



# NOTES

## BREAST MASSES

### GENERALLY, WHAT ARE THEY?

#### PATHOLOGY & CAUSES

- Diverse breast tissue disorders; often in biologically-female individuals, often benign
  - Young: ↑ benign masses
  - Elderly: ↑ breast cancer

#### CAUSES

- Hormonal stimulation
- Genetic predisposition

#### COMPLICATIONS

- Possibility that benign mass → breast cancer

#### SIGNS & SYMPTOMS

- Possibly asymptomatic
- Breast size/appearance change

#### DIAGNOSIS

- Suggestive physical findings, medical/family history

#### DIAGNOSTIC IMAGING

Mammogram

MRI

Ultrasound

#### LAB RESULTS

- Biopsy, histological analysis

#### TREATMENT

- Benign disorders may regress spontaneously

#### SURGERY

- Lumpectomy
- Mastectomy

#### OTHER INTERVENTIONS

- Alternatives (e.g. cryoablation, radiation therapy)

# BREAST CANCER

osms.it/breast-cancer

## PATHOLOGY & CAUSES

- Diverse malignant breast lesions with different microscopic features, biologic behavior
  - ↑ common non-skin malignancy in biologically-female individuals
  - Rare in biologically-male individuals

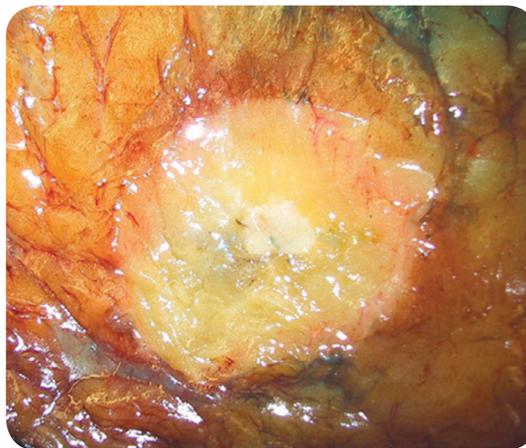
## TYPES

### Molecular subtypes

- Molecular subtypes classified by estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER2) expression; protein Ki67 levels (controls cancer cell growth)
  - **Luminal A:** ER, PR positive, HER2 negative, ↓ protein Ki67 levels
  - **Luminal B:** ER, PR positive, HER2 negative or positive, ↑ protein Ki67 levels
  - **Triple-negative:** ER, HER2, PR negative
  - **HER2 enriched:** ER, PR negative, HER2 positive
  - **Normal-like:** ER, PR positive, HER2 negative, ↓ protein Ki67 levels

### Most common types

- **Ductal carcinoma in situ (DCIS)**
  - In ducts → possible invasive ductal carcinoma (usually in same breast)
- **Lobular carcinoma in situ (LCIS)**
  - In lobules → ↑ cancer risk in either breast
- **Invasive ductal carcinoma**
  - 70% of all invasive cancers
  - **Subtypes:** tubular, medullary, mucinous, papillary, cribriform
- **Invasive lobular carcinoma**
- **Inflammatory breast cancer**
  - Rare aggressive form
  - Poor prognosis



**Figure 122.1** The gross pathological appearance of breast cancer in a wide local excision specimen.

## CAUSES

- Genetic aberrations
- Hormonal exposure
- **Inherited susceptibility genes** (familial, 10% of cases)
  - Breast cancer 1 (**BRCA1**), breast cancer 2 (**BRCA2**) (80–90% of single-gene familial breast cancers, 3% of all cancers)

## RISK FACTORS

- Breast cancer prior history
- ↑ age → ↑ risk
- Breast cancer in first-degree relatives
- Individuals who are biologically female
- Race/ethnicity
  - Highest incidence in white people of Ashkenazi Jewish descent
- Hormonal influence
  - **Estrogen exposure** (e.g., menopausal hormone therapy)
  - Early menarche (< 11 years old)
  - Late menopause

- Nulliparity/ > 35 years old at first birth
- ↓ breastfeeding duration
- **Obesity**
- Toxin exposure
  - Ionizing radiation
  - Smoking
  - ↑ alcohol consumption

## COMPLICATIONS

- **Metastasis** (bone, lung, liver, brain common)
- Treatment complications
  - Lymph node resection → lymphedema
  - Cytotoxic chemotherapy → infertility
  - Chemotherapy, radiation therapy → cardiac disorders (e.g. cardiomyopathy) and/or myeloid neoplasms

## SIGNS & SYMPTOMS

- Possibly asymptomatic (especially premalignant breast masses)
- Palpable mass (hard, nontender, irregular borders, immobile)
- **Palpable lymph nodes**
  - **Axillary**, supraclavicular
- Skin dimpling (orange peel skin)
- Nipple retraction, discharge (usually bloody), **eczema-like rash** (**Paget's disease of breast**)
- Inflammatory breast cancer
  - Presentation mimics inflammation (tenderness, warmth, swelling, erythema)
  - Orange peel skin over mass

## DIAGNOSIS

### DIAGNOSTIC IMAGING

#### Breast MRI

- High-risk individuals (with mammography)

#### Mammogram

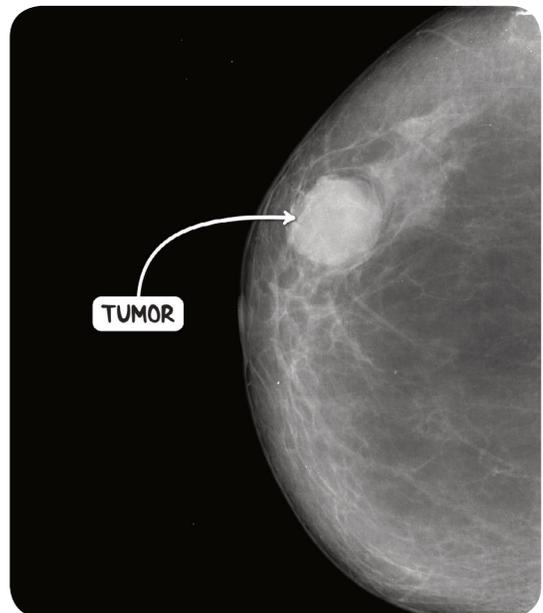
- Ill-defined, spiculated mass
  - Clustered **microcalcifications**

### Ultrasound

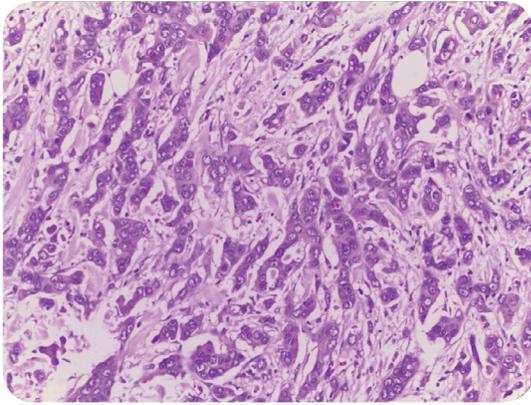
- Differentiate cystic/solid masses
- Provide procedure guidance
- Hypoechoic lesion
  - Calcifications, shadowing, irregular margins



**Figure 12.2** An inverted nipple caused by a sub-areolar breast tumor.



**Figure 12.3** A mammogram of the breast demonstrating a well-circumscribed tumor.



**Figure 122.4** The histological appearance of breast carcinoma, no special type. This subtype can take many forms but in this instance there are cords of pleomorphic, atypical cells with open chromatin and prominent nucleoli.



**Figure 122.5** A fungating tumor of the left breast. The tumor involves almost the entire organ and extends into the axilla where the overlying skin has ulcerated.

## LAB RESULTS

- Core biopsy
  - Histological analysis, tumor grading
- Immunohistochemistry analysis
  - Detect estrogen/progesterone receptor expression; HER2 overexpression
- Sentinel lymph node biopsy

## OTHER DIAGNOSTICS

- Suggestive physical findings, medical/family history

## TREATMENT

### SURGERY

- Lumpectomy/mastectomy
  - Individual's choice

### OTHER INTERVENTIONS

- Radiation therapy
- Chemotherapy
- Adjuvant hormone therapy/chemoprevention (some cancers)

# FIBROADENOMA

osms.it/fibroadenoma

## PATHOLOGY & CAUSES

- Benign, estrogen-sensitive proliferative breast lesion (from stromal, epithelial components)
  - ↑ occurrence **young people (< 35 years old)**
  - Most common benign breast neoplasm
- Cause unknown; possibly hormone presence
  - Pregnancy, pre-menstruation → ↑ proliferation
  - Regresses with age

## TYPES

- Giant fibroadenomas
  - >10cm/3.9in (phylloid tumors appear similar)
- Juvenile
  - Young individuals (10–18 years of age), grow rapidly, ↑ glandularity, ↑ stromal cellularity
- Complex fibroadenomas
  - Proliferative changes (e.g. sclerosing adenosis, calcifications/hyperplasia)

## COMPLICATIONS

- Size increases → possible infarction/inflammation
- Mildly ↑ breast cancer risk (especially complex fibroadenomas)

## SIGNS & SYMPTOMS

- **Typical presentation:** 2–3cm/0.79–1.2in average size, firm, **well-circumscribed**, round, palpable, **mobile**, painless (possibly **painful during menstrual cycle**)
- Often multiple, bilateral

## DIAGNOSIS

### DIAGNOSTIC IMAGING

#### Breast ultrasound

- Well-defined, solid, hypoechoic lesion

#### Mammogram

- Circumscribed, dense lesion, possible clustered calcifications

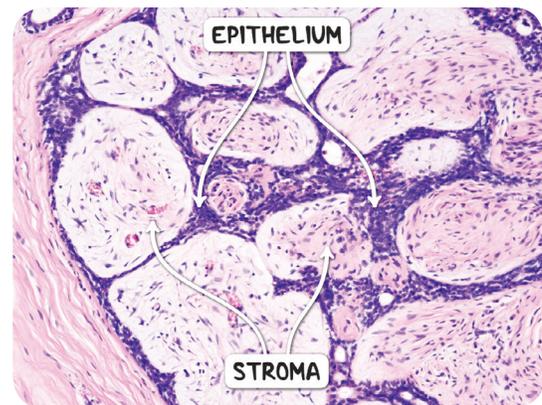
### LAB RESULTS

#### Biopsy

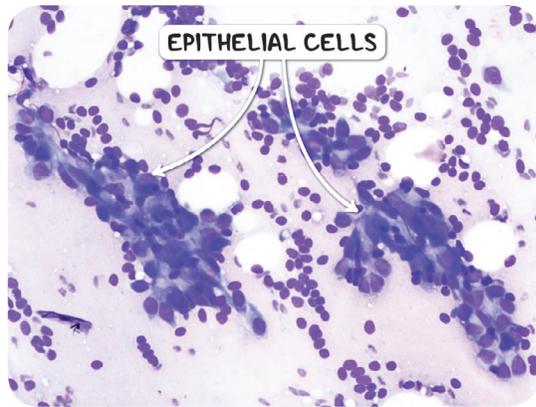
- Definitive diagnostic test
  - Glandular, fibrous tissue
- Excludes breast cancer

### OTHER DIAGNOSTICS

- Suggestive physical findings



**Figure 122.6** The histological appearance of a fibroadenoma. There is overgrowth of both the stroma and the glandular epithelium.



**Figure 122.7** A fine needle aspirate of a fibroadenoma of the breast. Sheets of epithelial cells are arranged in a staghorn pattern.

## TREATMENT

- Therapy seldom required; often regress post-menopause

## SURGERY

- Surgical excision

## OTHER INTERVENTIONS

- Cryoablation

# FIBROCYSTIC BREAST CHANGES

[osms.it/fibrocystic-breast-changes](https://osms.it/fibrocystic-breast-changes)

## PATHOLOGY & CAUSES

- Common **benign** breast disease
- Bilateral tenderness, multiple lumps related to cyclic ovarian hormonal stimulation
  - AKA fibrocystic disease, mammary dysplasia, cystic mastitis
  - **Premenopausal individuals (< 35 years old)** → ↑ common; 50% of reproductive-age biologically-female individuals
  - Increased breast cancer risk not associated (**non-proliferative breast lesions**)
- Characteristic changes
  - Cysts
  - Adenosis
  - Stromal fibrosis

## TYPES

- Sclerosing adenosis
  - Acini, stromal fibrosis, calcifications associated, slight ↑ cancer risk

- Epithelial hyperplasia
  - Cells in terminal ductal/lobular epithelium, atypical cells → ↑ carcinoma risk

## COMPLICATIONS

- Some subtypes (sclerosing adenosis, atypical hyperplasia) → ↑ increased invasive carcinoma risk (both breasts)

## SIGNS & SYMPTOMS

- Menstrual cycle-related clinical manifestations
  - **Bilateral breast pain**, tenderness
  - Multiple, smooth, well-defined, mobile lumps (“lumpy bumpy” breasts); usually upper outer quadrant

## DIAGNOSIS

### DIAGNOSTIC IMAGING

#### Mammogram

- Dense breasts with cysts

#### Ultrasound

- Fluid-filled cysts

### LAB RESULTS

#### Aspiration

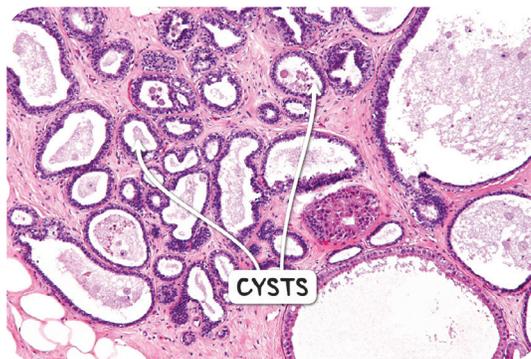
- If mass persistent
- Excludes tumor
- If clear fluid obtained, mass disappears → fibrocystic breast changes

#### Biopsy

- Cysts
  - Blue serous fluid (“blue dome” appearance), various sizes, calcifications common
- Fibrosis
  - Due to chronic inflammation from cyst rupture, material release to stroma
- Adenosis
  - ↑ acini per lobule

### OTHER DIAGNOSTICS

- Suggestive physical findings



**Figure 122.8** The histological appearance of fibrocystic change of the breast. There are numerous small cysts surrounded by fibrous tissue. The cysts are lined with ductal epithelium.

## TREATMENT

### MEDICATIONS

- Conservative measures
  - Oral contraceptives; analgesics (e.g., nonsteroidal anti-inflammatory agents (NSAIDs))

### SURGERY

- Surgical intervention often unnecessary; resolves with menopause
- Surgical treatment
  - Complex cysts, if biopsy results atypical/malignancy revealed

### OTHER INTERVENTIONS

- Conservative measure
  - Caffeine elimination
- Conservative measures fail → therapeutic aspiration

# INTRADUCTAL PAPILLOMA

[osms.it/intraductal-papilloma](https://osms.it/intraductal-papilloma)

## PATHOLOGY & CAUSES

- Rare benign fibroepithelial breast tumor arising from lactiferous duct epithelium

## TYPES

- Central
  - Develops near nipple, usually solitary, often arise near menopause
- Peripheral
  - Often multiple, usually in younger individuals

## RISK FACTORS

- Biologically female, 20–30 years old

## COMPLICATIONS

- Slightly ↑ breast cancer risk
- Peripheral
  - ↑ risk
- ↑ age → ↑ risk

## SIGNS & SYMPTOMS

- Intermittent bloody/serous nipple discharge (especially premenopausal)
- Breast feels full (relieved by discharge passage)

## DIAGNOSIS

### DIAGNOSTIC IMAGING

#### Galactography

- Contrast-enhanced mammogram; definitive test but invasive
- Filling lactiferous duct defect

#### Mammogram

- Excludes breast cancer
- Intraductal papilloma usually too small to detect

#### Ultrasound

- Projections extending from duct wall within lumen; used to diagnose/guide surgical resection

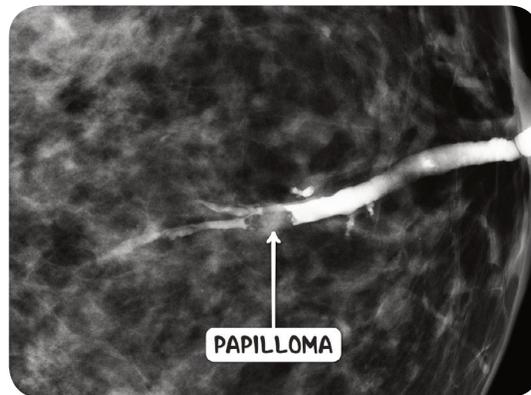
## LAB RESULTS

#### Biopsy

- Fibrovascular intraductal projections lined by myoepithelial, epithelial cells

## OTHER DIAGNOSTICS

- Suggestive physical findings



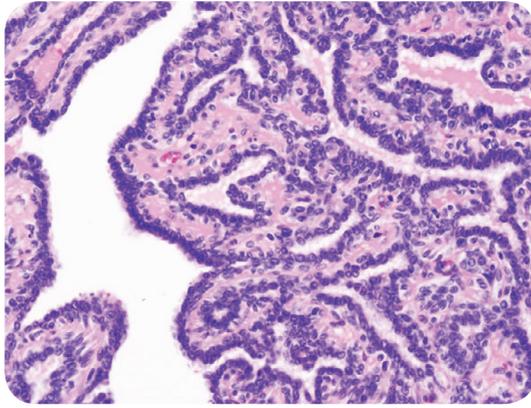
**Figure 122.9** Breast ductography demonstrating a solitary intraductal papilloma.

## TREATMENT

- Small, incidental papillomas: treatment may be unnecessary

## SURGERY

- Breast duct removal



**Figure 122.10** The histological appearance of a papilloma of the breast. There are multiple infolded papillae giving a cribriform pattern. The papillae are lined by benign ductal epithelium.

## PAGET'S DISEASE OF THE BREAST

[osms.it/pagets-disease-of-the-breast](https://osms.it/pagets-disease-of-the-breast)

### PATHOLOGY & CAUSES

- Rare cutaneous breast cancer manifestation
  - Eczema-like skin changes in nipple, areola
- Pathogenesis
  - *Epidermotropic theory*: underlying mammary carcinoma present (85–88% of cases) → malignant cells migrate through ductal system → nipple epidermis
  - *In situ transformation theory*: nipple keratinocyte transformation → malignant cells (independent of other breast pathology)
- Less common: bloody nipple discharge, nipple inversion, pain
- Palpable mass in 50–60% of cases → worse prognosis



**Figure 122.11** The clinical appearance of Paget's disease of the breast.

### SIGNS & SYMPTOMS

- *Typical presentation*: unilateral; nipple + adjacent areolar skin; scaly; itching, burning; erythematous

## DIAGNOSIS

### DIAGNOSTIC IMAGING

#### Mammogram

- Identify associated mass, microcalcifications, tissue distortion

### LAB RESULTS

- Ultrasound-guided mass core biopsy, histopathological analysis
- Nipple scrape cytology/full-thickness wedge/punch biopsy
  - Malignant, intraepithelial adenocarcinoma cells (Paget cells) present

### OTHER DIAGNOSTICS

- Suggestive physical findings

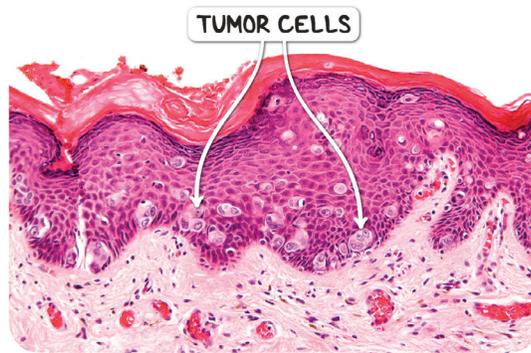
## TREATMENT

### SURGERY

- Mastectomy, breast-conserving surgery

### OTHER INTERVENTIONS

- Whole breast radiotherapy



**Figure 122.12** The histological appearance of Paget's disease. There are tumor cells migrating upward toward the skin surface individually and in small groups.

# PHYLLODES TUMOR

[osms.it/phyllodes-tumor](https://osms.it/phyllodes-tumor)

## PATHOLOGY & CAUSES

- Rare fibroepithelial breast tumor
  - Typical phyllodes (leaf-like) projections on pathologic examination
  - AKA cystosarcoma phyllodes
- Generally **benign**, can become malignant sarcoma
- Arises from periductal breast stroma

### RISK FACTORS

- Biologically female, 30–50 years old

- Associated with acquired chromosomal mutations; most commonly gains in chromosome 1q

### COMPLICATIONS

- Local recurrence after excision
- Local hemorrhage, necrosis
- High-grade tumors can give distant hematogenous metastasis; lymphatic spread rare

## SIGNS & SYMPTOMS

- Mass
  - **Large**, palpable, firm, multinodular, well-circumscribed, mobile, painless
- Slow-growing or develops rapidly over entire breast
- Overlying skin possibly shiny, stretched
- Possible bloody discharge

## DIAGNOSIS

### DIAGNOSTIC IMAGING

#### Breast MRI

- Well-circumscribed lesion, ↑ signal intensity on T1-weighted, ↓ signal intensity on T2-weighted

#### Mammogram

- Smooth, polylobulated mass, resembles fibroadenoma

#### Ultrasound

- Solid, hypoechoic, well-circumscribed lesion; possible cystic areas within mass, microcalcifications absent

### LAB RESULTS

#### Core needle biopsy

- **Histologic grading:** ↑ cellularity, ↑ mitotic rate, nuclear polymorphism, fibrous stroma overgrowth, **leaf-like lobulations**, **cysts**
  - Cellular pleomorphism indicates malignancy

### OTHER DIAGNOSTICS

- Suggestive physical findings

## TREATMENT

### SURGERY

- **Treatment of choice:** surgical removal (wide local excision)

### OTHER INTERVENTIONS

- **Large, high-risk/recurrent tumors:** adjuvant radiotherapy/chemotherapy



**Figure 122.13** The histological appearance of a Phyllodes' tumor. Whilst similar in appearance to a fibroadenoma, the stroma is more cellular and constitutes a larger component of the tumor

## BENIGN BREAST MASSES OVERVIEW

TUMOR	AGE	CLINICAL PRESENTATION	BREAST CANCER RISK	TREATMENT
<b>FIBROADENOMA</b>	Young women (<35 years old)	Small but grows with ↑ estrogens, firm, well-defined, mobile	↑ mildly	Therapy often unnecessary; regress with menopause
<b>FIBROCYSTIC BREAST CHANGES</b>	Young women (<35 years old)	Bilateral breast pain, tenderness; "lumpy bumpy" breasts	Sclerosing adenosis, atypical hyperplasia → ↑ risk	Often NSAIDs, oral contraceptives, caffeine elimination; regress with menopause
<b>INTRADUCTAL PAPILLOMA</b>	Young women (<35 years old)	Bloody/serous nipple discharge	↑ slightly (peripheral type)	Surgical removal of breast duct
<b>PHYLLODES TUMOR</b>	Young women (<35 years old)	Large, palpable, well-defined, mobile mass	Rarely becomes malignant sarcoma	Surgical removal