

# Papillary Lesions of the Breast

|                               | Intraductal Papilloma                              | Papilloma <i>with</i> DCIS                                             | Papillary DCIS                                                                        | Encapsulated Papillary Carcinoma                                                                                                                                       | Solid Papillary Carcinoma                                                                                                           | Invasive Papillary Carcinoma                                                    |
|-------------------------------|----------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Papillary Architecture</b> | Broad, blunt fronds                                | Broad, blunt fronds                                                    | Slender fronds, sometimes branching                                                   | Numerous slender fronds; sometimes branching, typically well-developed and peripheral. Fibrous capsule                                                                 | Solid with inconspicuous fibrous septae                                                                                             | Infiltrative carcinoma with papillary morphology, including fibrovascular cores |
| <b>Epithelial Cells</b>       | Heterogeneous non-neoplastic cells. Sometimes UDH. | <u>Focal</u> areas with cytologic features of DCIS (usually low-grade) | <u>Entirely</u> occupied by a cell population with features of DCIS (often low-grade) | Entirely occupied by a cell population with features of DCIS (often low-grade); Cribriform, micropapillary, and solid patterns may be present, with fusion of papillae | Entire lesion occupied by a population of cells with low to intermediate-grade nuclei; Often spindled or neuroendocrine morphology. | Low, intermediate, or, rarely, high-grade nuclei                                |
| <b>Myoeps in Papillae</b>     | Positive                                           | Positive in papilloma, but may be scant in DCIS component              | Negative                                                                              | Negative                                                                                                                                                               | Negative or positive                                                                                                                | Negative                                                                        |
| <b>Myoeps at Periphery</b>    | Positive                                           | Positive                                                               | Positive                                                                              | Negative (usually)                                                                                                                                                     | Negative or positive                                                                                                                | Negative                                                                        |
| <b>CK5/6</b>                  | Positive in myoeps and UDH                         | Positive in myoeps and UDH; Negative in DCIS                           | Positive in peripheral myoeps; Negative in lesion                                     | Negative                                                                                                                                                               | Negative                                                                                                                            | Negative                                                                        |
| <b>ER &amp; PR</b>            | Positive, but Heterogeneous                        | Strong, diffuse in DCIS                                                | Strong, diffuse                                                                       | Strong, diffuse                                                                                                                                                        | Strong, diffuse                                                                                                                     | Positive                                                                        |
| <b>Other stains</b>           | None                                               | None                                                                   | None                                                                                  | None                                                                                                                                                                   | Frequent synaptophysin and chromogranin expression                                                                                  | None                                                                            |
| <b>Staging</b>                | N/A                                                | pTis (DCIS)                                                            | pTis (DCIS)                                                                           | pTis (DCIS) <i>[or size of any invasion]</i>                                                                                                                           | pTis (DCIS) <i>[or size of any invasion]</i>                                                                                        | Per size of invasion                                                            |

## General

Papillary lesions have predominantly arborizing architecture, with **fibrovascular core** covered by epithelium with or without a myoepithelial cell layer, depending on the type of papillary neoplasm. Most papillary neoplasms are confined within ducts, which tend to be distended and cystic, with a thick fibrous wall. It is the nature of the epithelium determines whether a papillary neoplasm is benign, atypical, or malignant.

Correct categorization of a papillary lesion in a core biopsy can be difficult because of fragmentation and the inability to evaluate the entirety of a larger lesion. It's acceptable (and even prudent!) to say something like, "atypical papillary lesion" or "at least papillary carcinoma in situ", with a differential diagnosis and defer to an excision for more complete characterization of the process.

Lastly, beware, excision specimens that have undergone prior core needle biopsy often have displaced epithelium within the biopsy site—do not over-interpret this as invasion!

## Intraductal Papilloma

**Benign** intraductal proliferation composed of papillary projections with fibrovascular cores, covered by epithelial **and** myoepithelial layers.

Can be central (Solitary) or peripheral (Multiple)

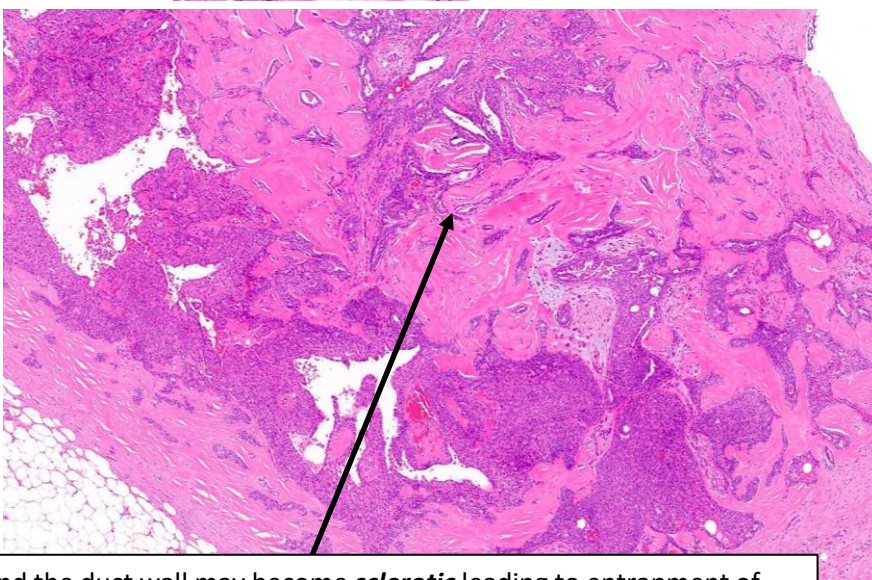
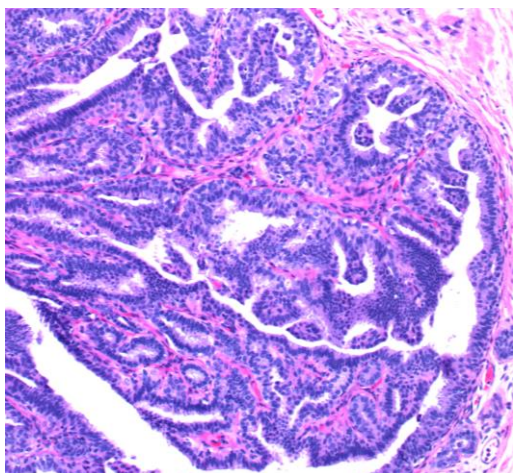
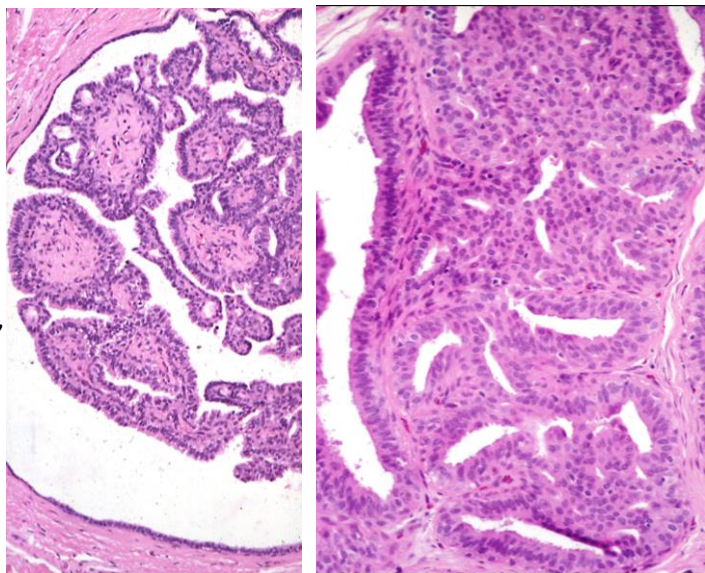
Central present with serosanguinous discharge.

**May have superimposed UDH**, apocrine metaplasia, sclerosing adenosis, duct ectasia, etc..

Should have **No atypia**. [Virtual Slide 2 3](#)

Molecular: Monoclonal with frequent PIK3CA mutations.

Management: **No** need for excision



**Pitfall Alert:** The fibrovascular cores and the duct wall may become **sclerotic** leading to entrapment of epithelium *mimicking* invasion. Luckily, the myoepithelial stains can be identified by IHC, confirming the absence of invasion.



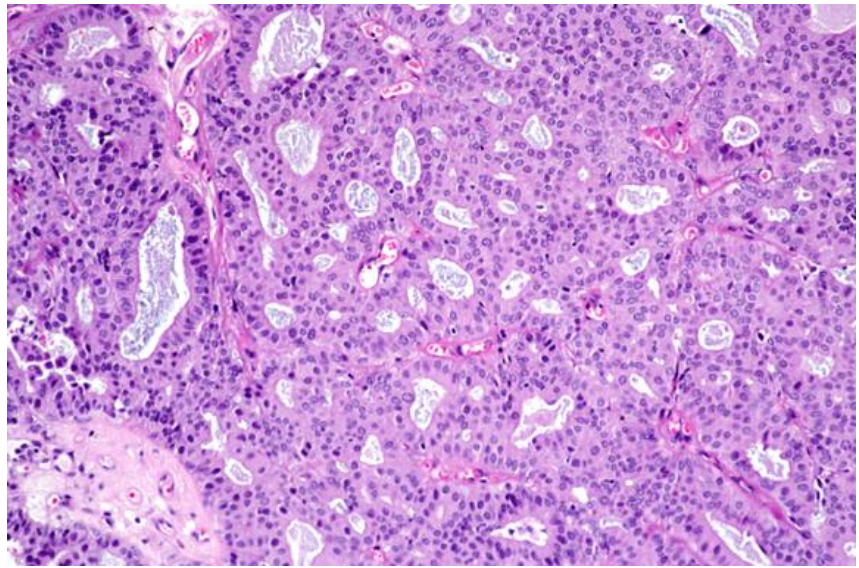
## Papilloma with DCIS

**Foci** of DCIS (or ADH) superimposed on an intraductal papilloma.

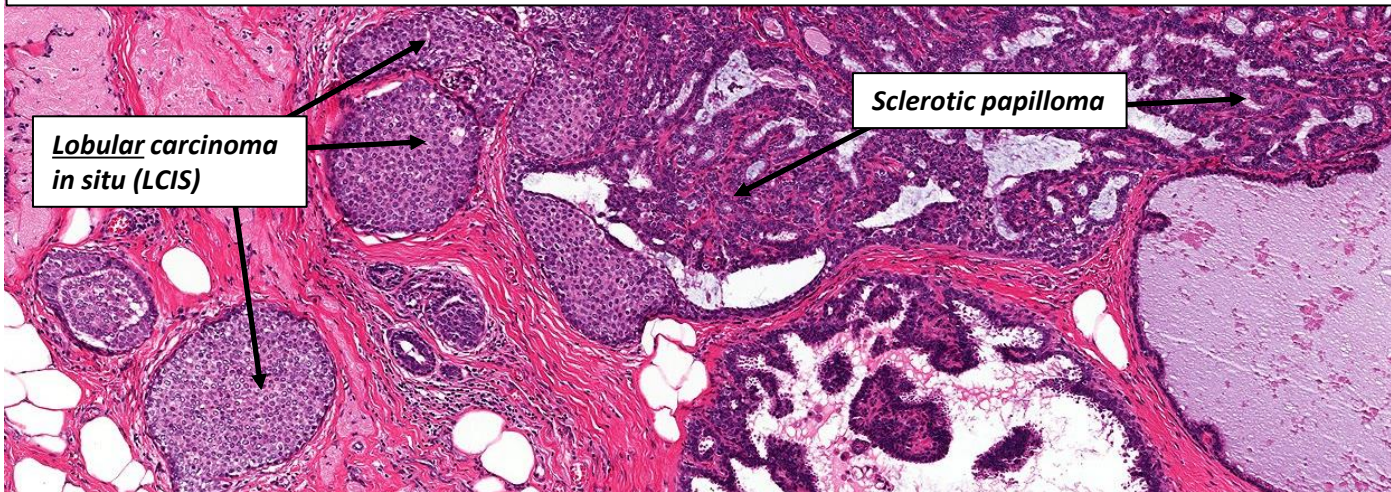
**Focal monotonous cells** with cytologic and architectural features of low-grade ductal neoplasia.

For low-grade lesions, use same size criteria cut-off for ADH (<3mm) vs DCIS (≥3mm).

For intermediate and high-grade lesions, there is no size criteria.



**Pitfall Alert:** If it's a solid proliferation involving a papilloma, consider lobular neoplasia (which can be supported with abnormal E-cadherin and other IHC). LCIS and ALH are famous for secondarily involving other processes



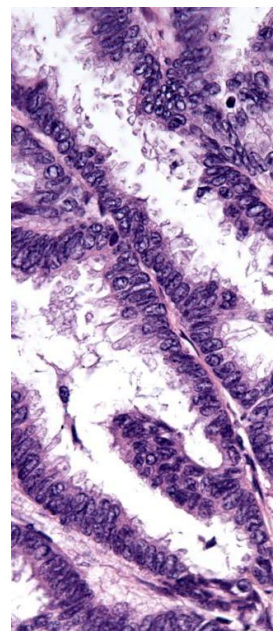
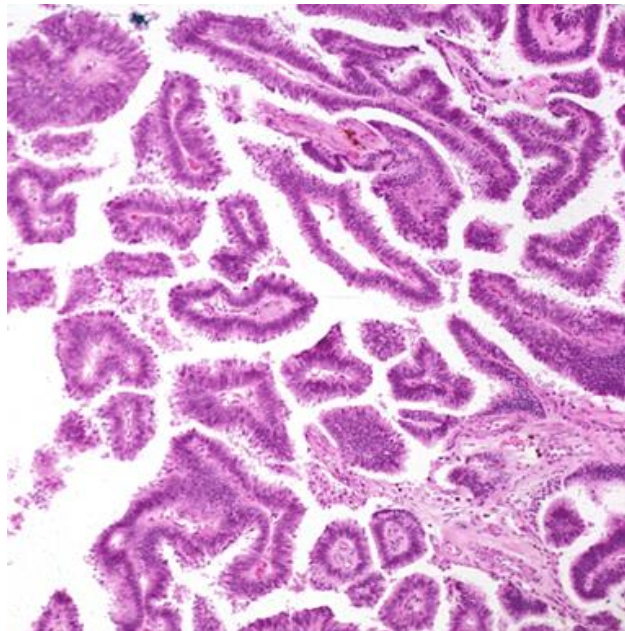
## Papillary DCIS

DCIS lining filiform, arborizing fibrovascular cores devoid of myoepithelial cells, but contained in a duct with preserved surrounding myoepithelial cells.

May be deceptively bland with stratified spindled cells, compact columnar cells, or clear cells.

Often accompanied by other patterns of DCIS.

Grade based on nuclei.





# Encapsulated Papillary Carcinoma

Carcinoma with fine fibrovascular stalks covered by neoplastic epithelial cells of low to intermediate nuclear grade, typically present within a cystic space, and surrounded by a fibrous capsule.

Usually, **No myoepithelial cells** are present in the papillae or at the periphery.

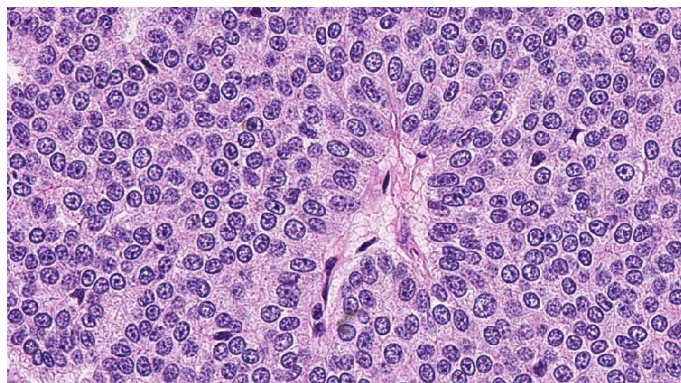
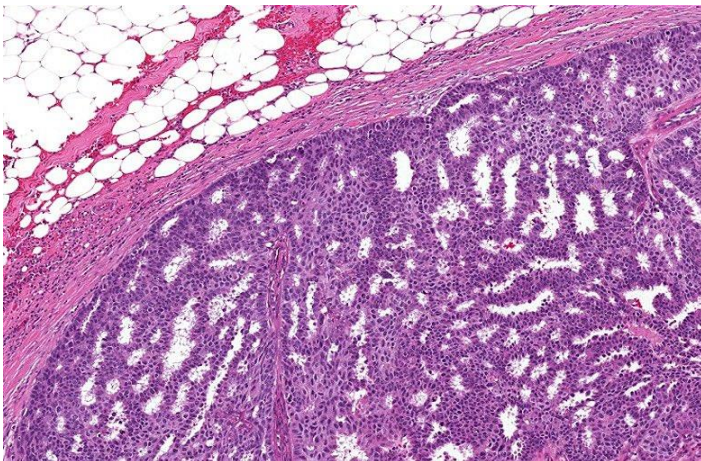
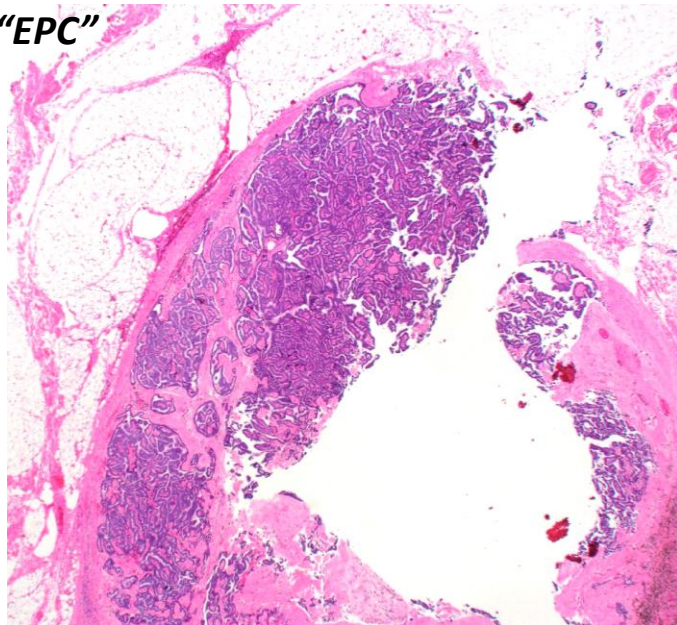
**Circumscribed, round masses.** Typically old women.

**Pushing border** with fibrous capsule.

Must sample very thoroughly or completely to exclude invasion.

**Very favorable prognosis** → Stage as **pTIS**

**"EPC"**



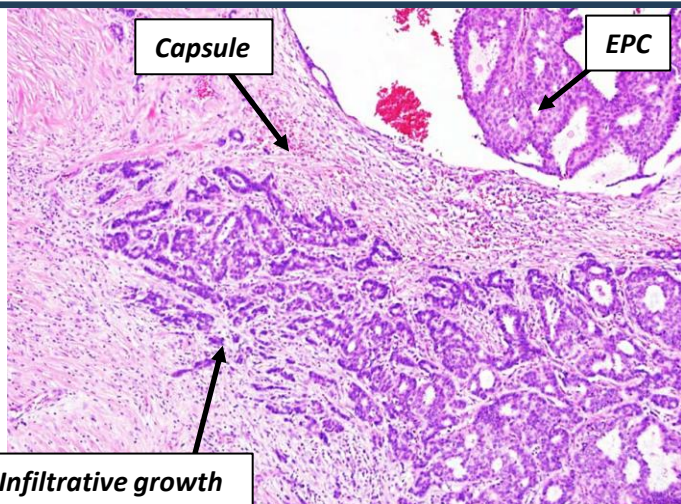
## **EPC with invasion:**

Neoplastic cells with **infiltrative growth beyond the fibrous capsule**.

Most frequently "No special type."

Must exclude "epithelial misplacement" from the biopsy (look for biopsy site changes, like hemosiderin-laden macrophages, fat necrosis, etc...)

Stage and grade based on invasive component.



***What if an EPC has high nuclear grade, increased mitotic activity, triple negativity, or ERBB2 (HER2) overexpression?***

The current recommendations is to still diagnose as pTis, but with a comment as to the unusual features (previously, they recommended staging as invasive, but this has changed)



## Solid Papillary Carcinoma in situ

**Solid, expansile, nodular growth** with delicate fibrovascular cores.

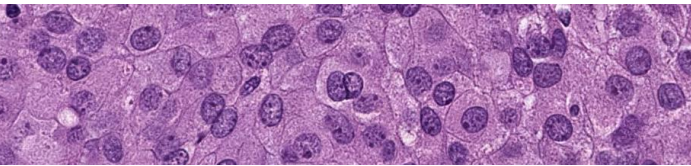
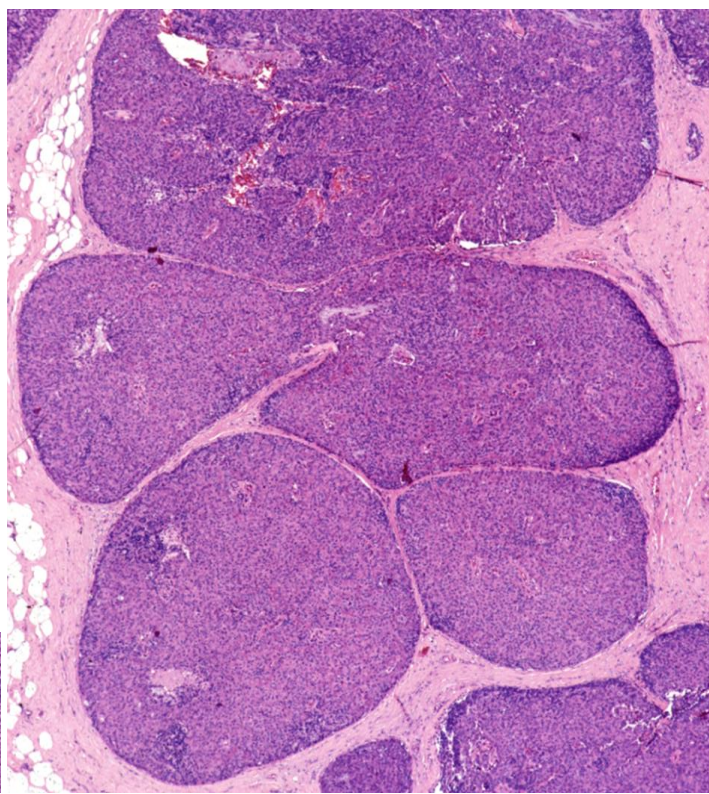
**Monotonous, round to spindled-shaped** epithelial cells with mild to moderate nuclear atypia and eosinophilic, granular cytoplasm.

Frequently show **neuroendocrine differentiation**. May have extracellular mucin.

If has rounded, well-circumscribed contours and a distribution pattern consistent with an in situ process, (regardless of if there are myoepithelial cells) → Solid papillary carcinoma in situ

Good prognosis.

[Virtual Slide 2](#)

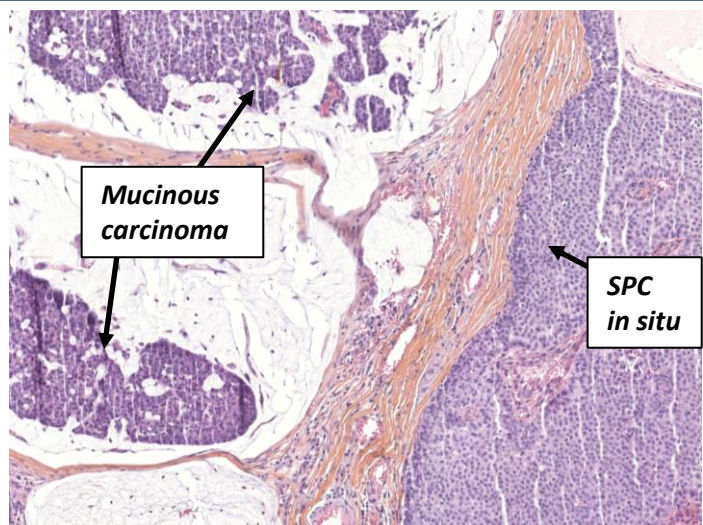


### SPC in situ with invasion:

Solid papillary carcinoma associated with strands or large clusters of tumor cells **with an irregular contour and an infiltrative growth pattern**.

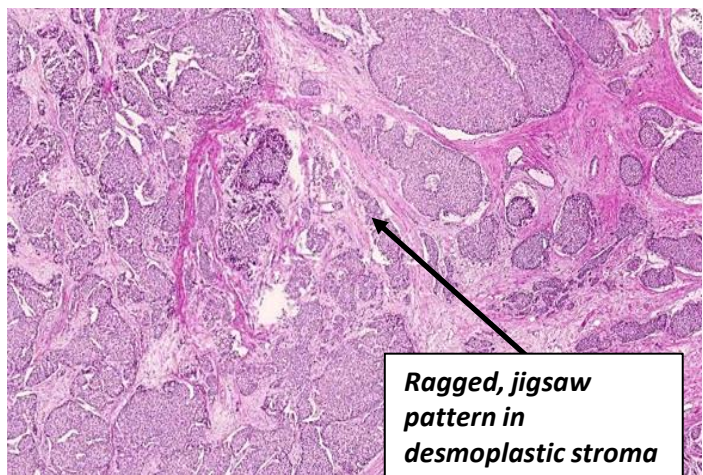
Often “NST,” but can be associated with pools of extracellular mucin at the periphery of the lesion → recognizable as mucinous carcinoma.

Stage and grade based on invasive component.



### Invasive Solid Papillary Carcinoma:

In rare cases, the majority of the lesion shows features of invasive disease with tumor nodules devoid of myoepithelium with **ragged contours creating a geographical jigsaw pattern** within a desmoplastic stroma



# Invasive Papillary Carcinoma

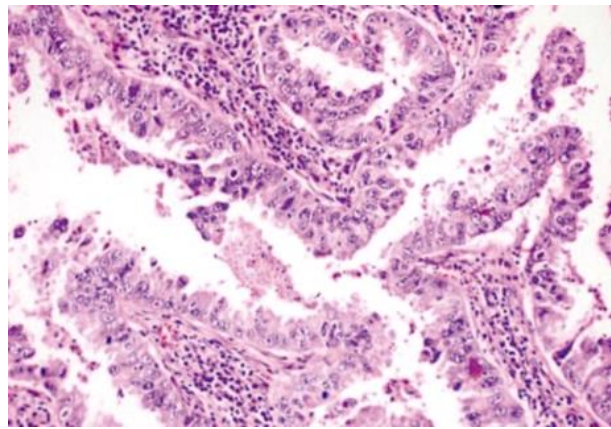
Invasive carcinoma with fibrovascular cores covered by neoplastic epithelium.

**Frankly invasive, infiltrating growth.**

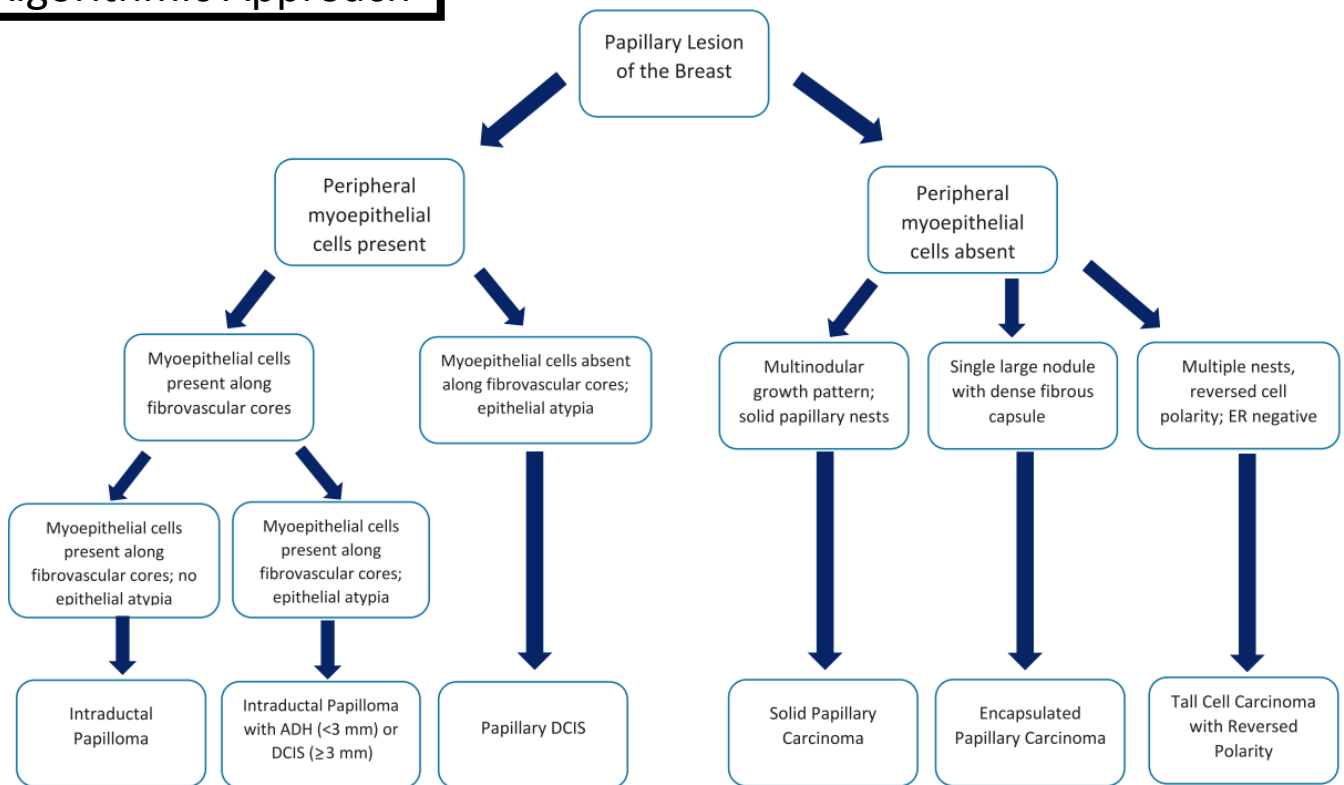
No myoepithelial cells anywhere in lesion.

**Very rare.**

**Must exclude metastasis** (e.g., Ovarian or lung)



## Algorithmic Approach



**Figure 4.** An algorithmic approach to papillary lesions of the breast. Abbreviations: ADH, atypical ductal hyperplasia; DCIS, ductal carcinoma in situ; ER, estrogen receptor.