

BREAST

Introduction

The breast (mammary gland) is a modified sweat gland located in the pectoral region.

◆ Key Points

- Well developed in females
- Rudimentary in males
- Modified apocrine sweat gland
- Lies in superficial fascia

 Frequently asked viva question: "What type of gland is the breast?" → Modified apocrine sweat gland.

Location & Extent

- ◆ Anatomical Position

Situated in superficial fascia over the anterior chest wall.

- ◆ Extent

Vertically:

2nd rib → 6th rib

Horizontally:

Lateral border of sternum → Mid-axillary line

 Upper outer quadrant extends into axilla → Axillary tail of Spence (very important in carcinoma).

Deep Relations

Breast rests on:

- Retromammary space
- Deep fascia (pectoral fascia)
- Pectoralis major
- Pectoralis minor

- Serratus anterior
 - External oblique
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- ◆ Retromammary Space

- Loose areolar tissue
- Allows mobility of breast over chest wall

Clinical importance ⚠:

Fixation of breast → Possible carcinoma infiltration.

Structure of Breast

The breast has three main components:

1. Skin
 2. Parenchyma
 3. Stroma
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Skin

Covers the gland and includes:

- ◆ Nipple
 - Located at 4th intercostal space
 - Contains:
 - Circular smooth muscle
 - Longitudinal smooth muscle

Function:

Contraction → Nipple erection → Helps in breastfeeding

- ◆ Areola
 - Pigmented skin around nipple
 - Contains modified sebaceous glands
 - Enlarges during pregnancy
- ◆ Tubercles of Montgomery

Enlarged sebaceous glands during pregnancy → Raised nodules around areola

📌 Viva point: They secrete lubricating material during lactation.

Parenchyma (Glandular Tissue)

This is the functional part of the breast.

- ◆ Composition
 - 15-20 lobes
 - Each lobe contains:
 - Lobules
 - Alveoli (acini)
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- ◆ Structural Flowchart (Very Important)

Lobe → Divides into lobules → Each lobule contains multiple alveoli (acini) → Alveoli secrete milk → Drain

into terminal ducts → Join to form lactiferous duct →
Lactiferous sinus (dilated portion) → Opens at nipple

- ◆ Terminal Duct Lobular Unit (TDLU)

Terminal duct + Lobule → TDLU

⚠ Clinically important because:

Most breast carcinomas arise from TDLU.

Stroma (Supporting Framework)

The supporting tissue of the breast.

- ◆ Components
 - Fibrous tissue
 - Fatty tissue
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- ◆ Suspensory Ligaments of Cooper

Fibrous septa extend from:

Dermis → Pass through breast tissue → Attach to deep fascia

Function:

- Support breast
- Maintain shape

Clinical relevance :

Carcinoma infiltration → Shortening of ligaments → Skin dimpling

◆ Fatty Stroma

- Forms bulk of breast
- Determines size
- Not related to milk production

 Important: Breast size \neq functional capacity.

Internal Anatomy Summary Table

Component	Function	Clinical Relevance
Skin	Protection	Paget disease
Nipple	Milk outlet	Retraction in cancer
Areola	Lubrication	Montgomery glands
Parenchyma	Milk secretion	Carcinoma origin
Stroma	Support	Dimpling in cancer

Clinical Conditions (Anatomical Basis)

- ◆ Fat Necrosis
 - Trauma
 - Mimics carcinoma

- ◆ Fibroadenoma
 - Benign tumor
 - Mobile
 - Common in young women

- ◆ Phyllodes Tumor
 - Rapidly growing
 - Arises from stroma

- ◆ Fibrocystic Changes
 - Most common benign condition
 - Painful nodules

- ◆ Mastitis / Abscess
 - Infection during lactation

- ◆ Galactocele
 - Milk retention cyst

- ◆ Ductal Carcinoma

- Most common malignancy
 - ◆ Lobular Carcinoma
 - Often bilateral
 - ◆ Paget Disease of Breast
 - Malignant cells in nipple epidermis
 - Eczematous lesion
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Blood Supply

- ◆ Arterial Supply

From three main sources:

- 1) Subclavian artery
 - 2) Axillary artery
 - 3) Intercostal arteries
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- ◆ Detailed Arterial Flow

-> Subclavian artery → Internal thoracic artery →
Perforating branches (2nd-4th ICS)

-> Axillary artery

- Superior thoracic artery
- Thoracoacromial artery (pectoral branch)
- Lateral thoracic artery
- Subscapular artery

-> Posterior intercostal arteries → Lateral branches
(2nd-4th ICS)

 Important Point:

2nd intercostal artery = largest contributor to upper
breast, nipple & areola.

Venous Drainage

◆ Superficial Veins

Drain into:

- Internal thoracic vein
 - Superficial neck veins
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◆ Deep Veins

Drain into:

- Internal thoracic vein
 - Axillary vein
 - Posterior intercostal veins
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◆ Clinical Significance

Posterior intercostal veins → Communicate with vertebral venous plexus → Route for metastasis to vertebrae

 Viva Pearls

- Breast = Modified apocrine gland
 - Lies in superficial fascia
 - Nipple at 4th intercostal space
 - 15-20 lobes
 - Carcinoma arises from TDLU
 - Cooper ligaments → Skin dimpling
 - Retromammary space → Mobility
 - Posterior intercostal veins → Vertebral metastasis
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Nerve Supply of the Breast

◆ Source

Anterior and lateral cutaneous branches of:

- 4th intercostal nerve
 - 5th intercostal nerve
 - 6th intercostal nerve
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◆ Important Clinical Point 

! Nerves are NOT involved in milk production or secretion.

Milk production → Hormonal (Prolactin)

Milk ejection → Oxytocin reflex

Nerves provide:

- Sensory supply
 - Reflex stimulation for let-down reflex
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◆ Sensory Flow

Suckling stimulus → Sensory impulses via intercostal nerves → Hypothalamus → Posterior pituitary → Oxytocin release → Milk ejection

 Viva pearl: Sensory nerves trigger milk ejection reflex, but do not produce milk.

Quadrants of the Breast

Breast is divided into 4 quadrants:

- Upper Outer Quadrant (UOQ)
- Upper Inner Quadrant (UIQ)
- Lower Outer Quadrant (LOQ)
- Lower Inner Quadrant (LIQ)

 Most carcinomas occur in Upper Outer Quadrant
Reason → Larger amount of glandular tissue + axillary tail.

Lymph Nodes & Lymphatic Drainage

◆ What Are Lymph Nodes?

Small bean-shaped immune structures

- Filter lymph
- Contain lymphocytes

Very important in metastasis of breast carcinoma.

Lymphatic Drainage of Breast

Three major pathways:

75% → Axillary lymph nodes

20-25% → Internal mammary (parasternal) nodes

5% → Other minor pathways

- ◆ Minor Pathways (5%)

- Supraclavicular nodes
- Deltopectoral nodes
- Posterior intercostal nodes
- Subdiaphragmatic nodes
- Subperitoneal lymph plexus

 Explains abdominal and vertebral metastasis.

Superficial vs Deep Lymphatics

Type	Drains
Superficial lymphatics	Skin (except nipple & areola)
Deep lymphatics	Parenchyma + Nipple + Areola

⚠ Nipple & areola drain with deep lymphatics.

Axillary Lymph Nodes

- ◆ Number

20-30 nodes

- ◆ Drain:

- Lateral breast quadrants
- Upper limb
- Thoracoabdominal wall (above umbilicus)

- ◆ Six Groups of Axillary Nodes

1. Anterior (Pectoral)
2. Posterior (Subscapular)
3. Lateral (Humeral)
4. Central
5. Infraclavicular (Deltopectoral)
6. Apical

- ◆ Arrangement Flow

Anterior group + Posterior group + Lateral group →
Drain into Central nodes → Drain into Apical nodes →
Subclavian lymph trunk

- ◆ Final Drainage

Right side:

Subclavian trunk → Right lymphatic duct

Left side:

Subclavian trunk → Thoracic duct

Internal Mammary (Parasternal) Nodes

- Located along internal thoracic vessels
- Drain medial quadrants
- Important in cross-breast metastasis

Explanation:

Medial lymphatics → Parasternal nodes → May cross
midline → Opposite breast

⚠ Explains bilateral spread of carcinoma.

Applied Anatomy

● Carcinoma of Breast

Types:

1. Benign

- Fibroadenoma
- Cysts

2. Malignant

- Ductal carcinoma (most common)
 - Lobular carcinoma
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● Peau d'Orange 🍊

Meaning: "Orange peel appearance"

Cause:

Carcinoma → Obstruction of lymphatic drainage →
Lymphatic edema → Skin tethering → Pitting + thickening

Common in:

- Inflammatory breast cancer
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● Skin Dimpling

Carcinoma infiltration → Shortening of Cooper ligaments
→ Skin pulled inward

● Retracted Nipple

Causes:

- Congenital
- Aging
- Breastfeeding
- Infection
- Carcinoma ⚠

Mechanism:

Tumor fibrosis → Shortening of lactiferous ducts →
Nipple pulled inward

● Other Signs of Breast Cancer

- Visible lump

- Surface erythema
 - Surface ulceration
 - Recent nipple inversion
 - Blood-stained discharge
 - Eczema around nipple (Paget disease)
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● Breast Abscess

Common in lactating women

Cause:

Bacterial infection → Mastitis → Abscess formation

● Mammography

Radiological investigation

Used for:

- Screening
- Early detection

- Detect microcalcifications
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Complete Clinical Correlation Flow

Breast carcinoma

- Lymphatic obstruction → Peau d'orange
 - Cooper ligament involvement → Skin dimpling
 - Duct fibrosis → Nipple retraction
 - Axillary node enlargement → Hard, fixed nodes
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Viva Pearls

- 75% drains to axillary nodes
- Nipple drains with deep lymphatics
- UOQ most common carcinoma site
- Peau d'orange = lymphatic obstruction
- Retraction = duct fibrosis
- Apical nodes → Subclavian trunk

Resources:

i) Snell's Clinical Anatomy by Regions (Book by Lawrence E. Wineski)

ii) BD Chaurasia's Human Anatomy: Regional and Applied Dissection and Clinical

-> The End <-