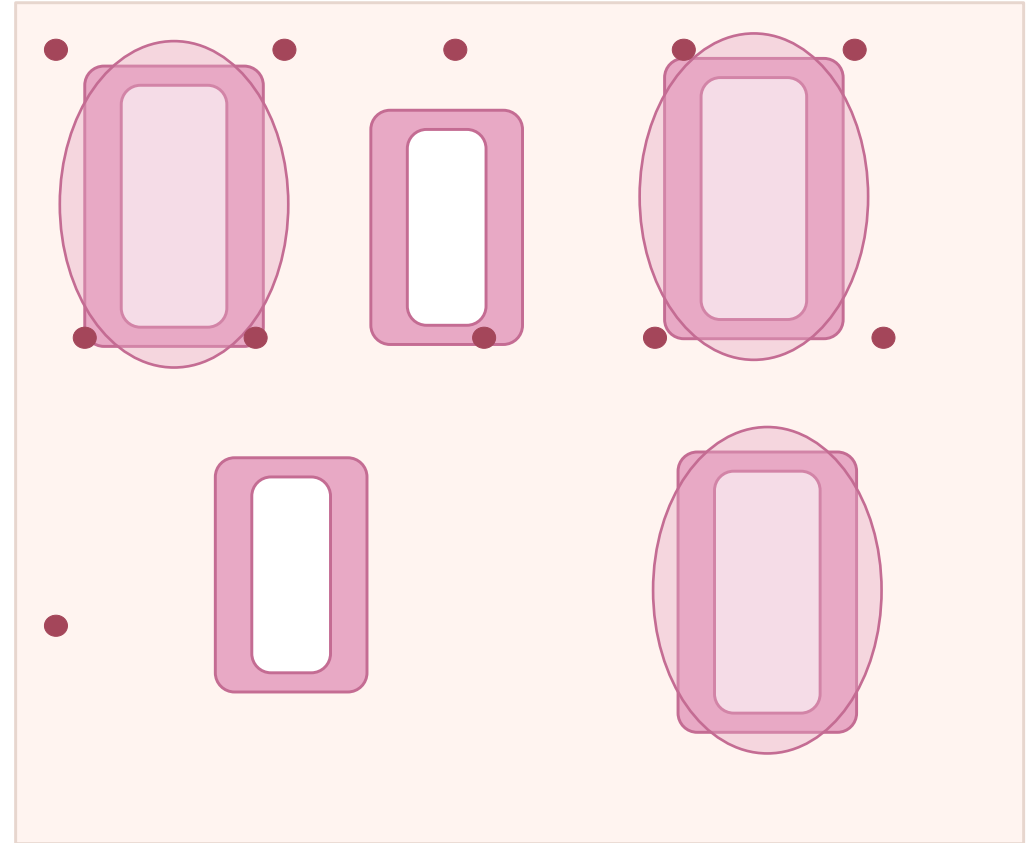
- Persistent failure to ovulate changes the timing of shedding.
- Repeated cycles can produce irregular endometrial bleeding.
- Clinical circumstances may lead to endometrial biopsy.



Schematic: Qualitative relationships only

Typical anovulatory biopsy pattern

- Pseudostratified endometrial glands predominate.
- Scattered epithelial mitoses may still be present.
- Cystic dilation may accompany estrogen-stimulated proliferation.



SCHEMATIC • Anovulatory: Cystic dilatation (simplified)

Anovulatory breakdown can mimic menstruation

- Stromal condensation occurs with bleeding.
- Eosinophilic epithelial metaplasia may accompany breakdown.
- These changes can resemble aspects of menstrual endometrium.

Menstrual

Withdrawal after
luteal phase

Secretory features
may precede

Anovulatory

No corpus luteum

No secretory /
predecidual change

Comparison: Teaching schematic

The absent progesterone effect is decisive

- Normal secretory glandular features are lacking.
- Stromal predecidualization is also absent.
- These negative findings distinguish anovulatory breakdown from a normal luteal cycle.

Menstrual

Withdrawal after
luteal phase

Secretory features
may precede

Anovulatory

No corpus luteum

No secretory /
predecidual change

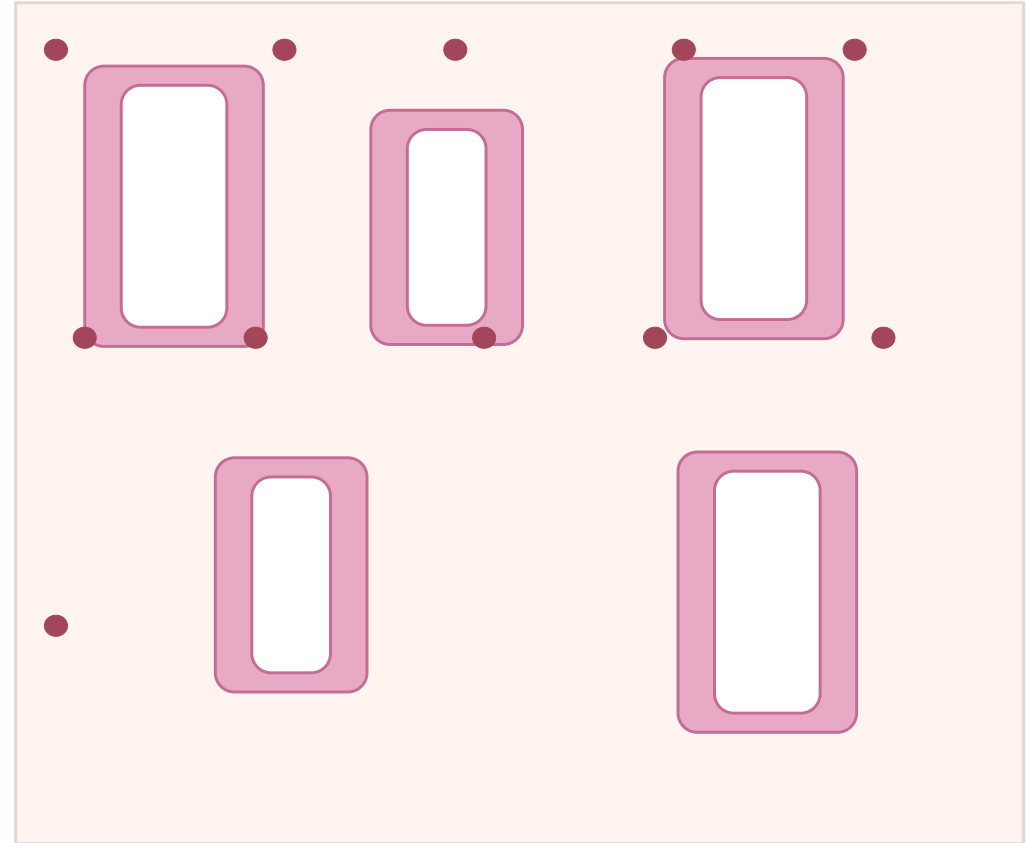
Comparison: Teaching schematic

The menstrual-versus-anovulatory distinction

Finding	Menstrual endometrium	Anovulatory breakdown
Hormonal context	Progesterone withdrawal	No luteal progesterone
Gland differentiation	Postsecretory context	Proliferative; Nonsecretory
Stromal state	Breakdown after luteal phase	Condensation; No predecidualization
Typical epithelial context	May follow sawtooth glands	Pseudostratified glands; Mitoses

Case: Identify the proliferative pattern

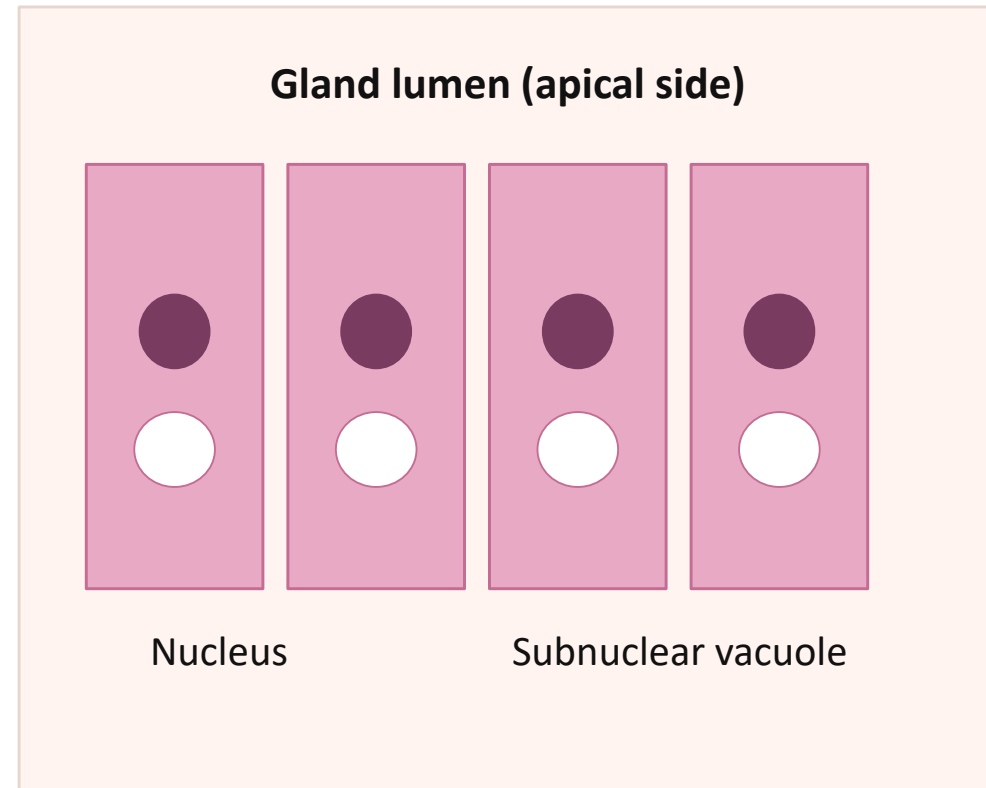
- Biopsy shows regularly arranged tubular glands.
- Pseudostratified epithelium and mitoses are evident.
- No secretory vacuoles or predecidual stromal change are present.



SCHEMATIC • Proliferative: Tubular glands / cellular stroma

Case: Recognize a progesterone response

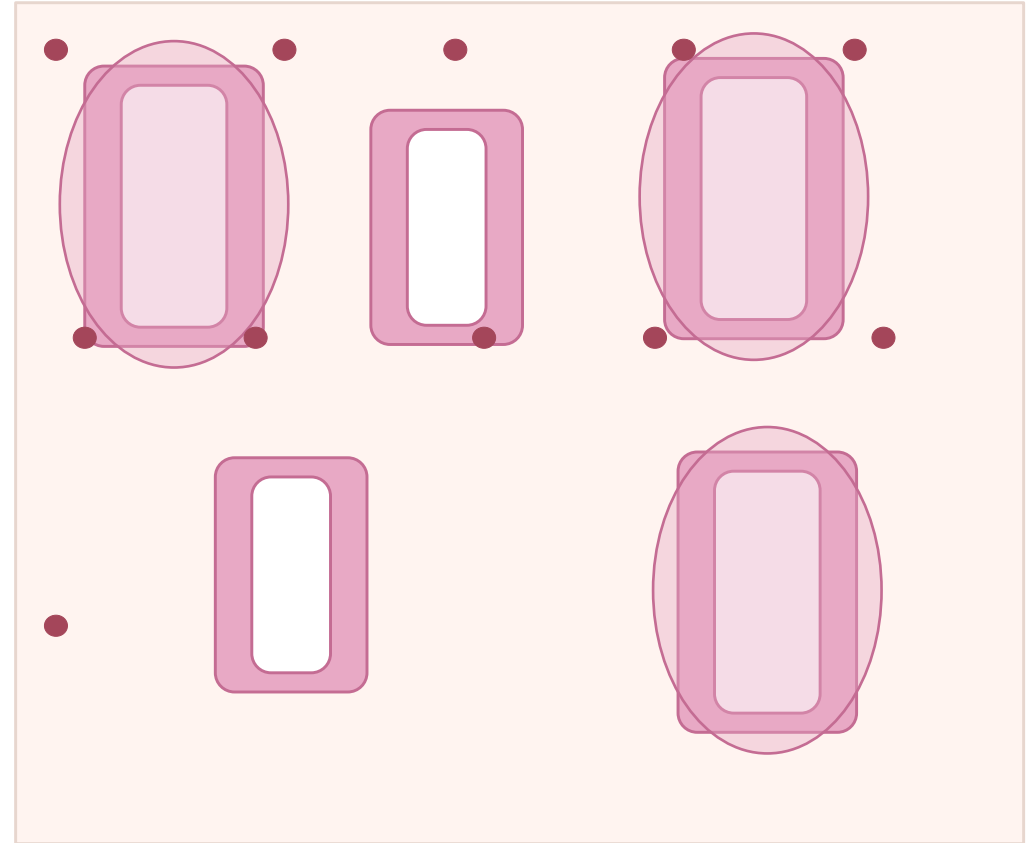
- Biopsy shows glandular subnuclear vacuoles.
- A subsequent sample shows tortuous glands and stromal edema.
- Interpret the sequential findings as postovulatory maturation.



SCHEMATIC • enlarged epithelial cells; Not a micrograph

Case: Bleeding without secretory maturation

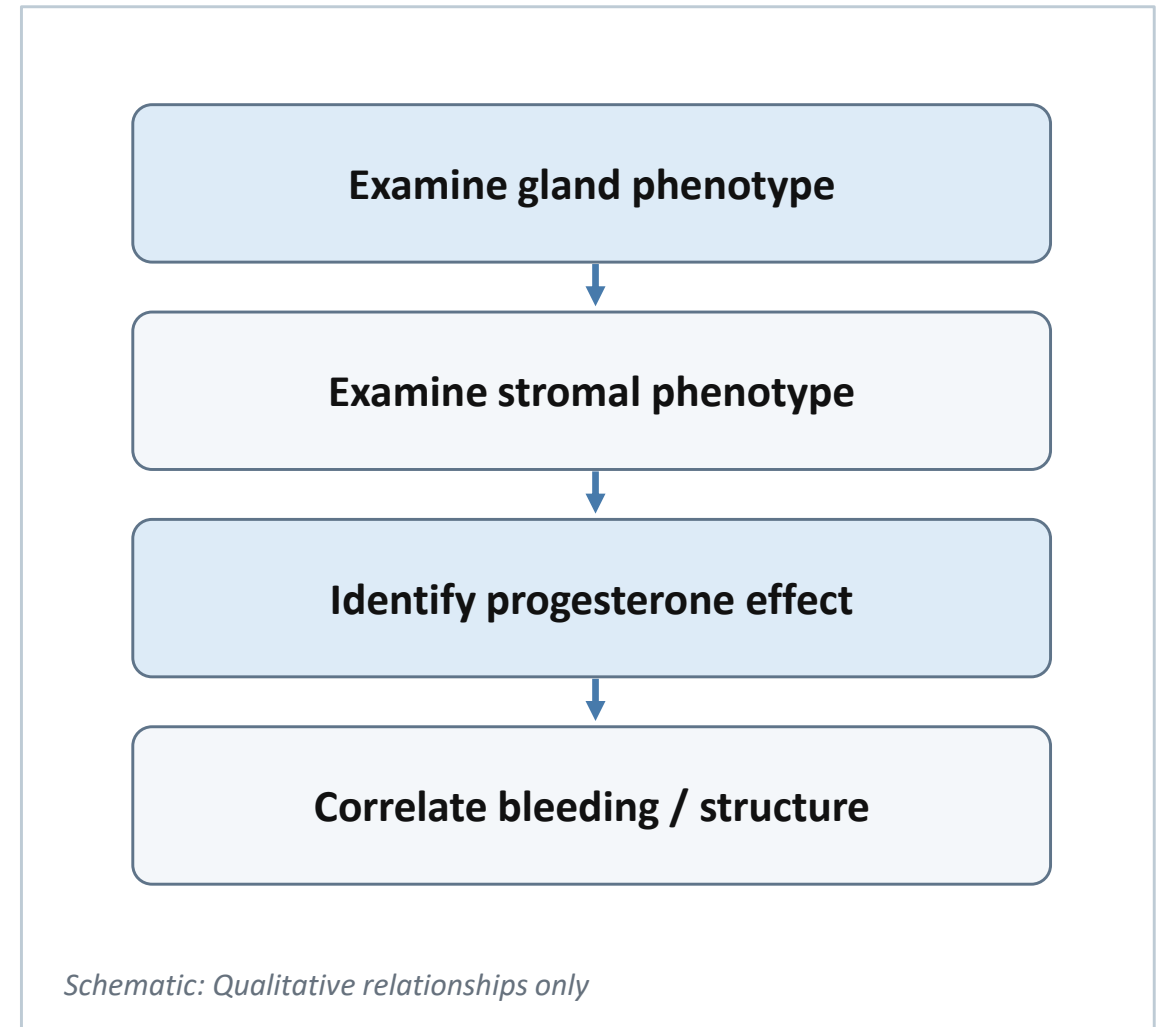
- Patient has irregular uterine bleeding and repeated anovulation.
- Biopsy shows pseudostratified glands, focal cystic dilation, and breakdown.
- The absent luteal differentiation is central to interpretation.



SCHEMATIC • Anovulatory: Cystic dilatation (simplified)

Four diagnostic reasoning checkpoints

- Assess whether the glands are proliferative or secretory.
- Read stromal features alongside epithelial morphology.
- Look for evidence of postovulatory progesterone effect.
- Correlate the biopsy with bleeding history and structural evaluation.



Summary: Structure, hormones, morphology

- Basalis supports restoration; Functional is undergoes shedding.
- Estrogen produces glandular and stromal proliferation.
- Progesterone shifts the endometrium toward secretory and predecidual change.
- Anovulation can cause bleeding without these luteal-phase features.

Estrogen → proliferation



Progesterone → differentiation



Withdrawal / anovulation → altered shedding

Schematic: Qualitative relationships only

Limits of histologic interpretation

- An endometrial pattern documents tissue responses to hormonal exposure.
- It does not, by itself, identify the upstream cause of anovulation.
- Structural causes must remain in the differential diagnosis of uterine bleeding.