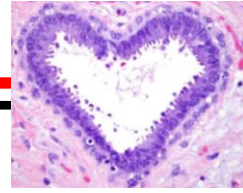


Intro to Breast Pathology



Does the biopsy explain what they saw?

Clinical setting

The
"Triple Test"

Radiology &
Physical exam
findings

Pathologic
findings

We need to consider if our findings explain the clinical and radiographic findings? This involves the "Triple test" of making sure the clinical setting, radiology, and pathology all agree.

Tailor your report to address the clinical question:

Are there calcifications?

Is there something mass-forming?

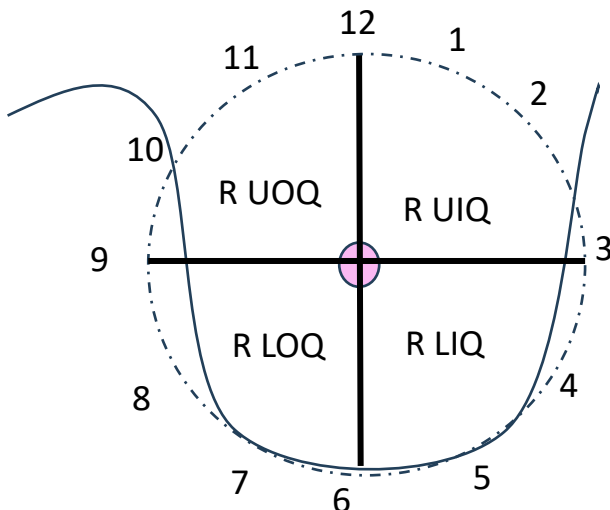
Imaging finding	Common pathologic correlates
Mass	Cancer, Fibroadenoma, Fibrocystic change,
Calcifications	DCIS, Cancer, Fibrocystic change, Fibroadenoma, vascular calcs
Architectural distortion	Cancer, Radial Scar, Fibromatosis
Non-mass-like enhancement	Fibrocystic change, Cancer, DCIS, PASH, inflammation, fibroadenoma

Breast location

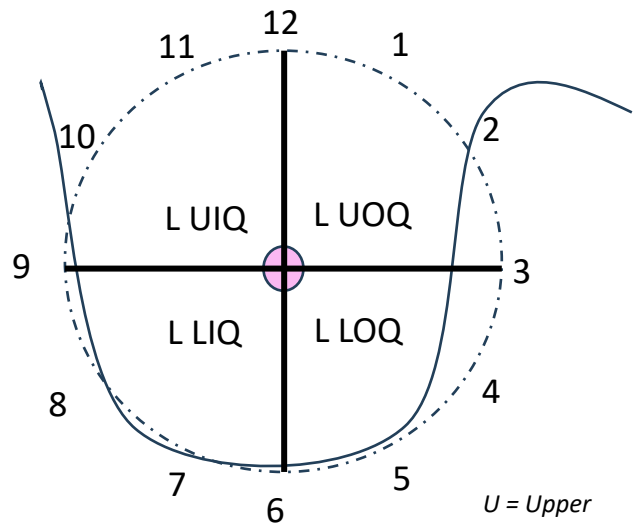


Location can be reported by either **quadrant** or using a "**clock**" system (see below)
Lesions are also usually reported using the distance from the nipple.

Right



Left



U = Upper
L = Lower (or left ;-)
I = Inner
O = Outer

Calcifications

"Calcs"

I usually report as *"Microcalcifications associated with _____"* Or *"_____ with associated microcalcifications"* (no need to specify which type of calcs as they appear similar on imaging)

Calcium phosphate

More common!

Dark purple on H&E

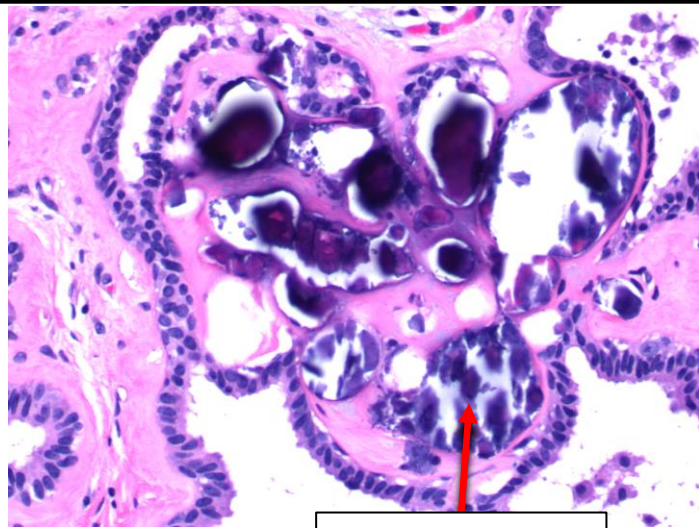
Often crack on sectioning and may stick out from the level of the tissue.

Calcium oxalate

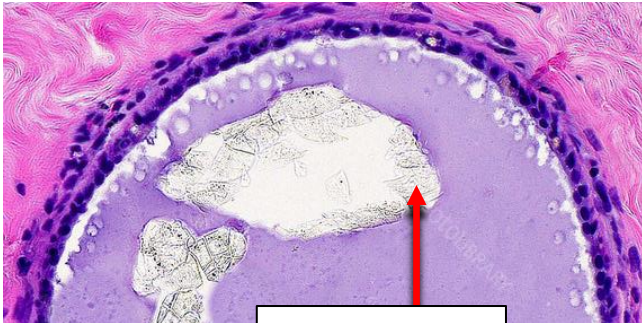
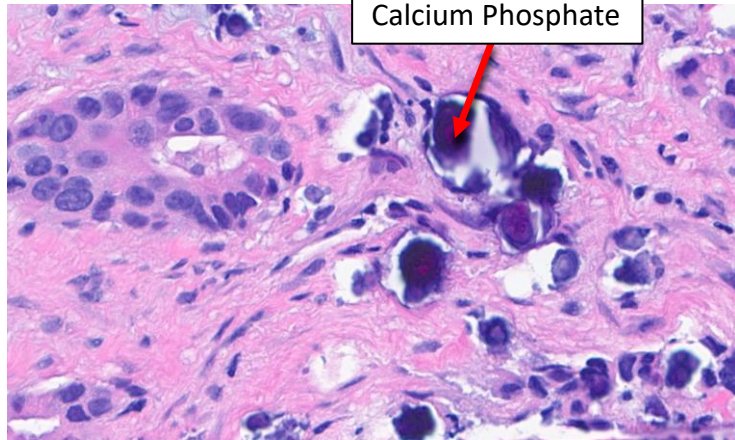
Less common and harder to find!

Appear as pale or **transparent crystals**, which are refractile under polarizable light

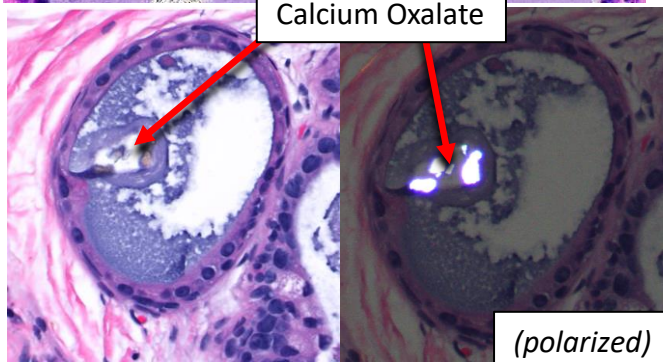
More often associated with apocrine cysts.



Calcium Phosphate



Calcium Oxalate



(polarized)

What if they saw Calcs on mammography, but you don't see any in the tissue?

1. Try **polarizing** to look for calcium oxalate
2. Consider **X-raying** the block(s)
3. Consider getting **levels**

(and document these efforts in your report to show you "did the work" of looking before another biopsy was necessitated.)

MRI "Non-mass enhancement"

"NME"

Breast MRI is very sensitive, but it isn't very specific. As such, it's mainly used for high-risk screenings and in patients with known cancer to map out extent of disease.

"Non-mass enhancement" or "NME" is used by the radiologist when there is an enhancing lesion without evidence of a mass. Only ~20% of NME represents cancer!

Benign findings that can cause NME: Fibrocystic change (most common by far), fibroadenomatous change, PASH, inflammation, etc...

Basic Histology

Basic architecture

I think of the breast glandular tissue as organized sort of like broccoli or a tree, with a stalk (duct) leading to lots of leaves (lobules) in a background of fibroadipose tissue.

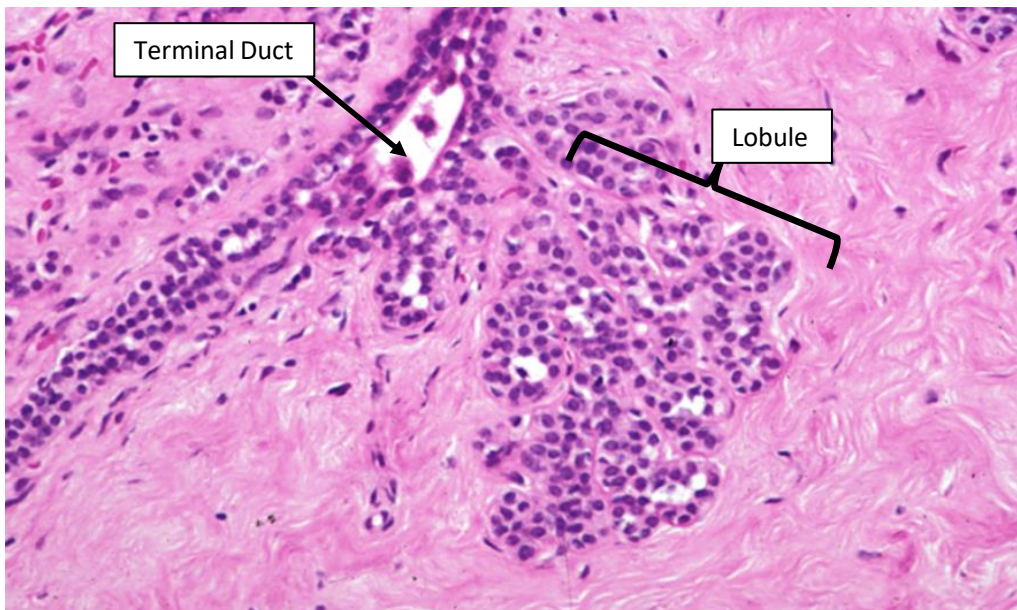
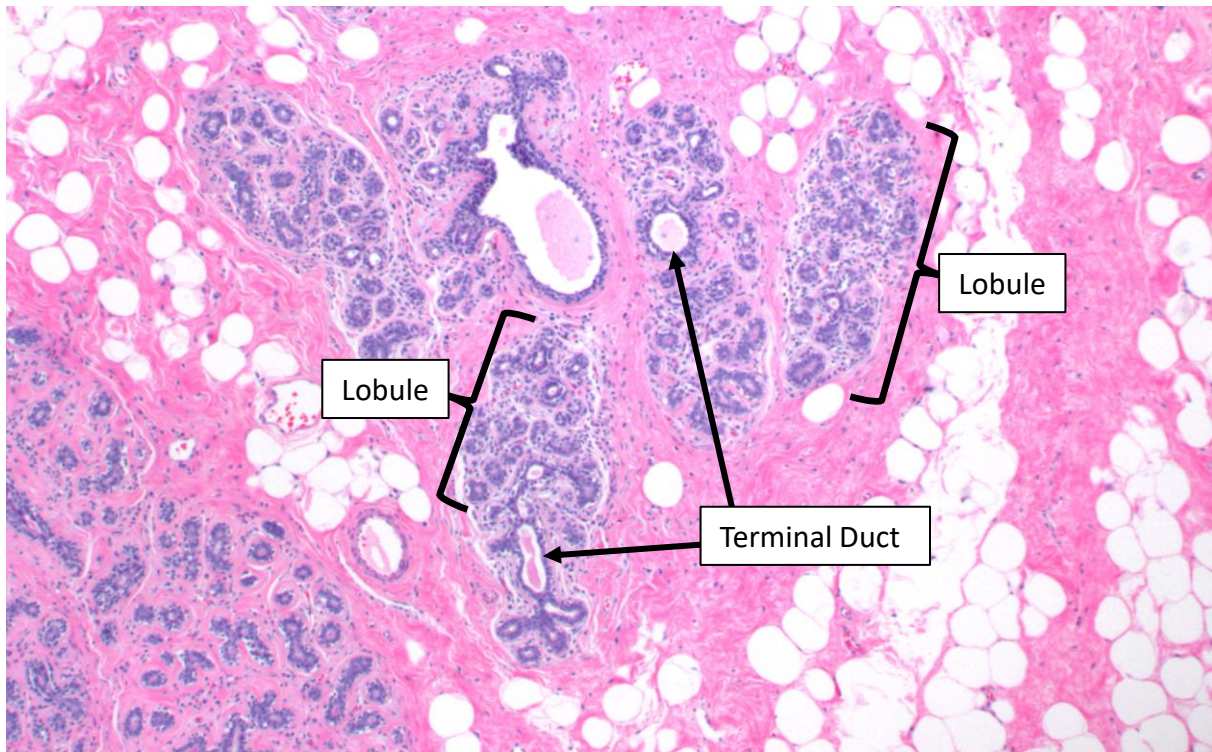


Milk flow: Acini → ducts → collecting ducts → Nipple

The Lobule + its terminal duct = **“Terminal Duct Lobular Unit” (TDLU)**

This is the structural and functional unit of the breast.

Epithelium of TDLU changes during lactation.



Both the ducts and lobules are lined by 2 cell layers:

1) Inner (luminal) epithelial cells:

Resting epithelial cells are cuboidal to columnar with pink cytoplasm and regular oval to round nuclei.

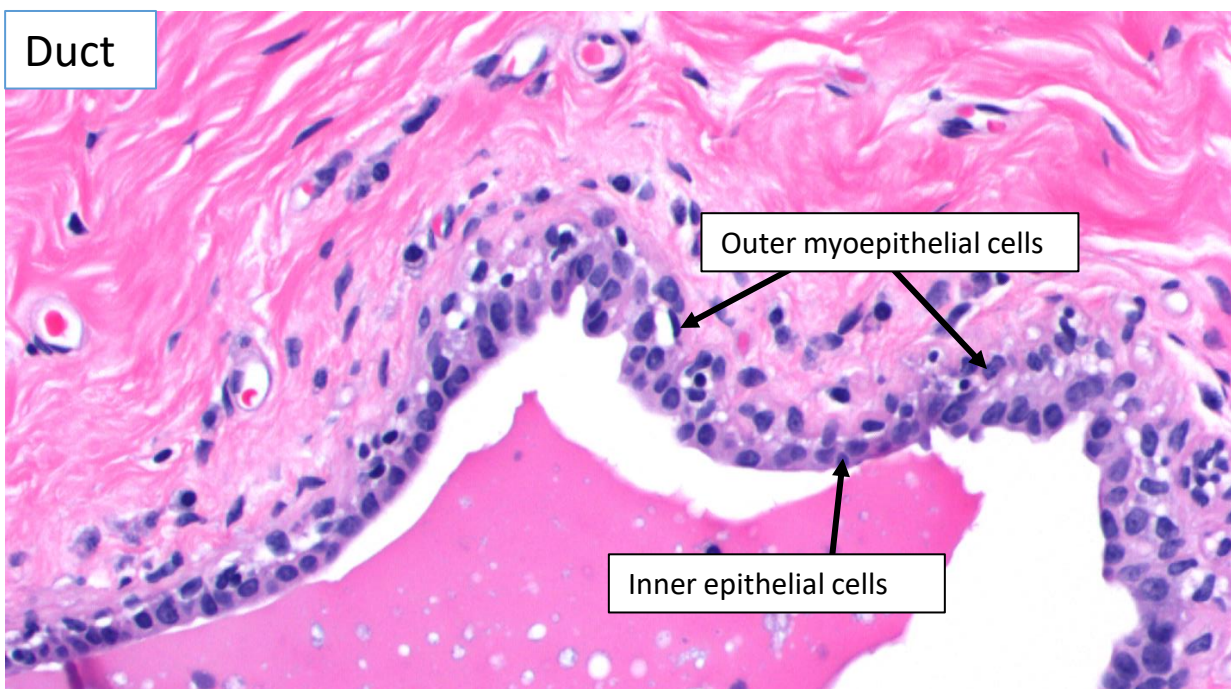
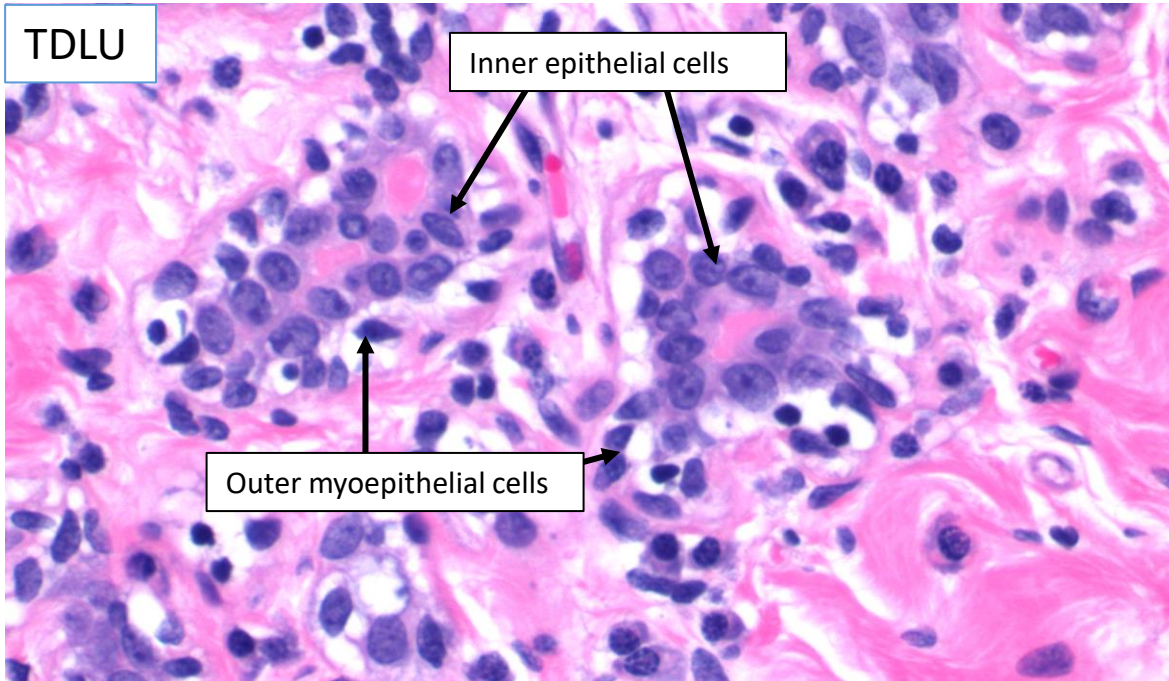
Function: Milk production

IHC: Express LMWCKs (e.g., CK7, CK19, etc.)

2) Outer (basal) myoepithelial cells:

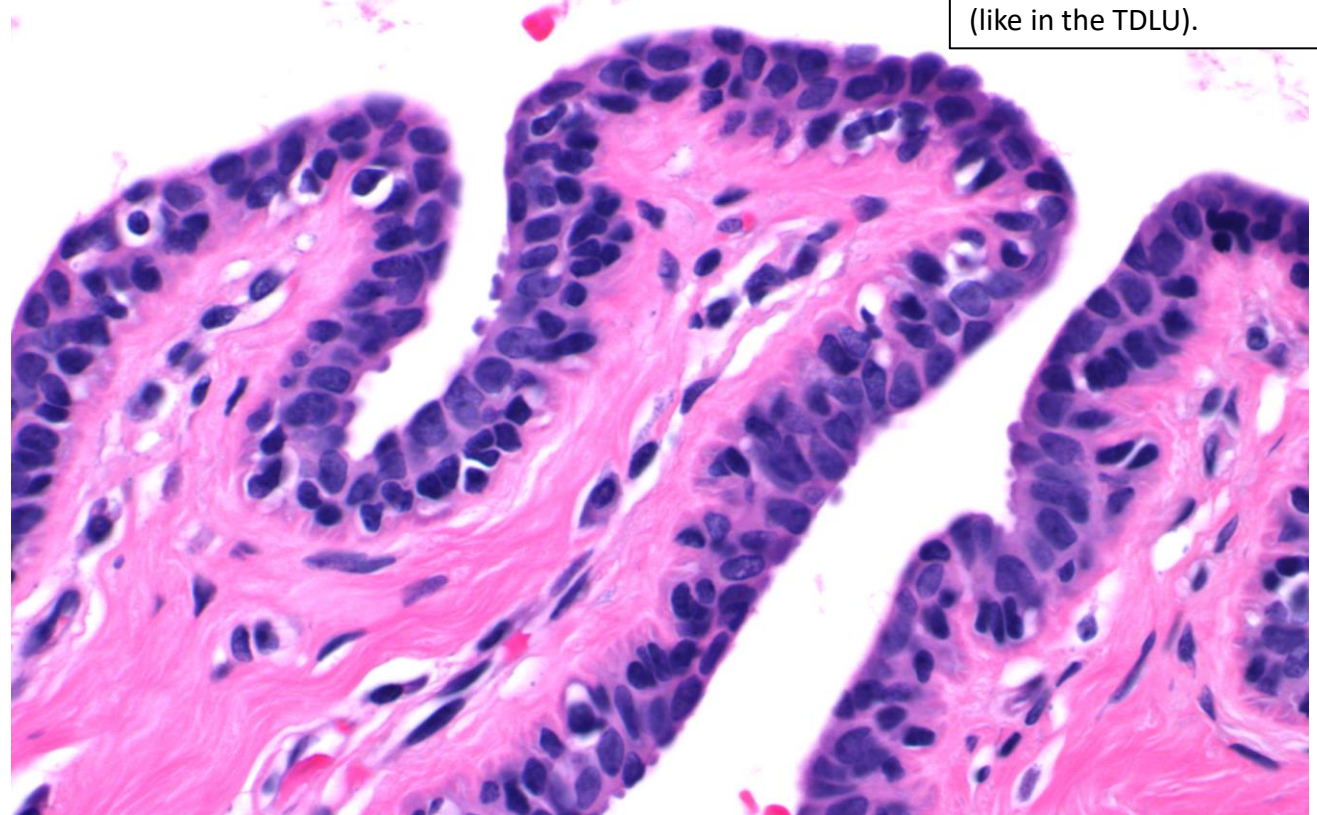
Variable appearance. Can be barely visible and flat, have abundant clear cytoplasm, or a pink myoid appearance. Function: Milk secretion by contraction

IHC: Express p63, SMMHC, Calponin, Actin, S100, CD10, CK5/6



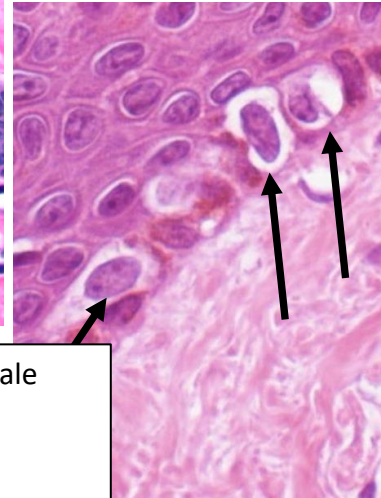
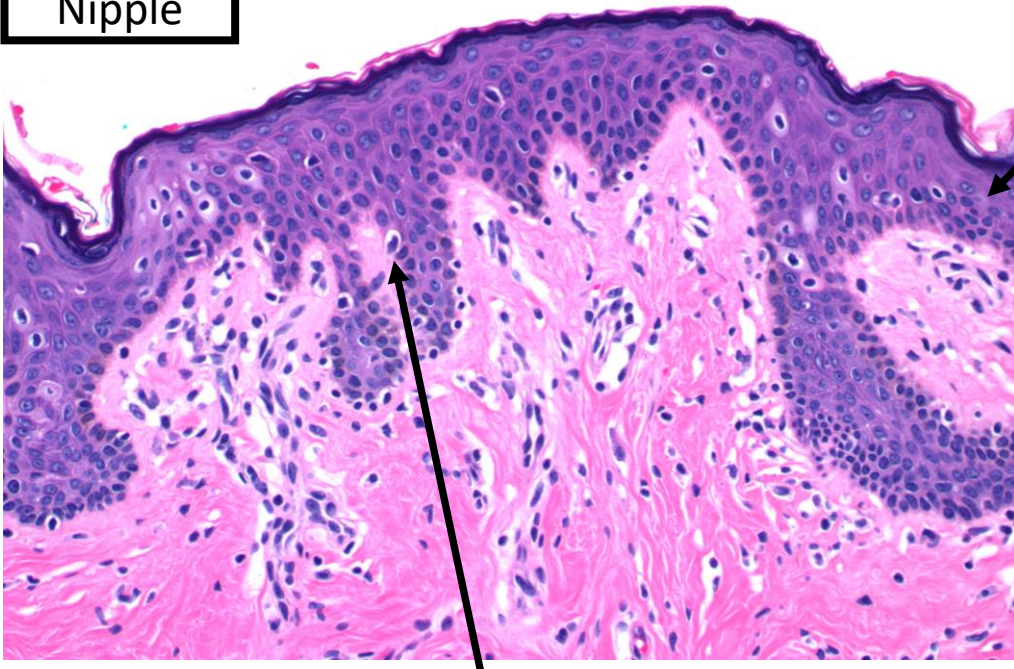
Large ducts underneath the nipple with serrated lumens and abundant surrounding collagen and smooth muscle.

The ducts have 2 cell layers (like in the TDLU).



Nipple

The nipple is covered with keratinizing squamous epithelium.

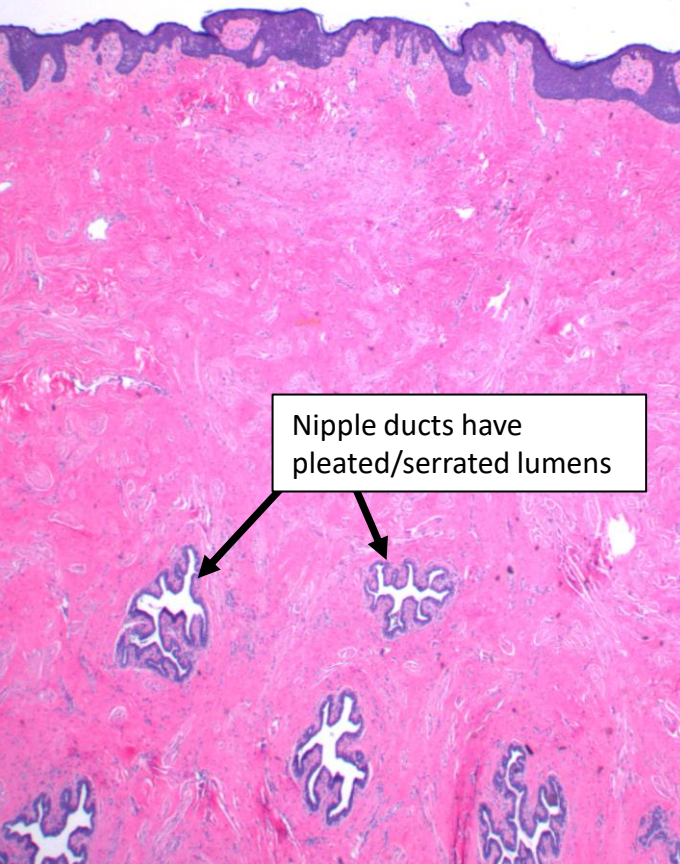


Toker cells: Clear cells in nipple epidermis normally. Bland, small nuclei with pale cytoplasm, present singly and in small clusters. Nucleoli are absent.
IHC: (+)CK7, EMA; (-) HER2, Mucicarmin
(some clears are also likely clear keratinocytes)

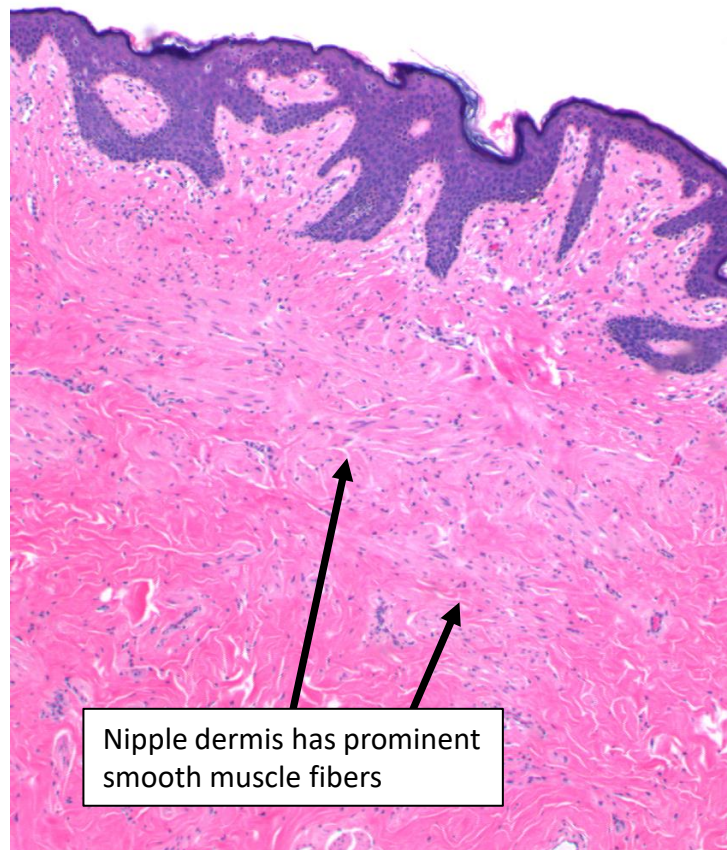
Important to not confuse with Paget's disease of the Nipple!

Paget cells are cytologically atypical, often with prominent nucleoli. Usually HER2+

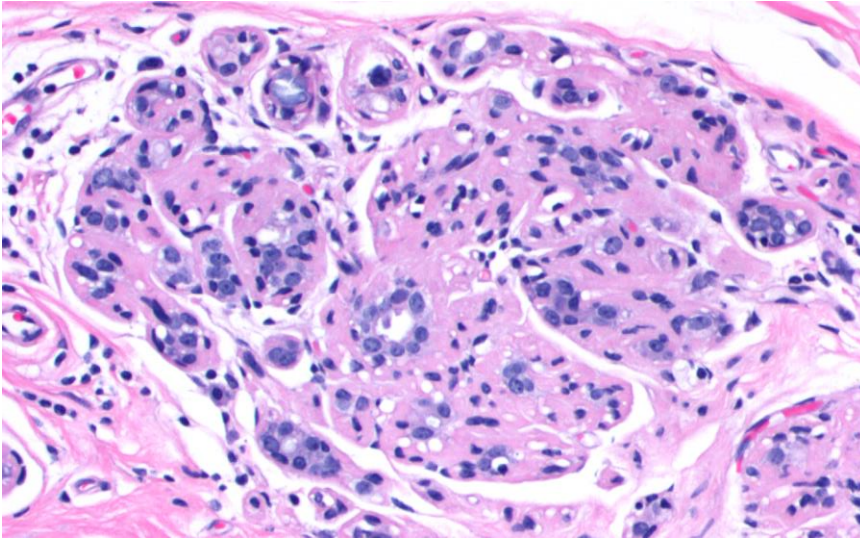
Nipple ducts have
pleated/serrated lumens



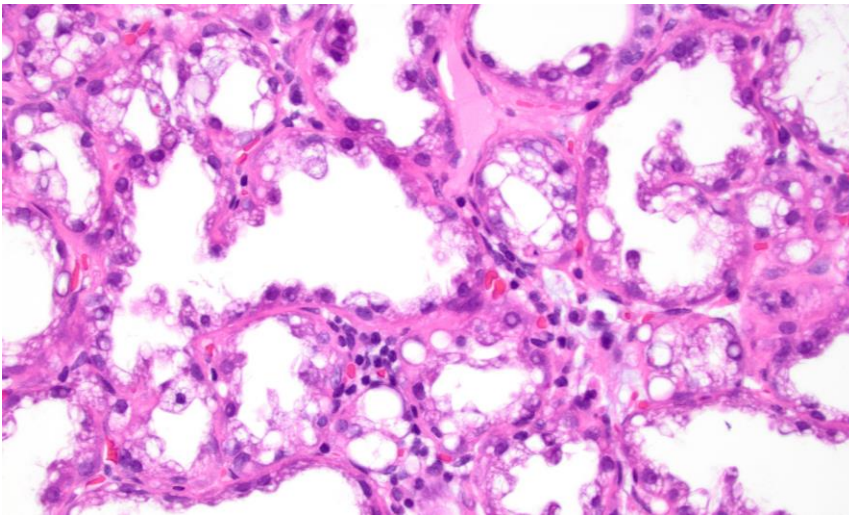
Nipple dermis has prominent
smooth muscle fibers



Variations of normal



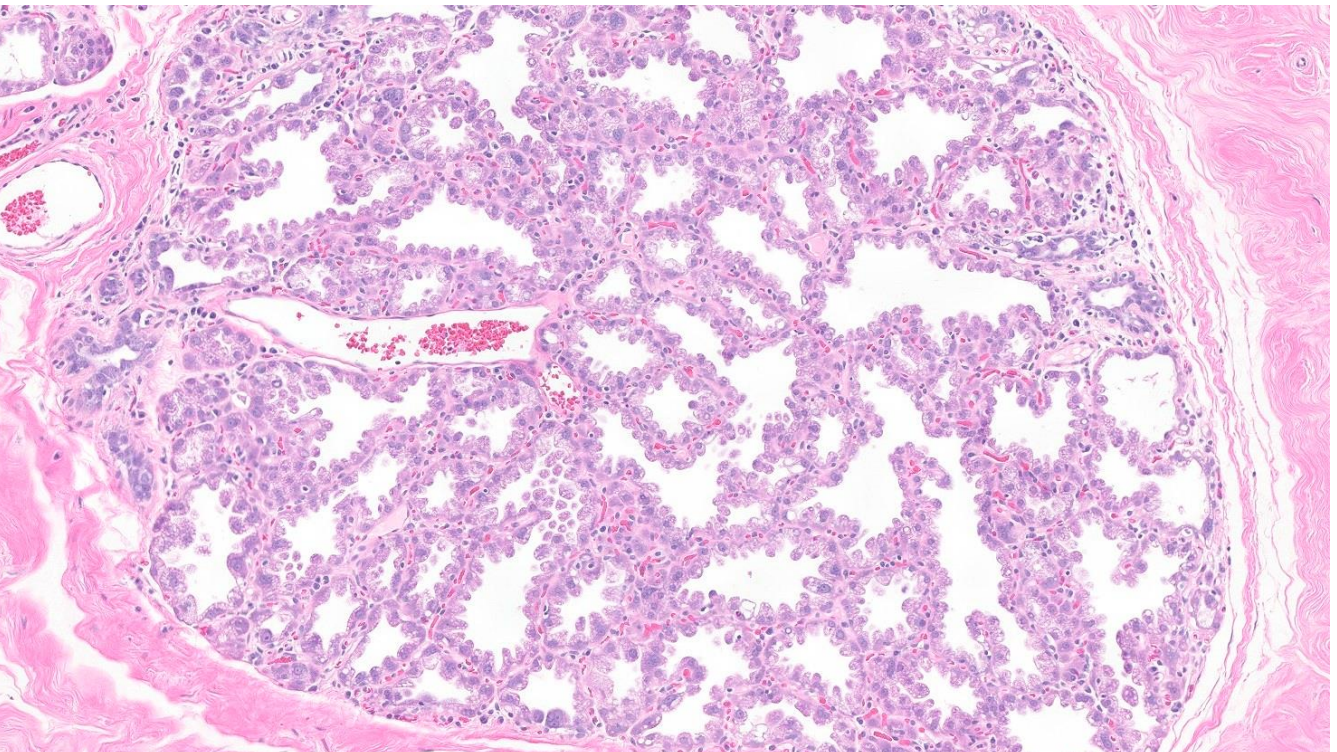
Myoepithelial cells with a pink, spindled myoid appearance reminiscent of smooth muscle (just a variant to look out for—no significance!)

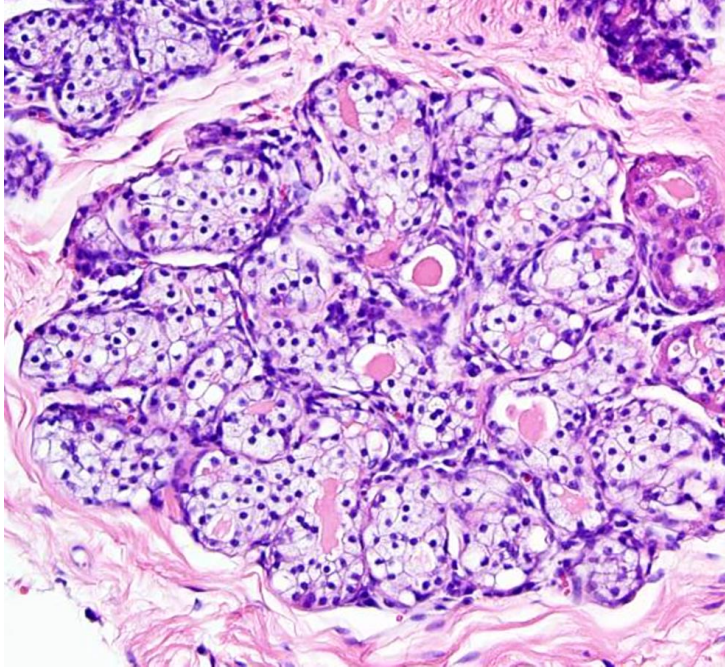


Lactational change

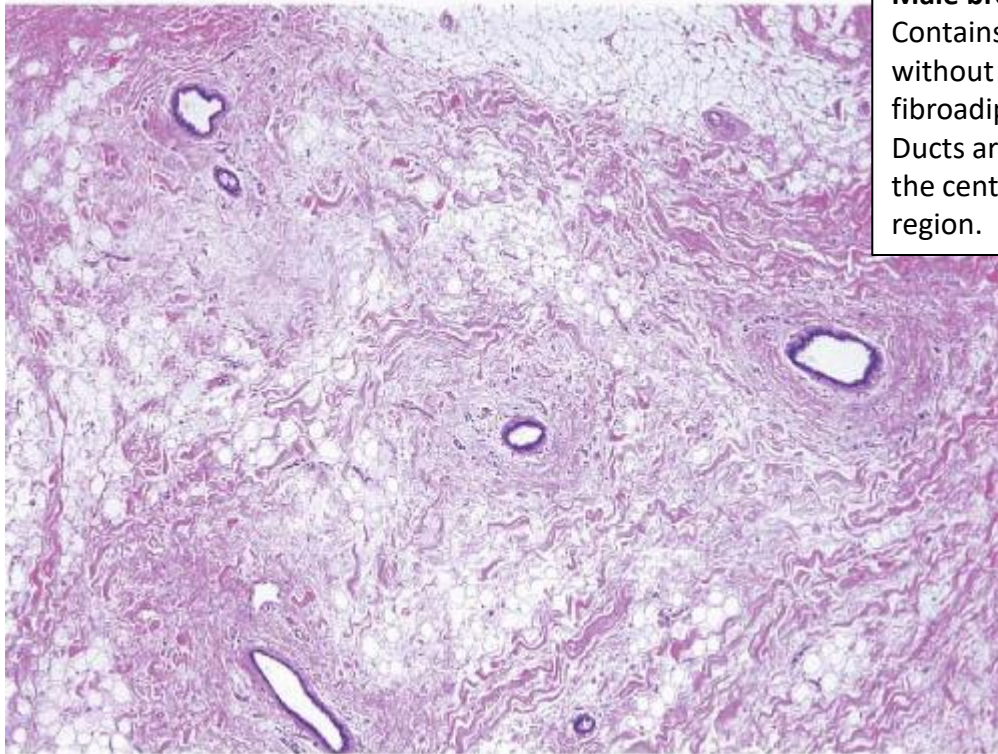
Cytoplasm is vacuolated and full of secretions (milk!). Many cells have a hobnail appearance. Myoepithelial cells are attenuated but present.

During pregnancy there is an increase in the number of lobules and acini. After lactation, the lobules return to their usual appearance





TLDU epithelium can show prominent **clear cell change**. Most common pre/post menopausal.



Male breast:

Contains large ducts mainly without lobule formation in fibroadipose tissue. Ducts are mainly confined to the central subareolar region.

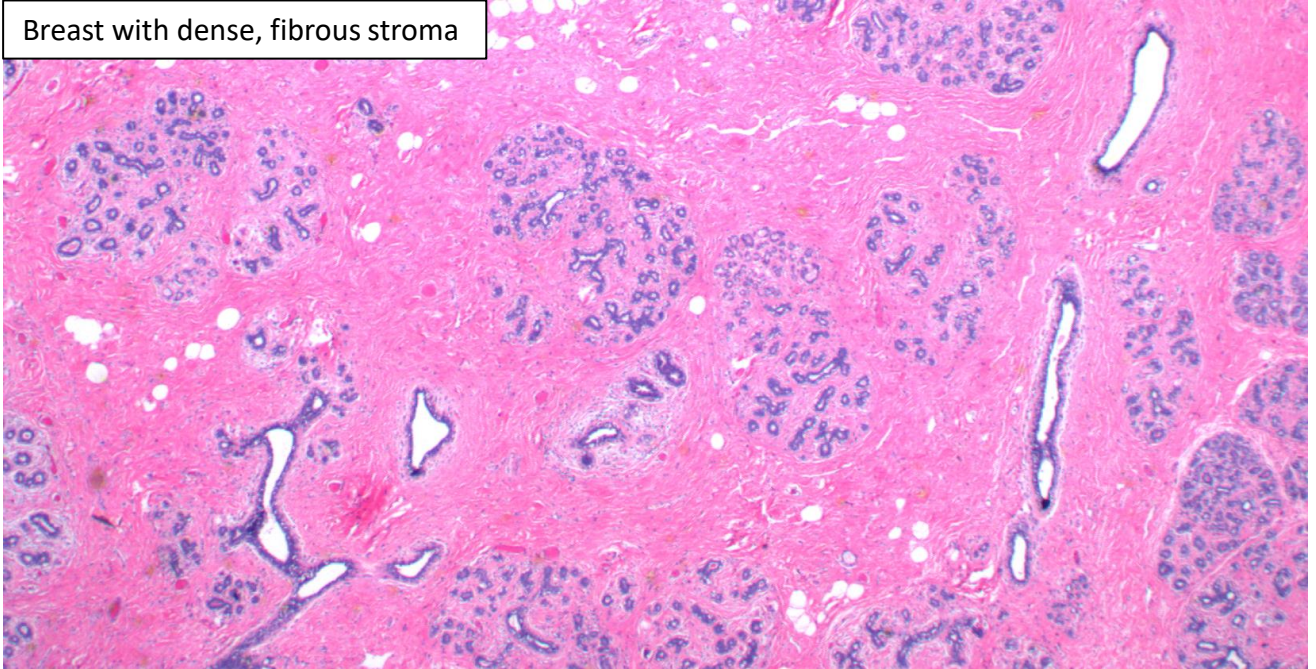
Variations over time:

The amount of stromal fat vs fibrous tissue varies with age and between individuals.

In general, younger breasts have more fibrous tissue and older breasts have more adipose tissue. Multinucleated giant cells can be seen in the stroma. There is also glandular atrophy with old age.

There are also glandular and stromal changes that correspond to the phases of the menstrual cycle, but these are not particularly pathologically relevant.

Breast with dense, fibrous stroma



Breast predominantly fatty stroma

