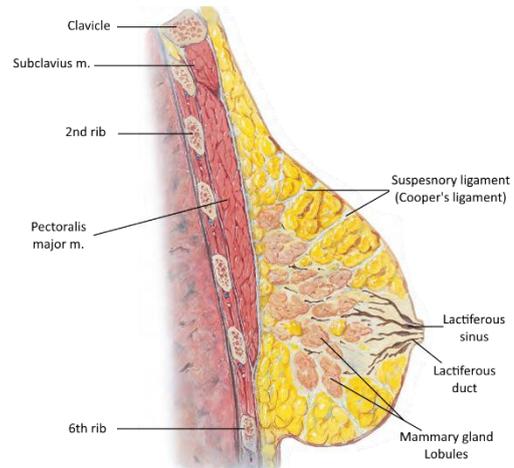
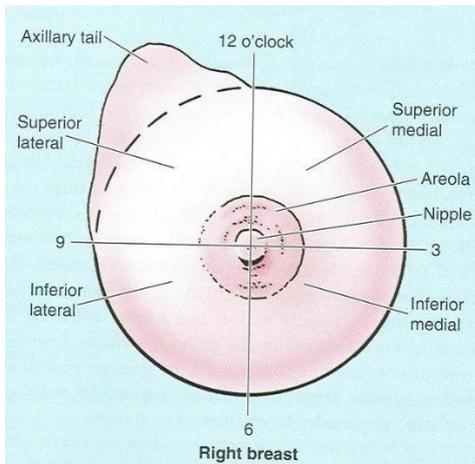


# Anatomy and development of the breast

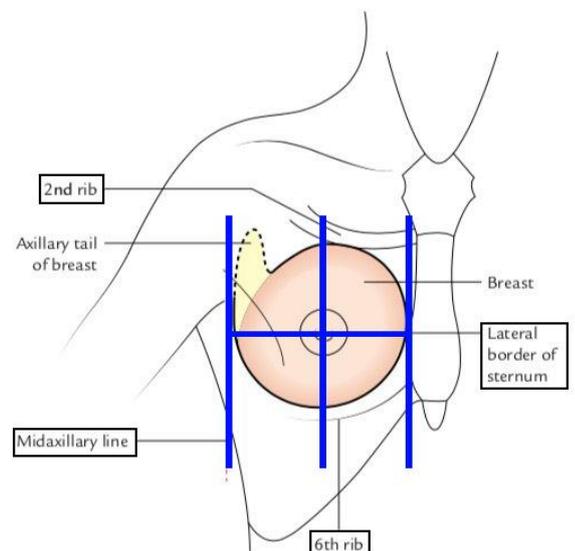
## Anatomy of female breast

<b>Definition</b>	Are specialized accessory glands of the skin that are capable of secreting milk and present in both sexes.	
<b>Shape</b>	It is conical in shape.	
<b>Location</b>	It lies in <b>superficial fascia</b> of the front of chest.	
<b>Parts</b>	➤ Base	➤ Apex
<b>Capsule</b>	It has no capsule.	
<b>Extent</b>	<b>Medial to lateral</b>	It extends from the <b>sternum to the midaxillary line</b> laterally.
	<b>Base</b>	Its base extends from <b>2nd to 6th ribs</b> .
<b>Axillary tail (Tail of Spence)</b>	It is a small part that extends upwards and laterally, pierces the deep fascia at the lower border of the pectoralis major and comes in contact with the axillary vessels. It contains a large amount of glandular tissue and is the <b>site of 60 % of carcinomas of the breast</b> .	



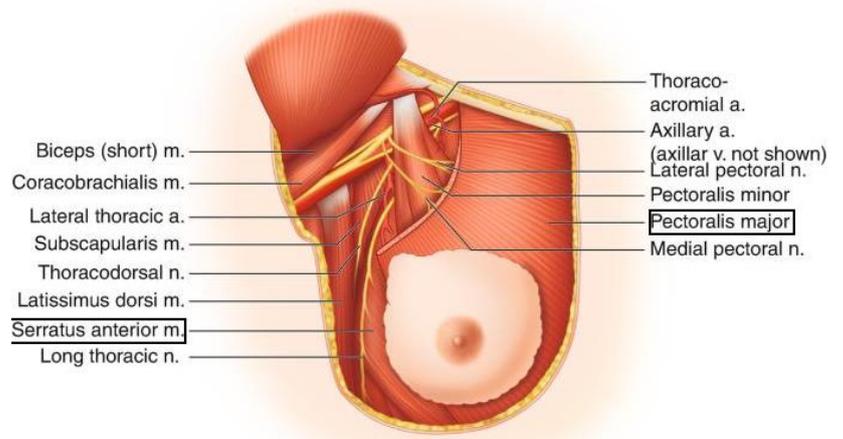
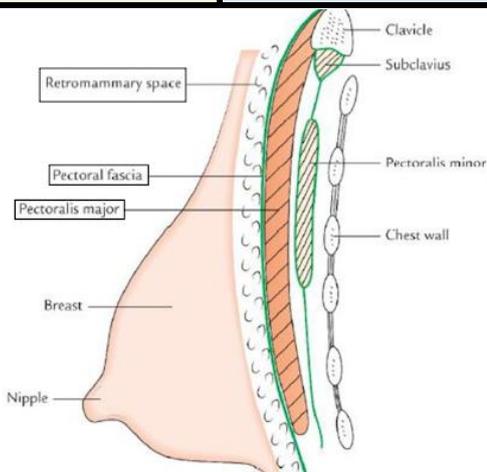
### Extension of the gland:

<b>Vertical extension</b>	Along the mid-clavicular line from <b>2nd to 6th rib</b> .
<b>Horizontal extension</b>	At level of 4th rib from lateral margin of <b>sternum to mid-axillary line</b> .
<b>Nipple</b>	Opposite <b>4th intercostal space</b> .



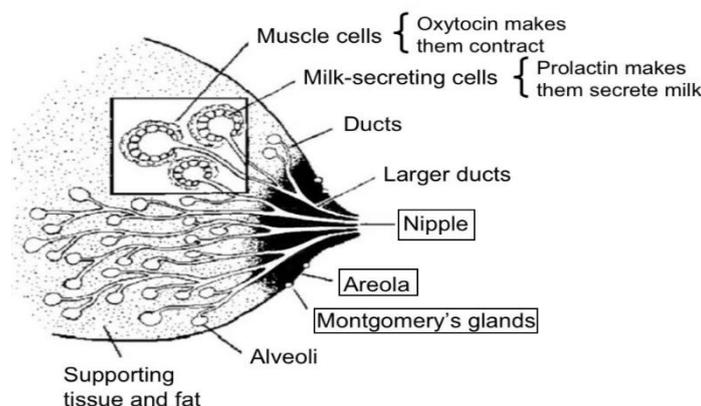
▪ Deep relations of the breast:

Breast bed	Retro-mammary space	Makes the breast <b>movable</b> over pectoralis major muscle.	
	Pectorial fascia (Deep fascia)	Covers pectoralis major.	
	Muscular bed	Pectoralis major	<b>Supero-lateral 2/3</b> of breast lies on it.
		Serratus anterior	<b>Infro-lateral</b> part
External oblique aponeurosis		<b>Lower 1/3</b> of breast lies on them	



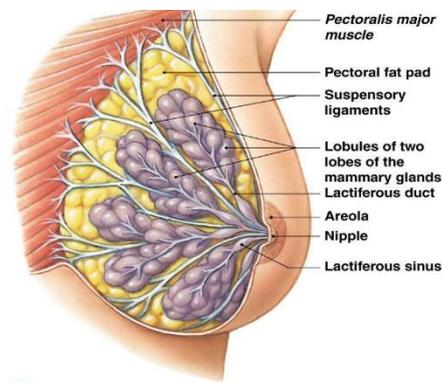
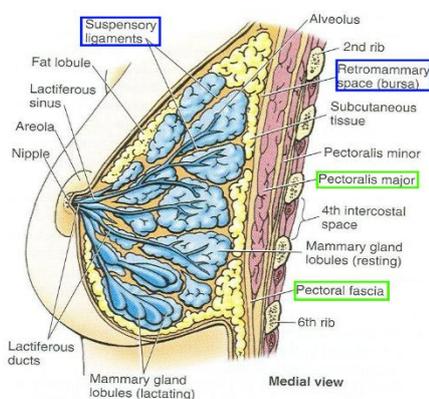
▪ Parts of mammary gland:

Nipple	<ul style="list-style-type: none"> <li>➤ It is a <b>conical eminence</b> that projects forwards from the anterior surface of the breast</li> <li>➤ The nipple lies opposite <b>4th intercostal space</b>.</li> <li>➤ It carries <b>15-20 narrow pores</b> of the lactiferous ducts.</li> <li>➤ It contains <b>smooth muscle fibers</b>, which can make the nipple stiff</li> </ul>
Areola	<ul style="list-style-type: none"> <li>➤ It is a <b>dark pink brownish circular area</b> of skin that surrounds the nipple.</li> <li>➤ The subcutaneous tissues of nipple &amp; areola are <b>devoid of fat</b>.</li> <li>➤ It contains <b>sebaceous glands</b> called areolar gland (<b>Montgomery Glands</b>) which produces tubercles on the skin of the areola.</li> </ul>



▪ Stroma & Parenchyma of mammary gland:

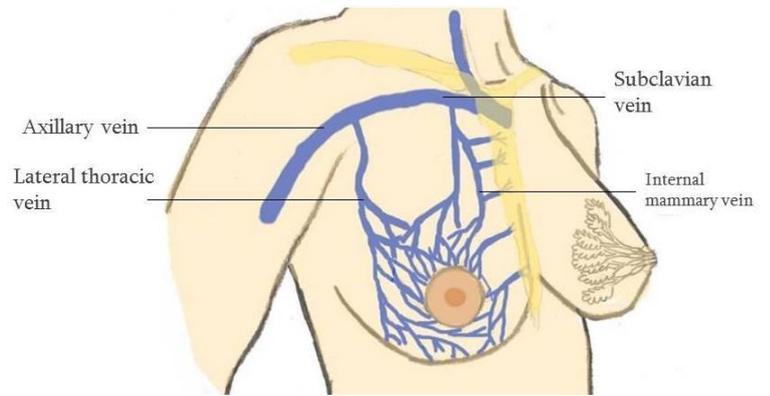
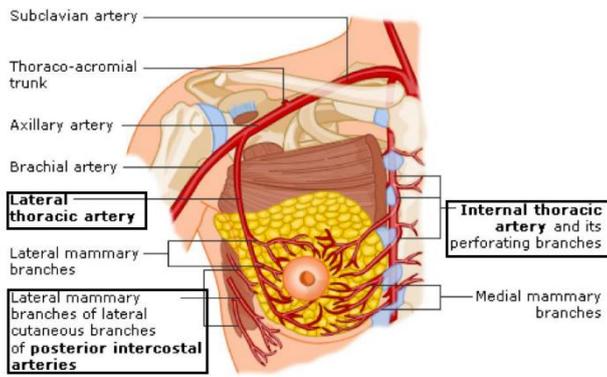
Stroma	<ul style="list-style-type: none"> <li>➤ It is <b>non capsulated</b> gland.</li> <li>➤ It consists of lobes and lobules which are embedded in the subcutaneous fatty tissue of superficial fascia.</li> <li>➤ It has fibrous strands (<b>ligaments of cooper</b>) which <u>connect</u> the <b>skin</b> with <b>deep fascia</b> of pectoralis major.</li> <li>➤ It is separated from the deep fascia covering the underlying muscles by a layer of loose areolar tissue which forms the <b>retromammary space</b> which <b>allows breast movements</b>.</li> </ul>
Parenchyma	<ul style="list-style-type: none"> <li>➤ It is formed of <b>15-20 lobes</b>.</li> <li>➤ Each lobe is formed of a number of lobules.</li> <li>➤ The lobes and lobules are <b>separated by</b> interlobar and interlobular fibrous &amp; fatty tissue, called <b>ligaments of Cooper</b>.</li> </ul> <p style="text-align: center;"><b>Q: Importance ligaments of Cooper?</b></p> <ul style="list-style-type: none"> <li>➤ These ligaments give the breasts support by connecting the skin of the breasts to the pectoralis muscles below them.</li> <li>➤ It has from <b>15-20 lactiferous ducts</b> which open by the same number of openings on the summit of the nipple.</li> </ul>



**a The mammary glands of the left breast**

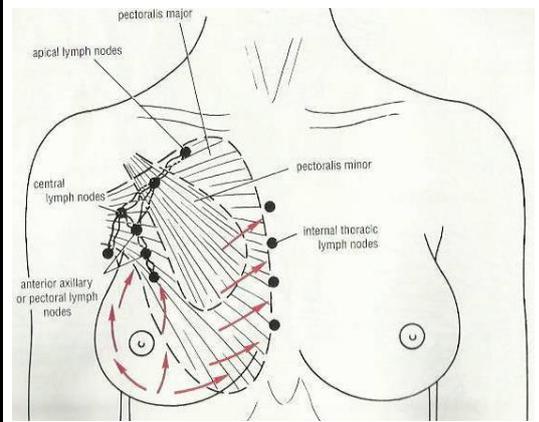
▪ Blood supply of the mammary gland:

Arterial supply	Venous drainage
<ul style="list-style-type: none"> <li>➤ Perforating branches of <b>internal thoracic (mammary)</b> artery.</li> <li>➤ Perforating branches of <b>2<sup>nd</sup>, 3<sup>rd</sup> &amp; 4<sup>th</sup> intercostal</b> arteries</li> <li>➤ <b>Axillary artery branches</b> (Superior thoracic, acromiothoracic &amp; lateral thoracic)</li> <li>➤ Mammary branches of <b>posterior intercostal a.</b></li> </ul>	<ul style="list-style-type: none"> <li>➤ Veins are corresponding to the arteries.</li> <li>➤ <b>Circular venous plexus</b> is found at the base of nipple.</li> <li>➤ Finally, veins of this plexus drain into <b>axillary, internal thoracic &amp; intercostal veins</b>.</li> </ul>



▪ Lymphatic drainage:

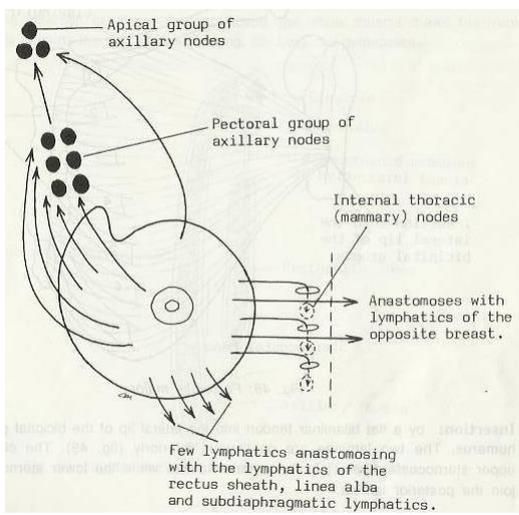
Lymphatics from skin covering mammary gland	
Skin covering lateral part of breast	➤ To ipsilateral anterior [ <b>pectoral</b> ] axillary L.N.
Skin covering medial part of breast	➤ To ipsilateral & contralateral <b>parasternal</b> L.N.
Skin covering upper part of breast	➤ To ipsilateral <b>deep cervical</b> L.N.
Skin covering Lower part of breast	➤ To ipsilateral <b>Sub-diaphragmatic</b> and <b>Retro-peritoneal</b> L.N.
From nipple & areola	➤ Pass to <b>subareolar</b> lymphatic plexus.



Lymphatic of the mammary gland	
Superficial lymphatic plexus ( <b>sub-areolar</b> )	<ul style="list-style-type: none"> <li>➤ Site: Beneath areola</li> <li>➤ Afferent: <ul style="list-style-type: none"> <li>✓ Nipple</li> <li>✓ Areola</li> <li>✓ Central part of gland</li> </ul> </li> </ul>
Deep lymphatic plexus ( <b>sub-mammary</b> )	<ul style="list-style-type: none"> <li>➤ Site: in fascia of pectoralis major</li> <li>➤ Afferent: all other parts of the breast</li> </ul>

## Deep regional lymphatics

<b>Definition</b>		It is an <b>Efferent lymphatic</b> from breast & their lymphatic plexus that accompany the arteries supplying the gland.
<b>Efferent from:</b>	<b>Lateral &amp; central parts</b>	<ul style="list-style-type: none"> <li>➤ Pass to ipsilateral anterior [<b>pectoral</b>] axillary L.N. [main]</li> <li>➤ Few → ipsilateral <b>subscapular</b> &amp; <b>apical</b> L.N.</li> </ul>
	<b>Medial parts</b>	<ul style="list-style-type: none"> <li>➤ Pass to ipsilateral &amp; contralateral <b>parasternal</b> L.N.</li> <li>➤ Few → Post. Intercostal L.N.</li> </ul>
	<b>Upper parts</b>	➤ Ipsilateral <b>apical</b> axillary L.N.
	<b>Lower parts</b>	➤ Ipsilateral <b>sub-diaphragmatic</b> & <b>retro-peri</b> L.N.



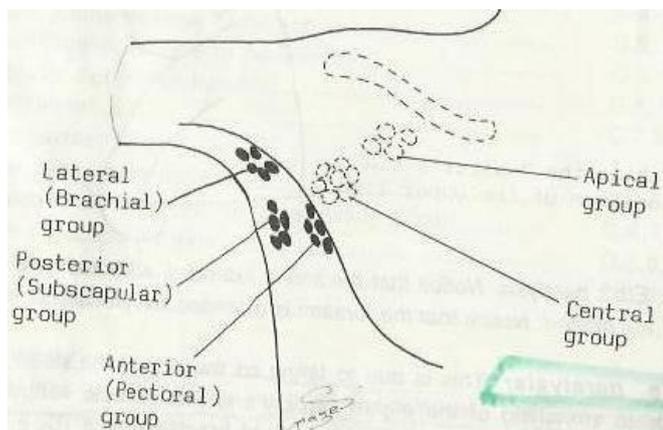
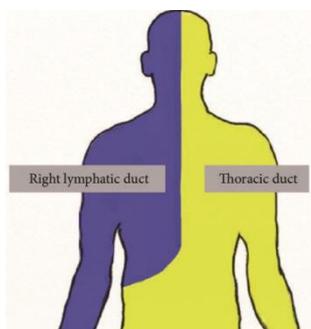
## Axillary L.N.

- Arranged in 5 groups which lies in the axillary fat:

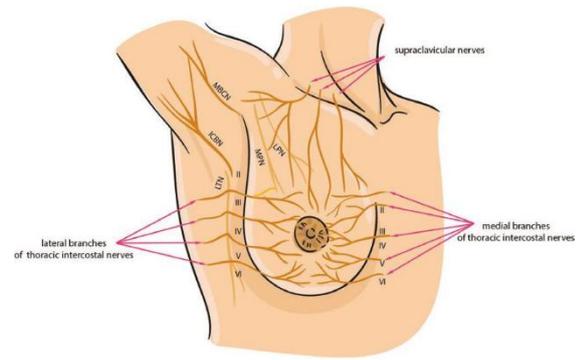
<b>Pectoral (anterior)</b>	➤ Which lies on the pectoralis minor <b>along lateral thoracic vessels.</b>
<b>Subscapular (posterior)</b>	➤ Which lies on posterior wall of axilla on lower border of subscapularis <b>along subscapular vessels.</b>
<b>Brachial (lateral)</b>	➤ Lies on lateral wall of axilla <b>along 3rd part of axillary vessels.</b>
<b>Central</b>	➤ Lies in axillary fat <b>at the base of axilla.</b>
<b>Apical</b>	➤ Lies at the <b>apex of the axilla.</b>

- Course of Efferent vessels of apical group:

- Efferent vessels of apical group → **subclavian lymph trunk** →
  - ✓ **Right side** → **Right lymphatic duct**
  - ✓ **Left side** → **Thoracic duct**

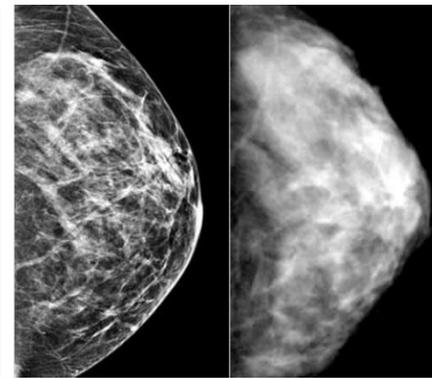
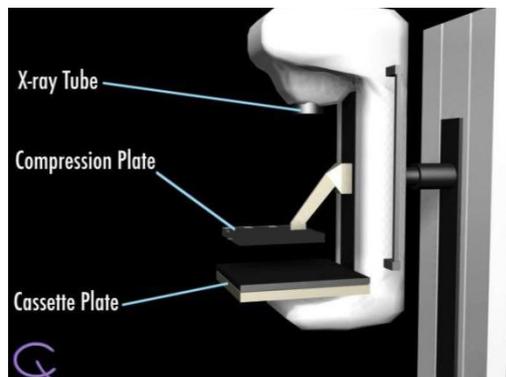


- Innervation of axilla & breast:
  - ✓ **Cutaneous branches of 3-6 intercostal nerves**
  - ✓ Long thoracic nerve
  - ✓ Medial & Lateral pectoral nerves

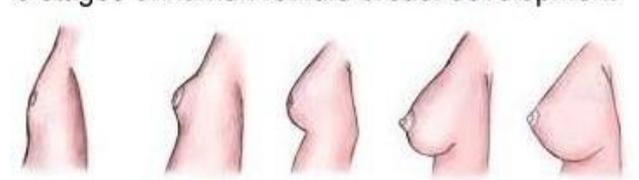


## Applied anatomy – Cancer breast

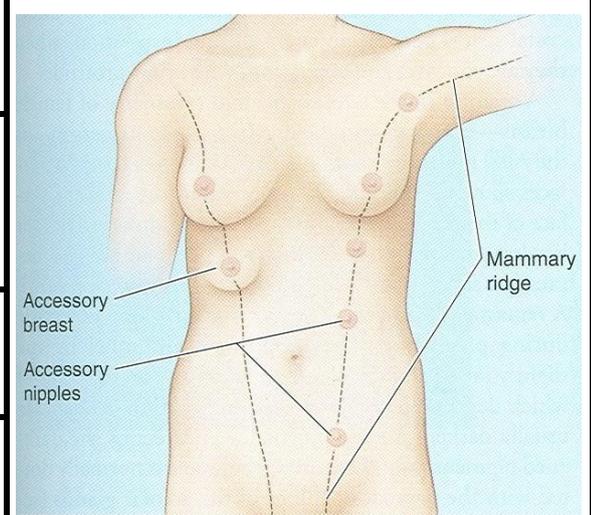
- Common surgical condition
- 60% of carcinomas of breast occur in:
  - **Upper lateral quadrant**
  - **Axillary tail**
- 75% of lymph from breast drains into the **axillary L.N.**
- In case of carcinoma of one breast, the following is also affected:
  - **Other breast**
  - **Opposite axillary L.N.**
- In patients with localized cancer breast, the TTT of choice is:
  - Simple **mastectomy**
  - **Radiotherapy** to axillary L.N.
- The lactiferous ducts are radially arranged from the nipple, so incision of the gland should be made in a radial direction to avoid cutting through the ducts.
- Infiltration of the ligaments of Cooper by breast cancer leads to
  - Shortening of the ligament
  - Gives **peau de'orange** appearance of the breast

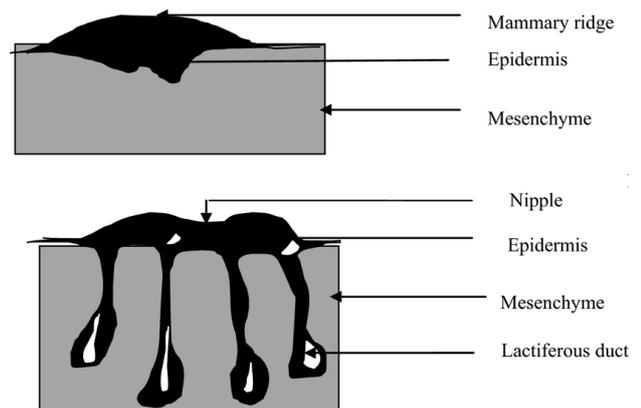
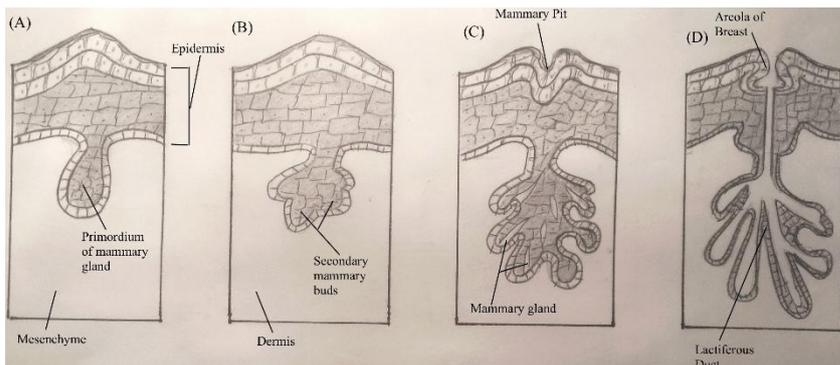


# Development of the breast

<b>Prenatal</b>	<ul style="list-style-type: none"> <li>➤ Breasts begin to form while the unborn baby is still growing in the mother's uterus</li> <li>➤ This starts with a thickening in the chest area called the <b>mammary ridge or milk line</b> which is a downgrowth of the <b>epidermis (ectoderm)</b> into the underlying <b>dermis (mesoderm)</b></li> </ul>
<b>At birth</b>	<ul style="list-style-type: none"> <li>➤ By the time a baby girl is born, nipples and the beginnings of the milk-duct system have formed.</li> </ul>
<b>Puberty</b>	<ul style="list-style-type: none"> <li>➤ In general, breast <b>development begins between the ages of 8 and 13.</b></li> </ul>
<p>5 stages of human female breast development</p> 	

▪ Mammary ridge:

<b>Extent</b>	<ul style="list-style-type: none"> <li>➤ Mammary ridge extends from the <b>axilla to the inguinal region.</b></li> </ul>	
<b>In humans</b>	<ul style="list-style-type: none"> <li>➤ The ridge disappears <b>EXCEPT</b> for a small part in the <b>pectoral region</b></li> </ul>	
<b>In animals</b>	<ul style="list-style-type: none"> <li>➤ Several mammary glands are formed along this ridge</li> </ul>	
<b>Canalization</b>	<ul style="list-style-type: none"> <li>➤ Canalization results in formation of <b>alveoli</b> and <b>lactiferous ducts</b></li> </ul>	



# Congenital anomalies

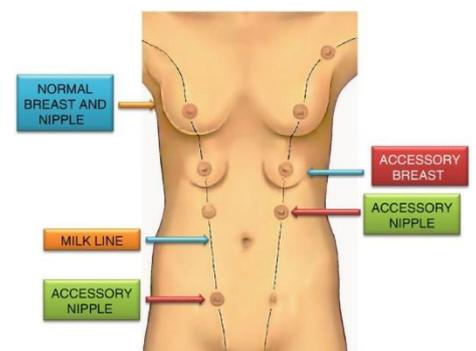
## Anomalies of the Nipples

1) Athelia	Congenital <b>absence</b> of the nipple (rare)
2) Polythelia	<ul style="list-style-type: none"> <li>✓ <b>Multiple nipples</b> that may occur anywhere <b>along the mammary line</b> extending from the anterior axillary fold to the inguinal region, due to persistence of milk line cells.</li> <li>✓ They may be mistaken for moles or warts</li> </ul>
3) Retraction of nipple	<ul style="list-style-type: none"> <li>✓ It is <b>present since birth</b> &amp; should be differentiated later from nipple retraction due to breast cancer or chronic inflammation.</li> <li>✓ It is treated by massage, stretching, or surgery</li> </ul>



## Anomalies of the breast

1) Amazia (Hypoplasia)	<ul style="list-style-type: none"> <li>✓ <b>Absence</b> of the breast (usually unilateral).</li> <li>✓ May be associated with <b>absence of the sternal part</b> of the pectoralis major muscle.</li> </ul>
2) Micromazia (Micromastia)	<ul style="list-style-type: none"> <li>✓ A unilateral or bilateral <b>small breast</b>.</li> <li>✓ Usually associated with congenital anomalies of the ovary.</li> </ul>
3) Polymazia (Polymastia)	<ul style="list-style-type: none"> <li>✓ Multiple or accessory breasts due to <b>persistence of the extramammary part</b> of the milk line (very rare).</li> <li>✓ Usually present (<b>along the milk line</b>) in the axilla, groin, thigh or vulva or, most commonly, on the chest wall.</li> <li>✓ May function during lactation and may suffer from disease as the ordinary breast.</li> </ul>



4) Ectopic breast	✓ Another breast present <b>outside the milk line</b> such as in axillary L.N.
5) Gynecomastia	✓ Painless <b>enlargement</b> of the <b>male breast</b> (unilateral or bilateral) that may occur at <b>puberty</b> or with <b>hepatic diseases</b> . ✓ Treatment: surgical excision
6) Breast hypertrophy	✓ May occur early in <b>infancy</b>
7) Gicantomazia	✓ Gicantomastia = Massive or Diffuse Hypertrophy of the Breast ✓ It's due to <b>abnormal sensitivity</b> of the breast to <b>estrogen</b> . ✓ Usually occurs at puberty & rarely during the first pregnancy. ✓ Treatment: Reduction mammoplasty (i.e. reduction of the breast size).



<p><b>Q1. Which is correct regarding the mammary gland</b></p> <p>A. It extends from the 2nd to 8th ribs.  B. Its base lies on the pectoralis major muscle.  C. It has 4-8 lactiferous ducts.  D. Its most lymph drains into the parasternal lymph nodes</p> <p>Answer: B</p>	<p><b>Q2. The lymphatics from upper part of mammary gland drain into:</b></p> <p>A. The parasternal lymph nodes.  B. Subdiaphragmatic lymph nodes.  C. Apical group of axillary lymph nodes.  D. Pectoral group of axillary lymph nodes.</p> <p>Answer: C</p>
<p><b>Q3. The lactiferous ducts of mammary gland are:</b></p> <p>A. Less than 10.  B. From 10-15.  C. From 15-20.  D. More than 20.</p> <p>Answer: C</p>	