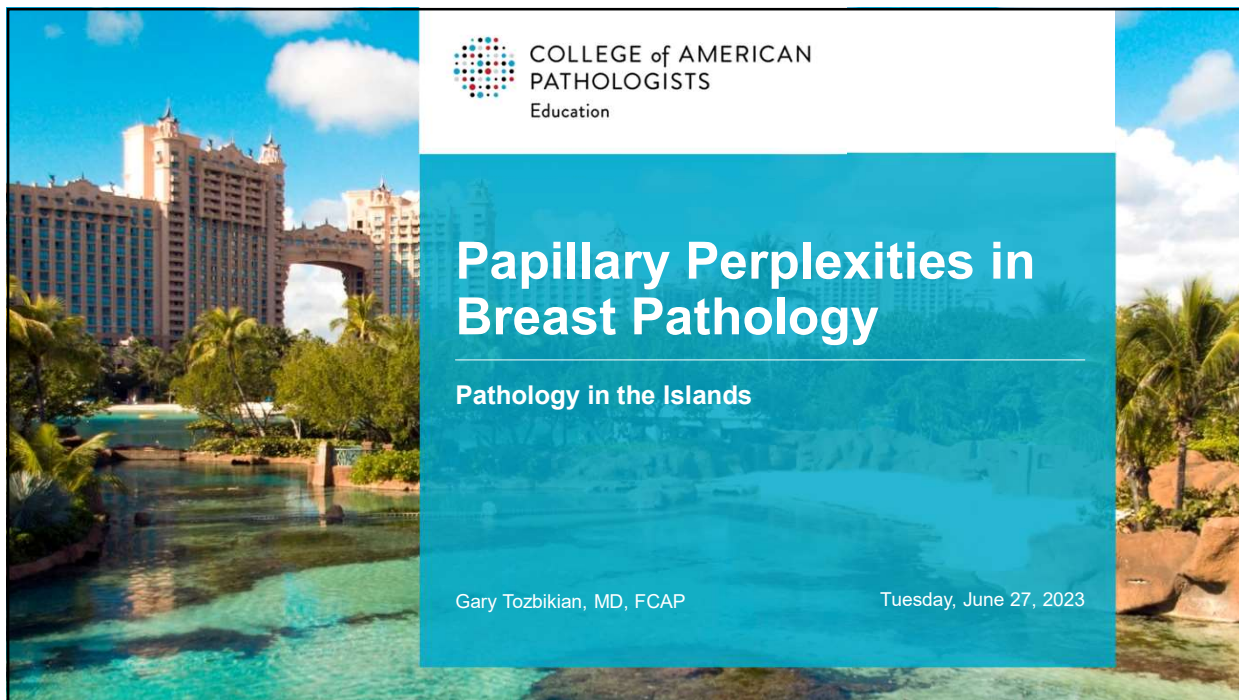




1

Objectives

- Recognize the diagnostic and immunocytochemical features that classify papillary lesions of the breast
- Discuss established and emerging data on the molecular biology and pathogenesis of these lesions
- Provide recommendations for the management of papillary breast lesions when detected on diagnostic core needle biopsy and surgical resection specimens

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Outline

- **Intraductal papilloma**
 - Sclerosing papilloma
 - Superimposed benign proliferations (adenosis, florid UDH)
 - ADH involving papilloma (atypical papilloma)
- **In-situ cancers**
 - Papillary DCIS
 - Encapsulated papillary carcinoma
 - Solid papillary carcinoma
- **Invasive cancers**
 - Tall cell carcinoma with reverse polarity
 - Invasive papillary carcinoma
- **Extramammary metastases to the breast**

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Intraductal papilloma (IDP)

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Intraductal papilloma

- Benign intraductal lesion comprised of papillary projections with fibrovascular cores lined by myoepithelial and epithelial cells
- Not a precursor lesion to breast carcinoma
- Can be secondarily involved by atypia or carcinoma

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Intraductal papilloma

- **Clinical Features**
 - Common, >5% of breast biopsies, wide age range (most between 30-50 years old)
 - Clinically present as nipple discharge or palpable mass
 - Solitary mammographic mass (central), may be multiple and incidental (peripheral)
- **Pathogenesis**
 - Clonal proliferation, activating mutations in PI3CA/AKT pathway, LOH of 16p13

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Source: Am J Surg Pathol. 2006;30(6):665-672.
Mod Pathol. 2021;34(6):1044-1061.
Hum Pathol. 1998;29(10):1113-1118.

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6

6

Intraductal papilloma

• Prognosis and management

- Slight elevated risk of subsequent invasive ca (2-3 fold risk, central vs peripheral)
- Higher risk if associated atypia (5-7.5 fold risk)
- Wide range of reported upgrade rates (2-35%)
 - <5% papillomas without atypia
 - 12-17% papillomas with atypia
- Excision recommended if associated with atypia
- Frequently benign papillomas are excised due to symptoms

Source: Am J Surg Pathol. 2006;30(6):665-672.
 Ann Surg Oncol. 20 (2013), pp. 94-101
 Mod Pathol.2004;17:165-71
 J Surg Res.2018;231:387-94
 Clin Breast Cancer. 2017;17:367-72
 BreastCancer Res Treat. 2016;159:203-13

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Upgrades rates of IDP diagnosed on core biopsy

Study	n	Without atypia (%)	With atypia (%)	Upgrade rate without atypia (%)	Upgrade rate with atypia (%)	Targeted (%)	Incidental (%)	Upgrade rate Targeted (%)	Upgrade rate Incidental (%)	DCIS (%)	Invasive (%)
Abbassi-Rahbar et al (2020)	125	89	11	8	26	100	0	11	NA	58	42
Lin et al (2021)	216	81	19	3	27	100	0	8	NA	74	26
Kiran et al (2018)	239	82	18	5	31	100	0	9	NA	100	0
Corbin et al (2022)	318	82	18	1	20	95	5	7	0	75	25
Zaleski et al (2018)	206	100	0	4	NA	90	10	4	0	100	0
Lee et al (2012)	17	100	0	0	NA	0	100	NA	0	0	0
Jaffer et al (2013)	14	100	0	0	NA	0	100	NA	0	0	0

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Hum Pathol. 2022;128:90-100.
 Ann Diagn Pathol. 2018;35:62-68.
 Virchows Arch. 2019;475(6):701-707.
 AJR Am J Roentgenol. 2012;198(2):W141-W145.

Breast J. 2013;19(2):130-133.
 Ann Surg Oncol. 2021;28(10):5768-5774.
 Hum Pathol. 2021;110:43-49.
 J Surg Res. 2018;231:387-394.

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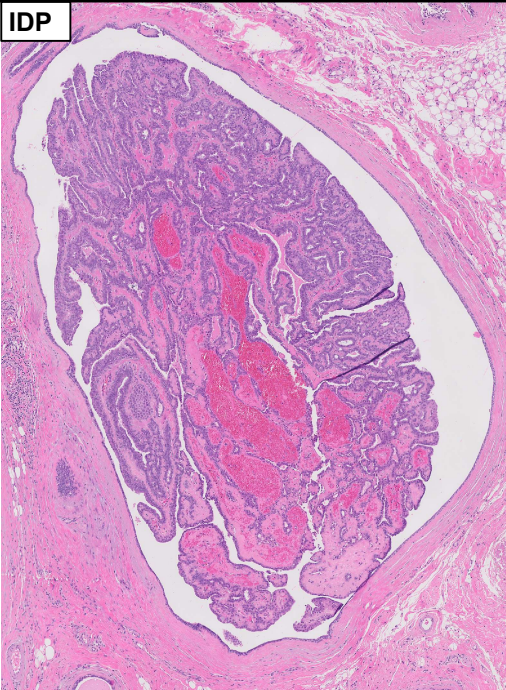
8

Intraductal papilloma

- **Histology**
 - Intraductal proliferation with papillary architecture within a dilated duct
 - Cohesive, compact, fronds fit together like jigsaw puzzle
 - Branching, arborizing fronds with abundant fibrovascular stroma
 - Broad fronds with blunt configurations with smooth overall contour
 - +/- Fibrosis may distort the lesion and entrap glandular elements (sclerosing papilloma)

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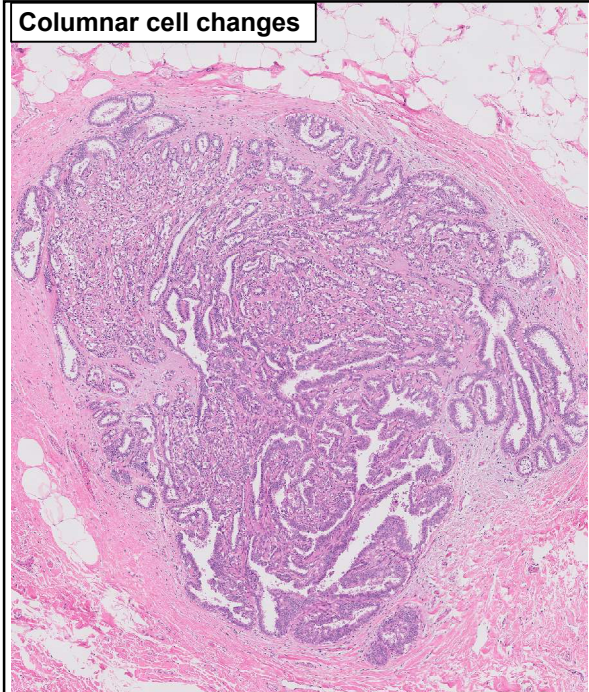
IDP



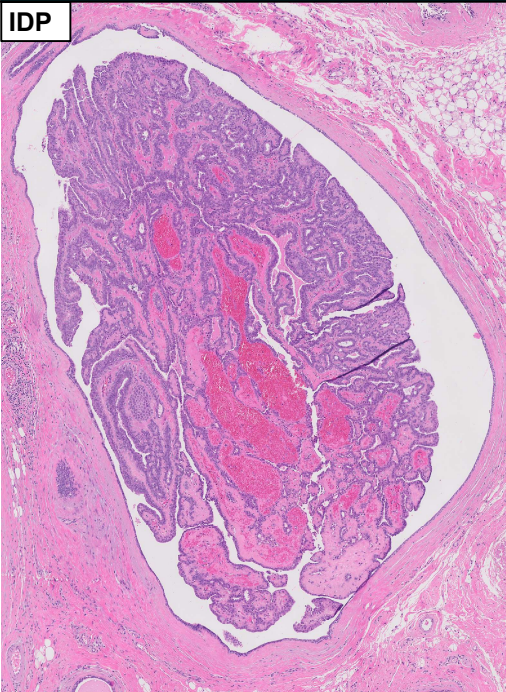
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Columnar cell changes

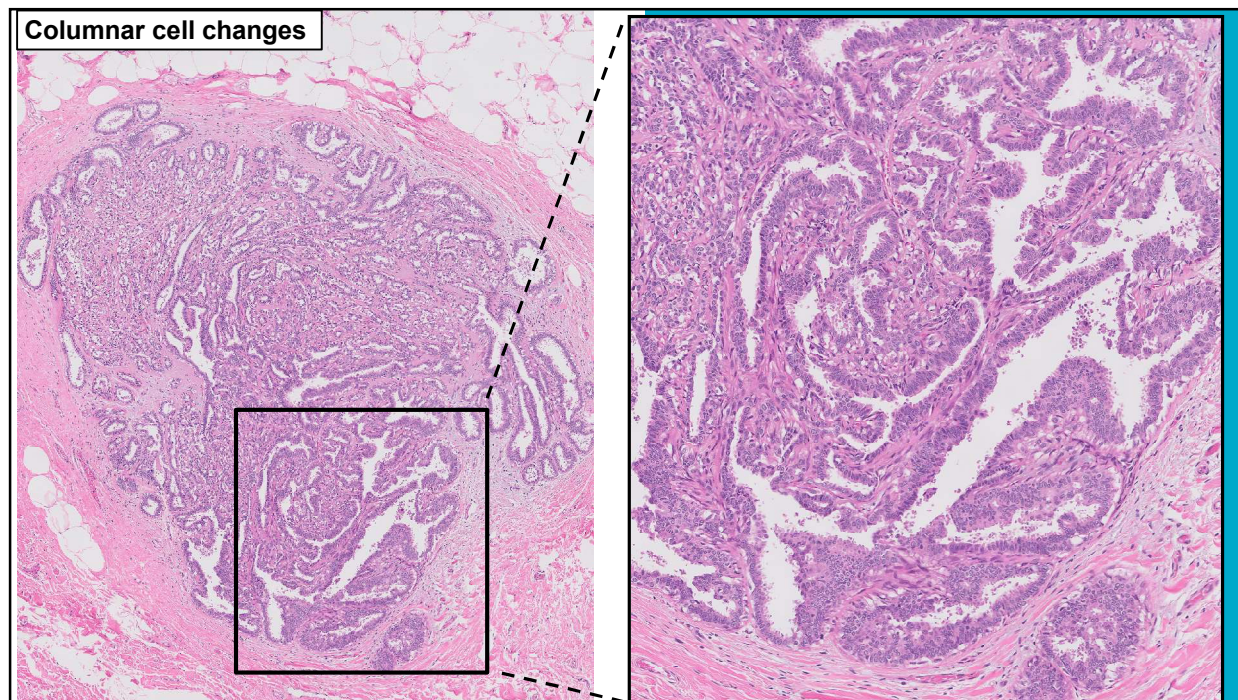


IDP

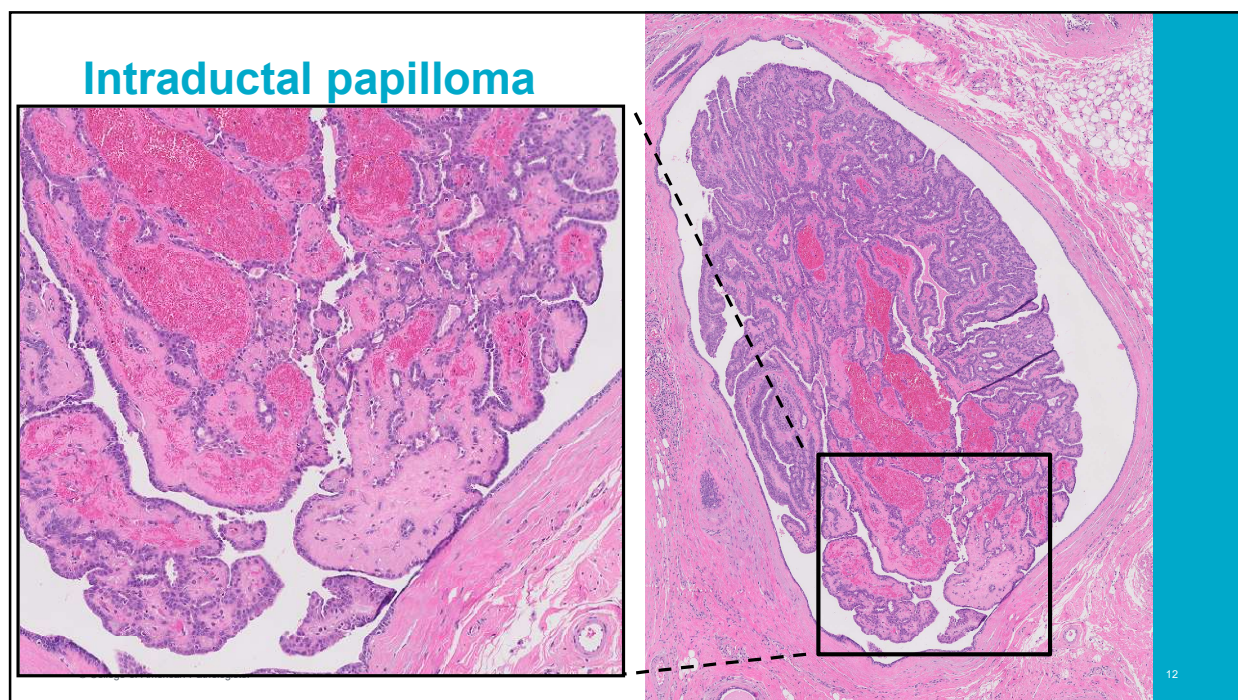


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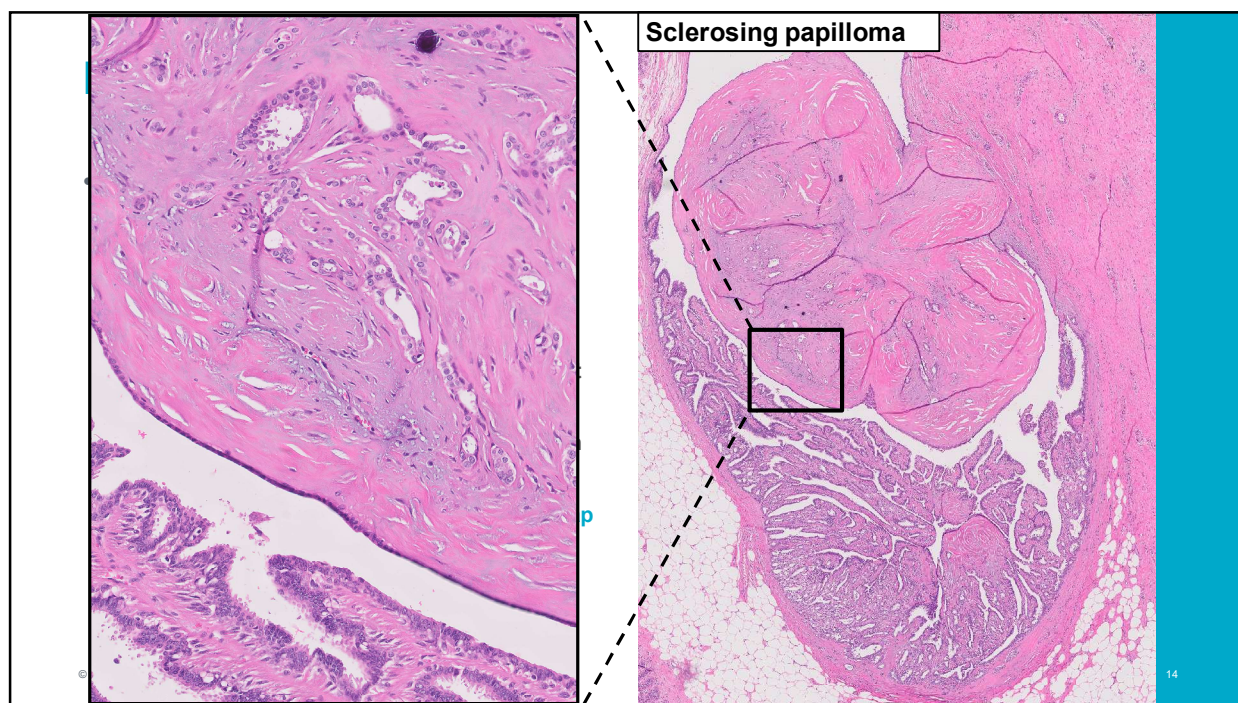
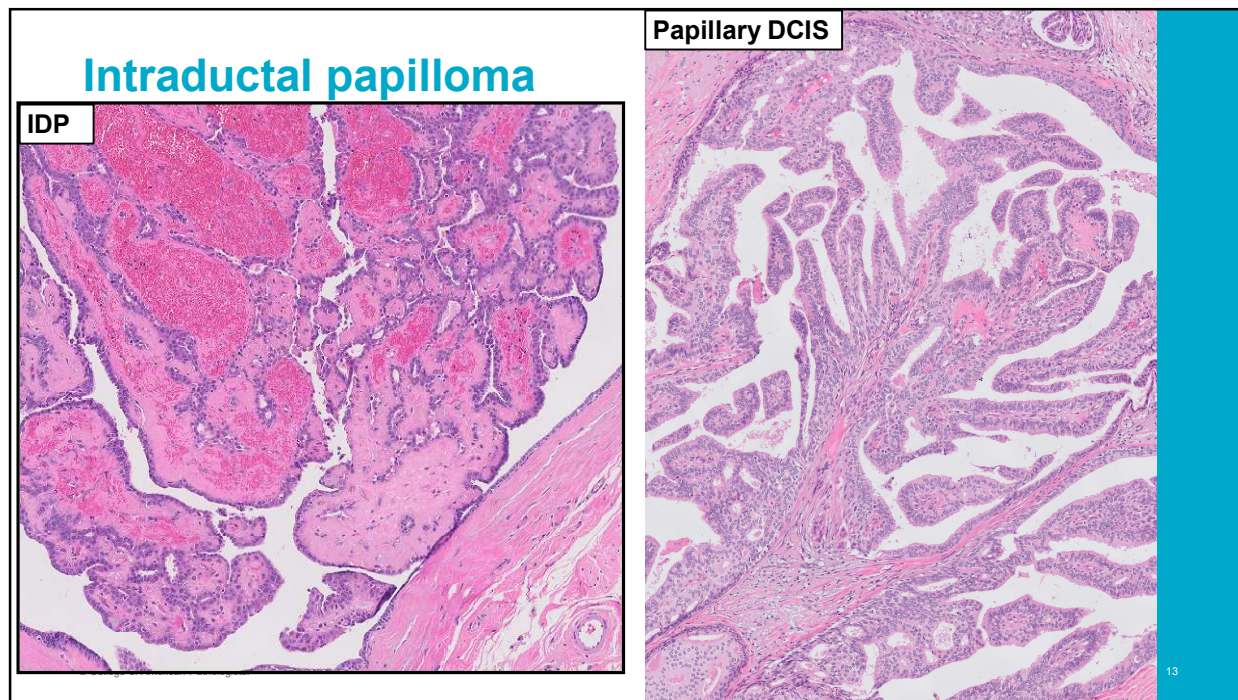
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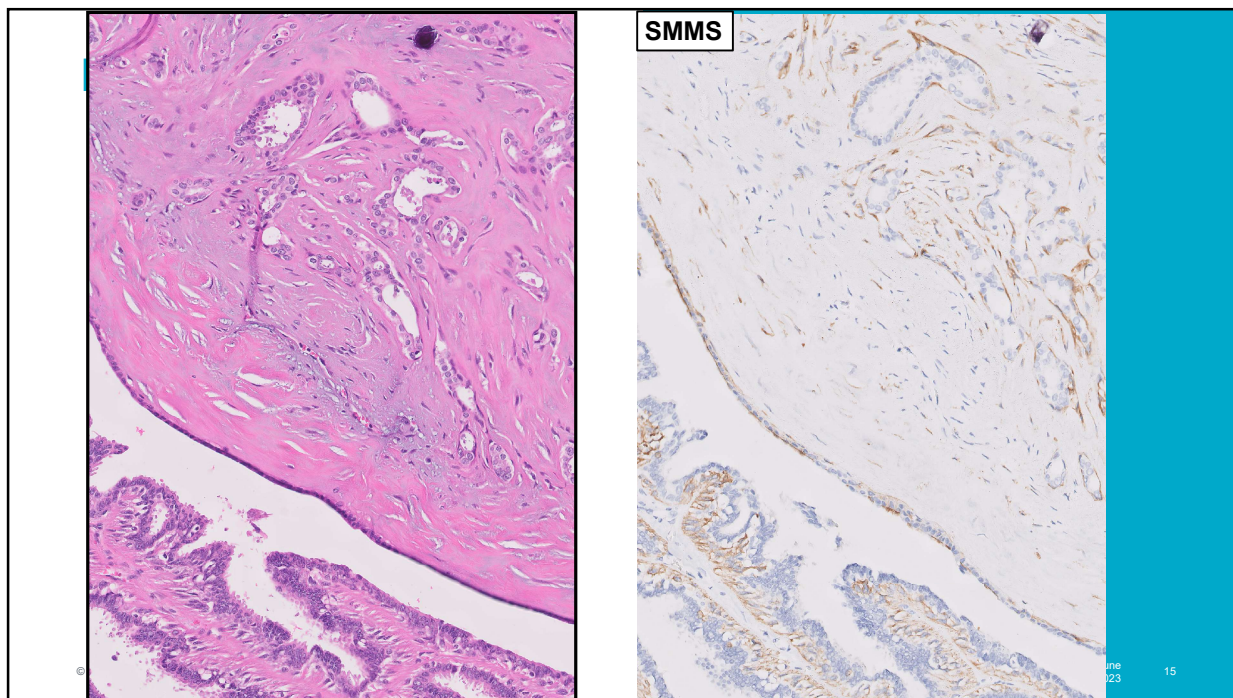


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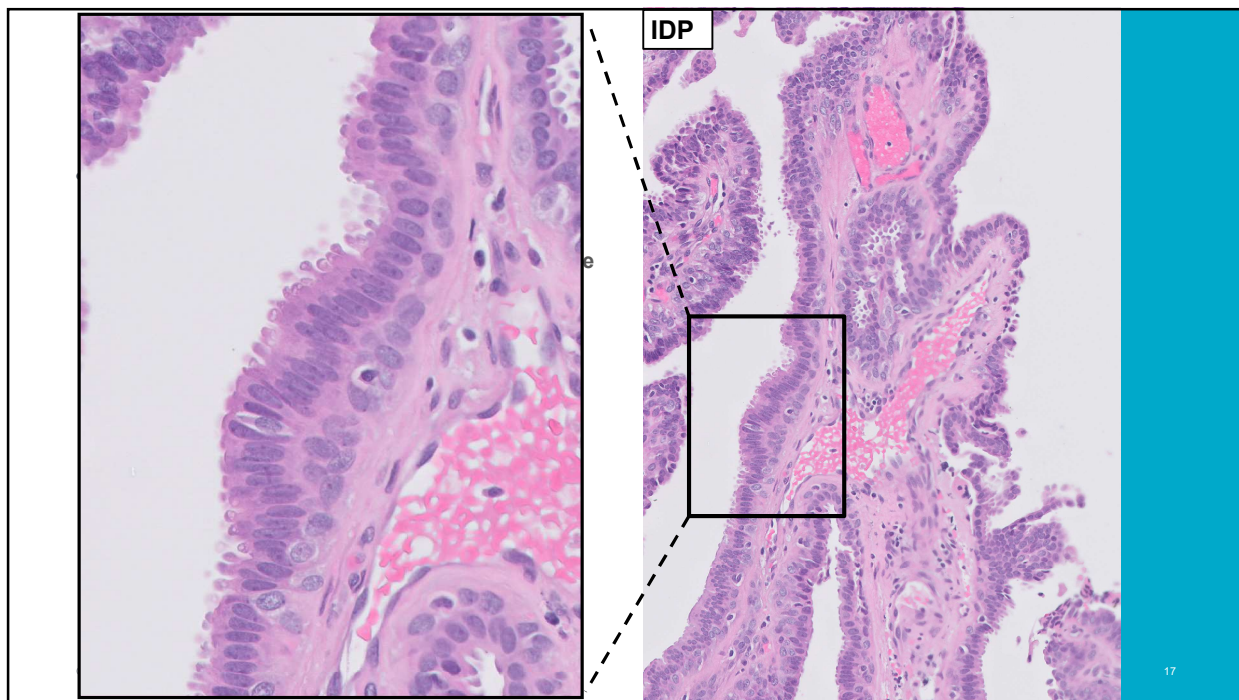
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Intraductal papilloma

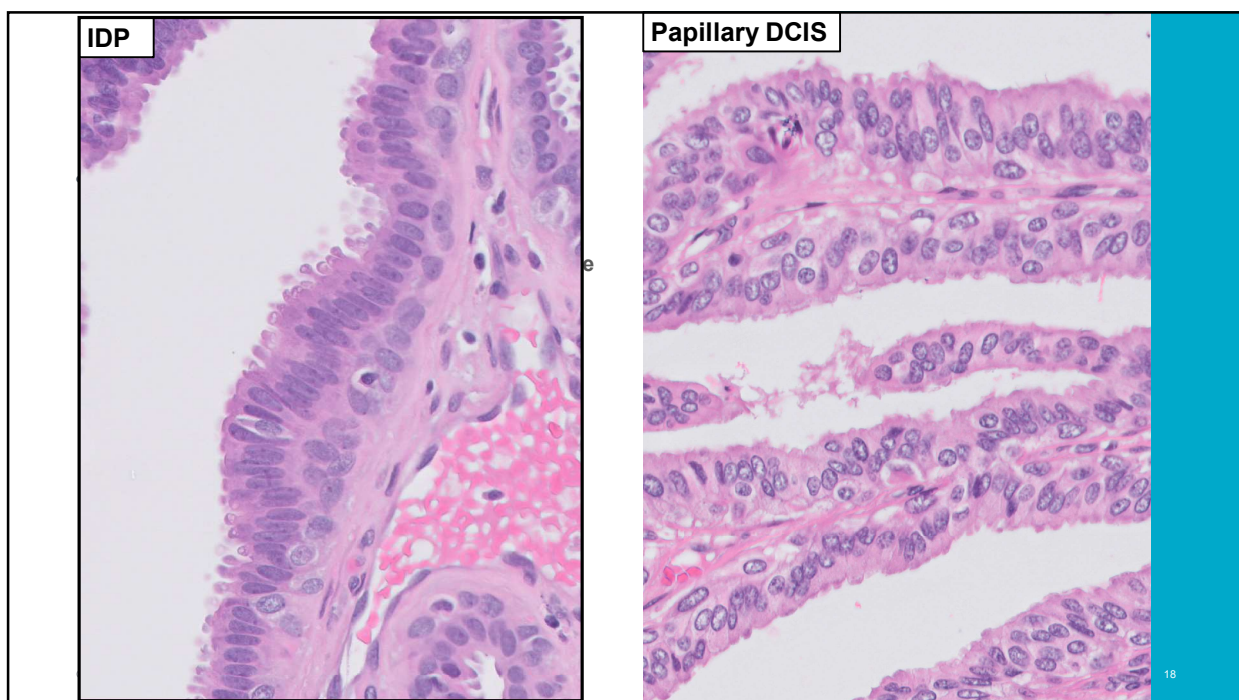
- **Histology continued**
 - **Two cell layers lining papillae**
 - **Epithelial cells:** Cuboidal/columnar, may be hyperplastic
 - **Myoepithelial cells:** may be prominent or attenuated
 - No cytologic atypia, mitoses rare/absent

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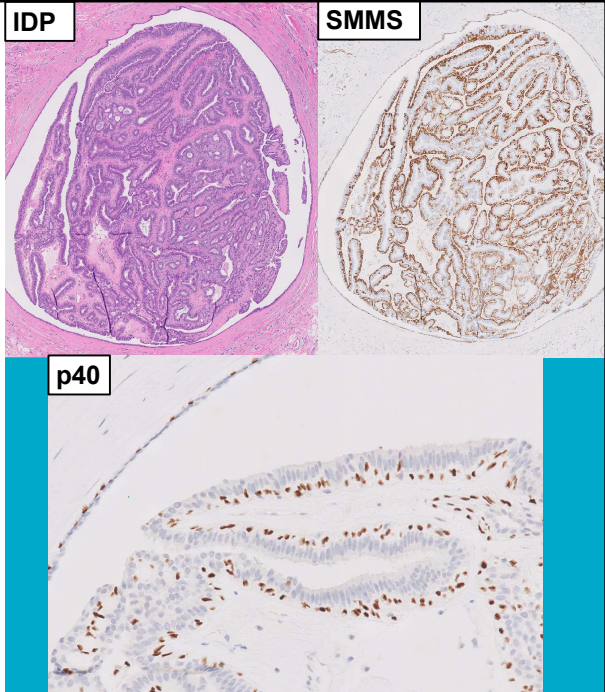


18

Intraductal papilloma

- Immunohistochemistry
 - Myoepithelial markers (e.g. SMMS, calponin, p63, p40)
 - Highlight myoepithelial cells surrounding peripheral duct space and lining papillae
 - May be attenuated in sclerosing papilloma
 - DDX:
 - Papillary DCIS: absent (or reduced) in papillae
 - Encapsulated papillary carcinoma: absent in periphery and in papillae
 - CK5/6 and ER
 - To evaluate for presence of associated ADH
 - Epithelium of papilloma diffusely ER positive

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Intraductal papilloma

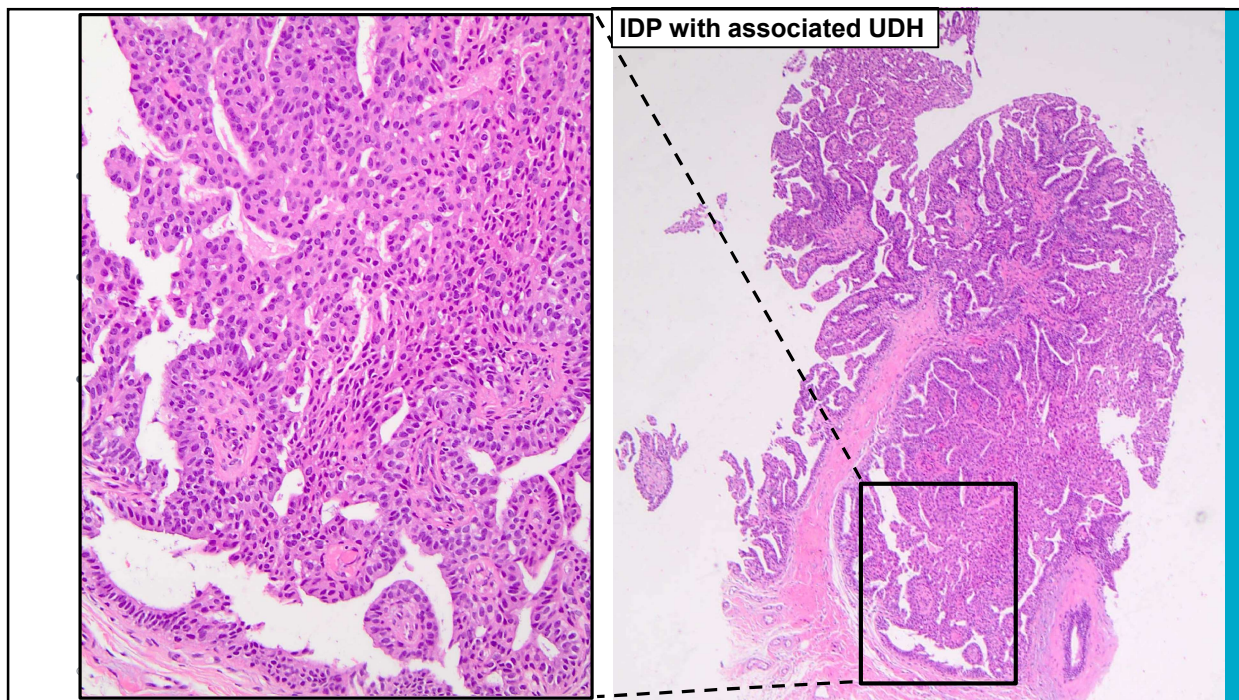
- Histology continued
 - Superimposed proliferations
 - Superficial stratified pattern (UDH)
 - Inverted adenosis pattern (adenosis)
 - +/- Associated ADH (atypical papilloma), ALH/LCIS, DCIS
 - +/- Apocrine/squamous/chondroid metaplasia
 - +/- Microcalcifications, necrosis/infarction
 - +/- Collagenous spherulosis

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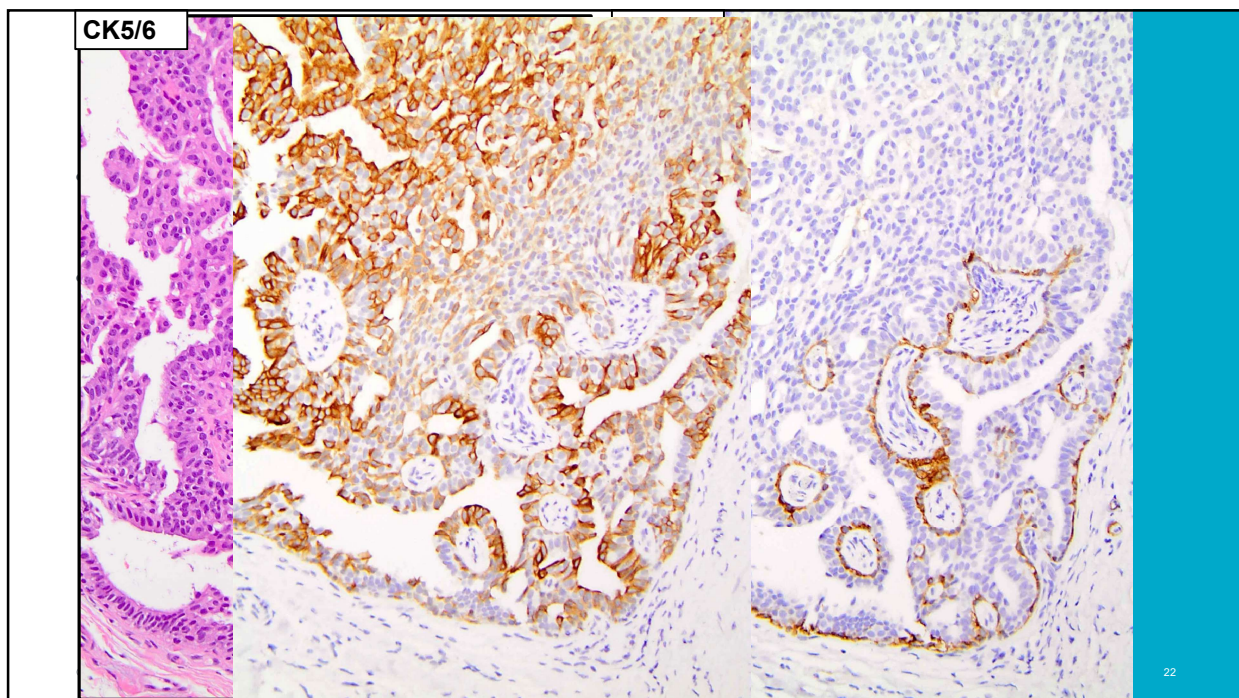


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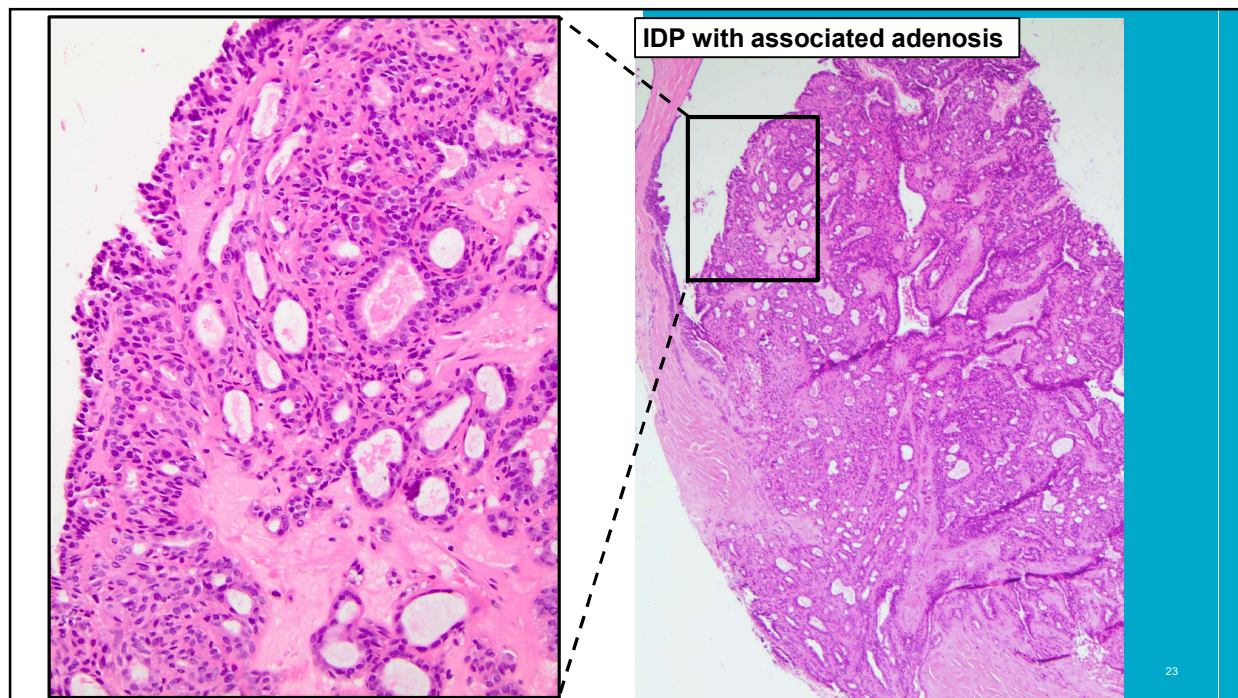
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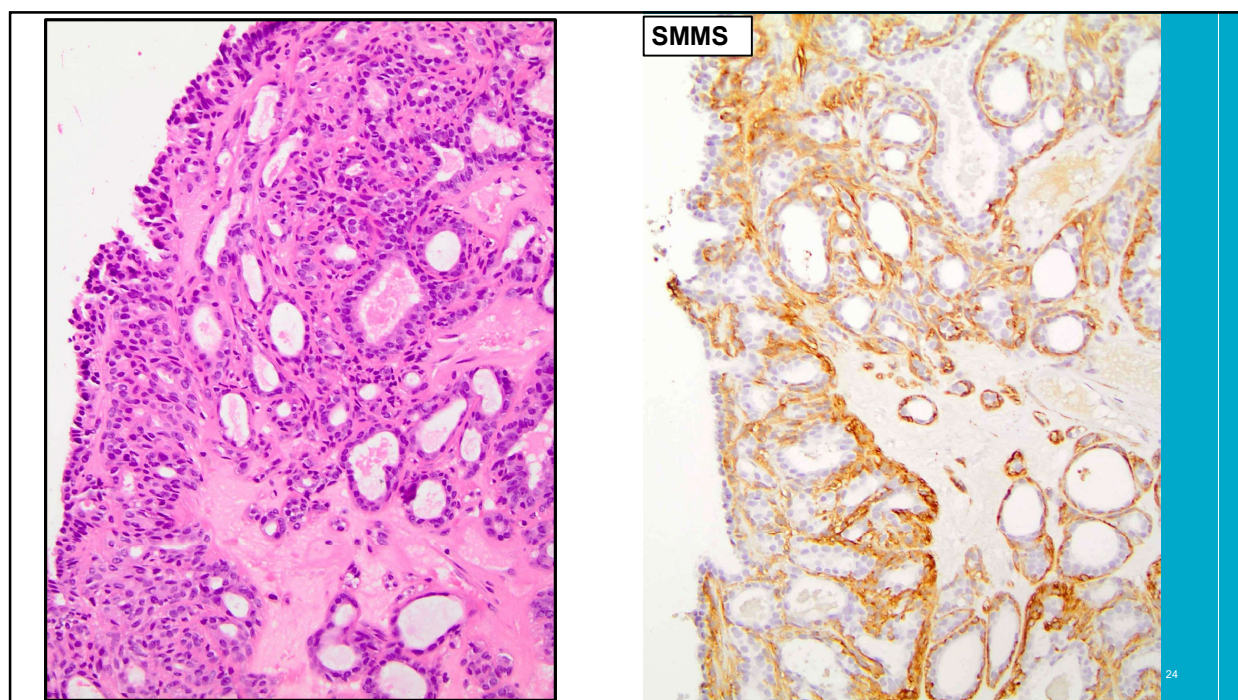
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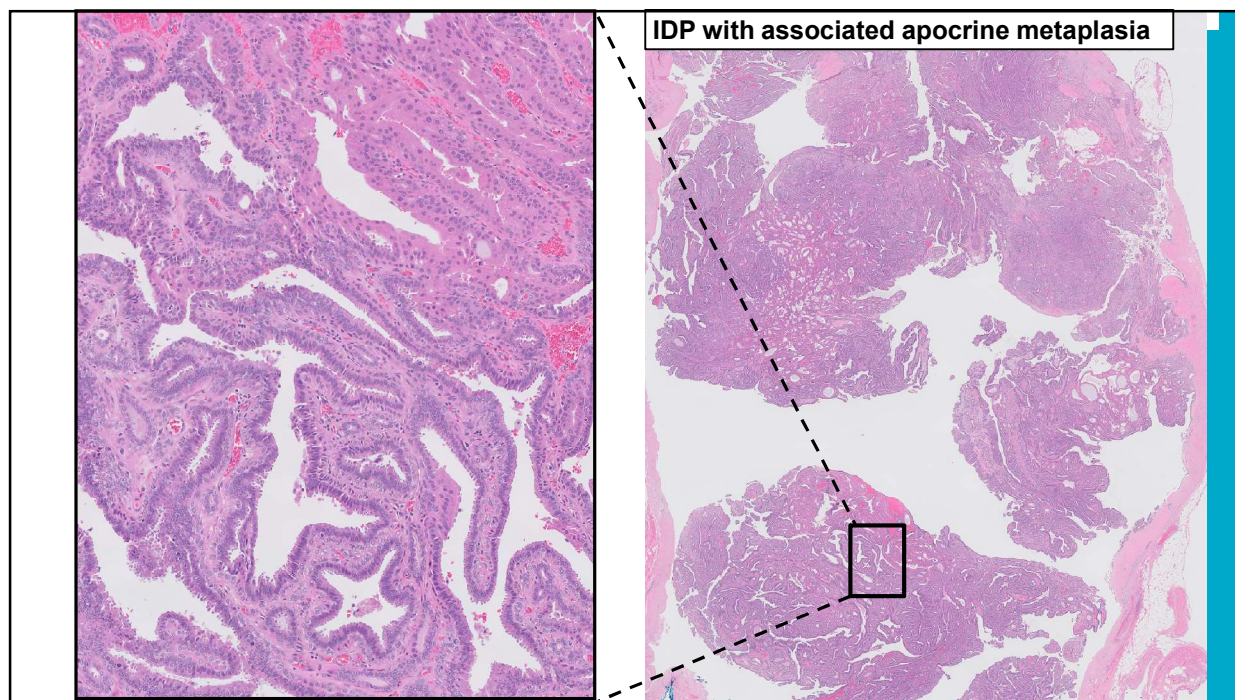
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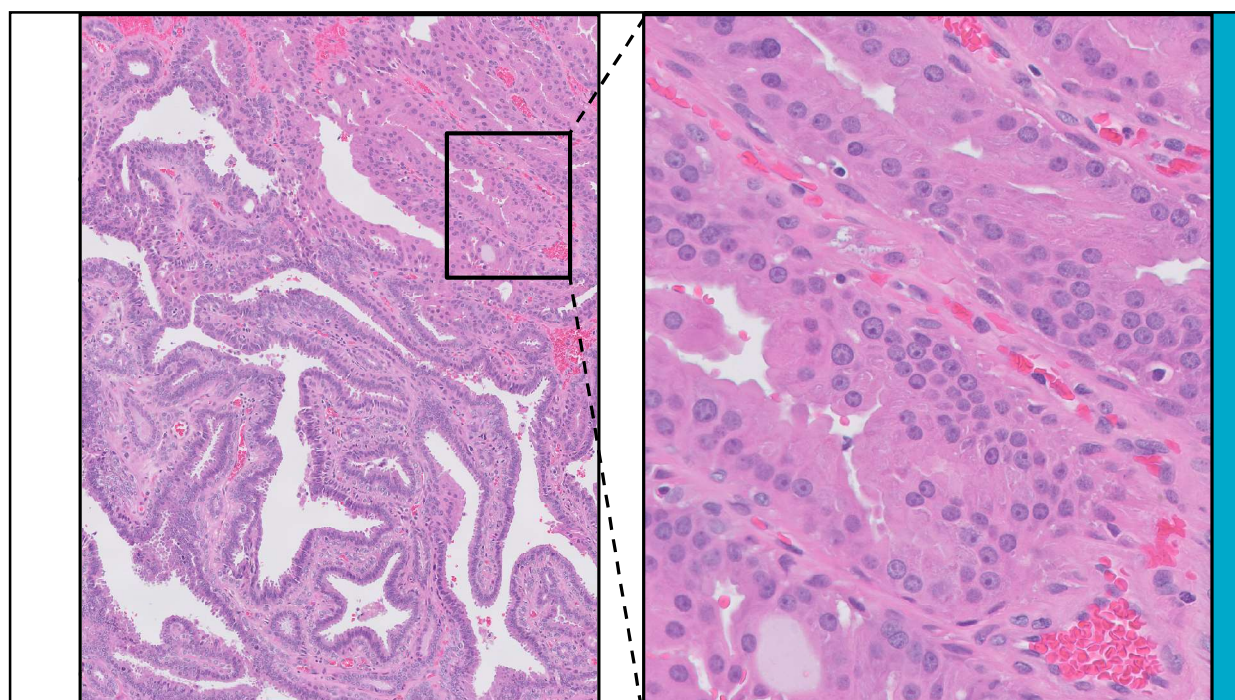
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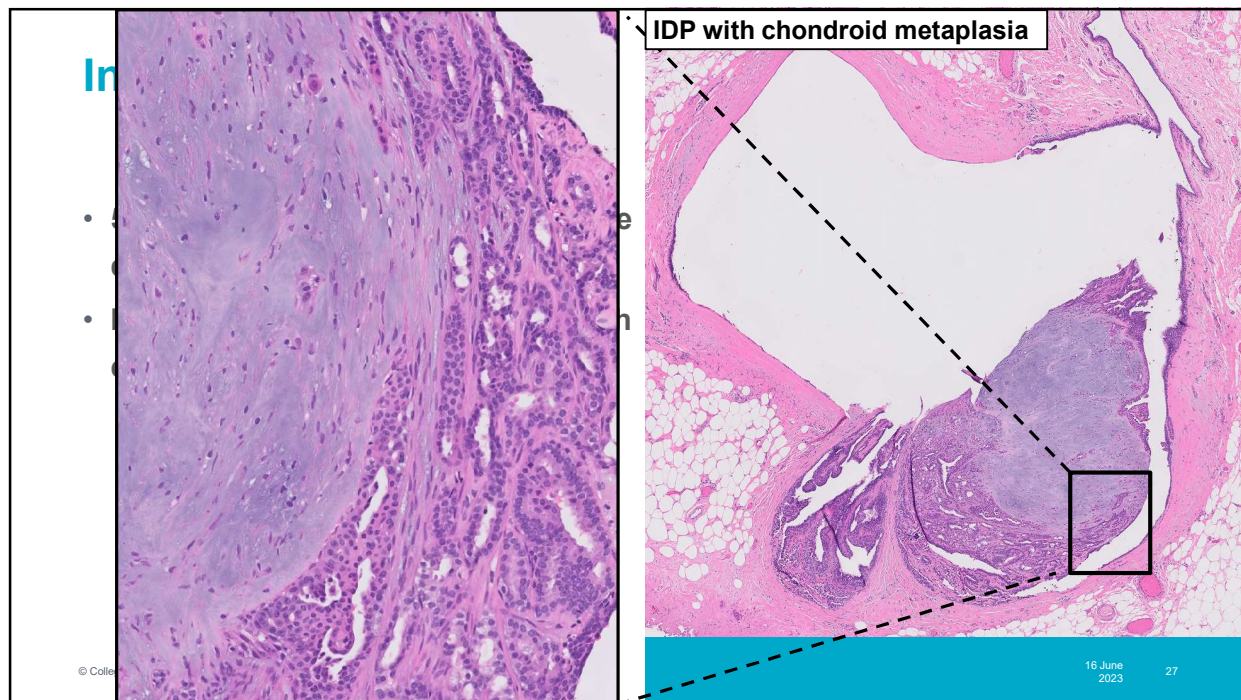
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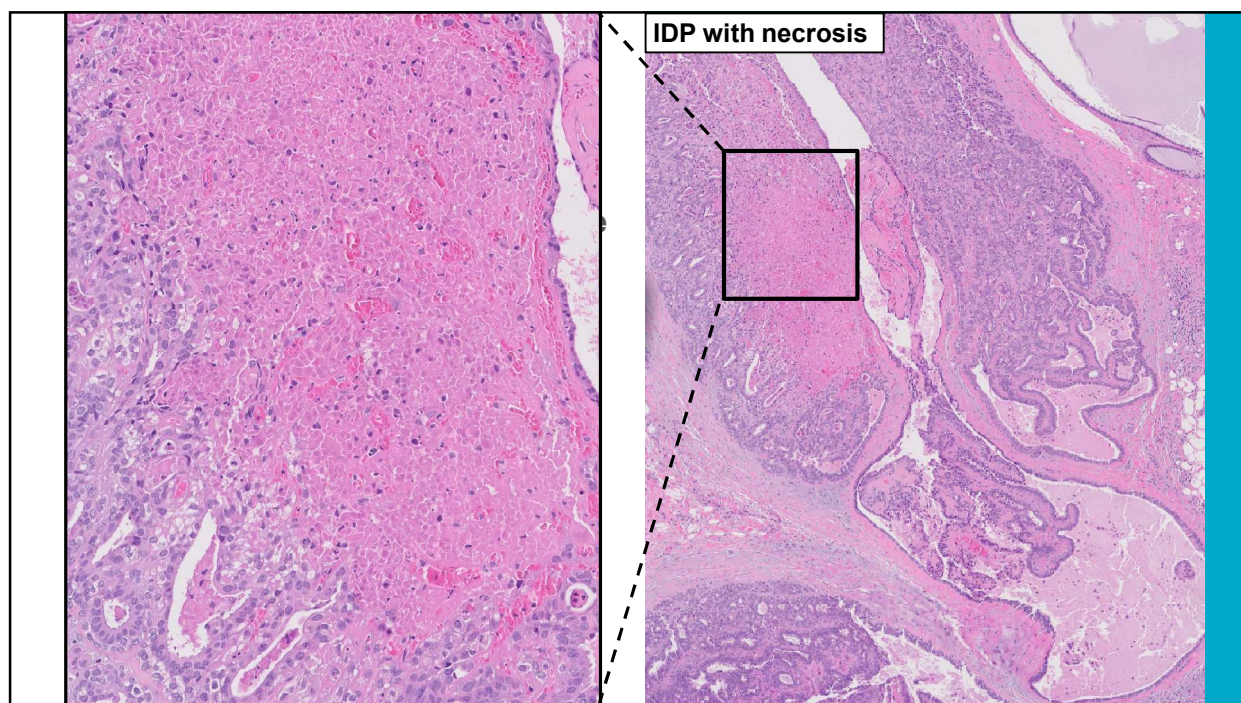
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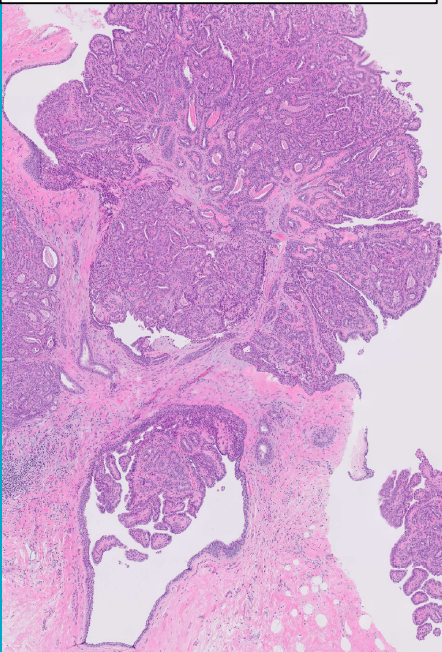
28

Intraductal papilloma

- 39-year-old female US guided core biopsy for a mass
- Intraductal papilloma with associated collagenous spherulosis

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IDP with collagenous spherulosis



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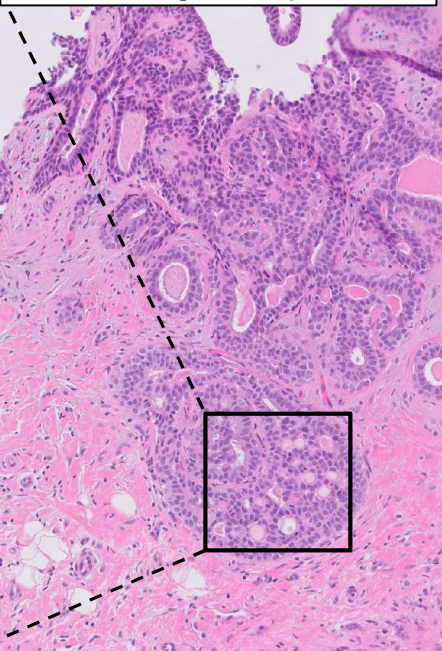
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Intra

- 39-year-old female US guided core biopsy for a mass
- Intraductal papilloma with associated collagenous spherulosis

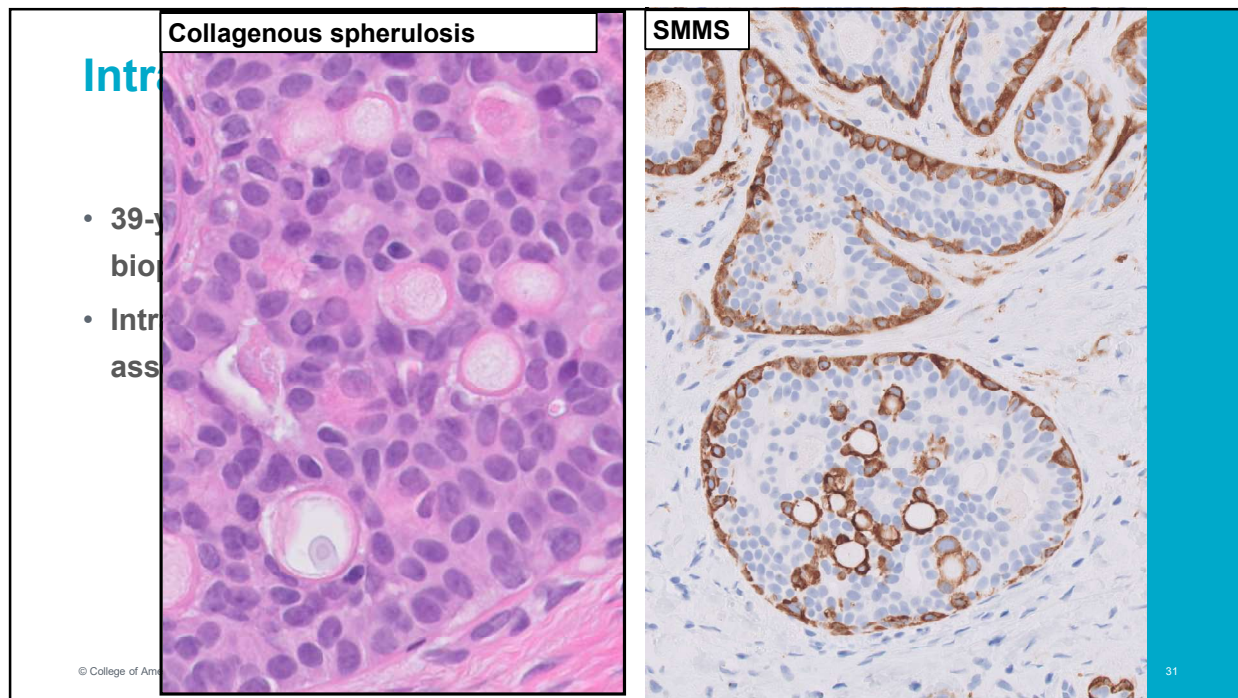
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IDP with collagenous spherulosis

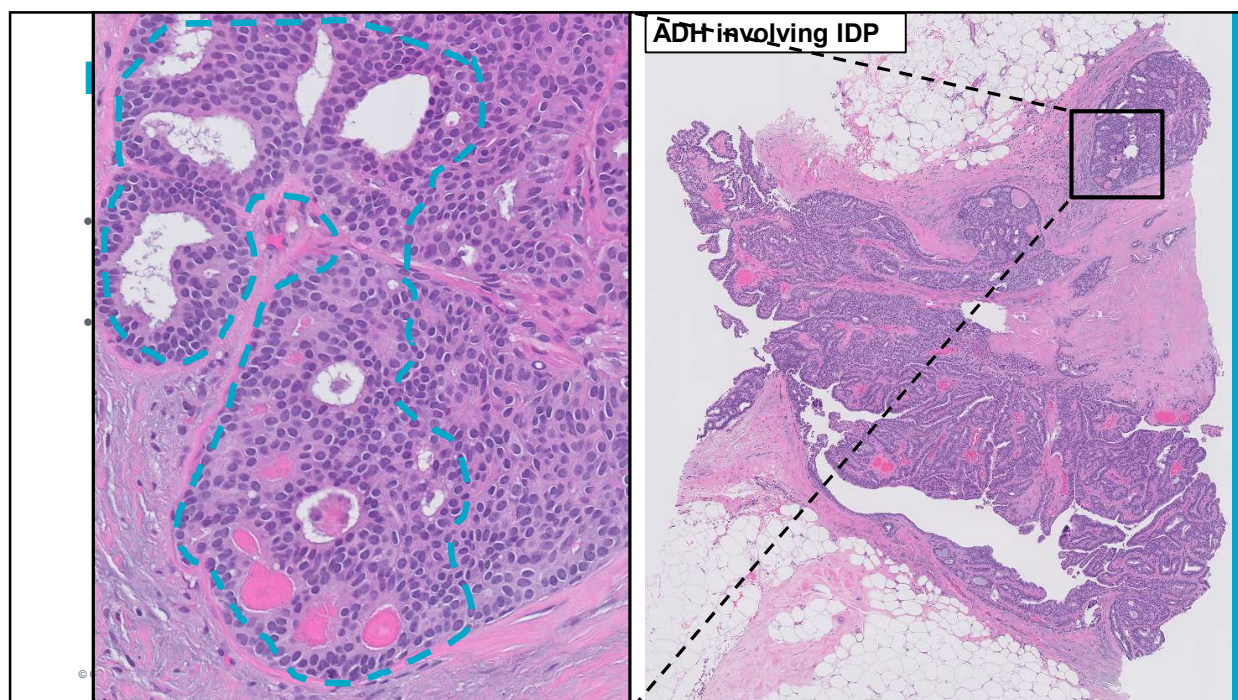


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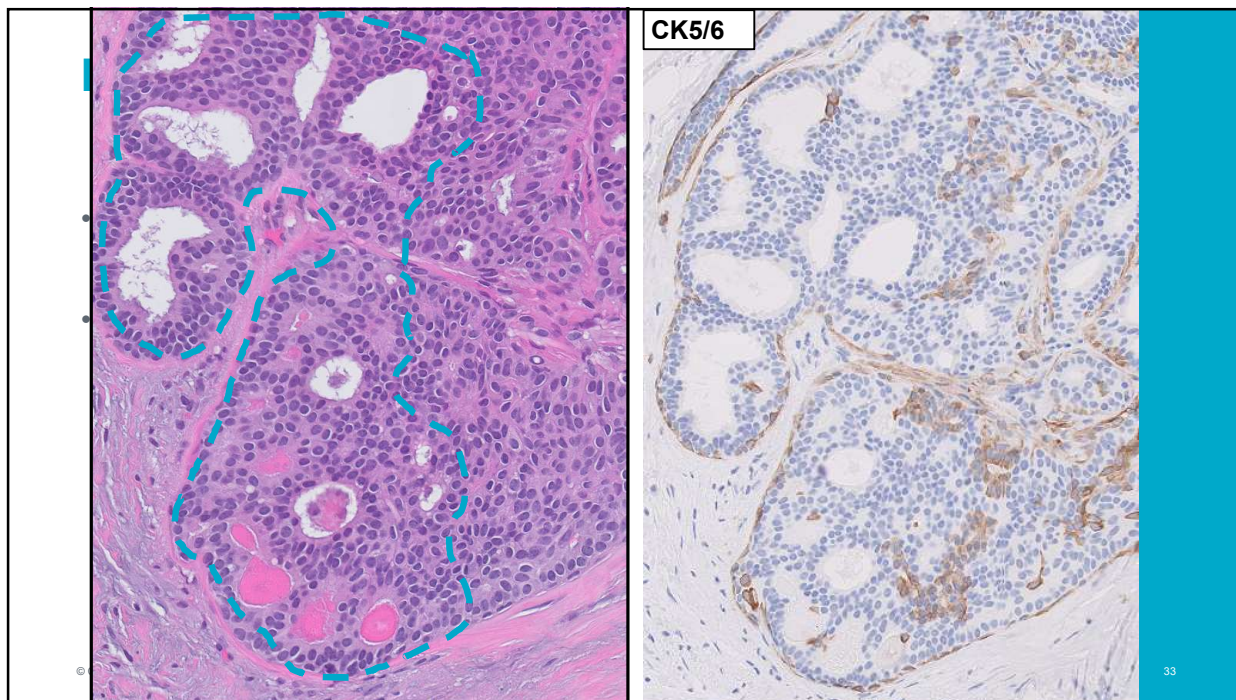
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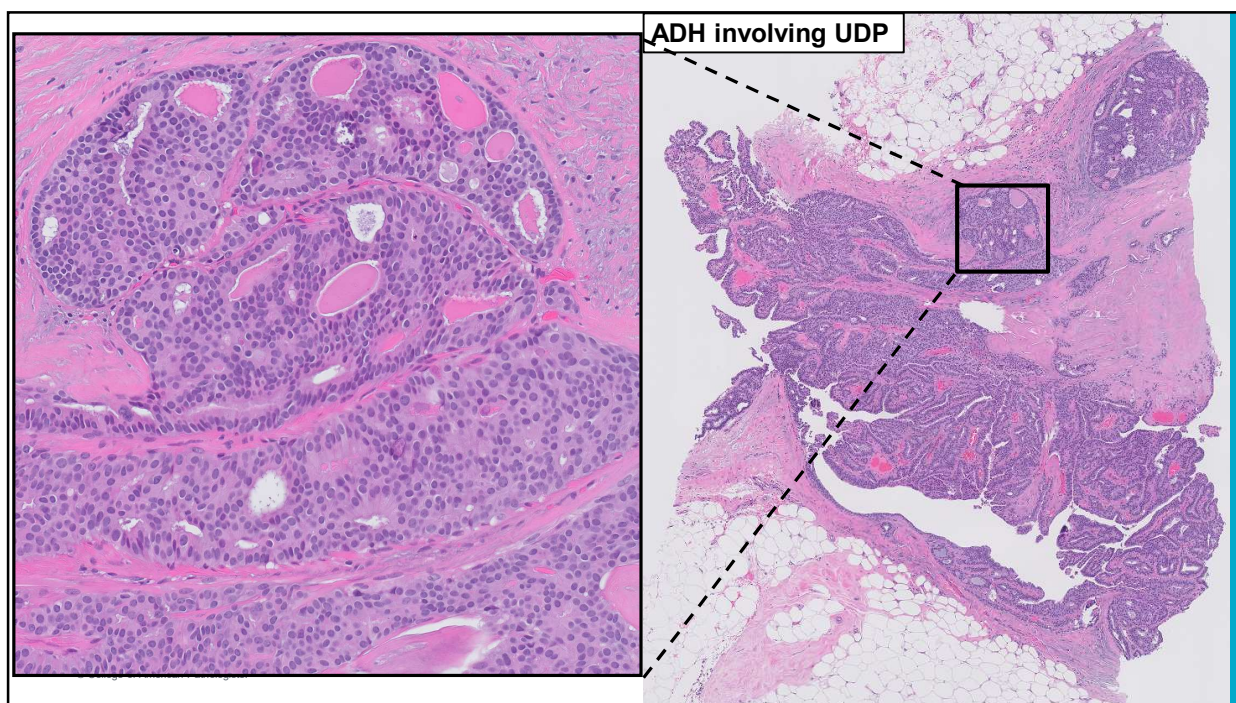
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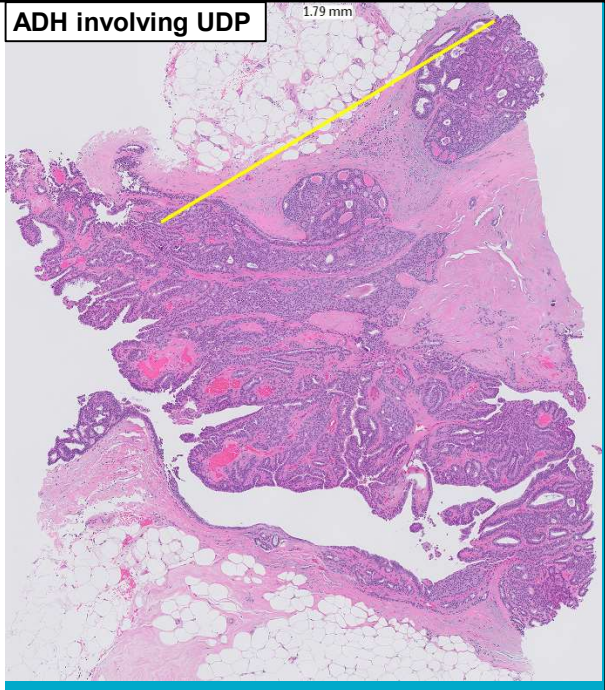
Intraductal papilloma

- Recommended size criterion to distinguish ADH vs. DCIS in a papilloma (5th Ed. WHO 2018)
- <3 mm: ADH involving IDP
- ≥3 mm: DCIS involving IDP
- Any intermediate or high grade cytology: DCIS involving IDP

© College of American Pathologists. Source: Cancer., 78 (1996), pp. 258-266

ADH involving UDP

1.79 mm



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Papillary ductal carcinoma in situ (DCIS)

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Papillary DCIS

- Architectural pattern of DCIS
- Non-invasive, intraductal neoplastic proliferation with papillary architecture
- Absence of myoepithelial cells within papillae, but retained in peripheral duct space

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Papillary DCIS



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Papillary DCIS

- Clinical Features
 - More common in post menopausal females, common pattern of DCIS in males
 - Similar to other DCIS, often mammographically presents as calcifications
- Pathogenesis
 - Similar to other DCIS
 - Prolonged estrogen exposure, older age, family history, genetic risk factors (e.g. BRCA1/2 mutation)
 - Low Grade DCIS (loss of 16q and 17p, gains 1p)
 - High Grade DCIS: (loss of 11q, 14q, 8p, 13q, gains of 17q, 8q, 5p)
- Prognosis and management
 - Similar to other DCIS
 - Non-obligate precursor conferring 2-8.6 fold risk of subsequent invasive breast cancer
 - Excision to negative margins, +/- radiation therapy, endocrine therapy chemoprevention

© College of American Pathologists. Cancer. 1998;83(10):2139-2149.
N Engl J Med 1985;312:146
Ann Surg 1997;225:69

Lancet 2000;355:724
J Pathol 2005;205:248

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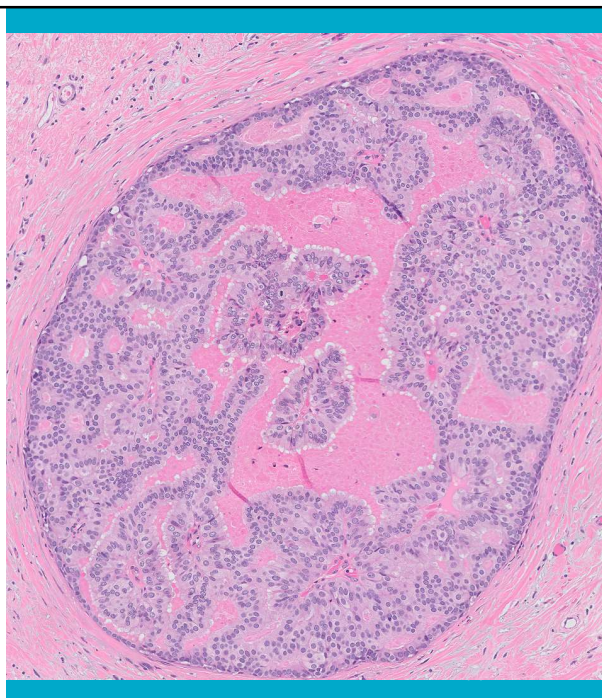
38

Papillary DCIS

- **Histology**

- Papillary fronds containing fibrovascular septa projecting into duct lumen lined by neoplastic epithelium
- Often disorderly architecture
 - Large # of fronds
 - Fronds vary in size and shape, often long and slender
 - Fronds do not fit into together neatly (unlike papilloma)

© College of American Pathologists. Koerner, Frederick. *Diagnostic Problems in Breast Pathology*, Philadelphia, PA Saunders Elsevier, 2009



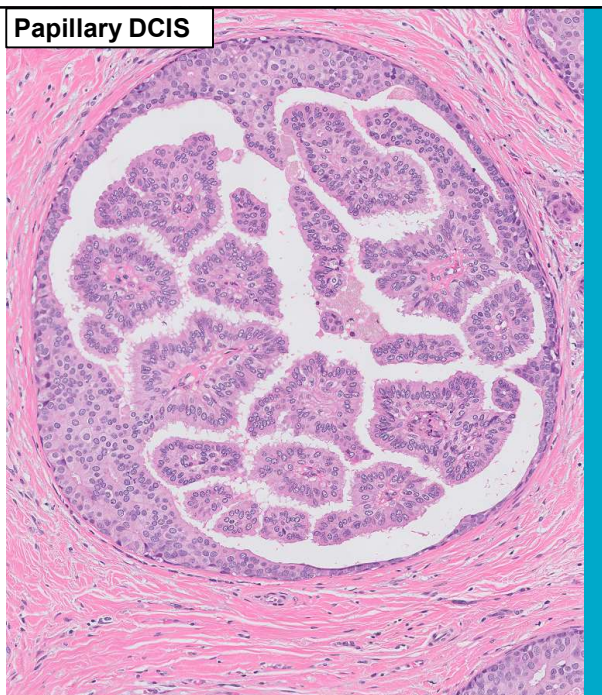
39

Papillary DCIS

- **Histology continued**

- Fronds contain relatively minimal fibrovascular stroma, composed mostly of epithelium (in contrast to papilloma)
- Often seen with other patterns of DCIS (e.g. cribriform, micropapillary, solid)

© College of American Pathologists. Koerner, Frederick. *Diagnostic Problems in Breast Pathology*, Philadelphia, PA Saunders Elsevier, 2009



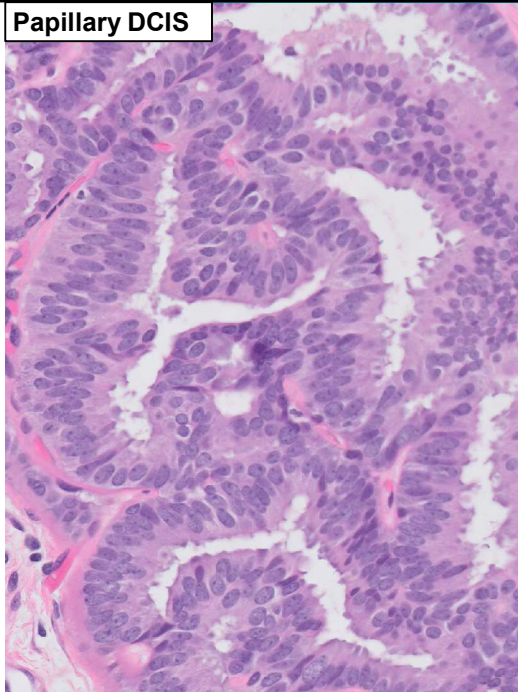
40

Papillary DCIS

- **Histology continued**
 - **Lack of myoepithelial cells lining the papillae**
 - Unlike intraductal papilloma
 - **But myoepithelial cell layer is preserved around the peripheral duct space**
 - Unlike EPC and invasive papillary carcinoma
 - **Nuclear grade 1-2, rarely high grade**

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Papillary DCIS



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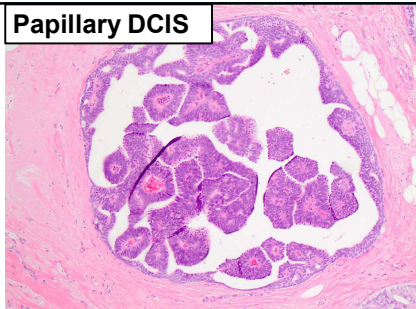
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Papillary DCIS

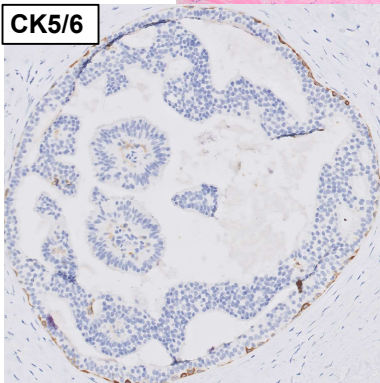
- **Immunohistochemistry**
 - **Myoepithelial markers (calponin, p63/p40)**
 - **Positive in the peripheral duct space**
 - **Negative within papillae**
 - **Biomarkers**
 - **Usually ER/PR positive**

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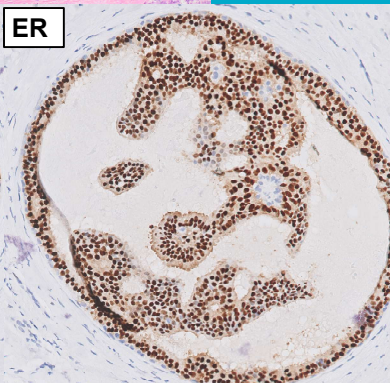
Papillary DCIS



CK5/6



ER



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Encapsulated papillary carcinoma (EPC)

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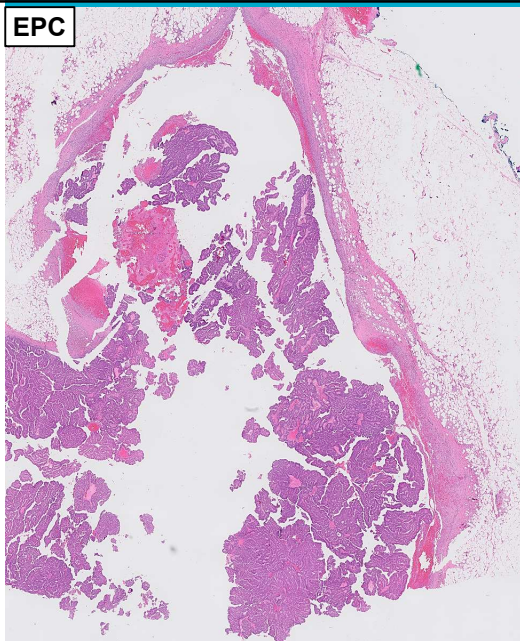
43

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Encapsulated papillary carcinoma

- Carcinoma with papillary architecture within cystic space surrounded by a fibrous capsule
- Lacking myoepithelial cells within papillae or at the periphery
- Staged as pTis in the absence of an invasive component

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Encapsulated papillary carcinoma

• Clinical Features

- Postmenopausal, 7th decade
- Mammographically present as a large, circumscribed solitary mass

• Pathogenesis

- Uncertain represents an indolent variant of invasive breast cancer with pushing border vs DCIS “in transition” to invasive cancer
- Recent study shows EPCs lack basement membranes, evidence these are indolent invasive carcinoma
- Genomic alterations of ER+, low grade invasive breast cancer, NST type
 - 16q losses, 16p and 1q gains
 - PIK3CA mutations
- Mostly Luminal A subtype

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Source: Am J Surg Pathol 2011;35:1093
Pathol Res Pract 2018;214:579
Breast J 2019;25:539

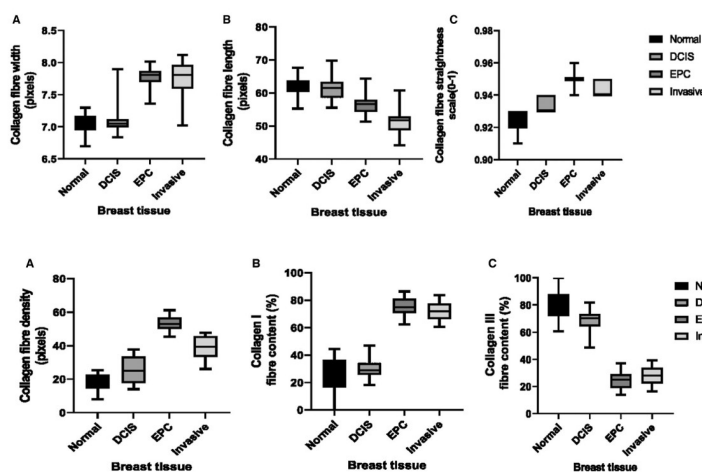
J Pathol 2012;226:427
Mol Oncol 2014;8:1588
Histopathology. 2023;10.1111/his.14939

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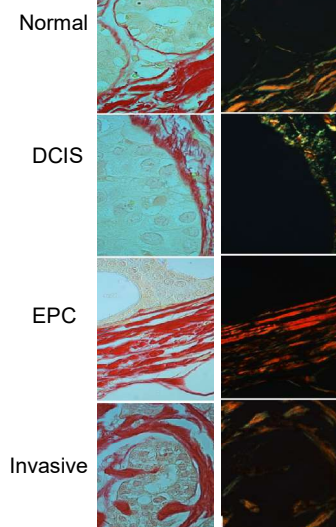
EPCs lack native basement membranes



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Histopathology. 2023;10.1111/his.14939

PRS stain with polarization



46

Encapsulated papillary carcinoma

• Prognosis and management

- In the absence of invasion has a favorable prognosis
 - EPC (without invasion) is staged and managed as pTis disease
 - Lymph node involvement has been reported in EPC
- Evaluate for the presence of an invasive component (usually NST type)
 - If invasion is present, pT staging is based on the invasive component only
 - Do not include the span of the EPC when determining pT size
- Rare high grade and HER2+ tumors with EPC morphology have been reported
 - Recommended these variants are managed and staged as invasive breast cancer (2018 WHO)

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Source: Int J Surg Pathol 2007;15:143,
Histopathology 2016;68:45
Histopathology 2015;66:740

Histol Histopathol 2019;34:137
Am J Surg Pathol 2011;35:1093

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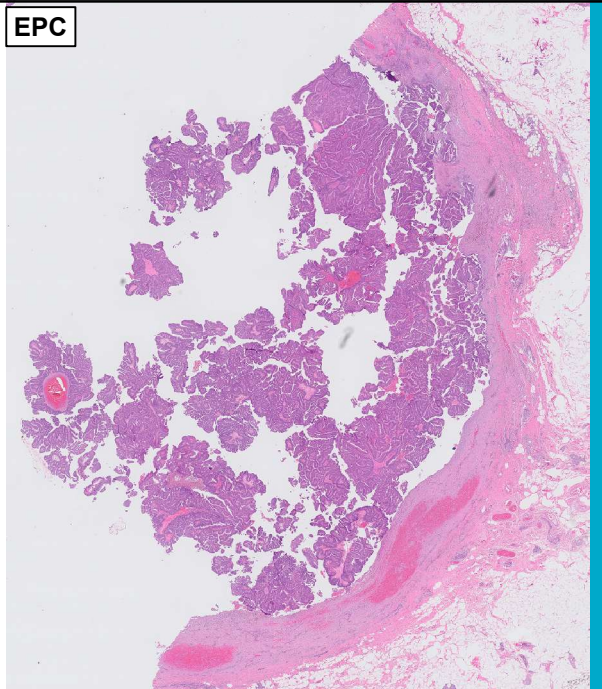
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Encapsulated papillary carcinoma

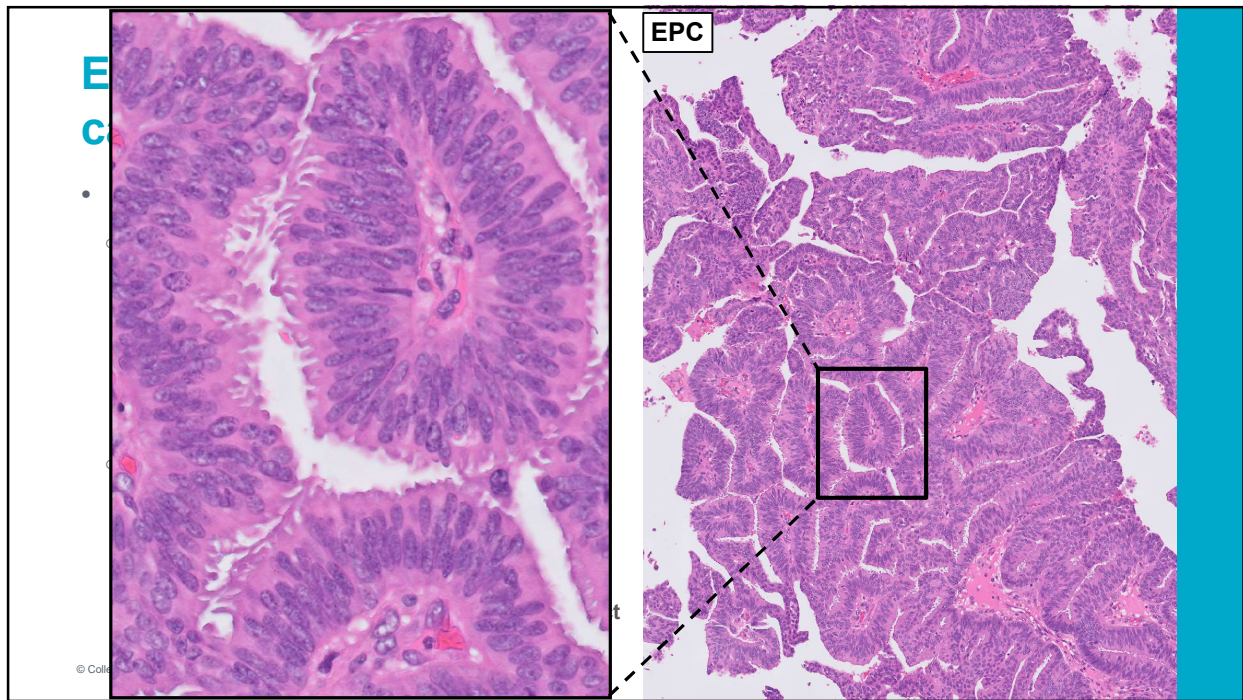
• Histology

- Large circumscribed mass within a cystic space surrounded by a thick fibrotic capsule
 - Less frequently composed of an aggregate of close nodules
- Papillary architecture
 - Delicate fibrovascular stalks lined by neoplastic epithelium
 - May have focal cribriform and micropapillary architecture

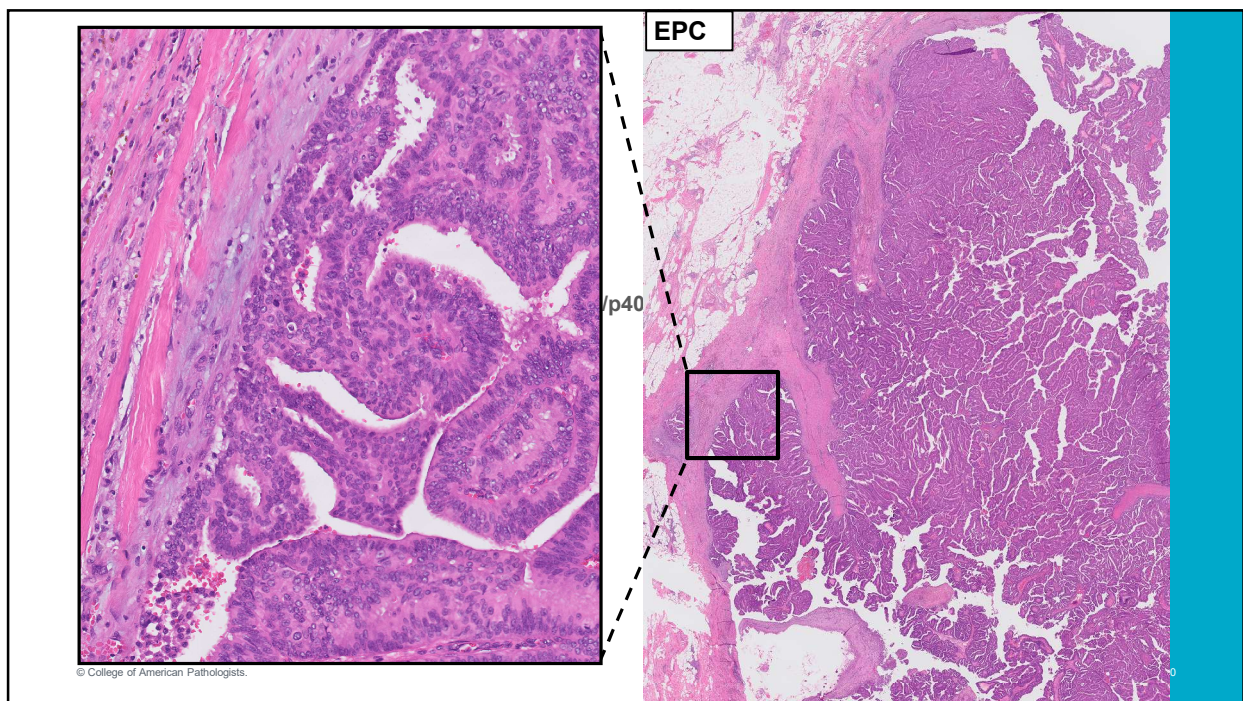
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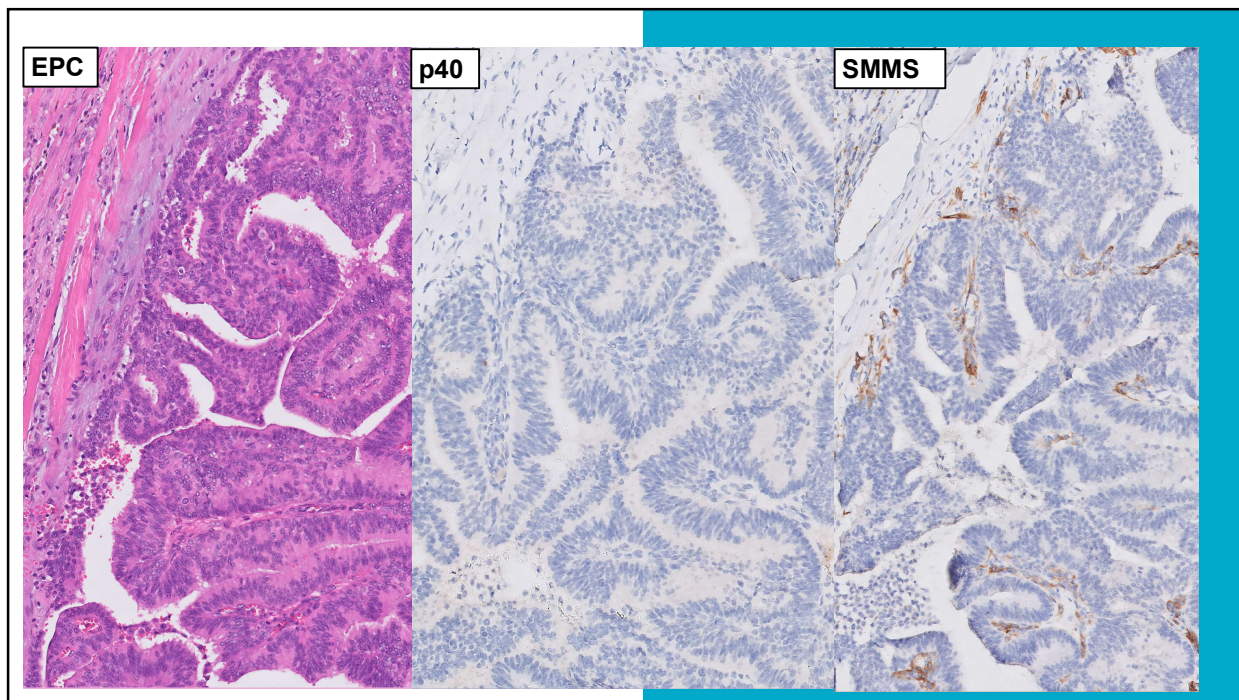
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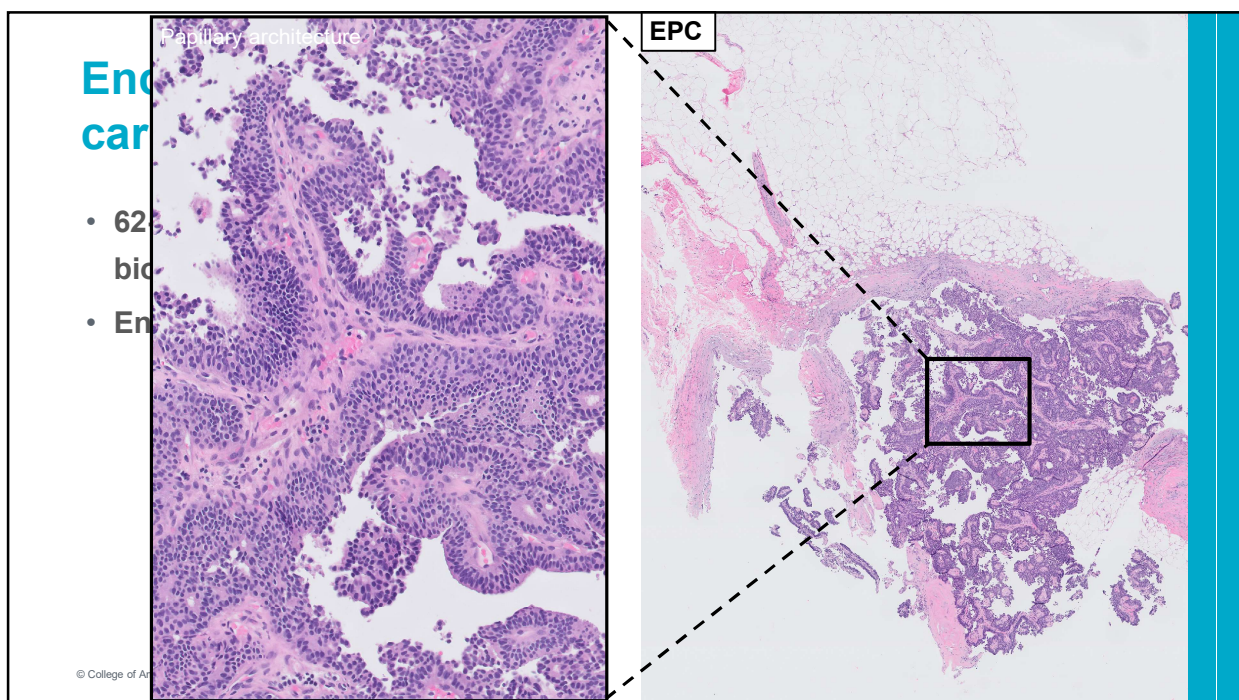
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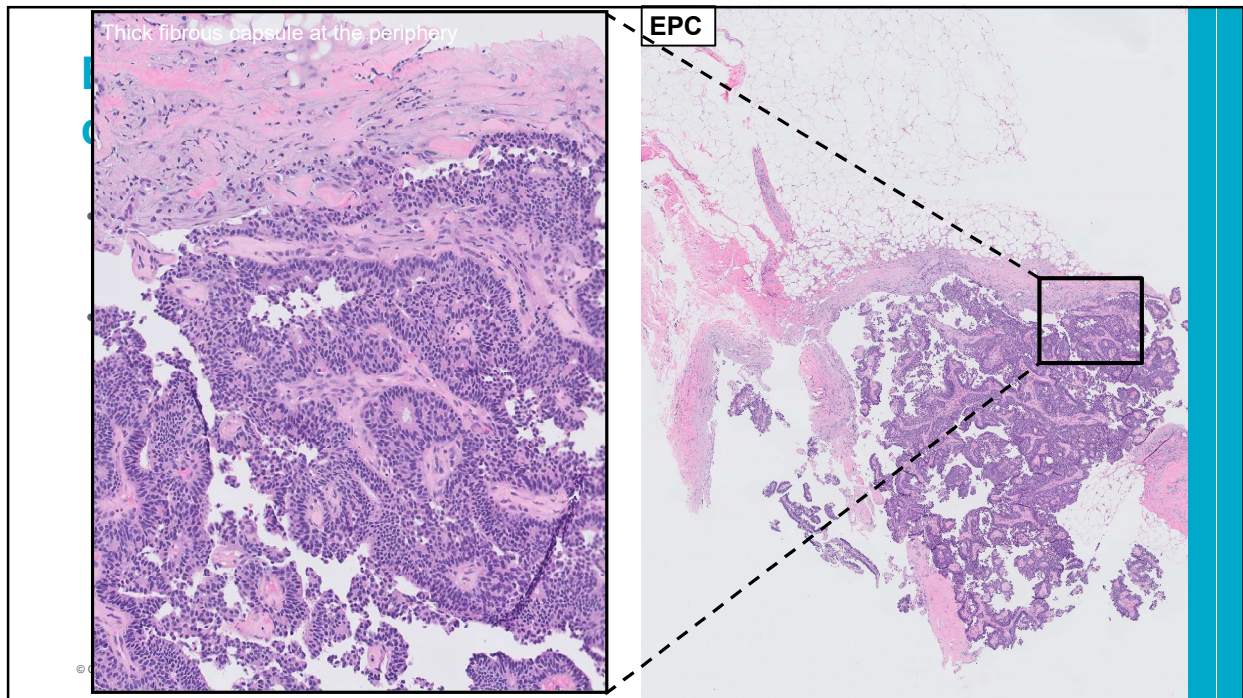
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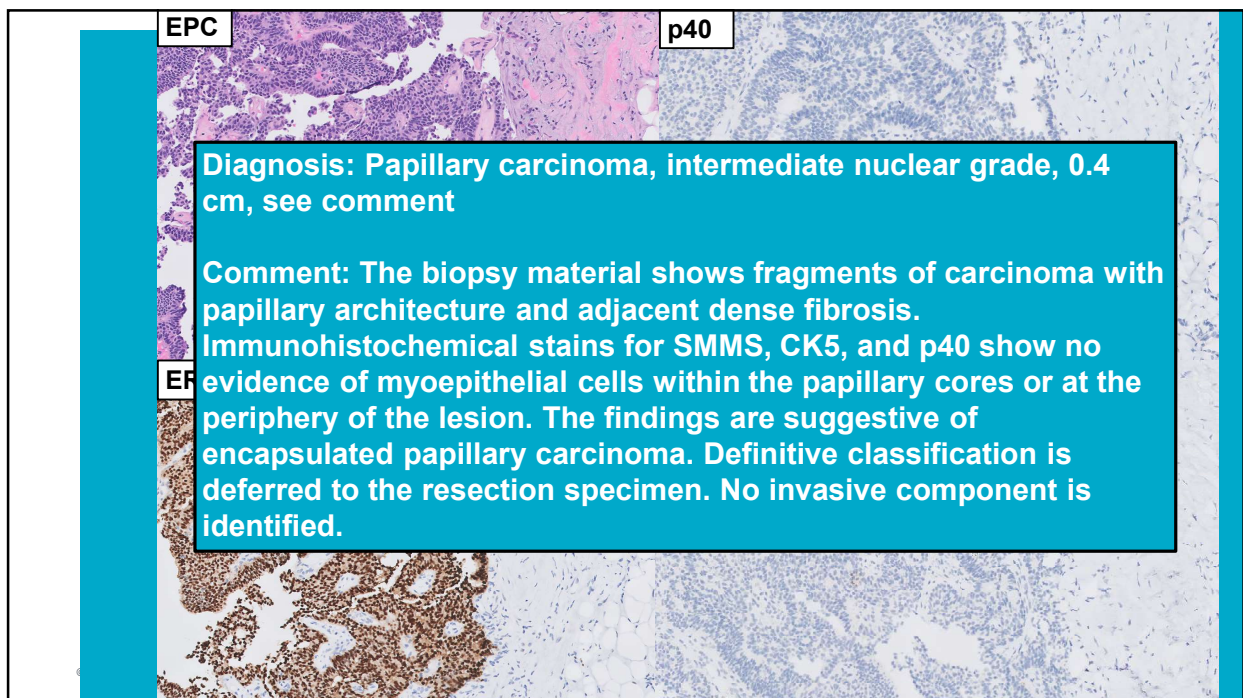
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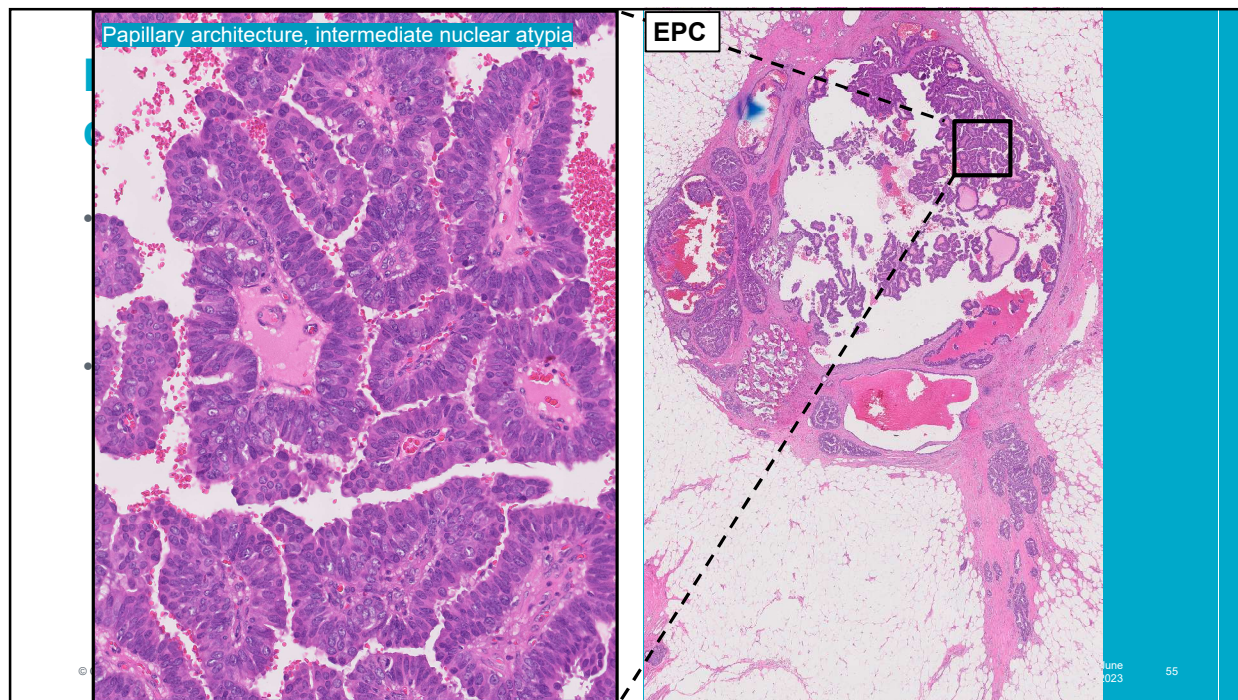
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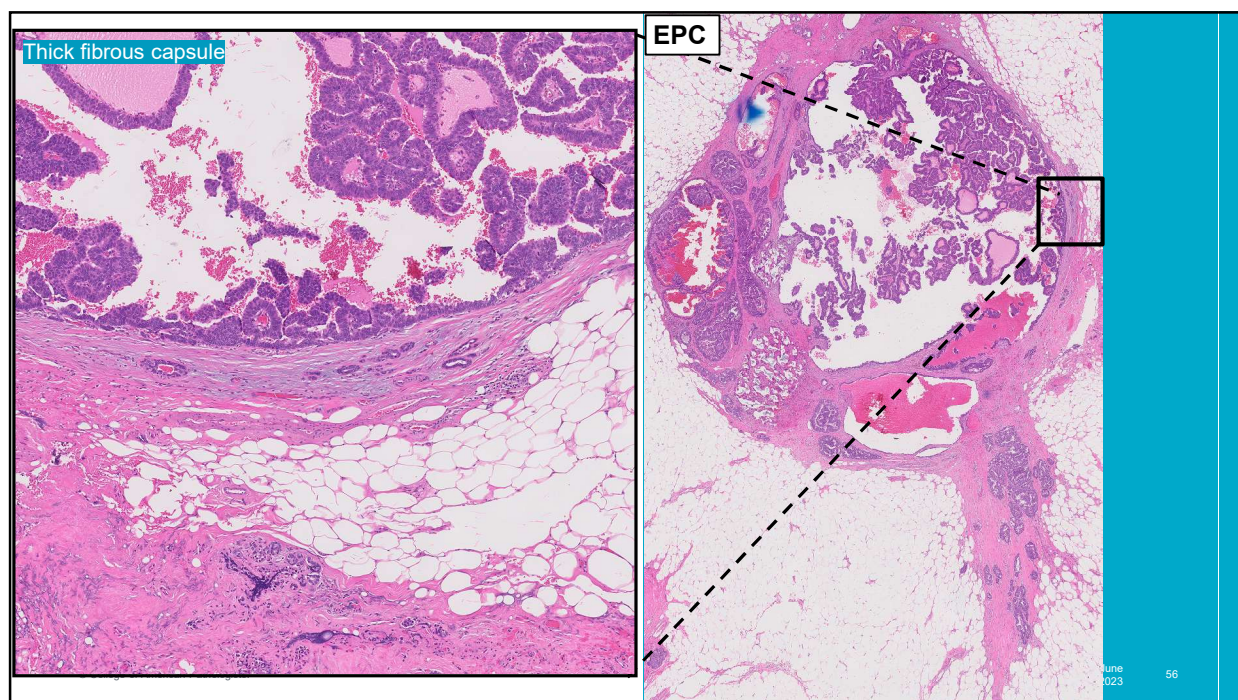
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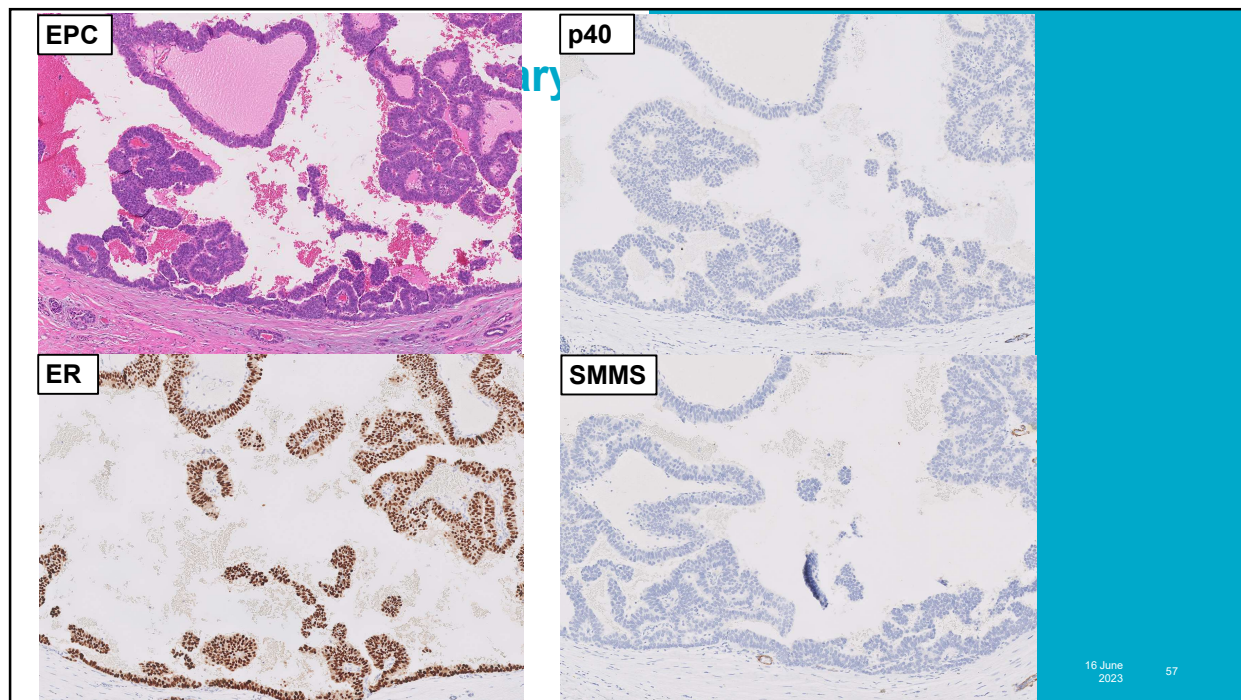
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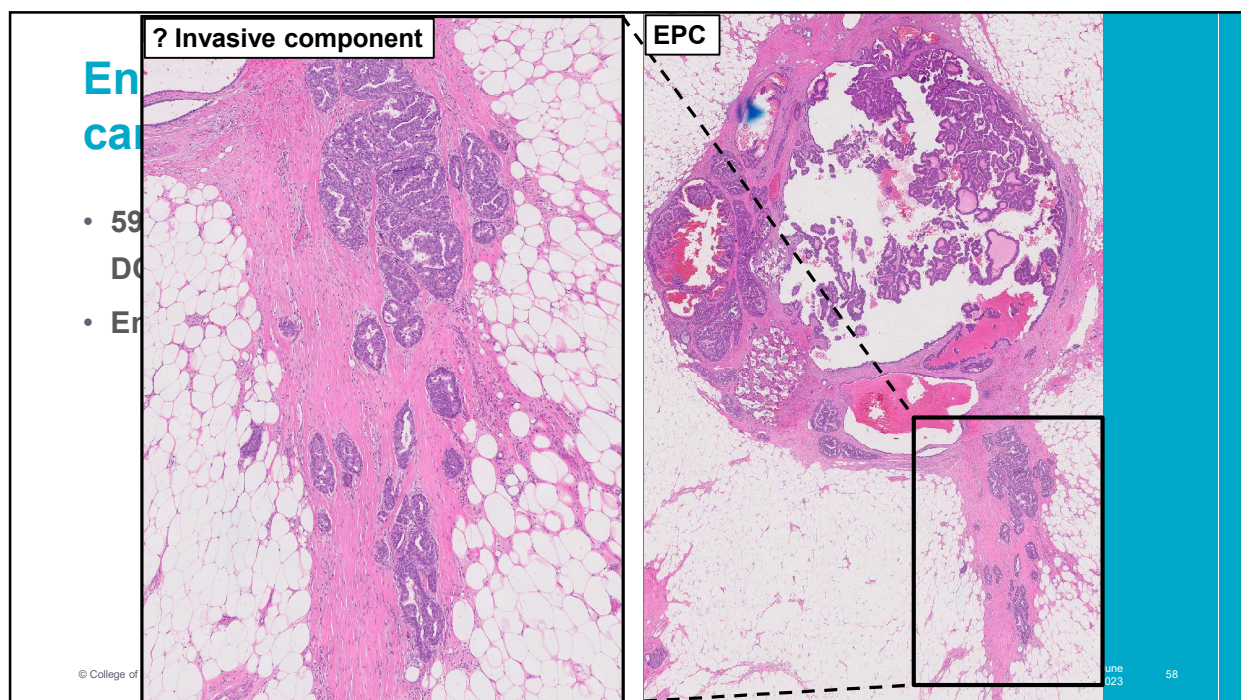
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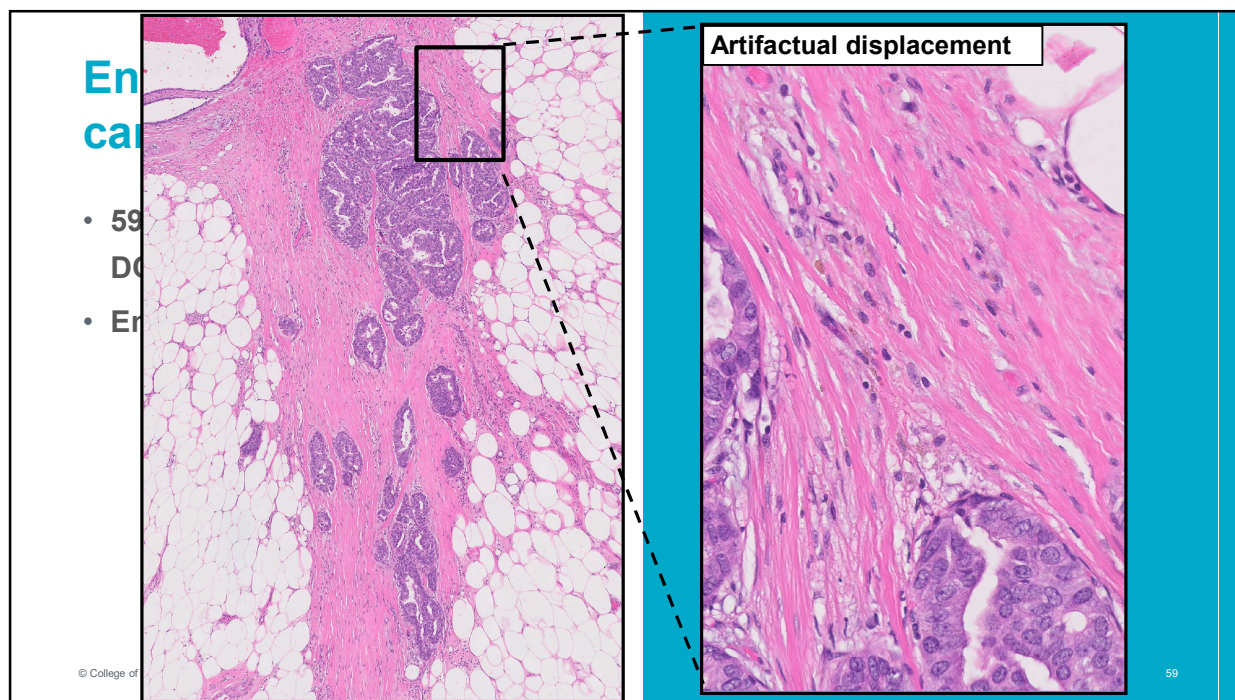
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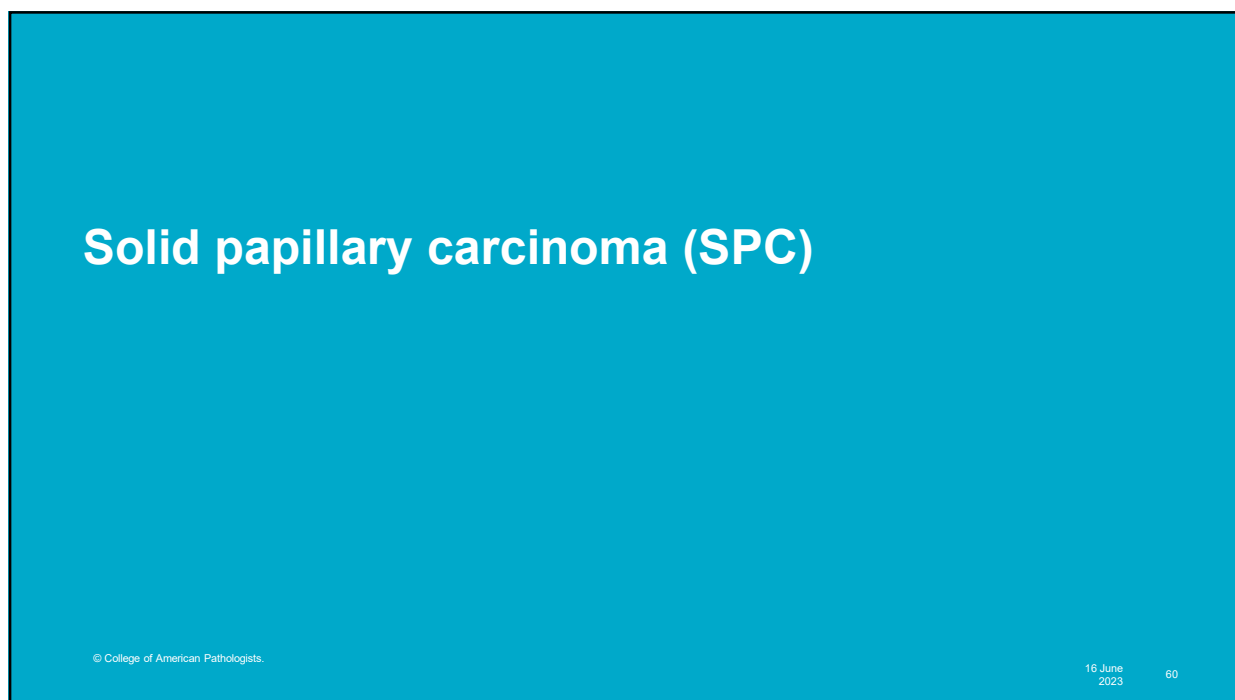
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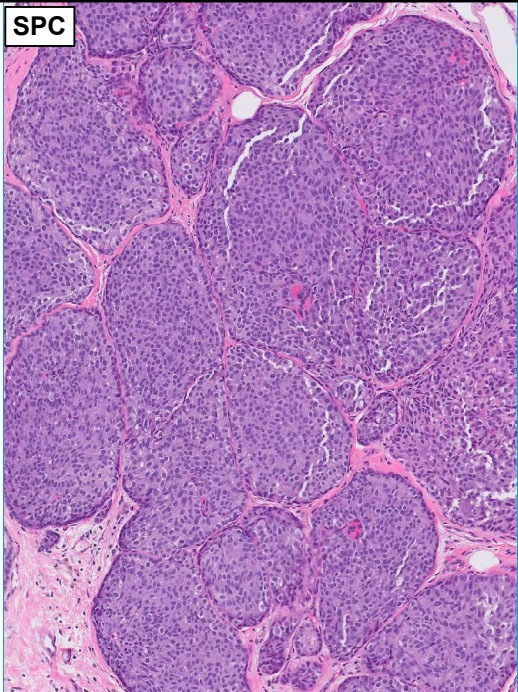
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Solid papillary carcinoma

- Tumors with solid growth pattern punctuated by delicate fibrovascular cores
- Frequent neuroendocrine differentiation
- Can be in-situ or invasive

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SPC



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Solid papillary carcinoma

- **Clinical Features**
 - Postmenopausal, 7th decade
 - Mammographically present as a mass, occasionally bloody nipple discharge
- **Pathogenesis**
 - Loss of 16q, gains 16p and 1q
 - PIK3CA mutations frequent
 - Luminal B subtype
 - Frequent expression of genes related to neuroendocrine differentiation (RET, ASCL1, DOK7)

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Source: Am J Surg Pathol 1995;19:1237
J Pathol 2012;226:427
Mol Oncol 2014;8:1588

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Solid papillary carcinoma

- **Prognosis and management**

- In the absence of invasion has a favorable prognosis
 - SPC (without invasion) is staged and managed as pTis disease
- Evaluate for the presence of an invasive component
 - If invasion is present, pT staging is based on the invasive component only
 - Lymph node involvement has been reported in cases with invasive component

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Source: J Pathol 2012;226:427

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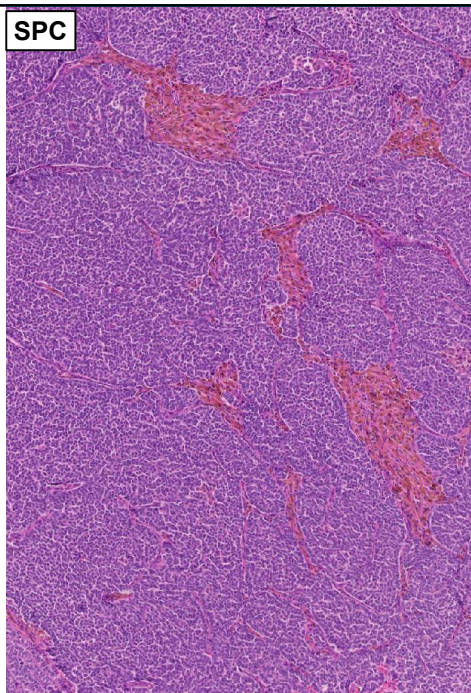
Solid papillary carcinoma

- **Histology**

- Circumscribed, rounded, expansile nodules of tumor with solid growth pattern
- Punctuated by delicate fibrovascular cores, surrounded by palisading cells
 - Lack of discrete papillae
- Low-intermediate nuclear grade
- Neuroendocrine (NE) differentiation
 - Granular eosinophilic cytoplasm, fine chromatin, expression of NE markers by IHC
- Absence of myoepithelial cells throughout
- +/- Extracellular mucin

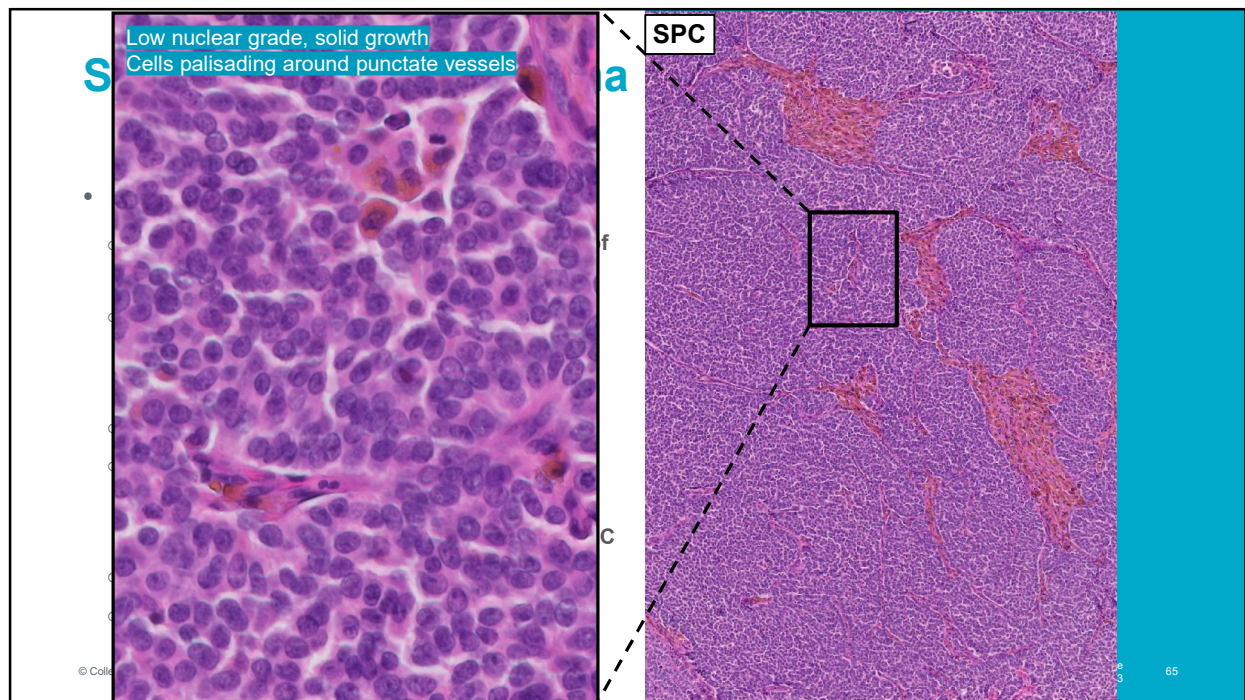
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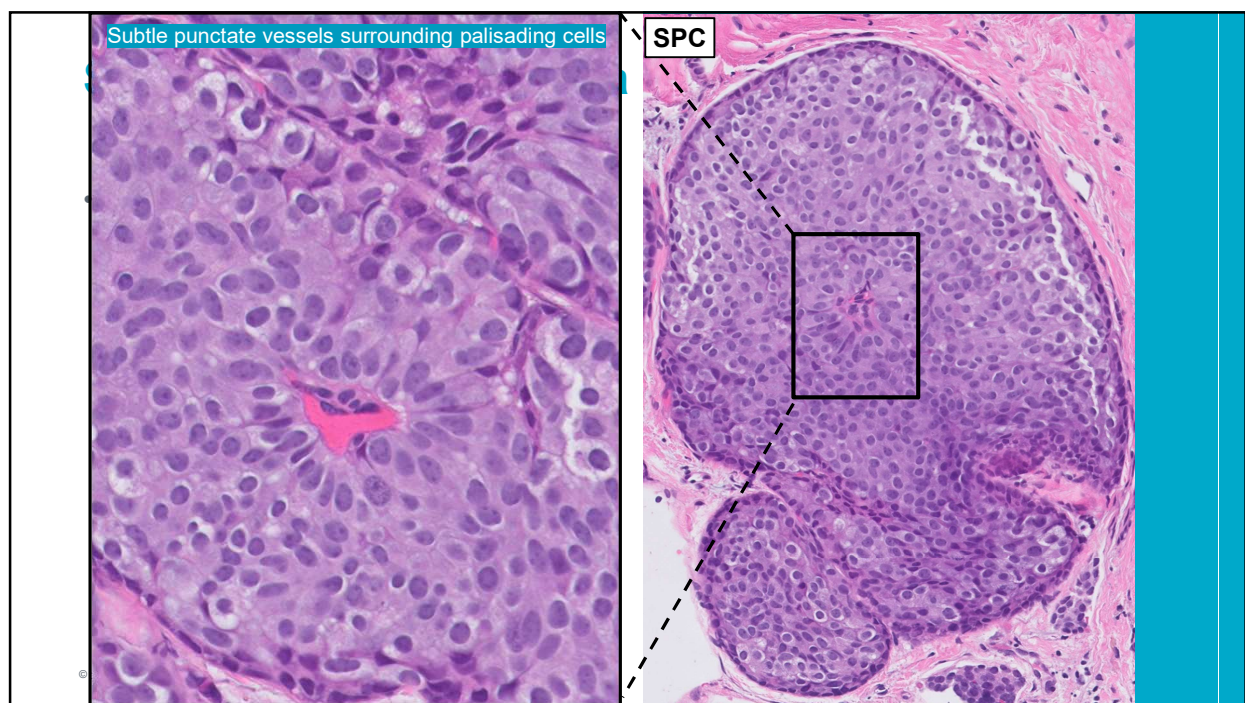


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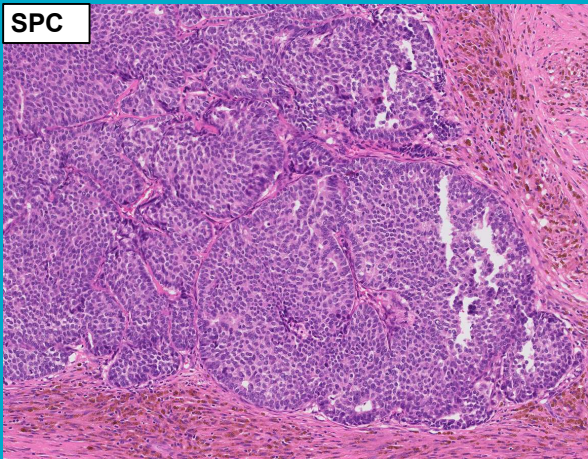


66

Solid papillary carcinoma

- Immunohistochemistry
 - Positive
 - Synaptophysin, chromogranin, INSM1
 - Negative
 - Myoepithelial markers (SMMS, calponin, p63/p40)
 - HMWK keratins
 - Biomarkers
 - ER/PR positive
 - HER2 negative (not necessary to perform unless invasive component is present)
 - Ki67 low-intermediate

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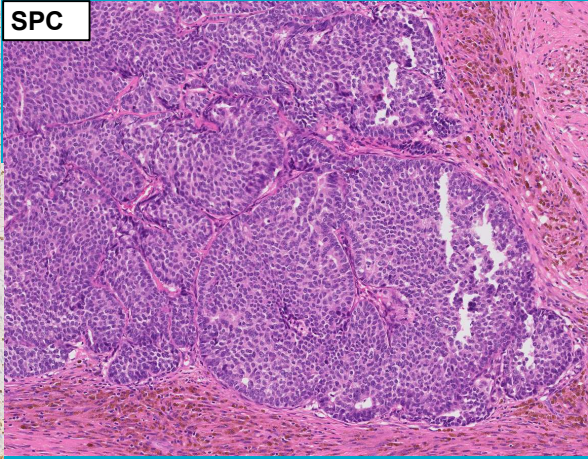
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67

Solid papillary carcinoma

- Immunohistochemistry
 - Positive
 - Synaptophysin, chromogranin, INSM1
 - Negative
 - Myoepithelial markers (SMMS, calponin, p63/p40)
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 - ER/PR positive
 - HER2 negative (not necessary to perform unless invasive component is present)
 - Ki67 low-intermediate

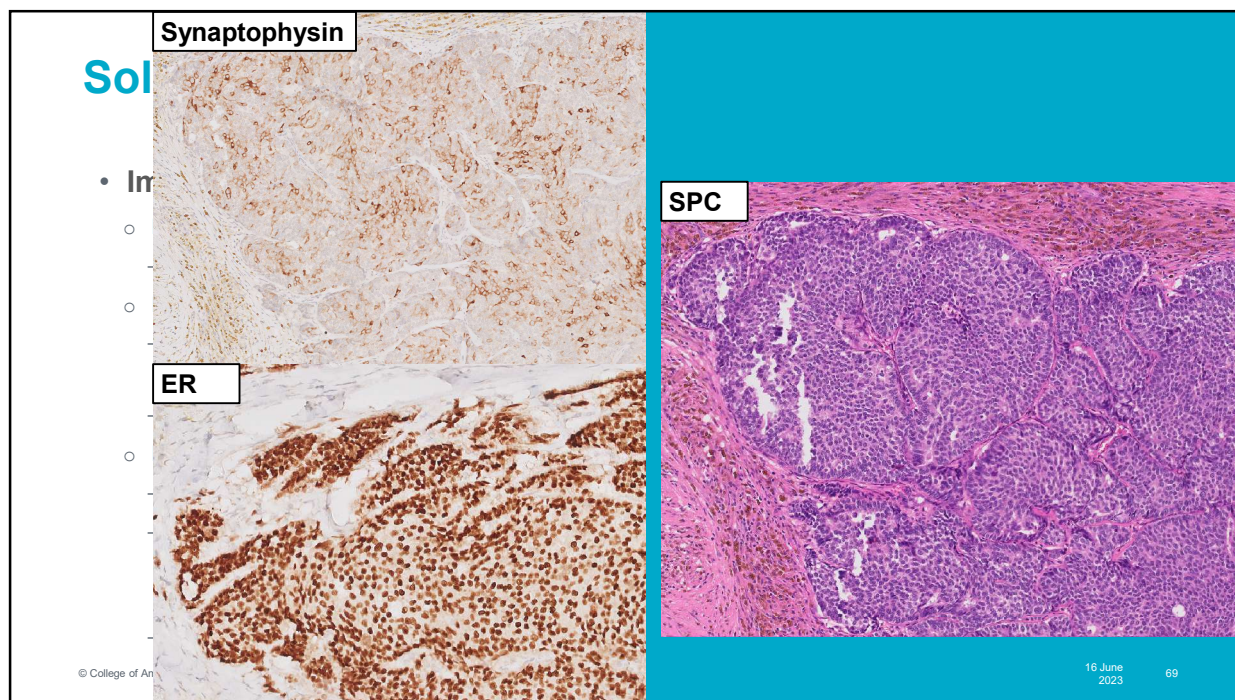
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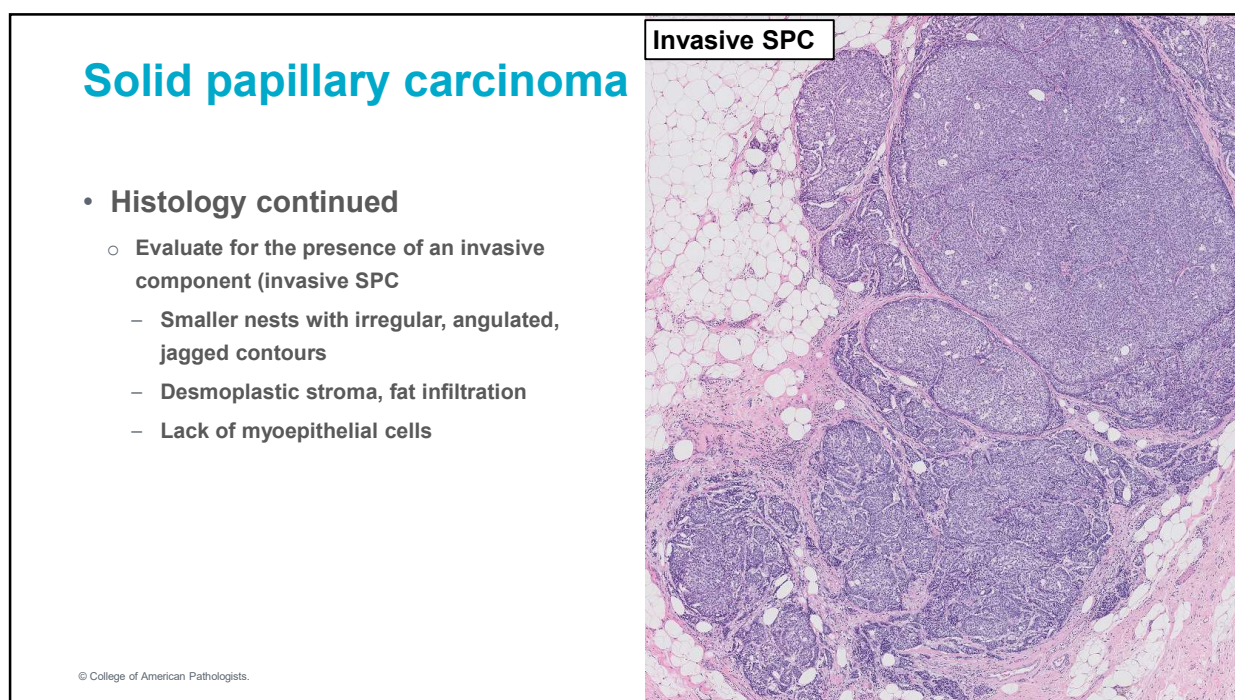
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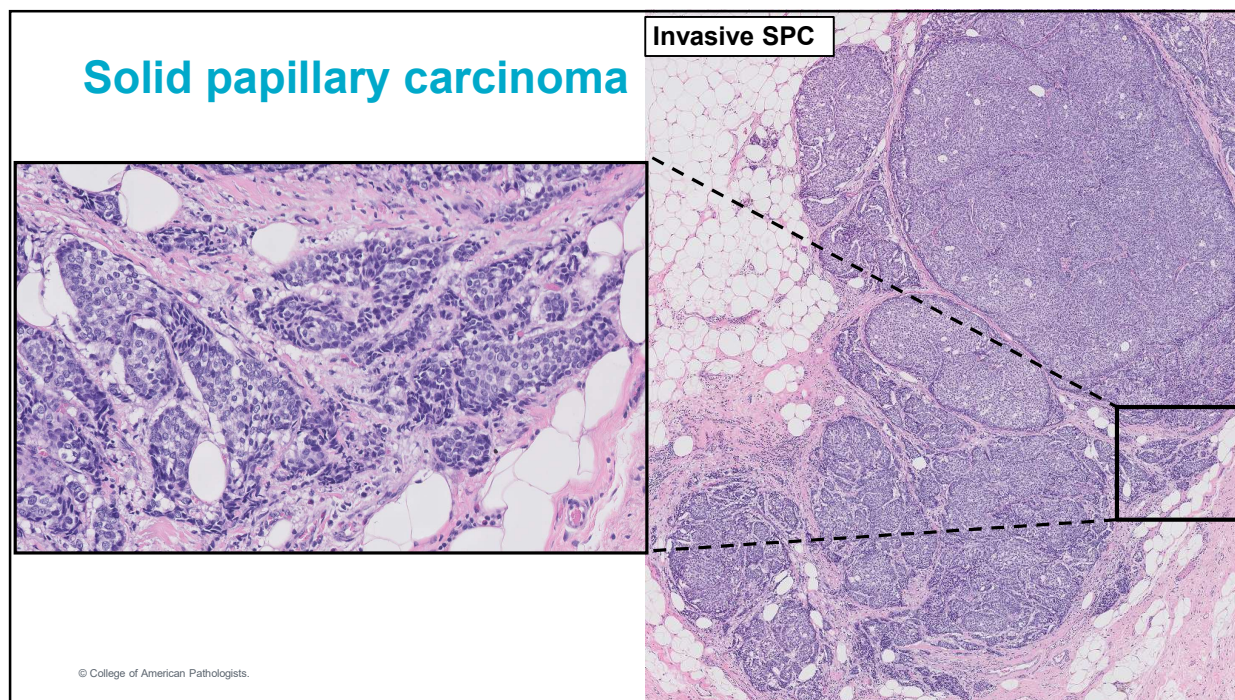
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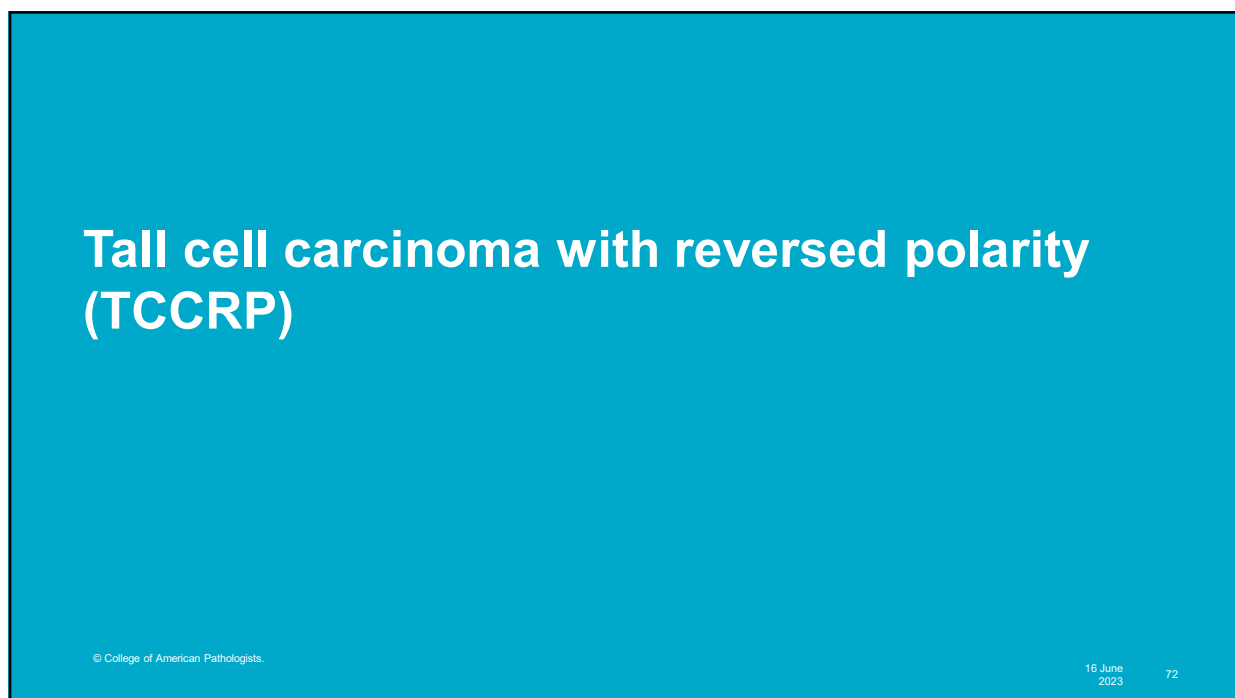
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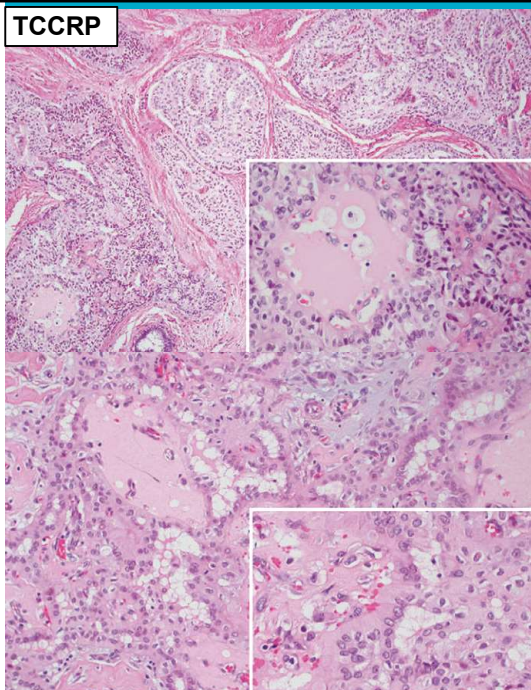
72

Tall cell carcinoma with reversed polarity

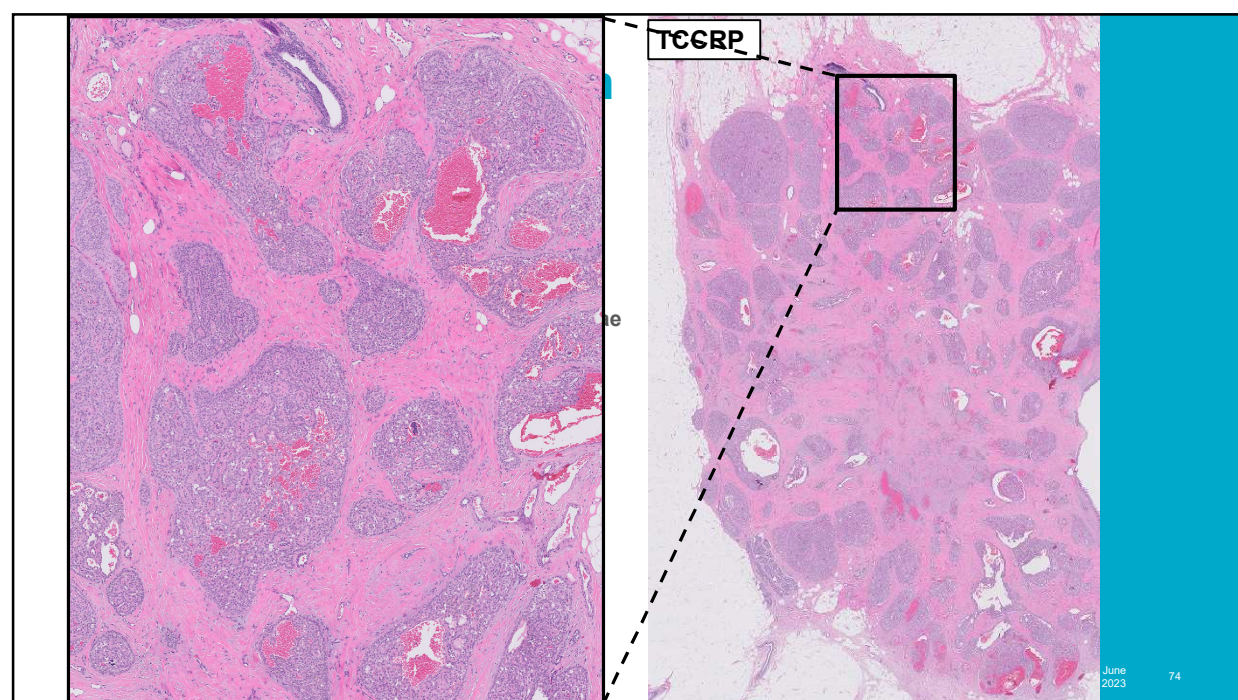
- Rare subtype of invasive breast cancer
- Resembles tall cell variant of papillary thyroid carcinoma
- Solid-papillary growth pattern, tall columnar cells with reversed nuclear polarity
- Triple negative for ER/PR/HER2

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Source: *Mod Pathol.* 2020;33(6):1056-1064.

TCCRP



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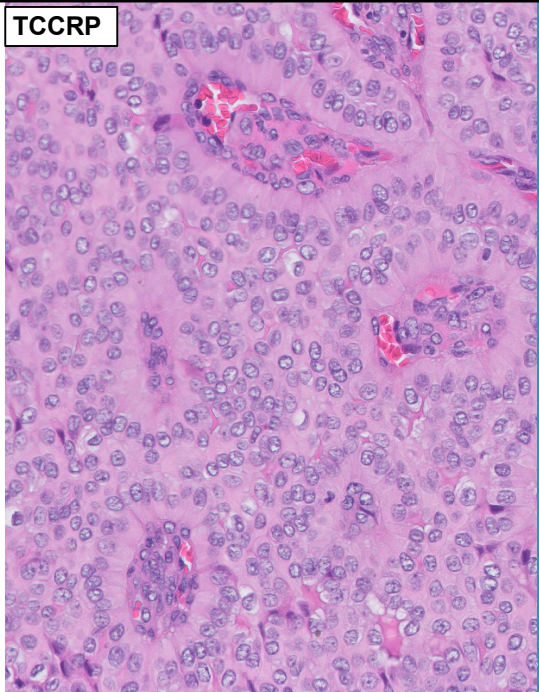
74

Tall cell carcinoma with reversed polarity

- **Histology**
 - Circumscribed nests, dense fibrous stroma
 - Solid-papillary growth pattern, focal true papillae
 - Tall columnar cells with abundant eosinophilic cytoplasm surrounding delicate capillaries, +/- foamy macrophages in cores
 - Bland cytology, variable nuclear grooves and intranuclear inclusions
 - **Reverse polarity: tumor cell nuclei oriented towards the apical rather than basal surface of the glands (defining feature)**
 - Absence of myoepithelial cells throughout

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TCCRP



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Tall cell carcinoma with reversed polarity

- **Clinical Features**
 - Mean age 64 (39-89 years)
 - Limited available epidemiologic information
- **Pathogenesis**
 - Distinct genetic alterations
 - Associated with IDH2 R172 hotspot mutations in 84%
 - Co-occurring PIK3CA missense mutations in 50-68%
 - Lacks BRAF and RET/PTC rearrangements seen in papillary thyroid ca
- **Prognosis and management**
 - Favorable prognosis, but progression with bone metastases have been reported

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Source: Cancer Res 2016;76:7118
Histopathology 2018;73:339
Cancer Res 2016;76:7118
Am J Surg Pathol 2017;41:887

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Tall cell carcinoma with reversed polarity

• Immunohistochemistry

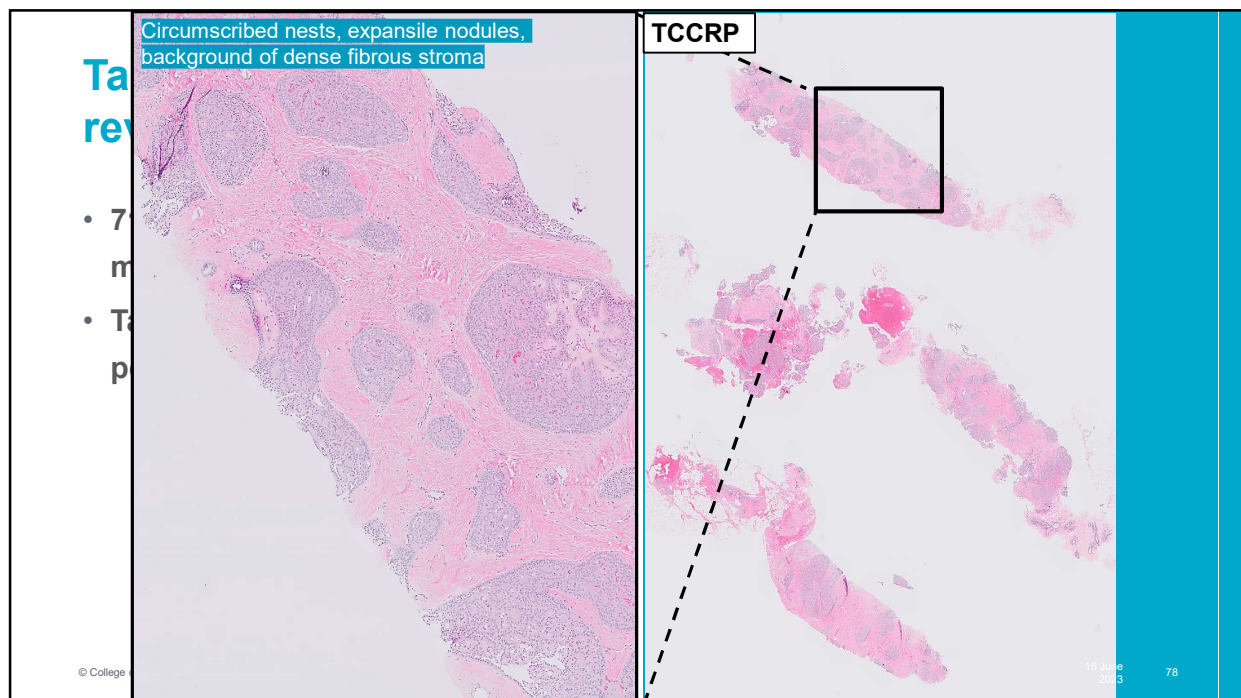
- Positive:
 - Express both LMWK and HMWK (e.g. CK7 and CK5/6)
 - Variable GATA3, mammaglobin, BRST2
 - Calretinin
- Negative:
 - Myoepithelial markers (SMMS, calponin, p63)
 - Neuroendocrine markers (synaptophysin, chromogranin)
 - TTF-1, thyroglobulin
- Biomarkers:
 - Generally triple negative for ER/PR/HER2
 - Estrogen and progesterone receptor may be weak/focal
 - Ki67 index is low (<20%)

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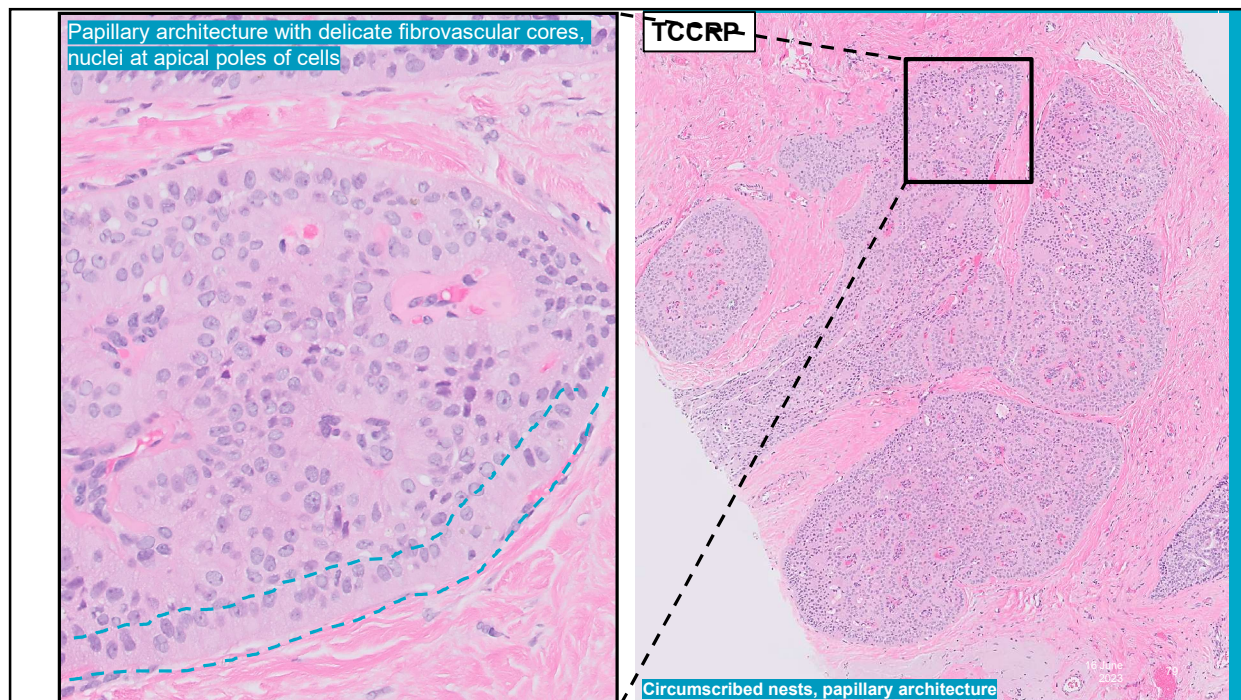
Source: Int J Surg Pathol 2007;15:14
Mod Pathol 2018;31:1367
Pathobiology 2019;86:83
Int J Surg Pathol 2019;27:134

Am J Clin Pathol 2017;147:399,
Mod Pathol 2018;31:1367
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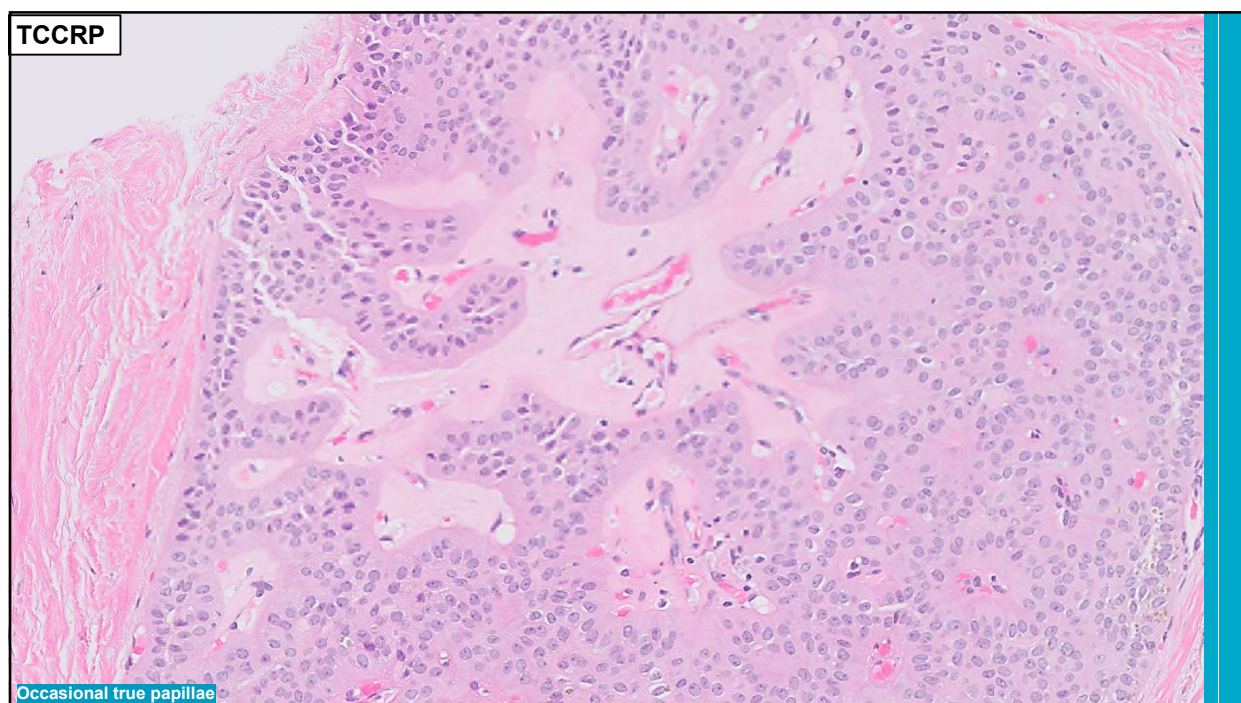
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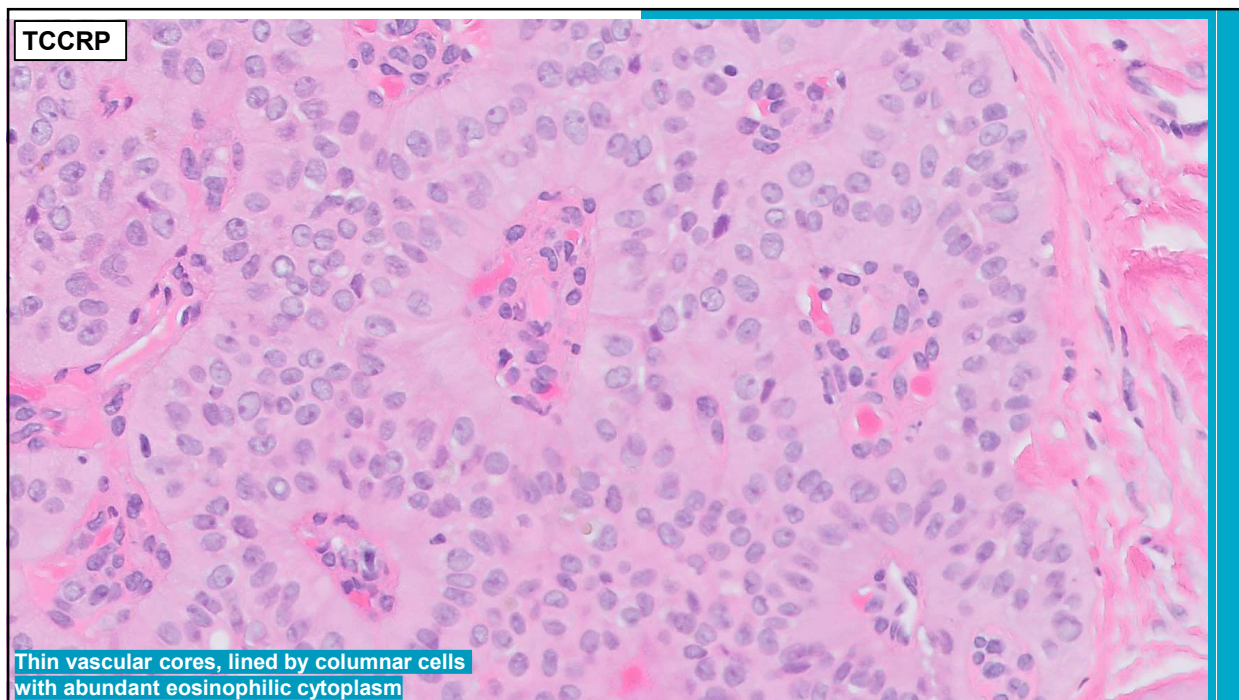
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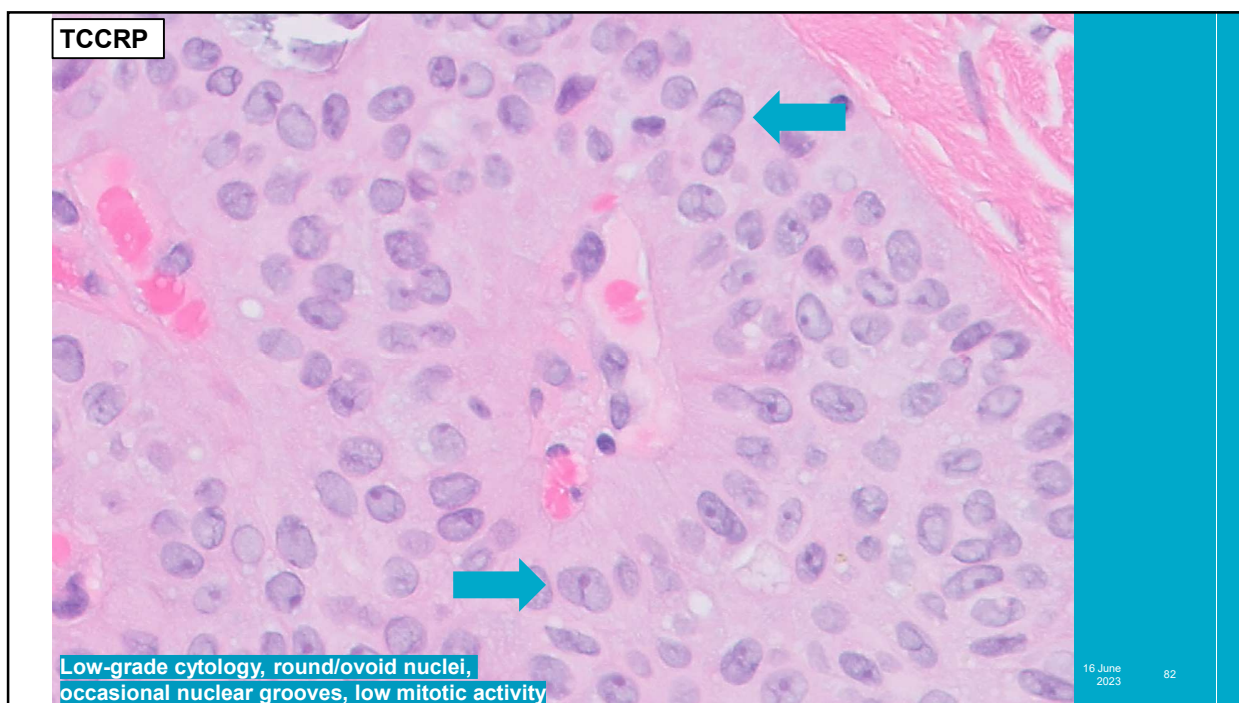
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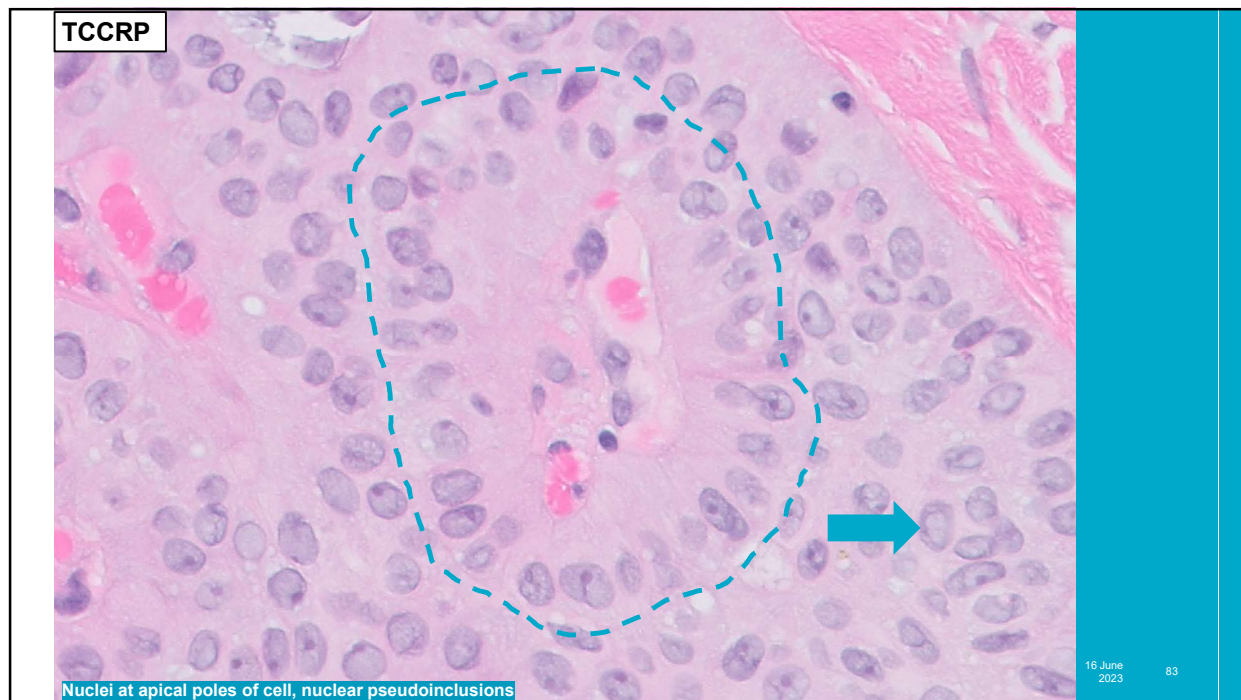
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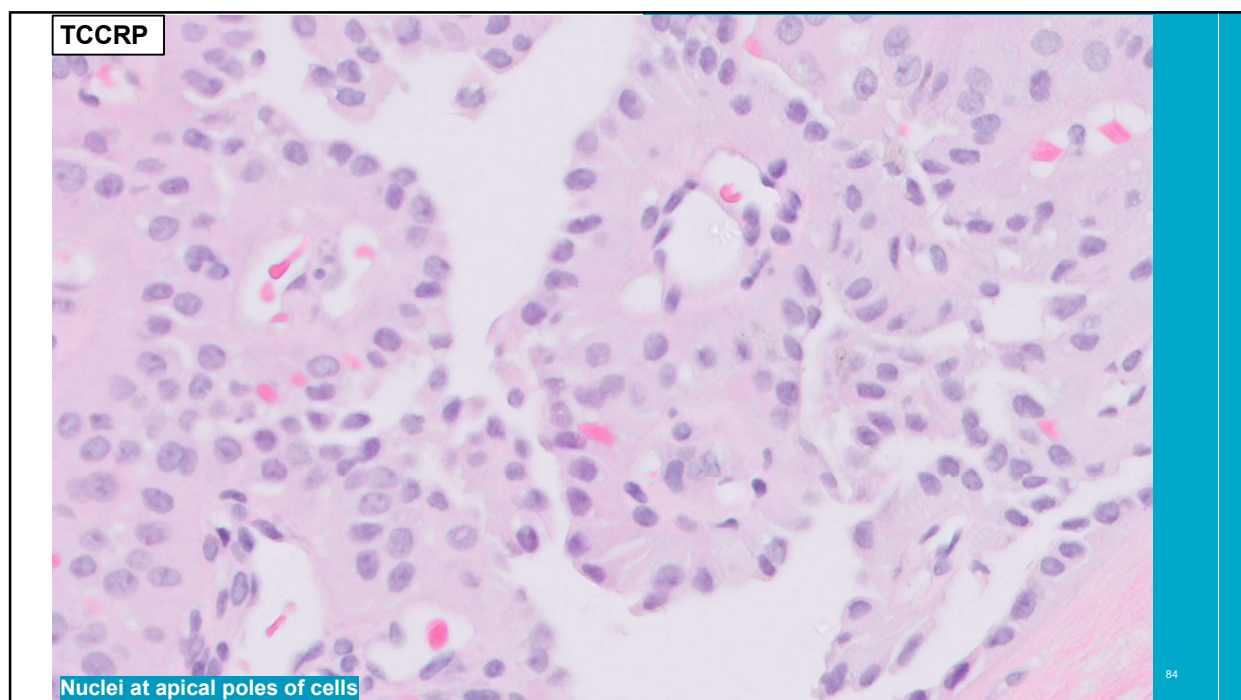
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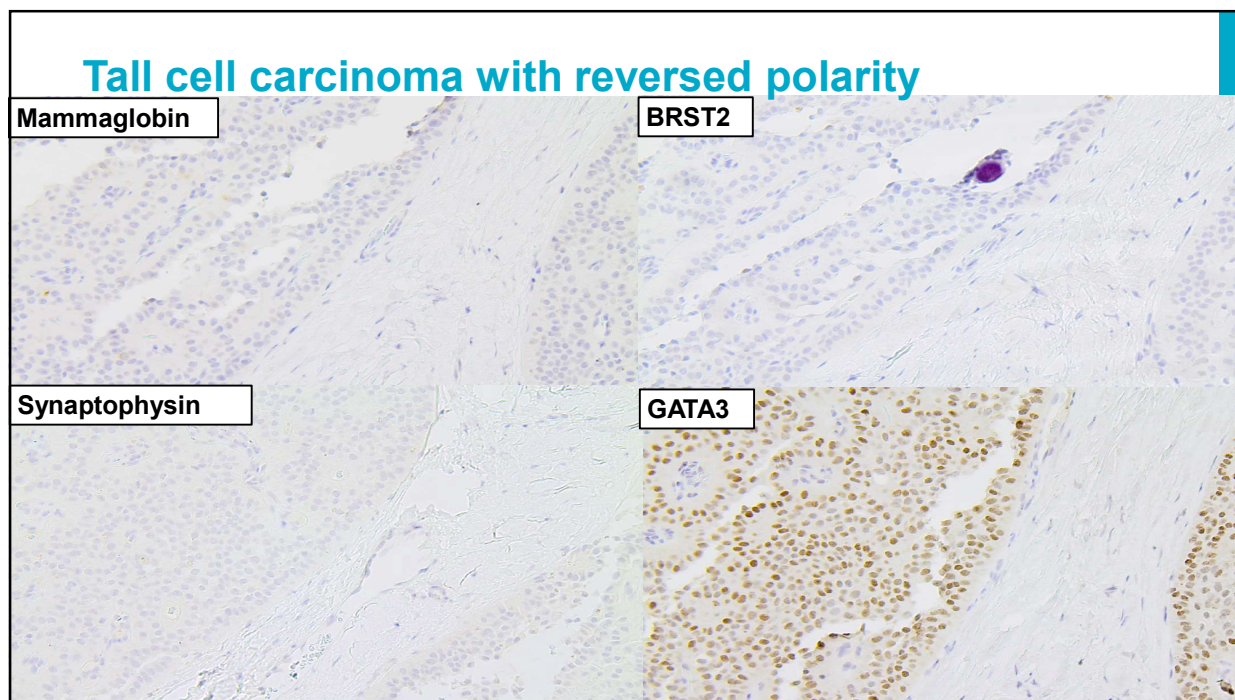
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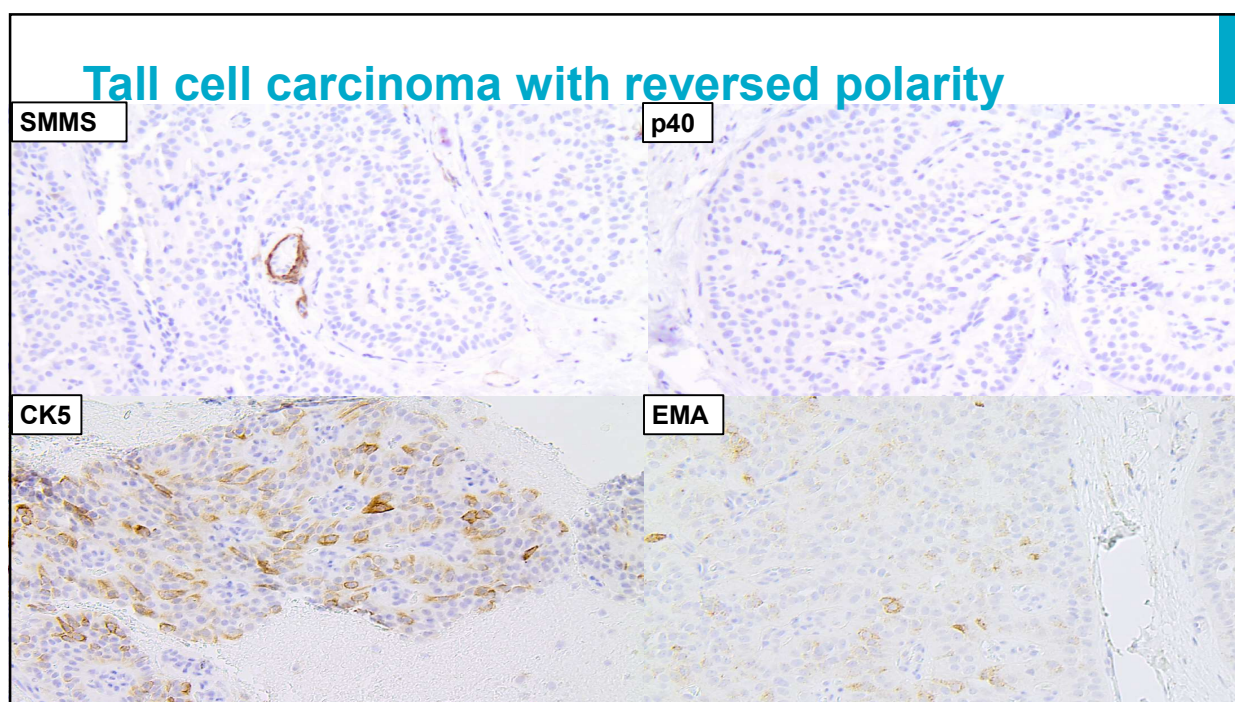
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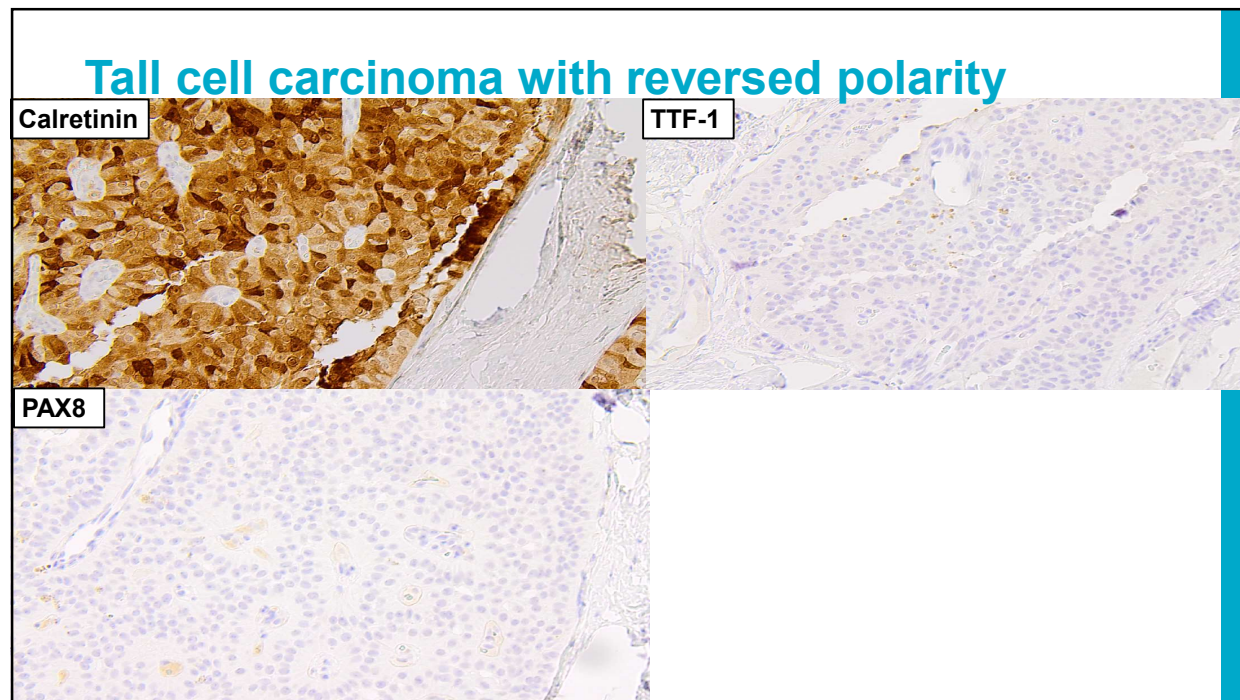
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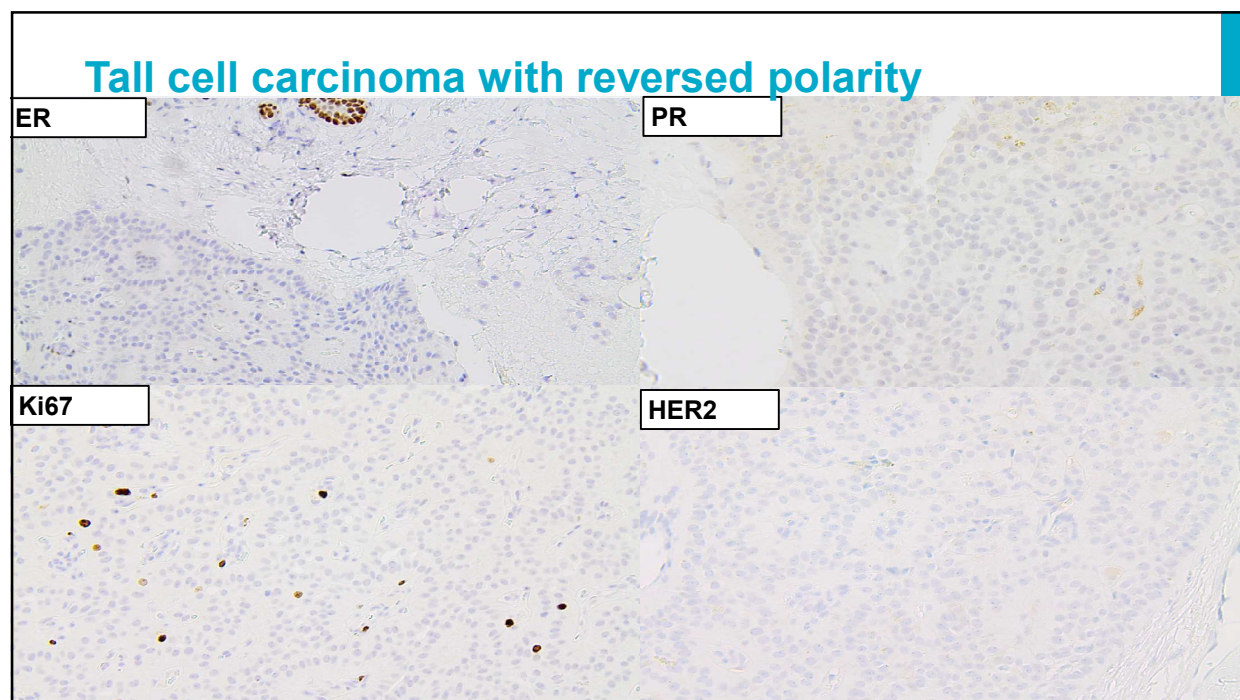
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Invasive papillary carcinoma

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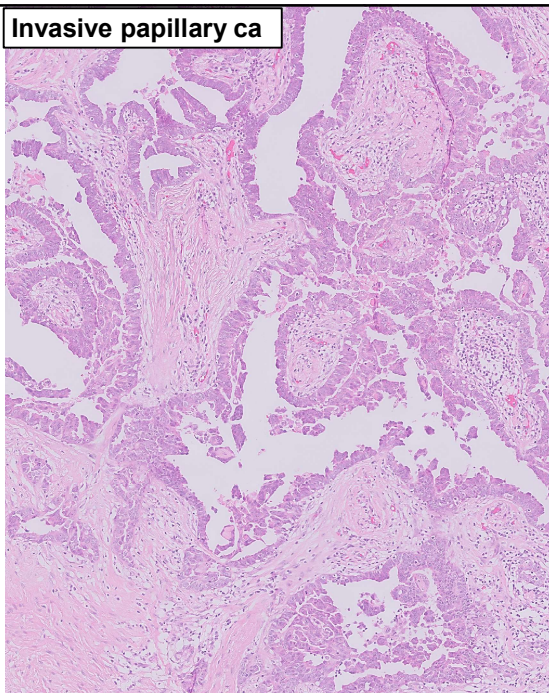
89

Invasive papillary carcinoma

- Extremely rare subtype of invasive breast cancer
- Tumor with frankly invasive growth pattern carcinoma with papillary architecture
- Must clinically exclude non-breast metastases to the breast (GYN, lung, etc)

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Invasive papillary ca



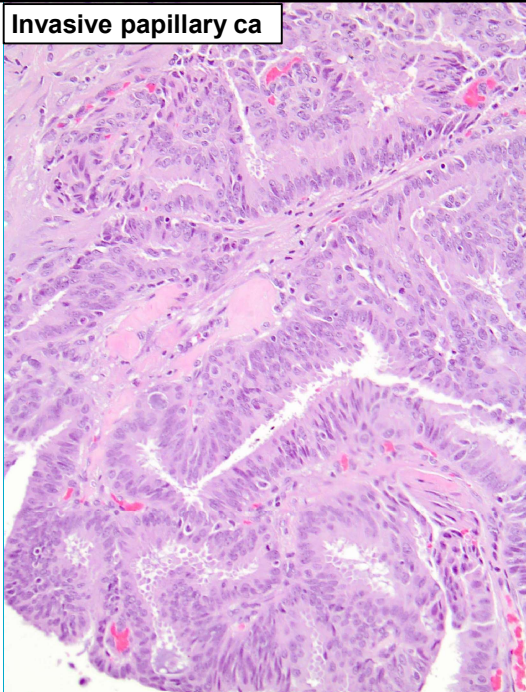
90

Invasive papillary carcinoma

- **Clinical Features**
 - Rare, no clinical data available
- **Pathogenesis**
 - Unknown
- **Prognosis and management**
 - Unknown, conflicting reports on prognosis but regarded as having poor prognosis
 - Generally staged and managed similar to invasive breast cancer (NST) as determined by stage, grade, biomarker status

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Invasive papillary ca



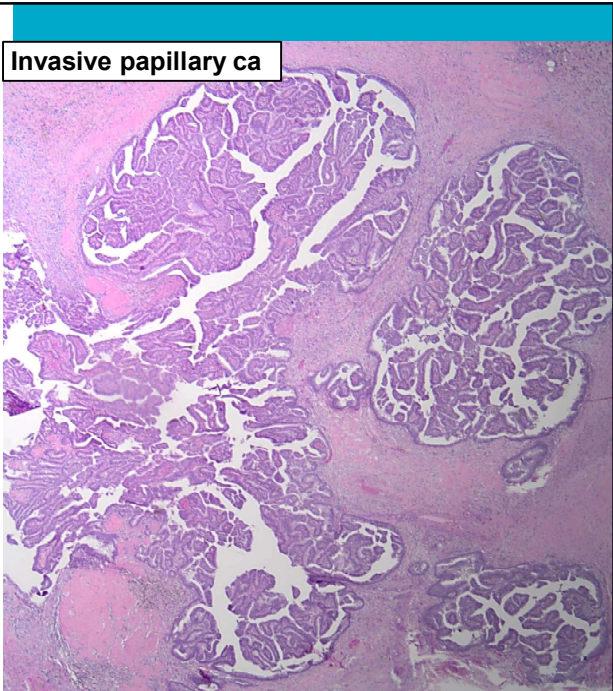
91

Invasive papillary carcinoma

- **Histology**
 - **Frankly infiltrative growth pattern**
 - Desmoplastic, inflamed stroma
 - Irregularly distributed clusters and microcysts containing tumor with papillary architecture
 - Disorderly collections of delicate papillary fronds with fibrovascular cores lined by stratified neoplastic epithelium
 - Epithelium predominates over stroma, often dishesion, forms a “shaggy” mass

© College of American Pathologists. Koerner, Frederick. *Diagnostic Problems in Breast Pathology*, Philadelphia, PA Saunders Elsevier, 2009

Invasive papillary ca



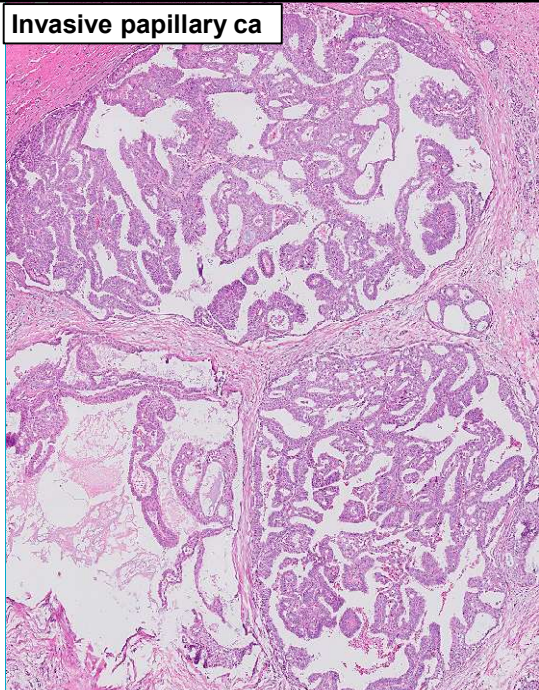
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Invasive papillary carcinoma

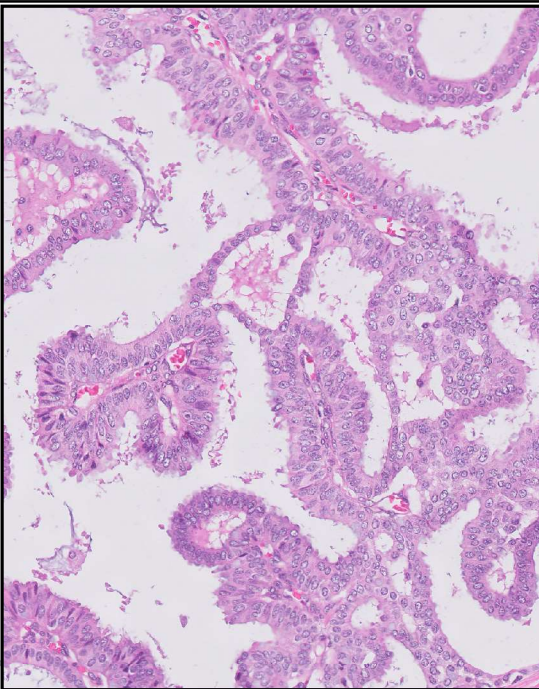
- **Histology continued**
 - Fronds vary greatly in length/shape, long and slender, do not fit together in a jigsaw pattern (unlike papilloma)
 - **Nuclear grade 2-3**
 - **Absence of myoepithelial cells throughout**
 - Lacks myoepithelial layer within papillae (unlike intraductal papilloma)
 - And at periphery (unlike papillary DCIS)
 - Lacks encapsulation with fibrotic cyst wall (in contrast to EPC)

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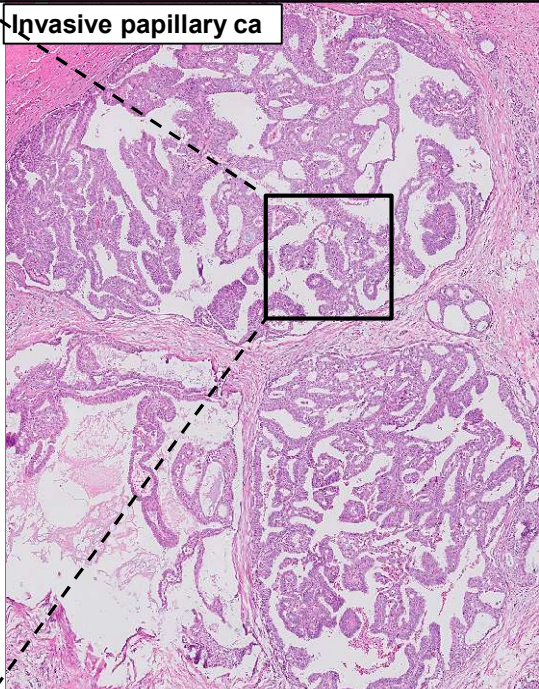
Invasive papillary ca



93

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Invasive papillary ca



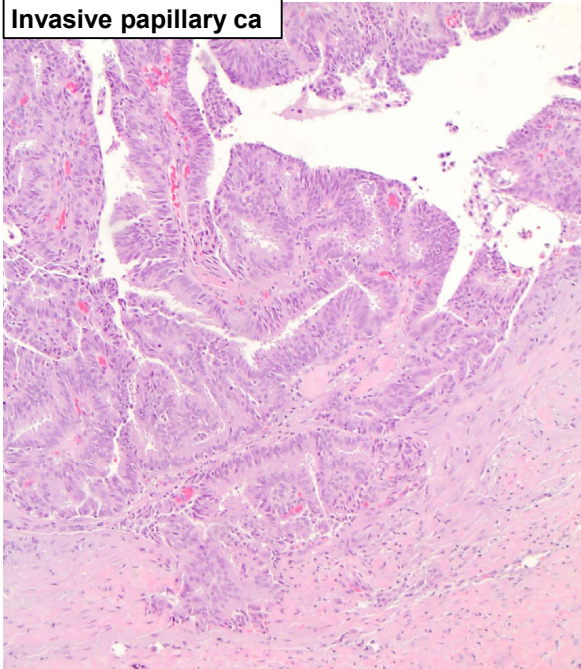
94

Invasive papillary carcinoma

- Immunohistochemistry
 - Positive:
 - GATA3 and/or SOX10
 - Negative:
 - Myoepithelial markers (SMMS, calponin, p63)
 - PAX8, WT-1, TTF-1, napsinA, thyroglobin
 - Biomarkers:
 - ER/PR positive
 - HER2 negative

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Invasive papillary ca



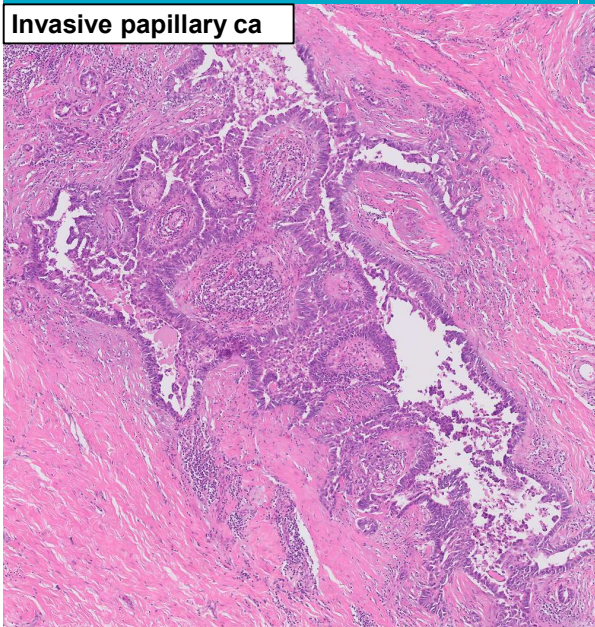
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Invasive papillary carcinoma

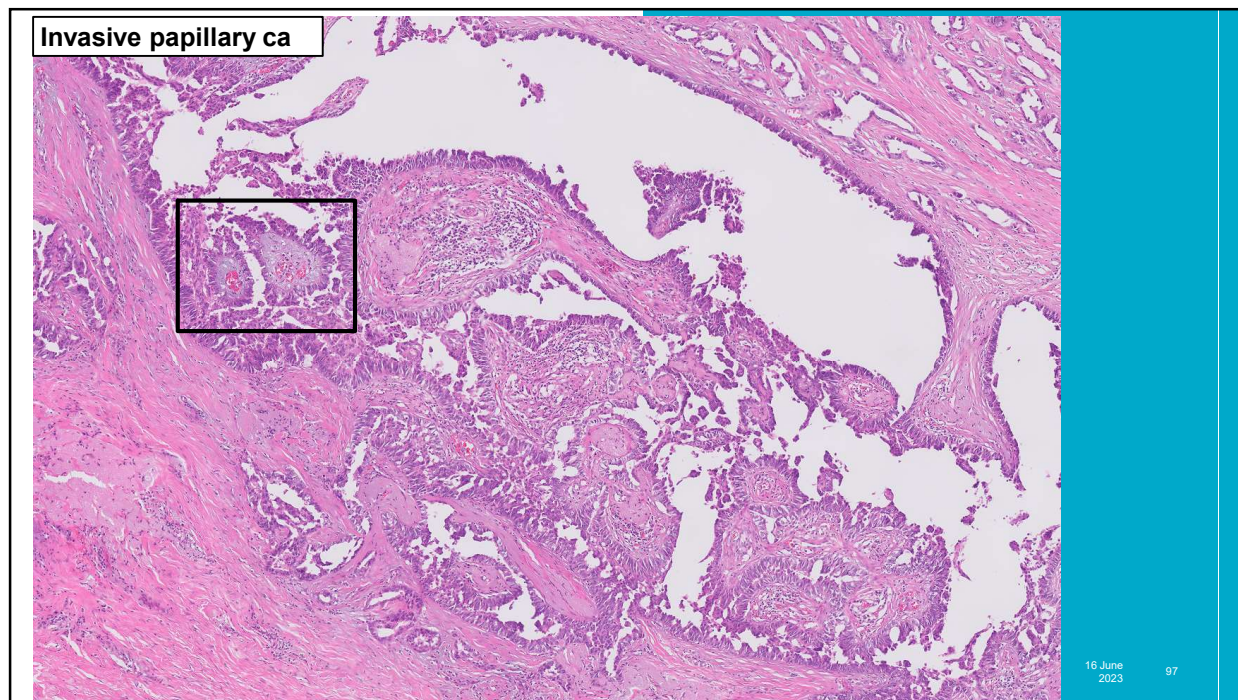
- 37-year-old female bilateral mastectomy for invasive papillary carcinoma

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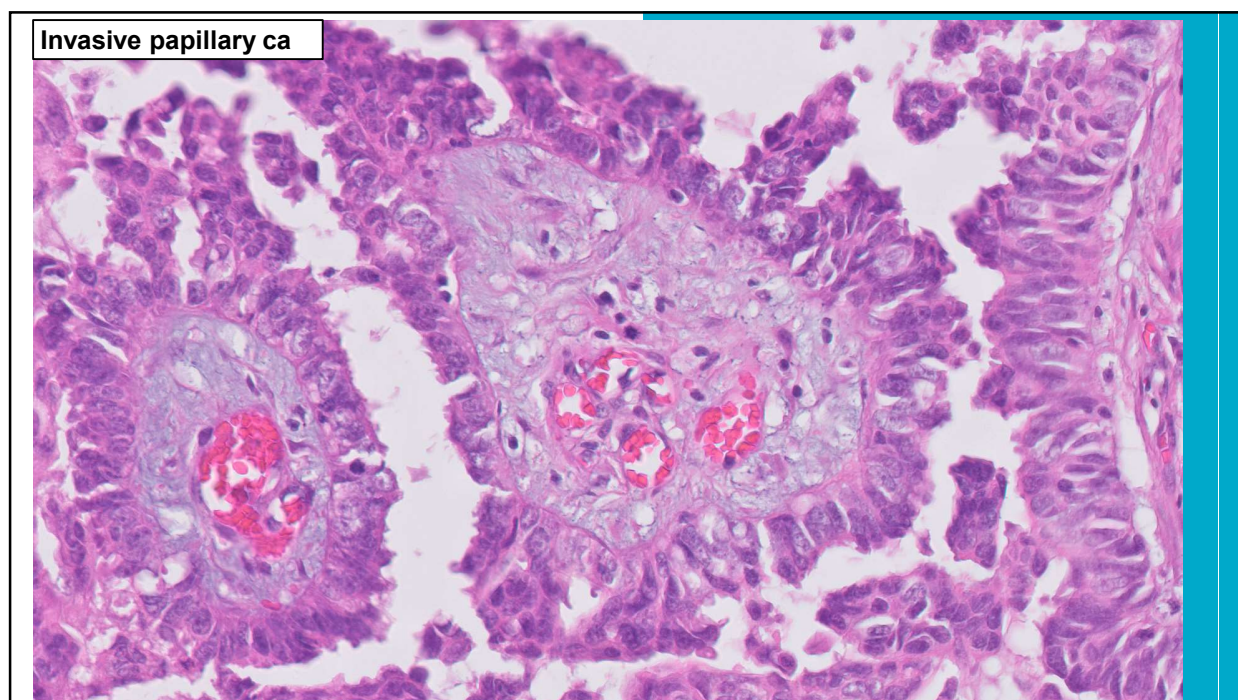
Invasive papillary ca



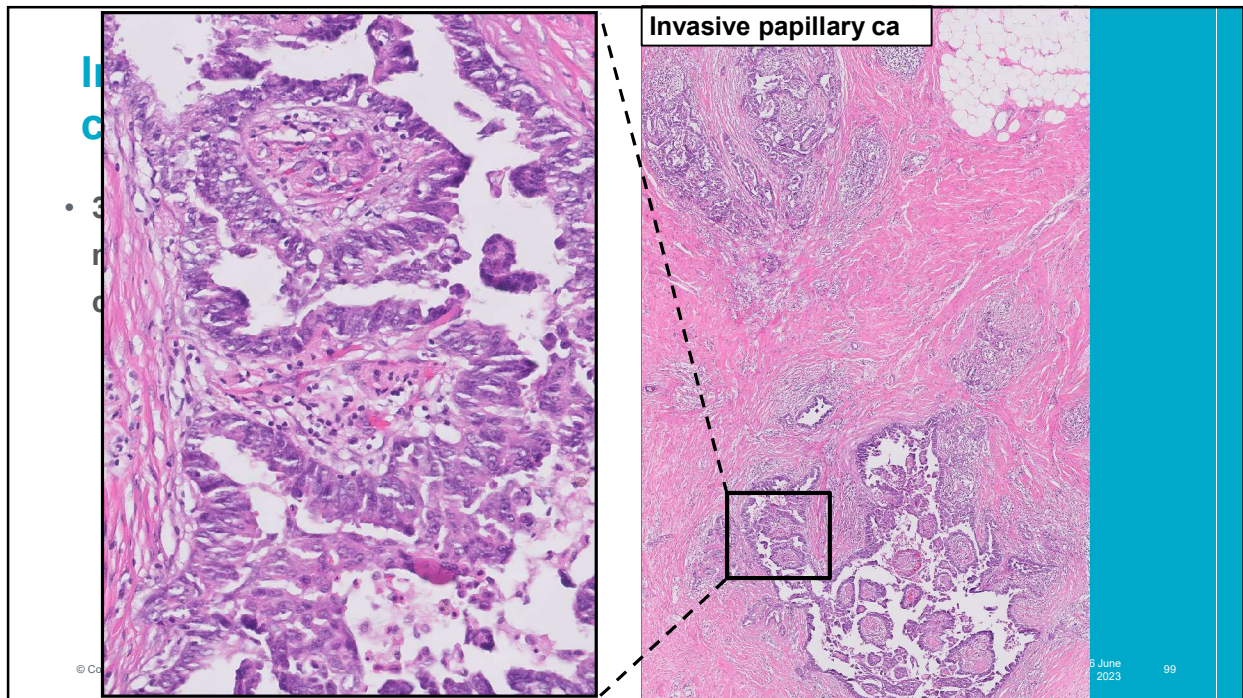
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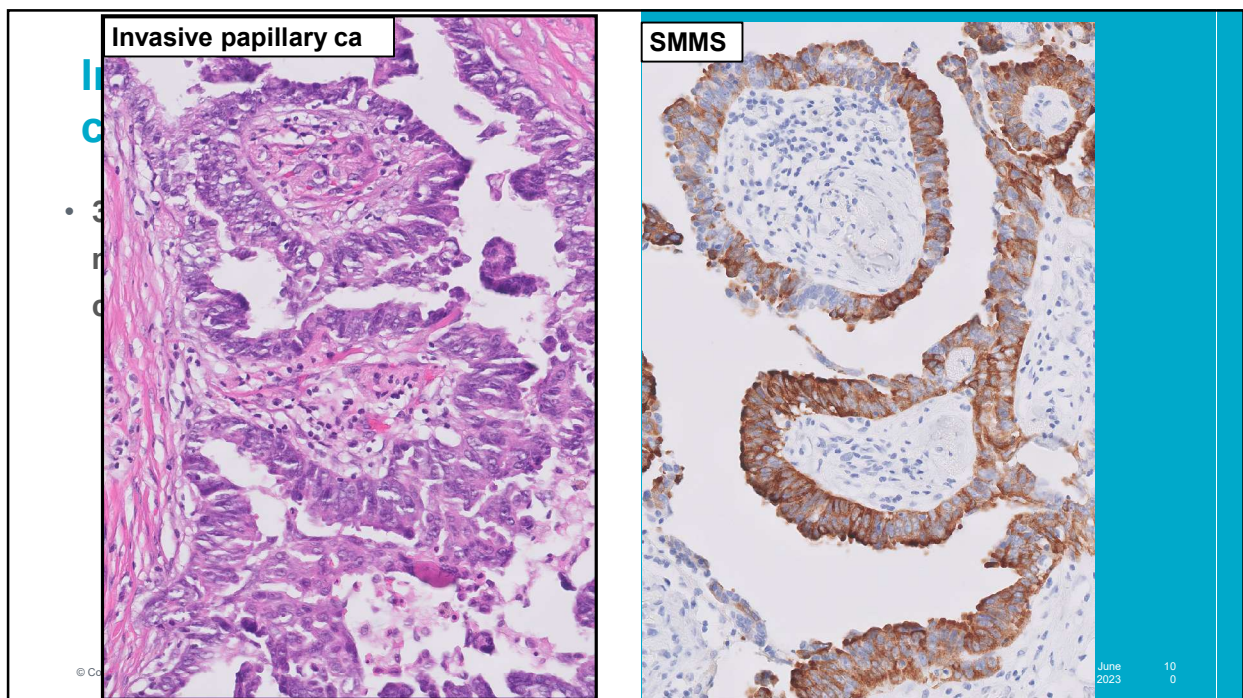
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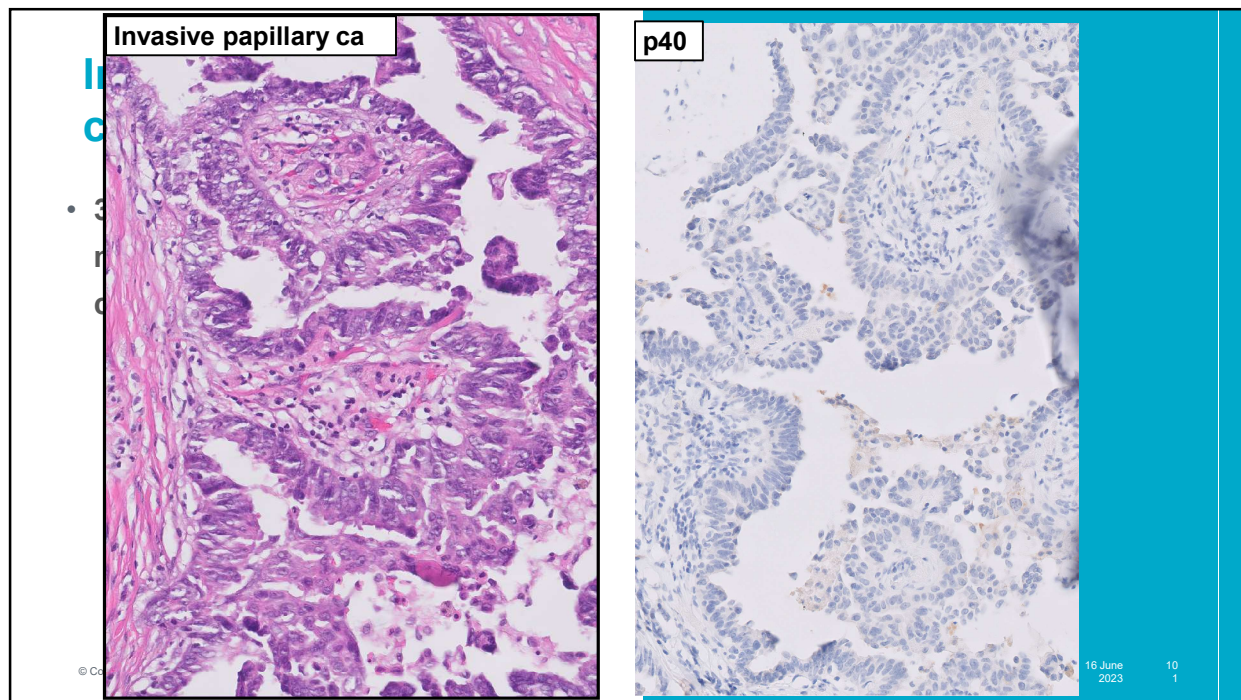
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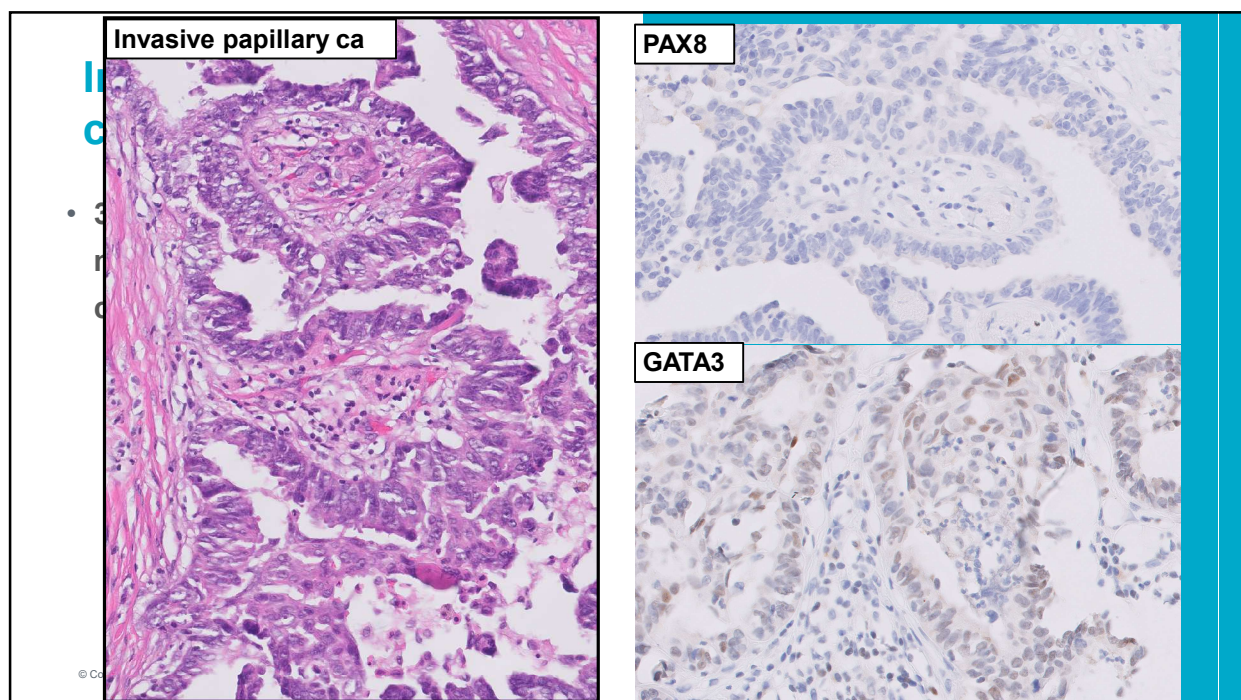
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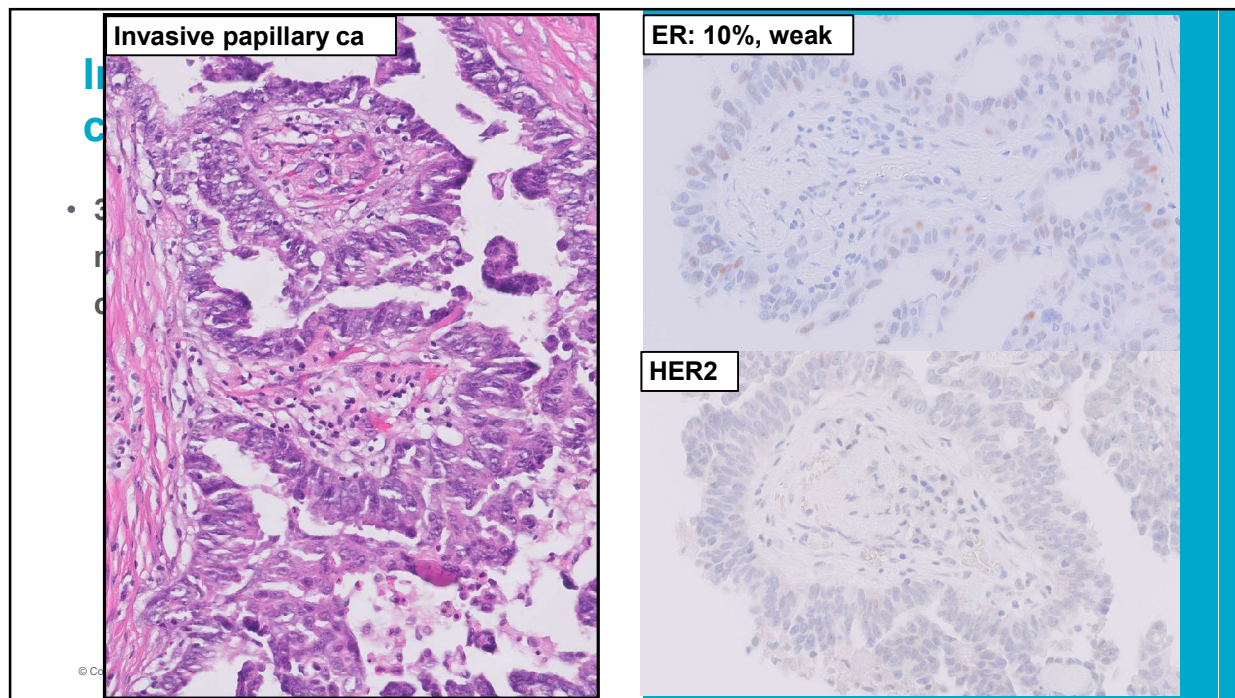
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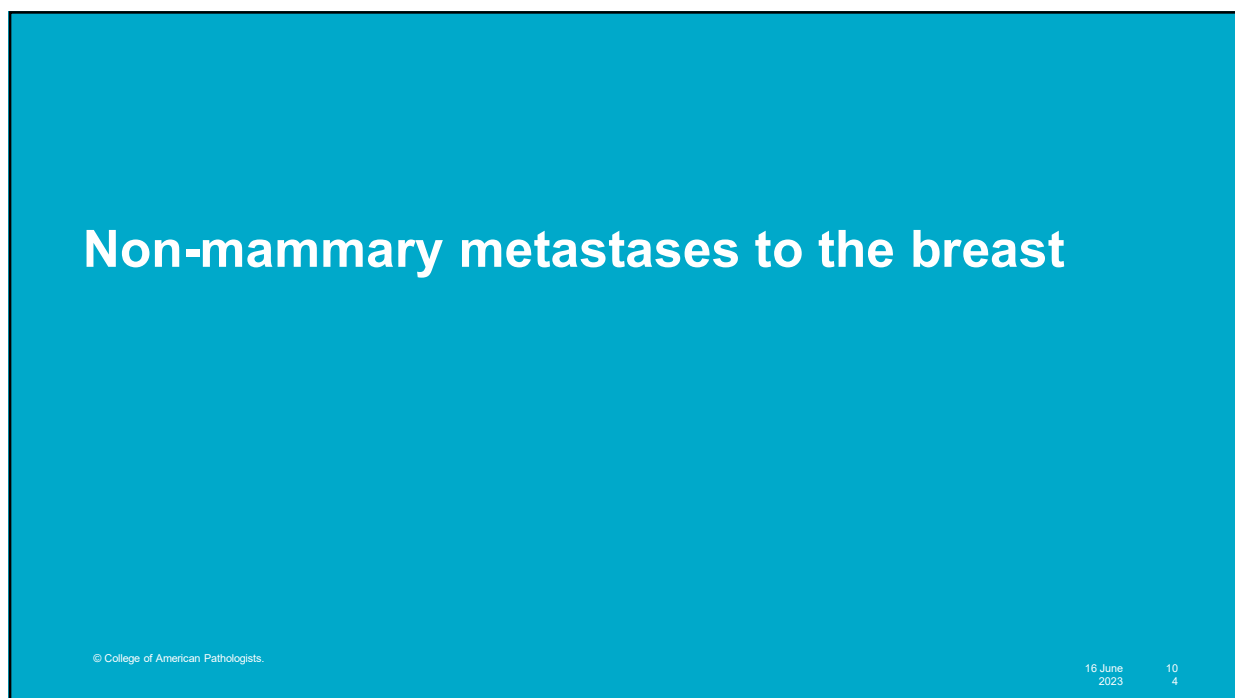
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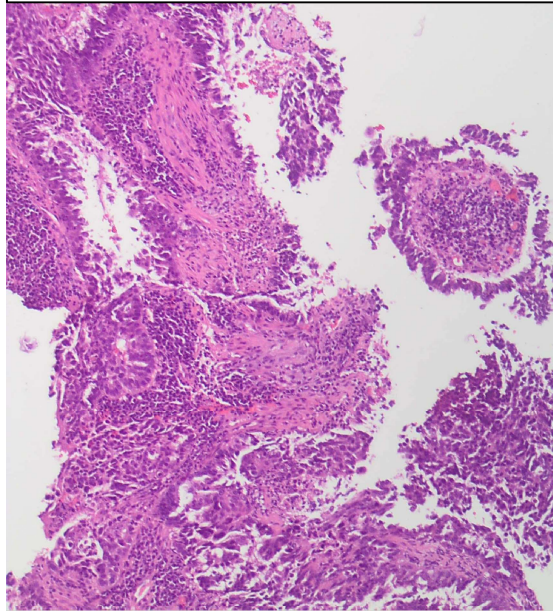
104

Non-mammary metastases to the breast

- Rare, <1% of breast malignancies
- Can be misdiagnosed due to non-specific and overlapping clinical, radiologic, morphologic and immunophenotypic features with primary breast cancer
- Clinical history is essential
- Accurate diagnosis of extramammary is essential to avoid inappropriate treatment

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Metastatic ovarian (serous) carcinoma to the breast



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Non-mammary metastases to the breast

• Clinical Features

- Rare, 5th decade, majority have a prior history of malignancy
- Often prior or coincident metastases to multiple other sites
- ~11% breast metastasis is the initial presentation of an occult extramammary malignancy
- Often long interval between primary and metastases in melanoma and ovarian cancer
- Frequently presents as a solitary, rapidly growing mass
- Axillary LN involvement in 25-48%, can present as an “inflammatory breast cancer”

• Pathogenesis

- Common primary sites:
 - Most common carcinomas: ovarian, lung, urothelial
 - Melanoma, lymphoma

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Non-mammary metastases to the breast

- **Prognosis and management**

- Poor prognosis; most patients present with advanced stage, widely disseminated disease
- Median survival of 8 - 10 months
- Individual prognosis is dependent on the specific clinical characteristics of the metastatic neoplasm
- Therapeutic approach is systematic treatment that is specific and appropriate to the primary lesion
- Surgical excision is not indicated for metastatic tumors to the breast, unless performed to palliate symptoms (e.g. bulky, ulcerated lesions)
- **Misdiagnosis can result in unnecessary surgery and inappropriate treatment**

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Non-mammary metastases to the breast

- **Histology**

- Histologic patterns and morphology that are unusual for a primary mammary tumor
- Absence of in-situ component
- Extensive LVI
- Metastatic tumors with certain morphologies (e.g. spindle cell, mucinous, squamous, clear cell, neuroendocrine, small cell) may show significant morphologic overlap with primary breast malignancies
- Calcifications are rare (except in ovarian serous)

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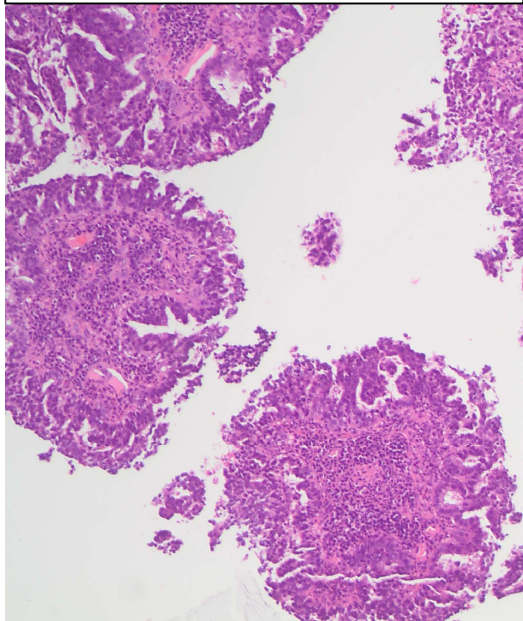
108

Non-mammary metastases to the breast

- **Histology continued**
 - **Metastatic ovarian carcinoma**
 - Common mimic of primary breast malignancy
 - Usually serous type, less commonly mucinous or clear cell types
 - Wide range of histologic appearances, including papillary, glandular and solid architecture

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Metastatic ovarian (serous) carcinoma to the breast



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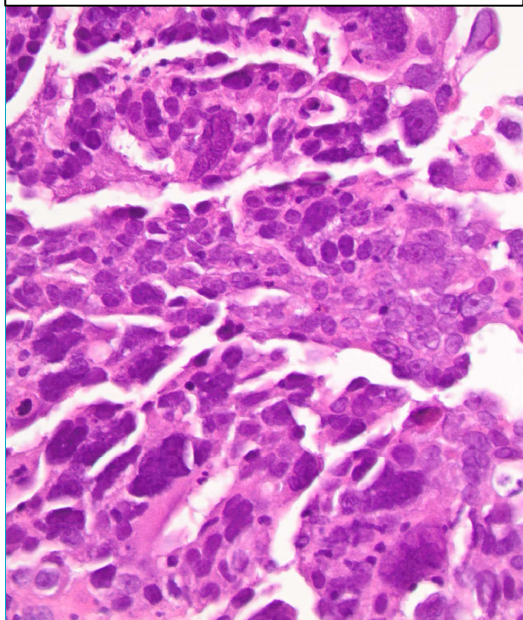
109

Non-mammary metastases to the breast

- **Histology continued**
 - **Metastatic ovarian carcinoma**
 - Necrosis and **high grade cytology**
 - **Papillary morphology**, psammomatous calcifications can suggest ovarian serous carcinoma
 - Morphologic overlap with breast primary

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Metastatic ovarian (serous) carcinoma to the breast



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Non-mammary metastases to the breast

• Factors that may influence correct diagnosis of metastatic ovarian ca

- Lack of clinical information (previous ovarian cancer history, imaging studies)
- Lack of available slides from previous ovarian cancer for comparison
- Lack of confirmatory IHC
- Overlapping risk factors between breast and ovarian cancer:
 - Ovarian cancer in pts with history of breast cancer is not uncommon in patients with BRCA mutations

Study	Breast cancer risk (%) by age 70 (95% CI)		Ovarian cancer risk (%) by age 70 (95% CI)	
	BRCA1	BRCA2	BRCA1	BRCA2
Antoniou et al.	65% (44–78)	45% (31–56)	39% (18–54)	11% (2.4–19)
Chen et al.	55% (50–59)	47% (42–51)	39% (34–45)	17% (13–21)

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Source: J Clin Oncol 25 (11): 1329-33, 2007
J Med Genet 42 (7): 602-3, 2005

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Non-mammary metastases to the breast

• Beware of the IHC overlap between primary breast and metastatic ovarian ca

IHC	Invasive breast carcinoma (NST)	Ovarian serous carcinoma
CK7	91%	97%
CK20	2%	9%
ER	80%	71%
PR	60-70%	20-40%
HER2	15%	26%
GCDFP-15	50%	6%
Mammaglobin	51%	0%
GATA-3	72-94%	6%
TRPS1	90-95%	10-15%
CA-125	14% (mucinous/micropapillary)	80%
WT-1	3% (mucinous/micropapillary)	86%
PAX-8	0%	97%

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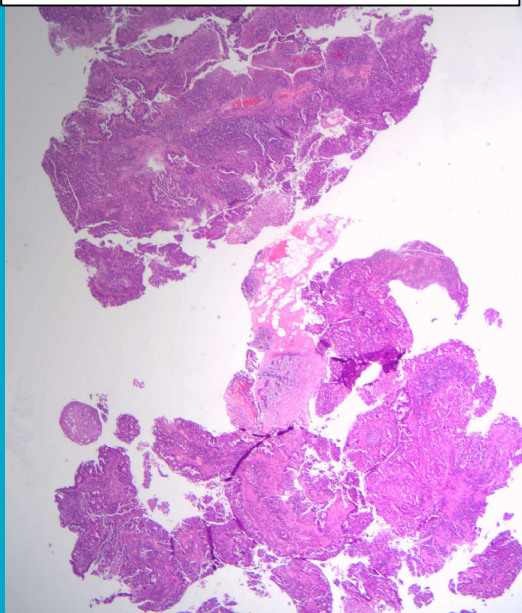
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Non-mammary metastases to the breast

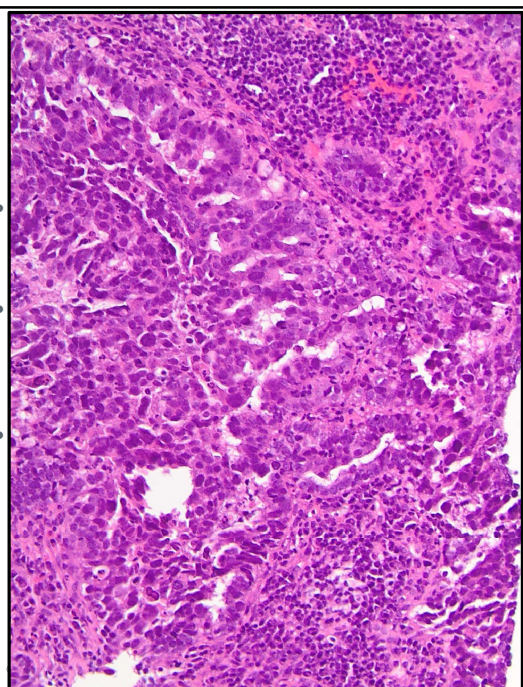
- 65 year old female, family history of breast and ovarian cancer
- Self palpated a breast mass
 - US: 2.5 cm solitary breast mass, enlarged axillary LN
- 2nd opinion review of outside breast core needle biopsy with provided diagnosis of G3, invasive breast cancer (NST), ER/PR:+ HER2: 1+

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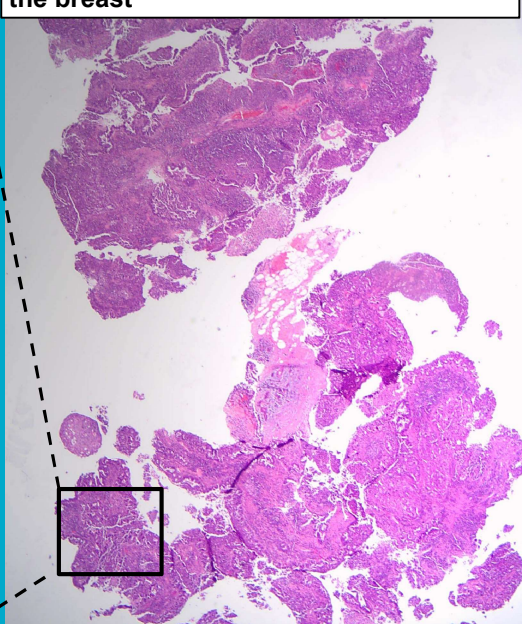
Metastatic ovarian (serous) carcinoma to the breast



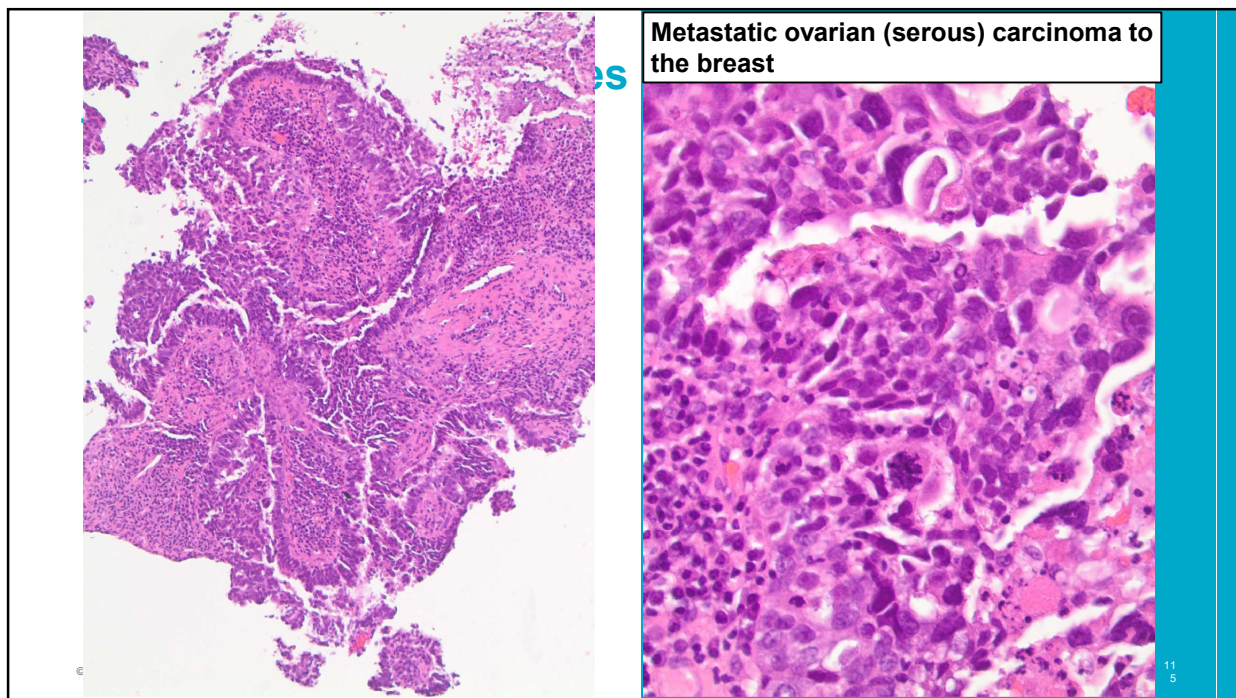
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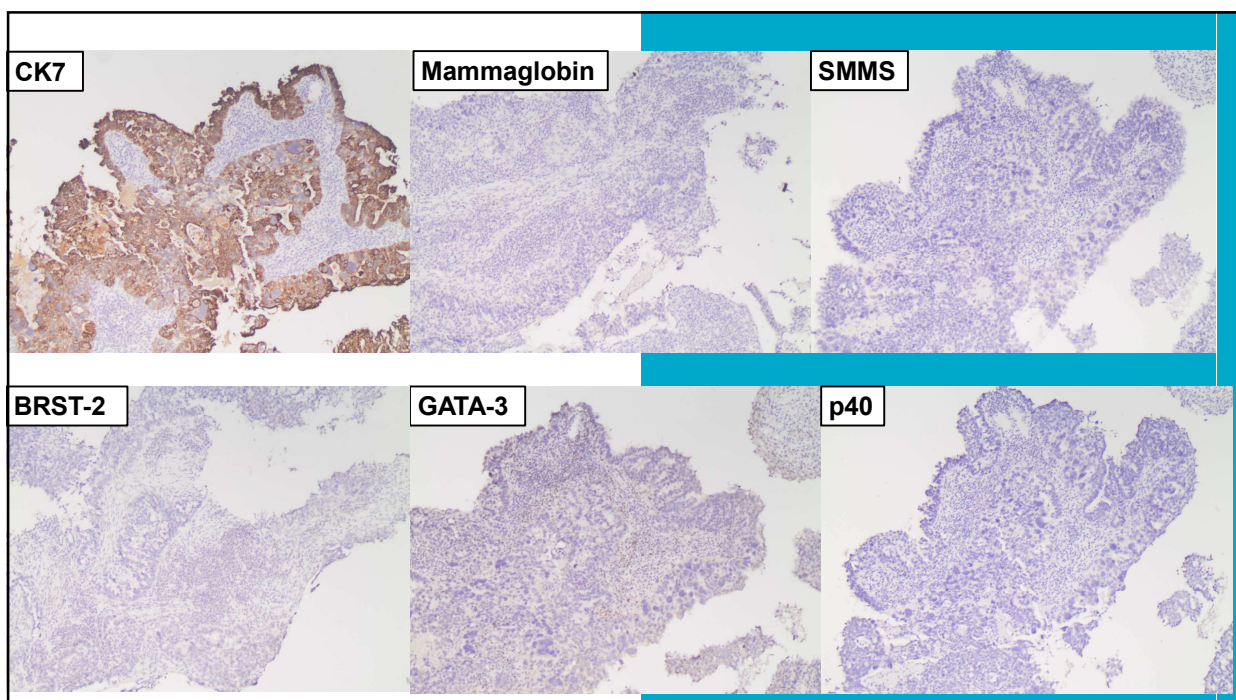
Metastatic ovarian (serous) carcinoma to the breast



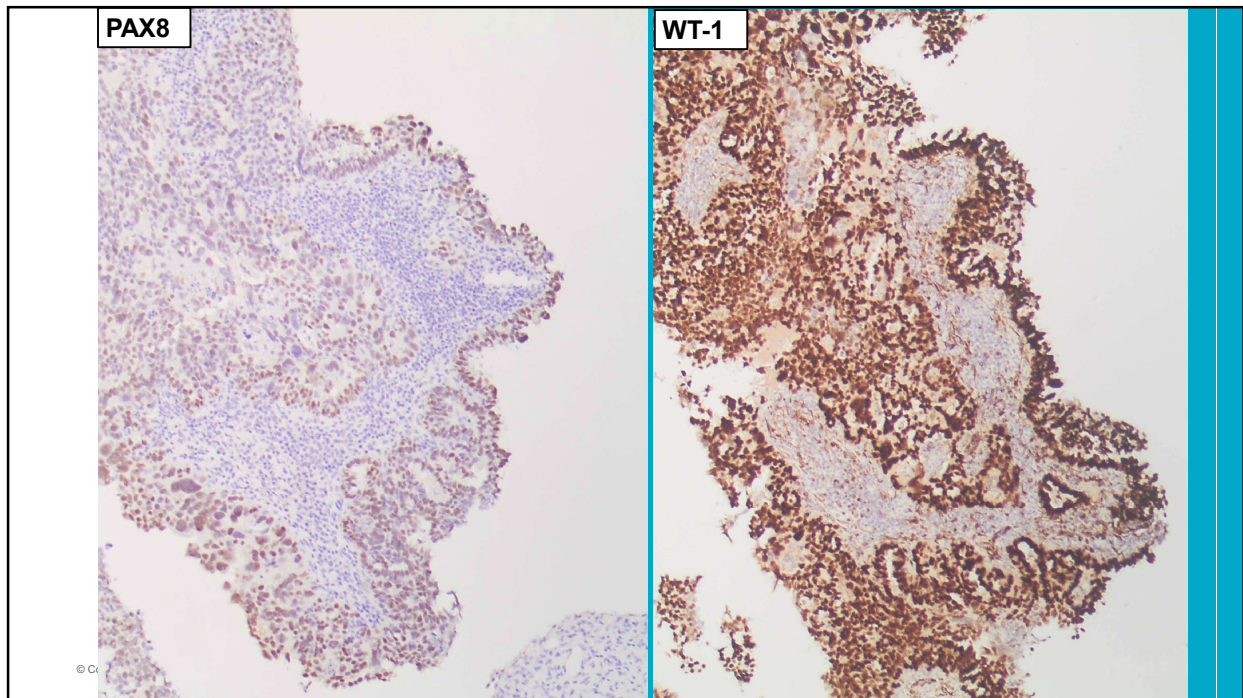
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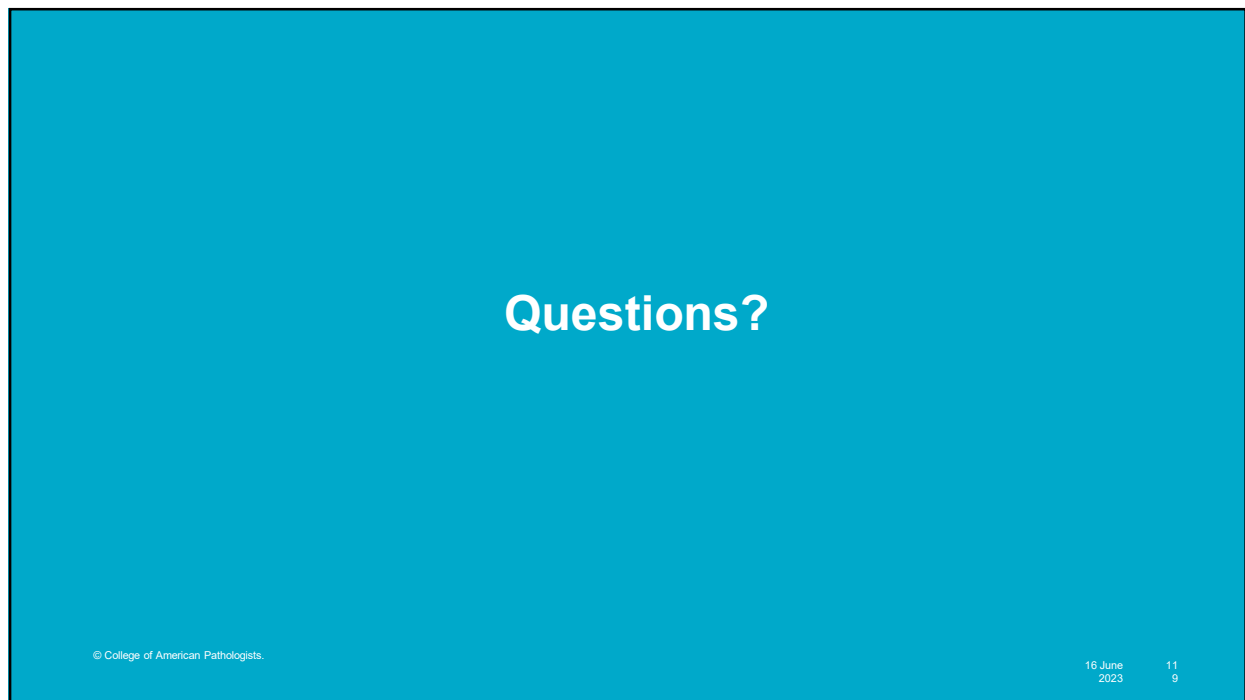
Closing Comments & Summary

- Papillary lesions of the breast encompass a broad spectrum of entities, from benign to malignant neoplasms, that can display overlapping morphologic features
- Careful histomorphologic examination and employment of IHC is needed to accurately classify papillary neoplasms of the breast
- Accurate diagnosis of papillary neoplasms is important for accurate staging, prognostication, and clinical management of patients

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