

Adnexal (Appendage) Tumors

Skin appendage differentiation, morphology and syndromic associations

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Learning objectives

- Classify adnexal neoplasms by follicular, sebaceous, eccrine and apocrine differentiation.
- Recognize the morphologic patterns emphasized.
- Connect characteristic tumors with CYLD, CTNNB1, PTEN and mismatch-repair pathways.
- Identify malignancy-related warnings and the differential with metastatic adenocarcinoma.

Adnexal neoplasms show appendage differentiation

Definition

Tumors arising from, or differentiating toward, cutaneous appendages.

Spectrum

Hundreds of distinct entities;
Clinical significance varies with context.

Biologic behavior

Most are benign, but malignant forms are documented.

The line of differentiation is the first organizing question.

Four lineages organize the field

Hair follicle

Trichoepithelioma
Pilomatricoma

Sebaceous

Sebaceous adenoma
Sebaceous carcinoma

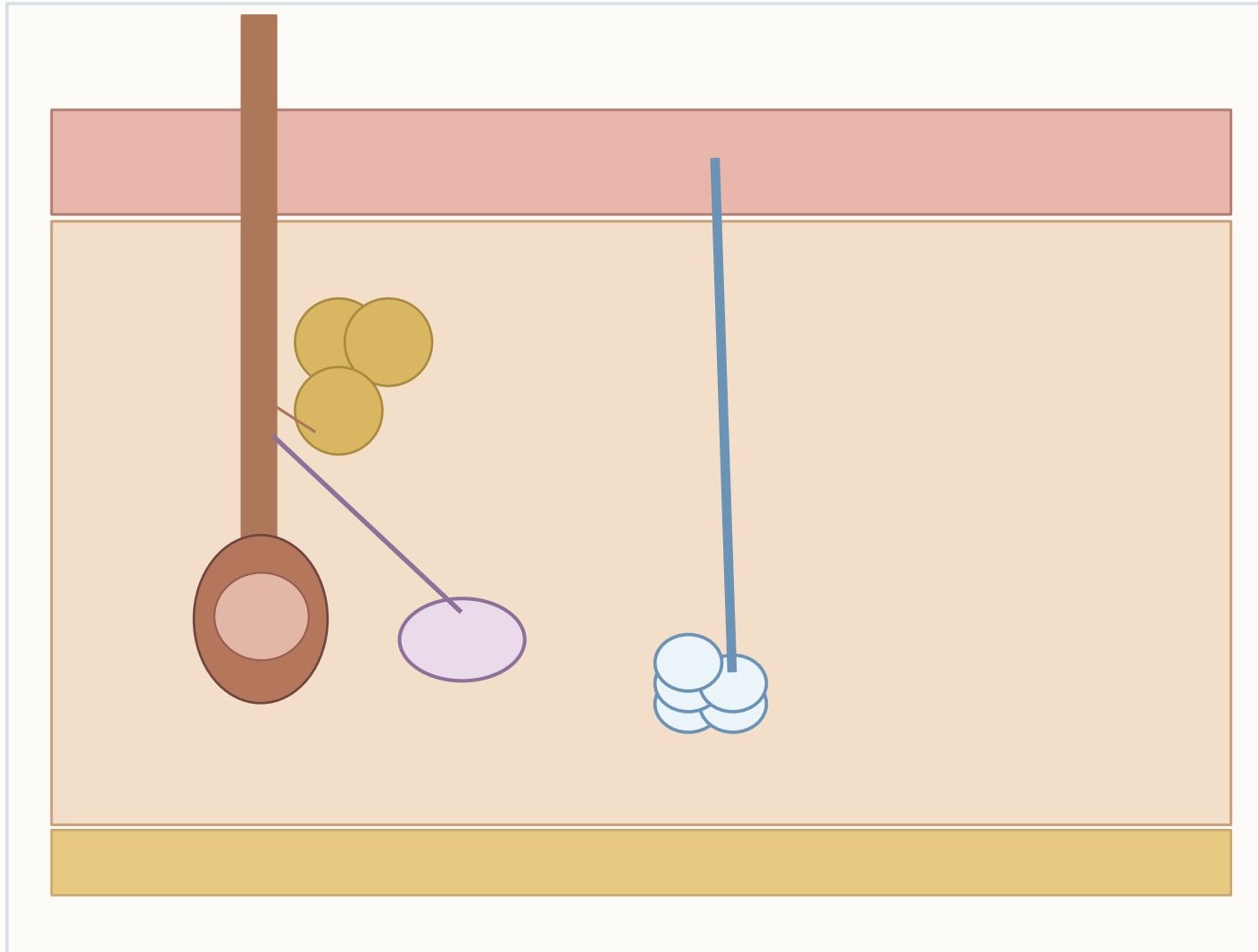
Eccrine

Poroma
Syringoma

Apocrine

Apocrine-differentiated neoplasms
Apocrine carcinoma

Skin appendages: A common anatomic framework



Schematic — not histologic evidence

Epidermis

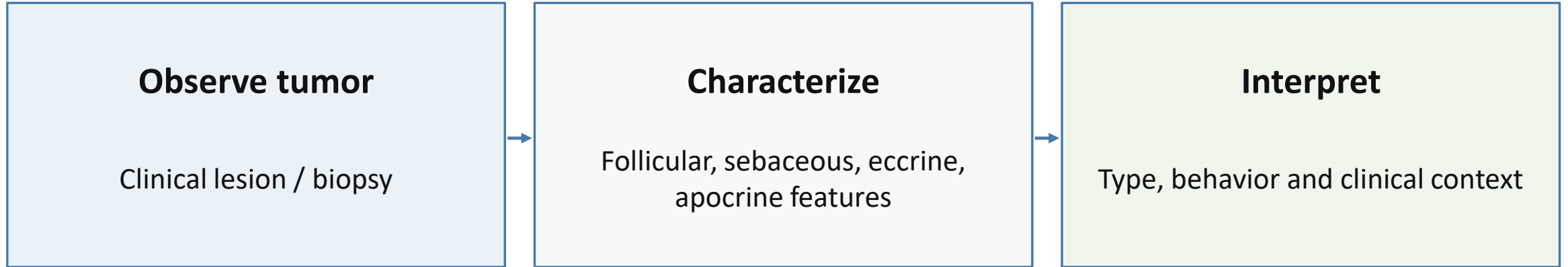
Follicular unit

Sebaceous lobules

Eccrine duct / coil

Apocrine differentiation

Differentiation is not identical to anatomic origin



“arising from or showing differentiation toward” skin appendages.

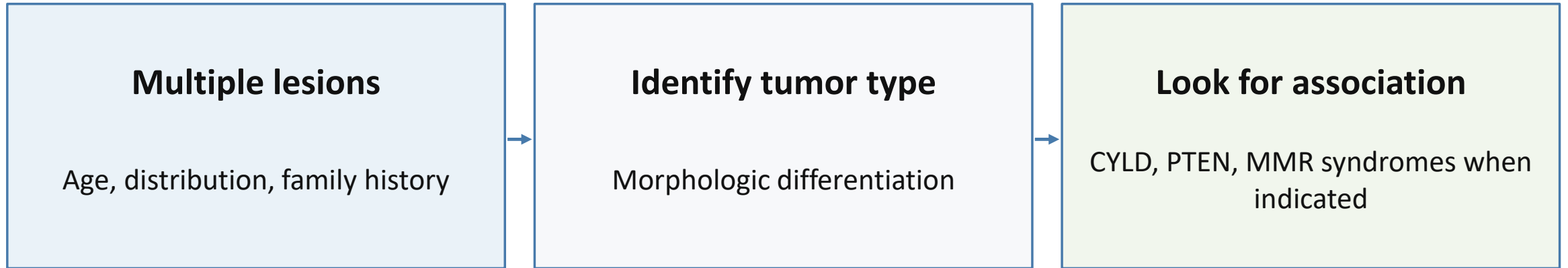
Most adnexal lesions are clinically nonspecific

- Often present as solitary or multiple flesh-colored papules or nodules.
- Surface appearance alone usually does not establish the exact lineage.
- Characteristic sites may support, but do not replace, morphologic interpretation.
- Multiplicity can change the clinical significance of an otherwise benign lesion.

Site clues are useful—not definitive

Location / pattern	Illustrative entity	Interpretive value
Palms or soles	Eccrine poroma	Predominant distribution
Lower eyelids	Syringoma	Multiple small tan papules
Forehead / scalp	Cylindroma	Nodules may coalesce
Perinasal region	Trichoepithelioma	Multiple papules / small nodules
Apocrine-rich sites	Apocrine tumors	Especially axilla and scalp

Multiplicity prompts a syndromic assessment



A benign-appearing appendage tumor may serve as a marker of inherited disease.

Benign and malignant categories coexist

Most appendage tumors

- Often benign and limited to skin.
- May simulate cutaneous malignancy.
- May carry syndromic significance.

Malignant appendage tumors

- Can follow an aggressive course.
- Can show gland-like architecture.
- May resemble a metastasis.

Diagnostic reasoning must integrate three axes

Clinical

Site
Number of lesions
Family history

Architectural

Nests, lobules, ducts, primitive
follicles, secretory features

Biologic

Benign or malignant
Germline association
Metastatic mimic

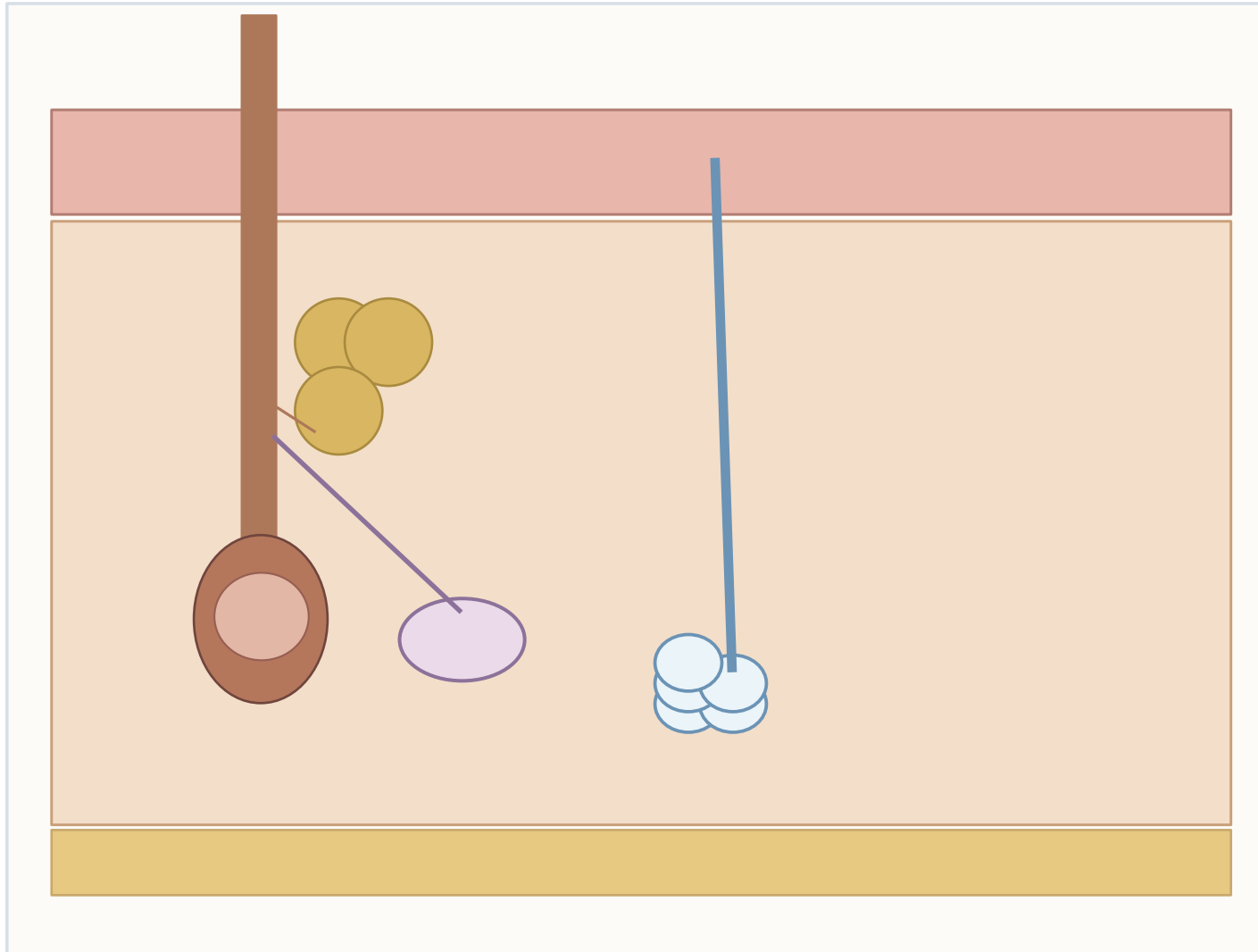
No single axis is adequate for the entire adnexal tumor spectrum.

Keep distinct categories distinct

Appendage tumor	Common look-alike in the chapter	Key distinction
Adnexal neoplasm	Epidermal tumor	Appendage-directed differentiation
Follicular inclusion cyst	Solid appendage tumor	Cystic cavity with keratin, not merely basaloid nests
Adnexal carcinoma	Metastatic adenocarcinoma	Clinical correlation needed if gland-forming

The chapter places these categories close together; They are not interchangeable.

Eccrine differentiation: The ductal concept



Schematic — not histologic evidence

Epidermis

Follicular unit

Sebaceous lobules

Eccrine duct / coil

Apocrine differentiation

Eccrine poroma: Characteristic distribution

Type

An adnexal tumor with eccrine differentiation.

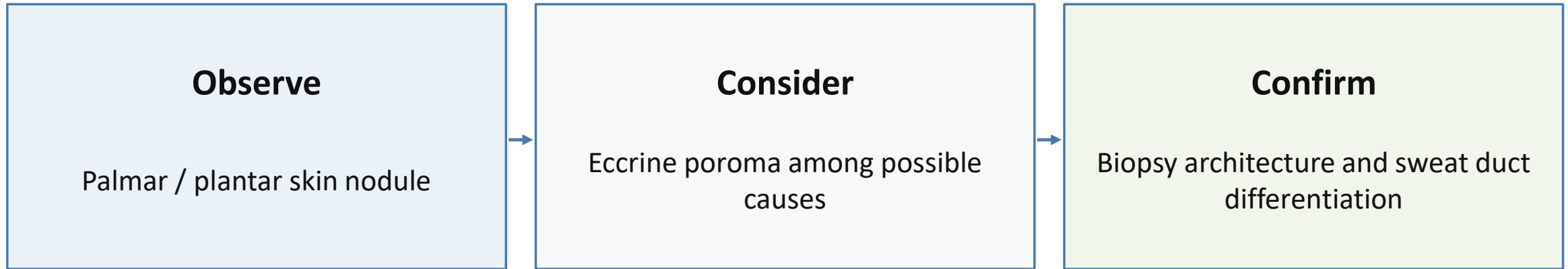
Favored sites

Palms and soles are predominant sites.

Diagnostic principle

Site helps suggest a lineage but does not establish it.

Poroma: Use clinicomorphologic correlation



The provided Robbins excerpt does not give formal microscopic criteria for poroma.

Syringoma: A recognizable clinical pattern

Morphologic lineage

Ecocrine differentiation.

Usual appearance

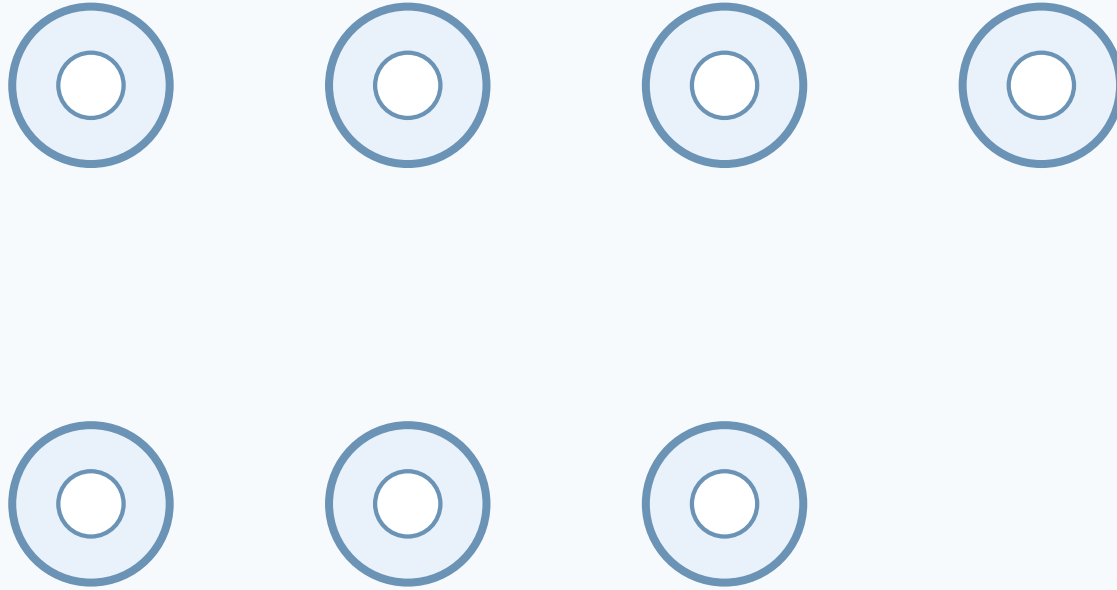
Multiple small, tan papules.

Usual location

Near the lower eyelids.

Syrinx means “pipe” or “tube,” pointing to the ductal theme.

Syringoma: Understand the ductal analogy



How to read the schematic

- Tubular / duct-like differentiation
- Multiple small superficial papules clinically
- Exact microscopic criteria are not reproduced from this excerpt

Schematic, not photomicrograph

Poroma versus syringoma: High-yield distinction

Feature	Poroma	Syringoma
Lineage	Eccrine	Eccrine
Typical site	Palms / soles	Near lower eyelids
Clinical form in excerpt	Not specifically characterized	Multiple small tan papules
Interpretive cue	Anatomic distribution	Distribution + ductal naming

Cylindroma: Clinicopathologic identity

Differentiation

Apocrine or eccrine appendage differentiation.

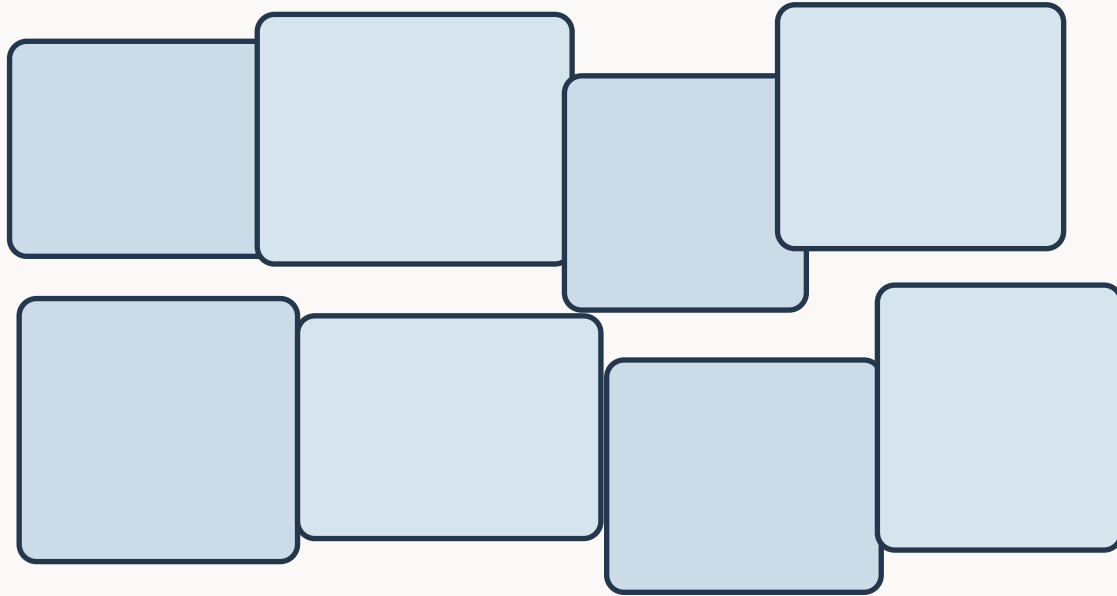
Typical sites

Forehead and scalp.

Characteristic pattern

Basaloid nests arranged in a jigsaw-puzzle architecture.

Cylindroma: Jigsaw-puzzle architecture

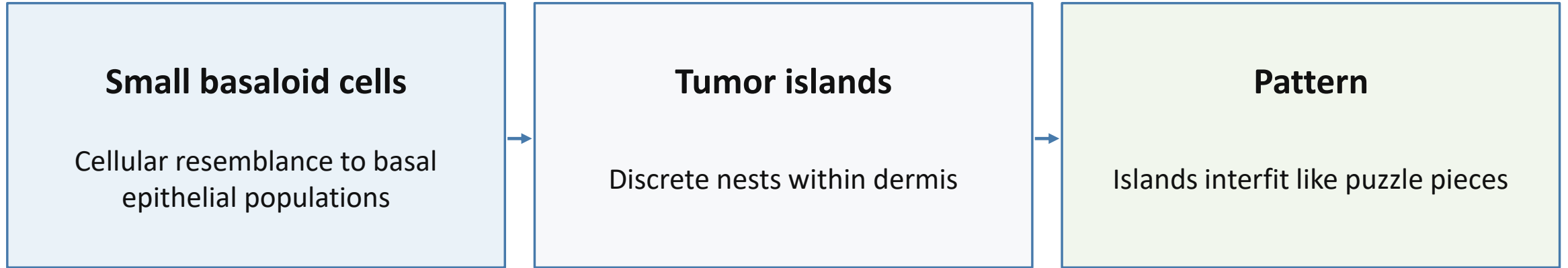


Morphologic architecture schematic — not a micrograph

Architectural recognition

- Islands of basaloid cells
- Interlocking “jigsaw” arrangement
- Fibrous dermal matrix

Cylindroma: Why the architecture matters



Describe the architecture, not just the presence of basaloid cells.

Multiple scalp cylindromas can become confluent

Early lesions

Multiple nodules on scalp or forehead.

Over time

Nodules may coalesce into a hat-like mass.

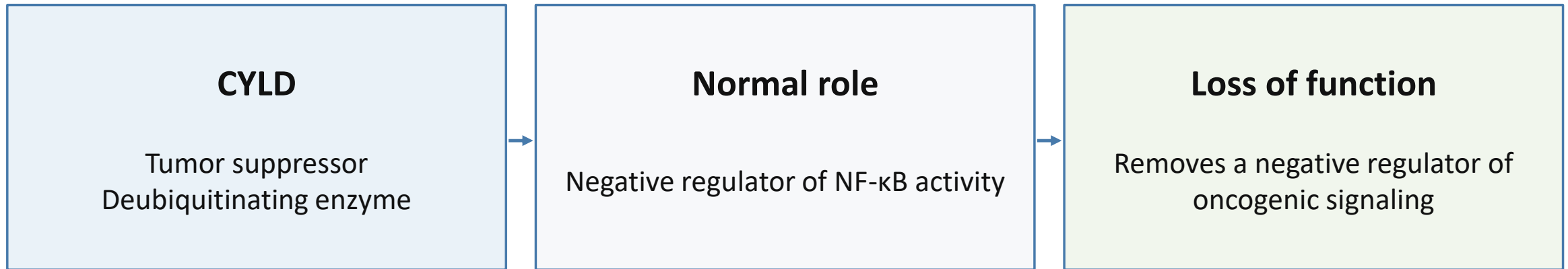
Traditional term

“Turban tumor” describes this growth pattern.

Familial cylindromatosis is an inherited syndrome

- Familial susceptibility may be inherited as an autosomal dominant trait.
- Tumors may appear early in life.
- Germline inactivating variants in CYLD are implicated.
- Related tumors can include trichoepitheliomas and spiradenomas.

CYLD restrains NF- κ B signaling



This is the mechanistic relationship; Not a complete signaling pathway.

CYLD-associated tumors share inherited context

Cylindroma

Characteristic basaloid jigsaw-pattern tumor.

Trichoepithelioma

Benign follicular-differentiated lesion.

Spiradenoma

An additional appendage tumor reported in some CYLD families.

Tumor combinations can be more informative than any single papule.

Trichoepithelioma: Presentation and lineage

Lineage

Follicular differentiation.

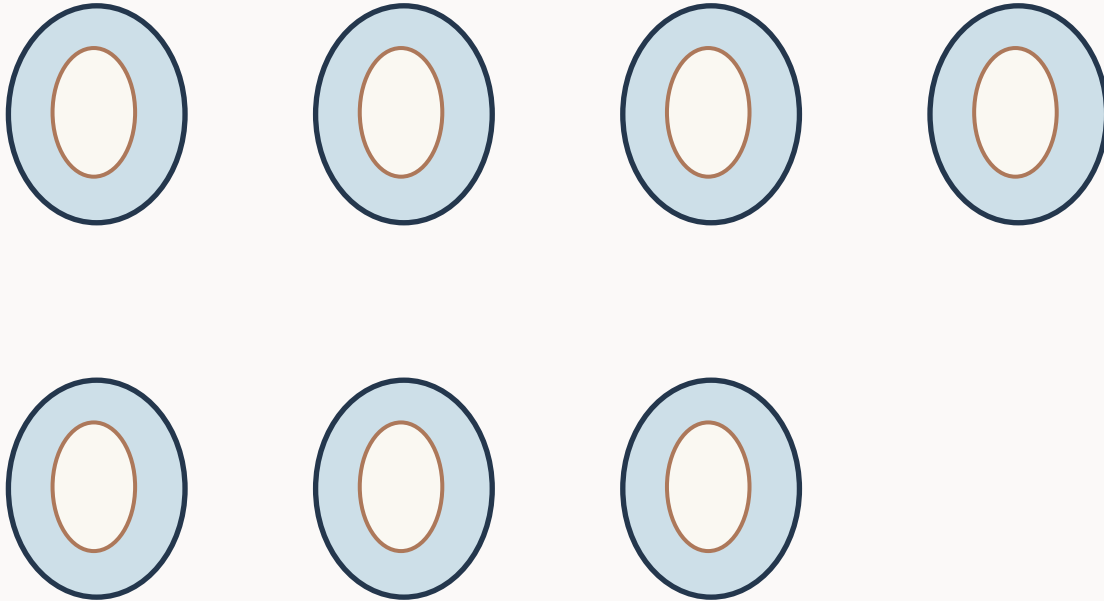
Clinical clue

Perinasal papules or small nodules.

Architecture

Basaloid buds that resemble primitive hair follicles.

Trichoepithelioma: Primitive follicular buds



Morphologic architecture schematic — not a micrograph

What the buds represent

- Basaloid epithelial proliferation
- Primitive hair follicle-like units
- Follicular differentiation is the key interpretation

Two basaloid lesions, different architecture

Cylindroma

- Basaloid tumor islands.
- Interlocking jigsaw configuration.
- Eccrine / apocrine differentiation.

Trichoepithelioma

- Basaloid buds.
- Primitive follicular structures.
- Hair-follicle differentiation.

Follicular differentiation has several patterns

Entity	Follicular feature	Associated molecular / clinical clue
Trichoepithelioma	Primitive follicular buds	Can accompany CYLD-associated tumors
Pilomatricoma	Hair-matrix / anagen-type differentiation	Activating CTNNB1 variants
Trichilemmoma	Hair-related epithelial tumor	Multiplicity may indicate Cowden syndrome

Pilomatricoma differentiates toward hair matrix

Tumor identity

A hair follicle-differentiated neoplasm.

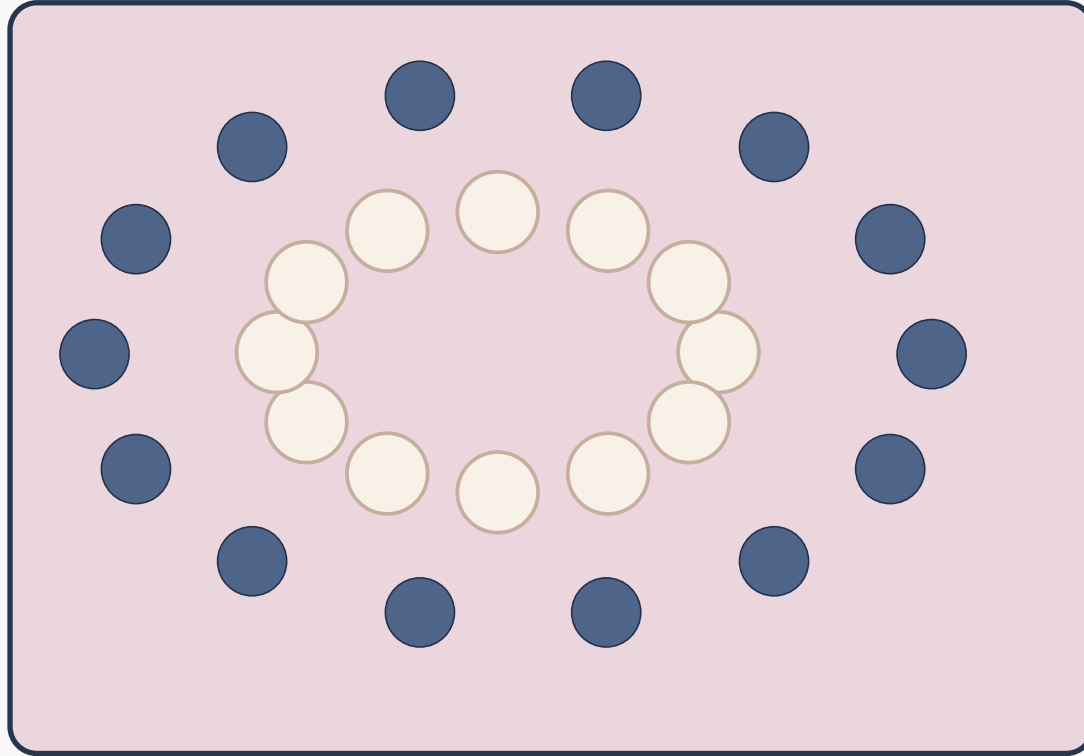
Cellular pattern

Basaloid cells with hair-matrix-like maturation.

Molecular association

Activating CTNNB1 variants.

Pilomatricoma: Basaloid cells to shadow cells

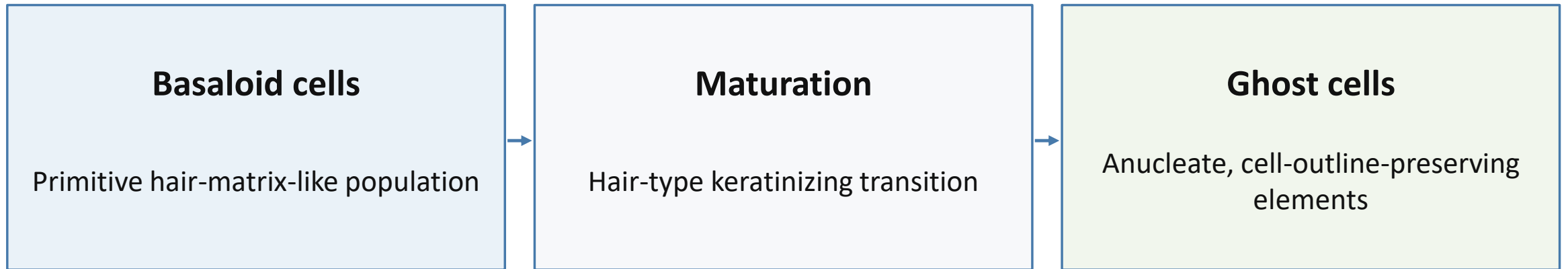


Morphologic architecture schematic — not a micrograph

Cellular maturation

- Dark basaloid matrix-like cells
- Transition toward anucleate “ghost” cells
- Ghost cells indicate hair-type keratinization

Ghost cells are a differentiation clue



The Robbins figure caption specifically notes anucleate ghost cells.

CTNNB1 encodes β -catenin

Gene

CTNNB1

Protein

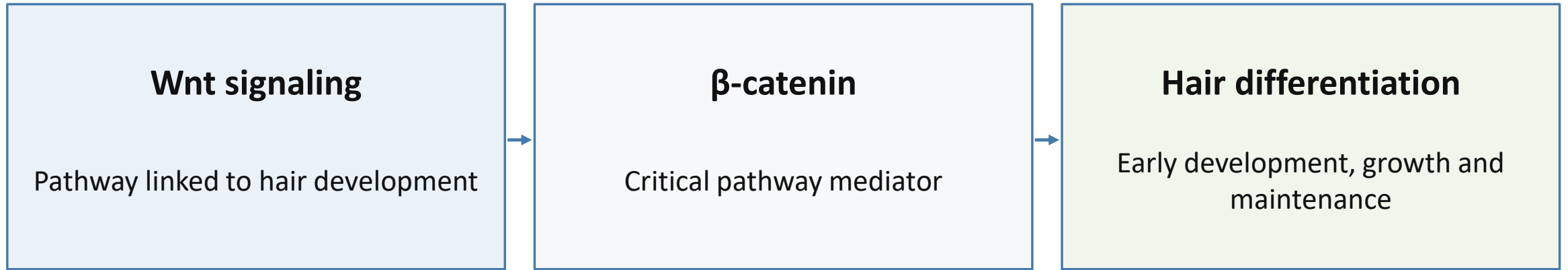
β -catenin

Association

Activating mutation in
pilomatricoma

Use precise gene/protein nomenclature: CTNNB1 $\neq$ β -catenin.

Wnt- β -catenin signaling and hair biology



CTNNB1 activation with the cell lineage of pilomatricoma.

Architecture and molecular biology converge

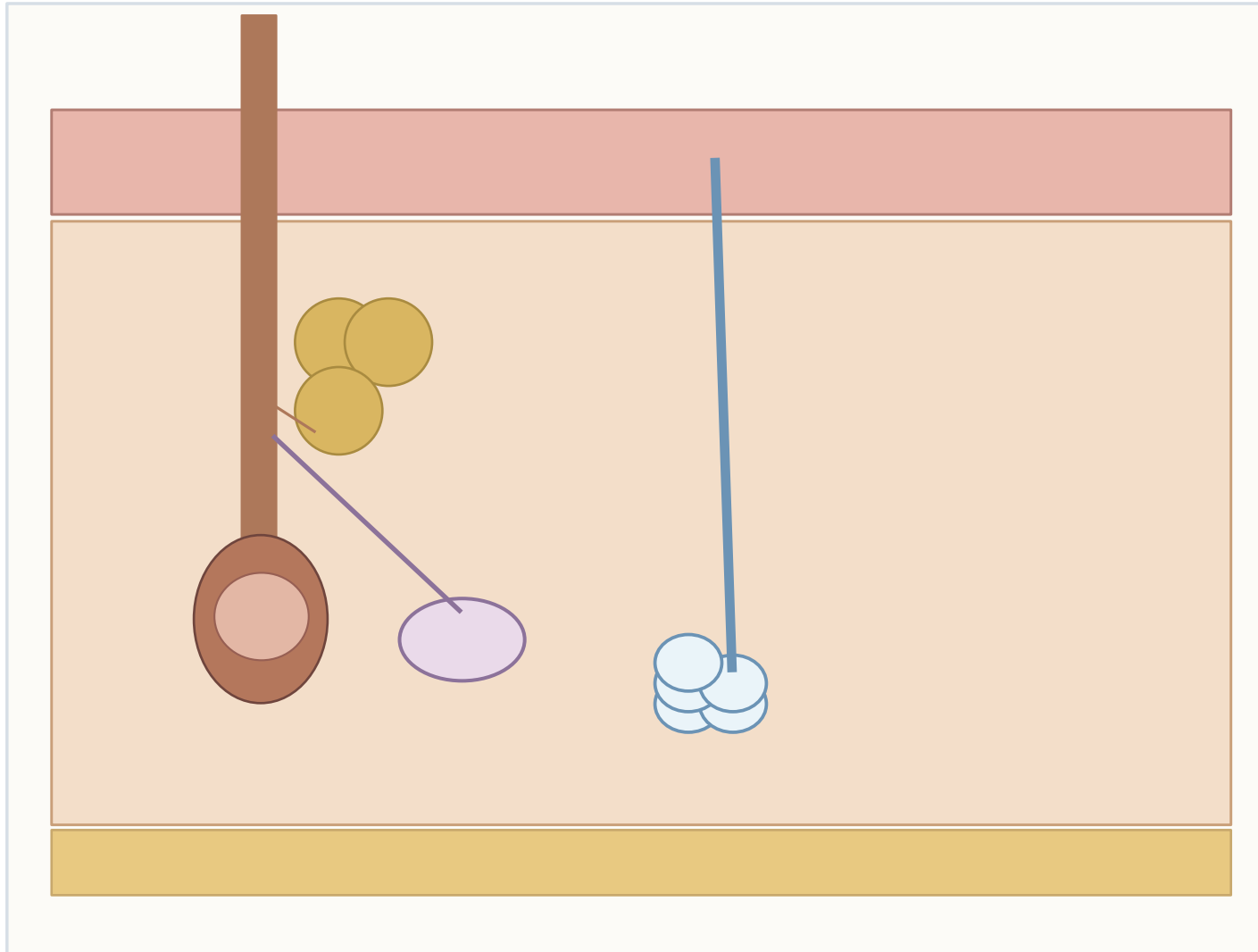
What histology demonstrates

- Hair matrix-like basaloid cells.
- Shadow / ghost cell maturation.
- Follicular identity.

What molecular association suggests

- Activating CTNNB1 variants.
- β -catenin involvement.
- Biologic continuity with hair-development signaling.

Sebaceous differentiation: Cellular concept



Schematic — not histologic evidence

Epidermis

Follicular unit

Sebaceous lobules

Eccrine duct / coil

Apocrine differentiation

Sebacaceous adenoma: Lobular architecture

Growth pattern

Lobular proliferation of sebocytes.

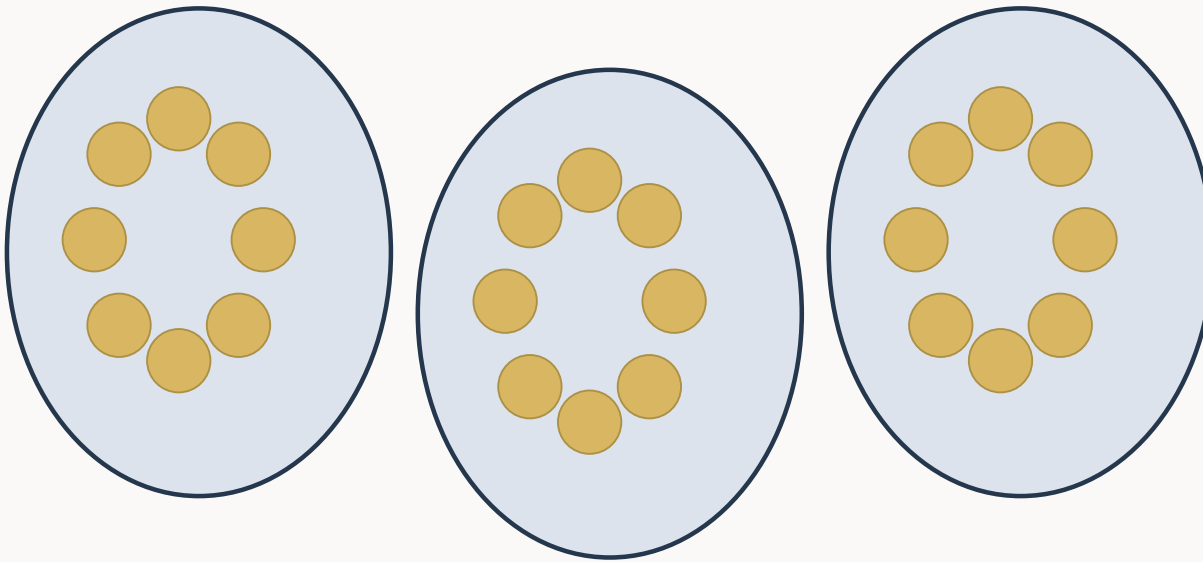
Periphery

An expanded basaloid population.

Center

More mature sebocytes with pale, foamy cytoplasm.

Sebaceous adenoma: Lobules and maturation

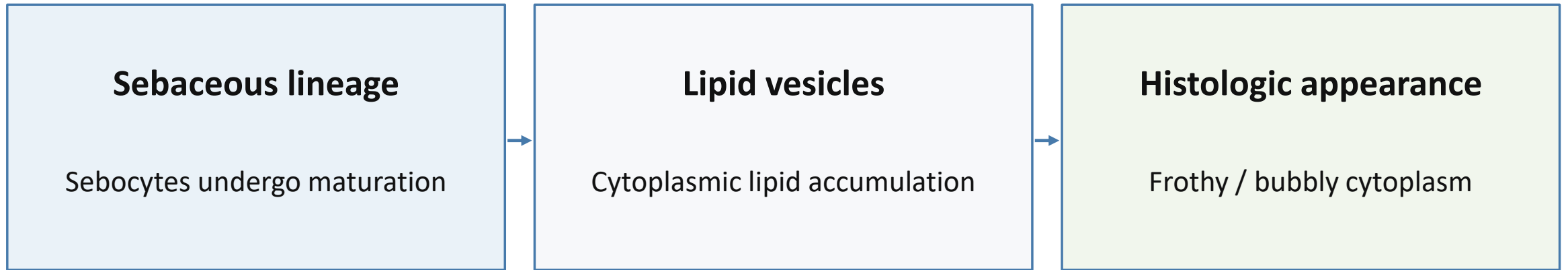


Morphologic architecture schematic — not a micrograph

Read from rim to center

- Peripheral basaloid cells
- Maturing lipid-rich sebocytes
- Frothy cytoplasm reflects lipid vesicles

Foamy cytoplasm reflects lipid-rich sebocytes



The cytoplasmic appearance is a mechanistically interpretable finding.

Sebacaceous adenoma can be a syndrome marker

Lesion

Sebacaceous adenoma

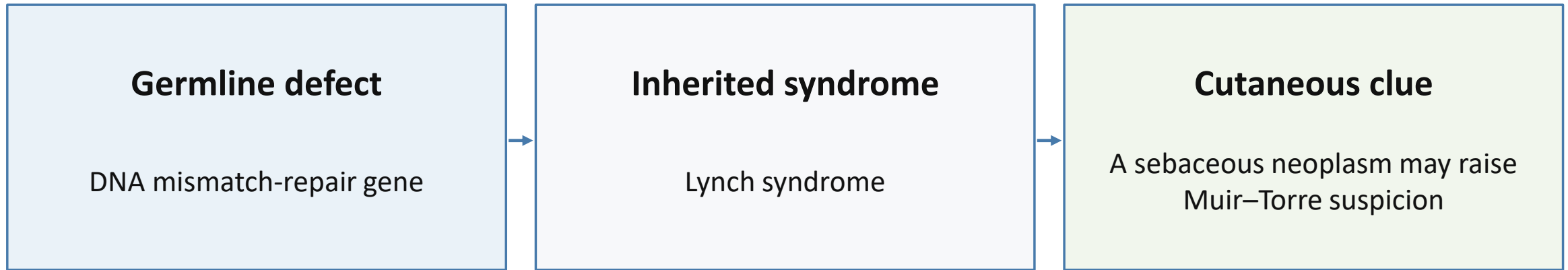
Clinical context

Association with internal malignancy in Muir–Torre syndrome

Broader linkage

Some cases are associated with Lynch syndrome / DNA mismatch repair defects

Mismatch-repair defects underlie Lynch syndrome



This is a syndrome association, not a claim that every sebaceous adenoma is hereditary.

Muir–Torre and Lynch: Related clinical contexts

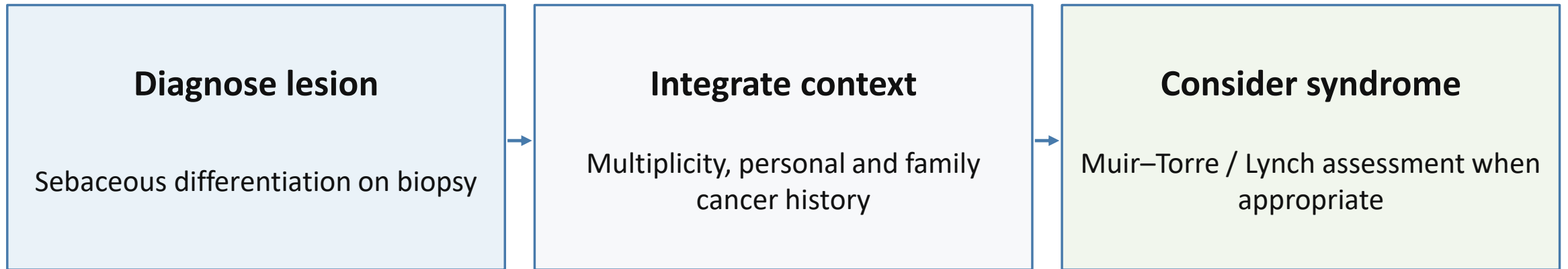
Muir–Torre syndrome

- Sebaceous tumors are a dermatologic clue.
- Association with internal malignancy.
- Clinical evaluation goes beyond the skin lesion.

Lynch syndrome

- Heritable mismatch-repair pathway defects.
- A subset of sebaceous tumor cases is associated.
- Cutaneous findings may suggest inherited predisposition.

When sebaceous histology changes the history



A teaching reasoning pathway; Not a formal genetic-testing guideline.

Multiple trichilemmomas are associated with Cowden syndrome

Skin finding

Multiple trichilemmomas.

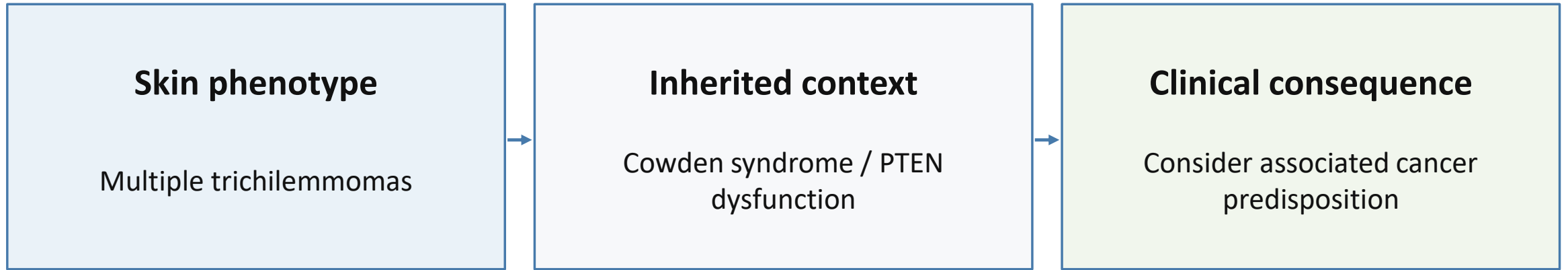
Germline association

Inactivating PTEN tumor-suppressor variants.

Clinical risk context

Increased risk of breast, endometrial and other malignancies.

PTEN-associated lesions signal broader disease



The skin lesion may be small; Its inherited significance may be substantial.

Three syndromic patterns not to confuse

Clinical clue	Associated gene / pathway	Named syndrome
Multiple cylindromas ± trichoepitheliomas / spiradenomas	CYLD / NF-κB regulation	Familial cylindromatosis
Multiple trichilemmomas	PTEN	Cowden syndrome
Sebaceous adenoma in appropriate clinical setting	Mismatch repair	Muir–Torre / Lynch association

Apocrine differentiation has a distinct distribution

Typical sites

Regions rich in apocrine glands.

Examples

Axilla and scalp are highlighted.

Behavior

Malignant apocrine tumors are emphasized.

Apocrine carcinoma: Ductal architecture

Lineage

Apocrine gland differentiation.

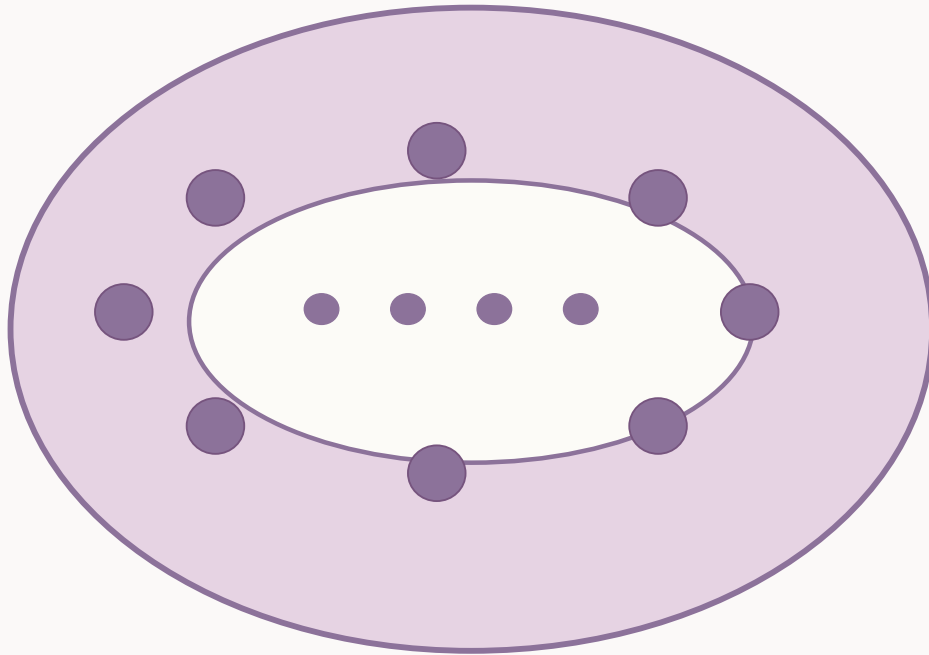
Histology

Ductal differentiation.

Secretory evidence

Decapitation secretion with
luminal material.

Decapitation secretion: An apocrine clue



How to interpret

- Lining cells form a ductal lumen
- Apical cytoplasmic secretion enters lumen
- Apocrine-type secretory differentiation

Morphologic architecture schematic — not a micrograph

Malignant apocrine tumors require caution

- Most adnexal tumors overall are benign.
- An unusual predominance of malignant over benign forms among apocrine tumors.
- Primary eccrine and apocrine carcinomas may form gland-like structures.
- Gland formation creates a differential with metastatic adenocarcinoma.

Primary adnexal carcinoma versus metastasis

Primary eccrine / apocrine carcinoma

- Cutaneous adnexal differentiation.
- Gland-like architecture possible.
- Anatomic and skin-pathology context essential.

Metastatic adenocarcinoma

- Can also produce glandular structures.
- May resemble a cutaneous gland-forming tumor.
- History and clinicopathologic evaluation are decisive.

Sebaceous carcinoma: Meibomian gland association

Anatomic origin highlighted

Meibomian glands in the eyelid.

Potential clinical behavior

Can pursue an aggressive course.

Major consequence

Systemic metastases may occur.

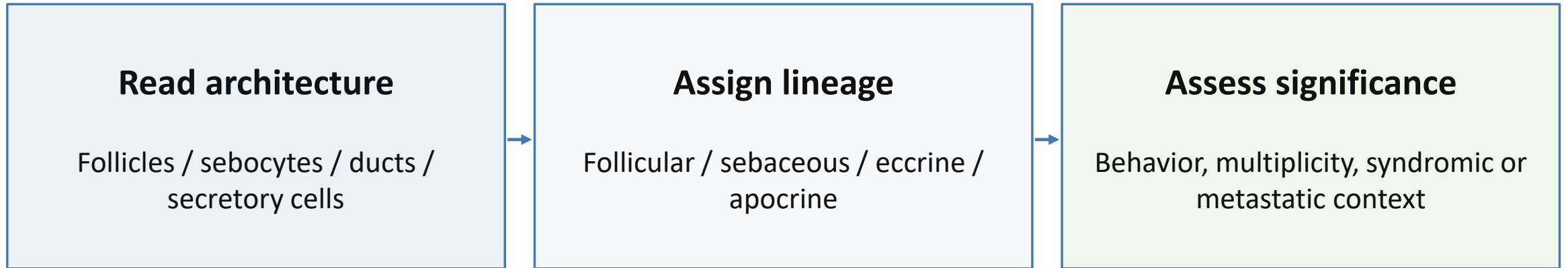
Sebaceous adenoma and carcinoma are not equivalent

Dimension	Sebaceous adenoma	Sebaceous carcinoma
Biologic behavior	Benign appendage neoplasm	Malignant neoplasm
Source emphasis	Lobular sebocyte maturation	Eyelid / meibomian gland association
Clinical significance	Muir–Torre / Lynch clue in a subset	Potential aggressive course with metastases
Diagnostic question	Is syndrome evaluation warranted?	Is this a primary sebaceous malignancy?

Histologic patterns to recognize together

Entity	Source-described architecture
Cylindroma	Basaloid islands arranged like jigsaw pieces
Trichoepithelioma	Basaloid buds resembling primitive hair follicles
Pilomatricoma	Hair-matrix-like basaloid cells and ghost cells
Sebaceous adenoma	Basaloid rim and foamy, mature sebocytes
Apocrine carcinoma	Ducts with decapitation secretion

A disciplined classification pathway



This is a teaching framework, not a substitute for full diagnostic criteria.

Case: Multiple periocular papules

Clinical vignette

- A patient has numerous small tan papules near the lower eyelids.
- No features of aggression are specified in the vignette.

What lesion is favored?

Syringoma. Clinical pattern and eccrine ductal differentiation fit the source description.

Case: Scalp nodules coalescing

Clinical vignette

- A young person develops multiple scalp and forehead nodules.
- Several lesions merge; Relatives have similar nodules.

What syndrome axis?

Familial cylindromatosis; Consider CYLD-associated adnexal tumor predisposition.

Case: Matrix-like cells and ghost cells

Clinical vignette

- A skin nodule shows basaloid cells resembling immature hair matrix.
- Adjacent elements are anucleate “ghost” cells.

Most likely lesion?

Pilomatricoma. CTNNB1 / β -catenin is the source-described molecular association.

Case: A sebaceous adenoma with a cancer history

Clinical vignette

- A skin biopsy shows a lobulated sebaceous adenoma.
- The history suggests internal malignancy in family members.

What association matters?

Muir–Torre / Lynch; Consider inherited mismatch-repair context with appropriate clinical evaluation.

Case: A malignant eyelid tumor

Clinical vignette

- A malignant epithelial lesion arises near eyelid meibomian glands.
- Pathology establishes sebaceous differentiation.

Why is this consequential?

Sebaceous carcinoma can behave aggressively and produce systemic metastases.

Case: A dermal gland-forming carcinoma

Clinical vignette

- A cutaneous malignant tumor forms gland-like structures.
- The architecture suggests eccrine or apocrine differentiation.

Critical differential?

Metastatic adenocarcinoma. The source emphasizes their potential morphologic confusion.

Integrated tumor–morphology–syndrome map

Entity	Dominant pattern	Association / caution
Cylindroma	Basaloid jigsaw islands	CYLD-associated familial disease
Trichoepithelioma	Primitive follicular buds	May accompany CYLD-associated lesions
Pilomatricoma	Hair matrix + ghost cells	Activating CTNNB1
Sebaceous adenoma	Lobular sebocytes	Muir–Torre / Lynch association
Trichilemmoma	Follicular differentiation	PTEN / Cowden when multiple
Apocrine carcinoma	Ducts, decapitation secretion	Gland-forming metastatic mimic

Central lessons of adnexal tumor pathology

- Adnexal tumors are classified by appendage differentiation, not merely by surface appearance.
- Architectures worth recognizing: Jigsaw islands, primitive follicular buds, ghost cells, sebocytes and secretory ducts.
- Multiple or unusual tumors may be outward clues to inherited cancer predisposition.
- Gland-forming cutaneous malignancies require distinction from metastatic adenocarcinoma.

Primary sources and image limitations

- Robbins, Cotran & Kumar. Pathologic Basis of Disease. 11th ed. (2026). Chapter 25, “The Skin,” pp. 1038–1039.
- Textbook Figures 25.10–25.11: cylindroma, trichoepithelioma and diverse adnexal tumors (captions consulted).
- Images in this lecture are original editable schematics. They are not representative clinical cases or H&E images.
- Original chapter PDF and reuse-cleared histology images were not provided for direct figure verification.