



# BREAST ANATOMY & HISTOLOGY

Dr Evelyne Ruf

MD (France), Fam. Med. Dipl. (Monash),  
IBCLC (since 1993), RCST



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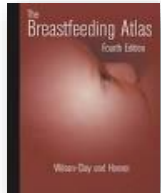


## Objectives

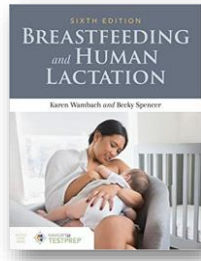
- Locate the major structures of the breast
- Discuss the innervation and blood supply of the breast.
- Describe the histology of the human breast

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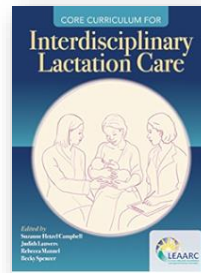
## Sources



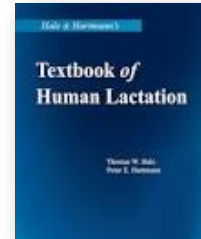
'The BF Atlas'  
Wilson-Clay &  
Hoover,  
4<sup>th</sup> Edition (2008)  
and CD from 2<sup>nd</sup>  
edition



'BF and Human Lactation'  
K. Wambach & B. Spencer  
6<sup>th</sup> Edition (2021)



'Core Curriculum for  
Interdisciplinary  
Lactation Care'  
LEAARC (2019)



'Textbook of Human  
Lactation'  
T. Hale & P. Hartmann  
1<sup>st</sup> Edition (2007)



Breastfeeding – A Guide for the Medical Profession  
By Ruth Lawrence and Robert Lawrence (2011, 7th Edition)

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## Plan

- Introduction
- External view
- Internal view ('new' anatomy)
- Supply to the breast
- Histology

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## A Solid Foundation for IBCLCs...



‘A thorough understanding of the anatomy, histology and *physiology* of the breast provides a solid foundation upon which to investigate and treat women and infants experiencing breastfeeding difficulties.’  
(Geddes D., 2007)

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## The Breast...

- Medical name: ‘mammary gland’
- Comes from Latin word for breast ‘*mamma*’ (probably due to infant’s hunger cry ‘mamma’)

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## ... a So Special Organ: Symbol of Life and Death

- Producing milk (primary function)
- Bonding with baby
- Womanhood
- Beauty/sex appeal



- Breast cancer
- Ageing breasts
- Pain

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## ... a So Special Organ: Changes So Much

- The only organ not fully developed at birth
- Changing appearance during a woman's life:
  - Before, during and after puberty
  - During the menstrual cycle
  - During pregnancy and breastfeeding
  - During menopause

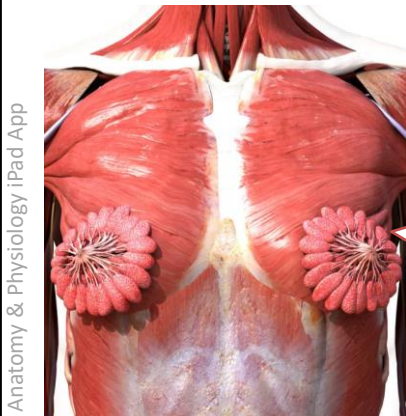
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## General Anatomy: Location

- Located in the superficial fascia
- Superficial to the pectoralis major muscle



Viral illustration  
on social media...

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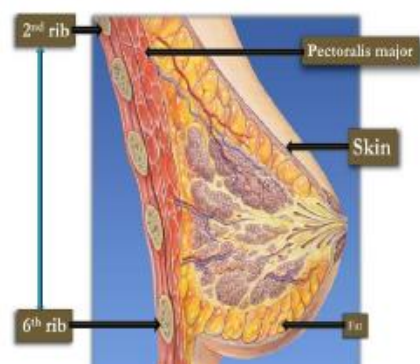
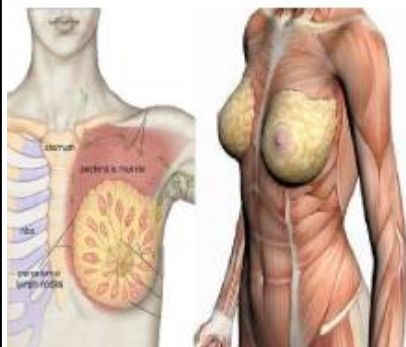


image.slidesharecdn.com/breastanatomy

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## Location (end)

- Vertically: between 2<sup>nd</sup> and 6<sup>th</sup> rib in the mid-clavicular line.
- Horizontally: from lateral border of sternum to the mid axillary line along the 4<sup>th</sup> rib.



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## Plan

- Introduction
- External view**
  - **Description tool**
  - **Size**
  - **Skin**
  - **Areola**
  - **Nipple**
- Internal view ('new' anatomy)
- Supply to the breast
- Histology

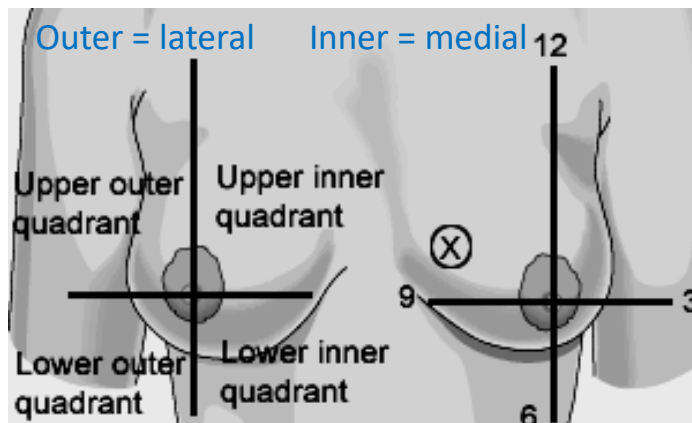
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## Description: Two Methods

- Quadrants: UOQ, UIQ, LOQ, LIQ
- Face of a clock: 'at 10 o'clock position'



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## Size and Milk Production

- No direct relation between **breast size** and **milk production**: what is important is the amount of **glandular tissue**.
- Fat gives breast size and shape.  
E.g. large fatty breasts could make less milk than small breasts full of glandular tissue..
- Breast size is more or less related to **milk storage capacity**, which is related to the frequency of feeding, NOT to the milk production capacity.

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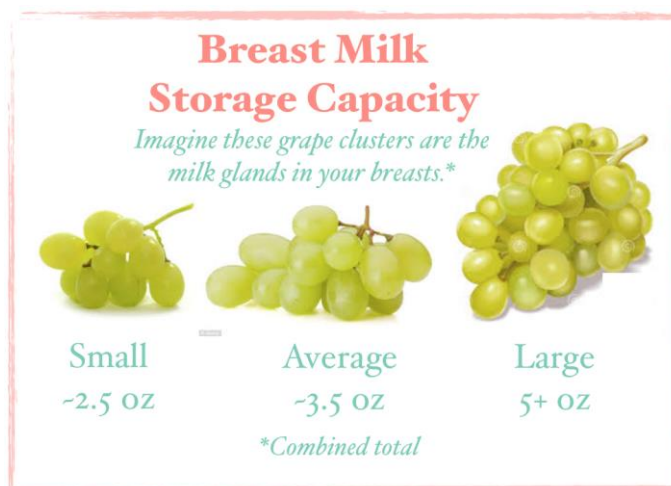
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## Milk Storage Capacity

Milk storage capacity = max volume of milk in the breasts at their natural\* fullness.  
I.e. usual volume in the largest pump session (by the end of the night or early AM)

\* Not 'forced' fullness



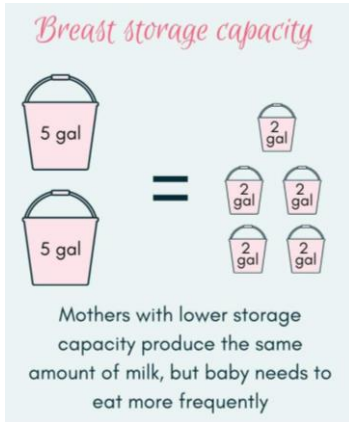
<https://www.dianneclancyconsulting.com/2021/04/21/is-it-low-milk-supply-or-small-storage-capacity/>

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## Milk Storage Capacity & 'Magic Number'



\*Oversupplier? This graphic may not apply to you.

|  |               | <b>Largest Capacity</b> | <b>Large Capacity</b> | <b>Average Capacity</b> | <b>Small Capacity</b> | <b>Smallest Capacity</b> |
|--|---------------|-------------------------|-----------------------|-------------------------|-----------------------|--------------------------|
| <b>Max pump yield</b><br>(both breasts combined) |               | 10+ oz                  | 5-9+ oz               | 3-5+ oz                 | 2-3+ oz               | 1-2+ oz                  |
| <b># Milk Removals per Day Needed to</b>         | Increase milk | 4-5                     | 6-8                   | 8-10                    | 10-11                 | 12+                      |
|  | Maintain milk | 3-4                     | 5                     | 6                       | 7                     | 8                        |
|  | Decrease milk | 2                       | 3                     | 4-5                     | 6                     | 7                        |

▶ If # of milk removals stays at or above your magic number, your milk production may remain stable or may even increase.

▶ If # of milk removals drops below your magic number, your milk production may decrease.

Adapted from Breastfeeding Made Simple by Nancy Mohrbacher



@LEGENDAIRYMILK WWW.LEGENDAIRYMILK.COM

<https://evidence-basedmommy.com/breast-storage-capacity-breastfeeding-magic-number/>

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(see session on physiology) 15

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## During Pregnancy

- Most common: gradual growth throughout entire pregnancy
- Greatest rate of breast growth: first 5 months
- Increase in breast volume can range between 12 - 227 ml
- Average weight (150-200 gr) doubles (400-500 gr) during lactation. Slight decrease between 6 and 9 months (milk production remains constant).

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## During Pregnancy

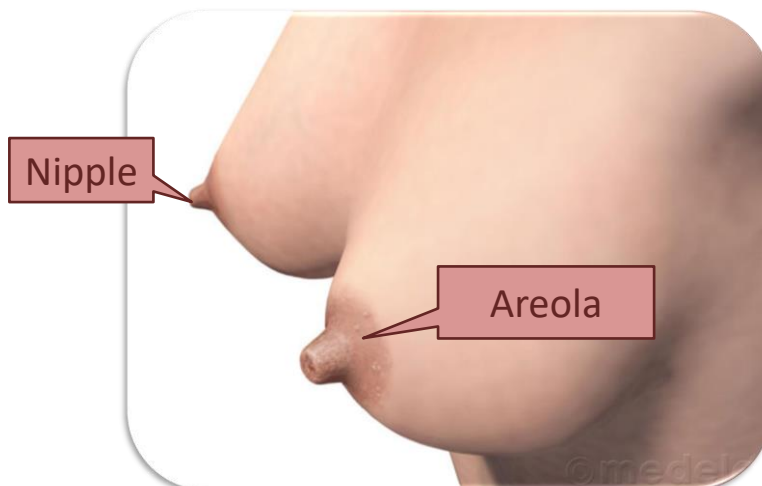
- Some women experience minimal breast enlargement ( less than 1 cup size) and still produces enough milk.
- No direct relationship between growth in pregnancy and milk production at 1 month (as optimal management from the first hour is determinant).
- Skin appears thinner, with more prominent veins.

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## External appearance - Skin



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## Skin of the Breast

- It includes the nipple, areola and general skin.
- Thin, flexible, elastic cover of the breast, adherent to the fat-laden subcutaneous tissue.
- It contains hair, sebaceous glands and sweat glands.
- The nipple and areola are extremely elastic and can stretch 2-3 times resting length \*.



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\* If not, many challenges will be encountered (latching, milk transfer...)

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## Areola

- Circular pigmented area which surrounds the nipple
- Constructed of smooth muscle, elastic connective tissue fibers in radial & circular arrangement.
- Contains numerous nerve endings.
- Surrounded by hair follicles (not on it).
- Contains Montgomery's tubercles, also called 'areolar glands'.



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## Areolar Glands = Montgomery's tubercles

- Within the areola
- Contain openings for sebaceous, lactiferous and sweat glands.
- Enlarge during pregnancy, become prominent.
- Secrete a substance that lubricates and protects the nipples and small amount of milk.

Number of areola glands: 1-15  
(Geddes, 2007)



The Breastfeeding Atlas Fig. 219

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## Areolar Glands (AGs)



**Figure 19a. Milk-white discharge and palpable mass associated with Montgomery gland blockage.**

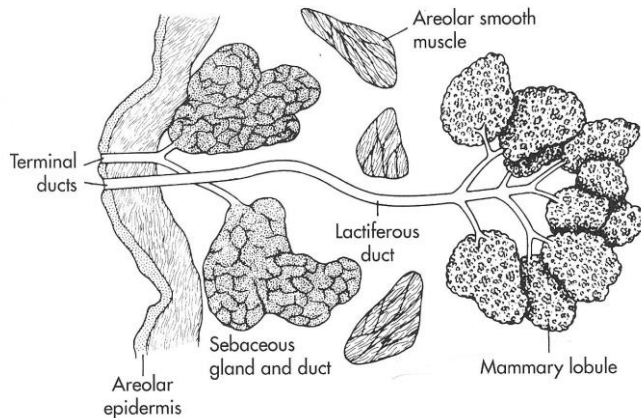
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Nicholson B T et al. Radiographics 2009;29:509-523

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## Areolar Glands: Mammary Milk Glands AND Sebaceous Glands



*Tubercle of Montgomery and underlying structures. Lactiferous duct may join sebaceous gland ducts and terminate at common opening in areola epidermis.*

Lawrence 2-9

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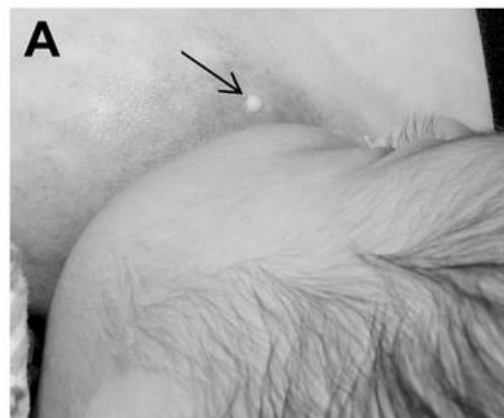
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## Areolar Glands (end)

**A)** Areola of a lactating woman (day 3 postpartum), with AG giving off their secretion (arrow).

About 1 in 5 lactating women reported seeing a visible fluid emission from their areolar glands.

**Excerpt from Figure 1. Areolar glands and infant behavior.**



Doucet S, Soussignan R, Sagot P, Schaal B (2009) The Secretion of Areolar (Montgomery's) Glands from Lactating Women Elicits Selective, Unconditional Responses in Neonates. PLoS ONE 4(10): e7579. doi:10.1371/journal.pone.0007579  
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0007579>

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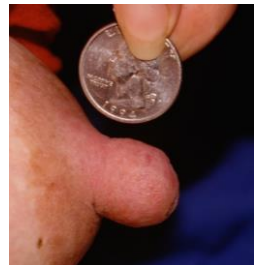
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## Nipple

- Conical elevation located in the center of the areola.
- Average diameter is **11-13 mm**, length 7-9 mm.
- Nipples vary in size and shape, some variations carry the potential for a difficult latch.
- Diameter and length increase during pregnancy  
*\*maintained after pregnancy: many grand multipara have large nipples [clinical observation]*
- Average diameter of nipple of **BF women: 16 mm** (Ziemer; Ramsay et al.), **17 mm** (Kay Hoover)
- *What is the diameter of pump flange tunnels?*

24, 25, 26 mm



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The Breastfeeding Atlas

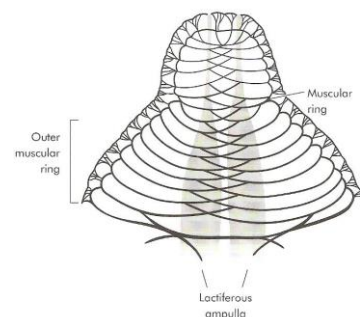
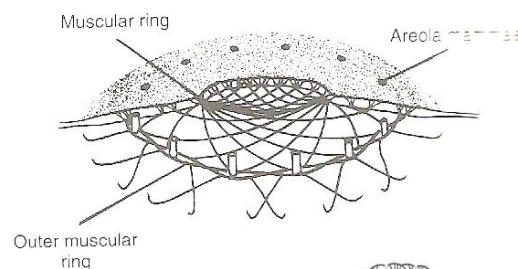
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## Nipple (end)

- Smooth muscle fibers function as a closure mechanism to keep milk from leaking.
- Longitudinal inner muscles and outer circular muscles make the **nipple erect when stimulated**.



Lawrence 2-10

Lawrence 2-11

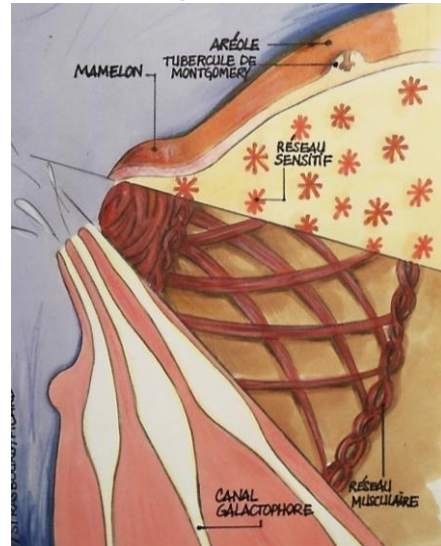
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## Summing-Up Areola & Nipple Complex

- Very rich muscular and nervous structure
- Stretchable
- Role of the areolar glands
- Let's enter through a nipple pore...



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## Plan

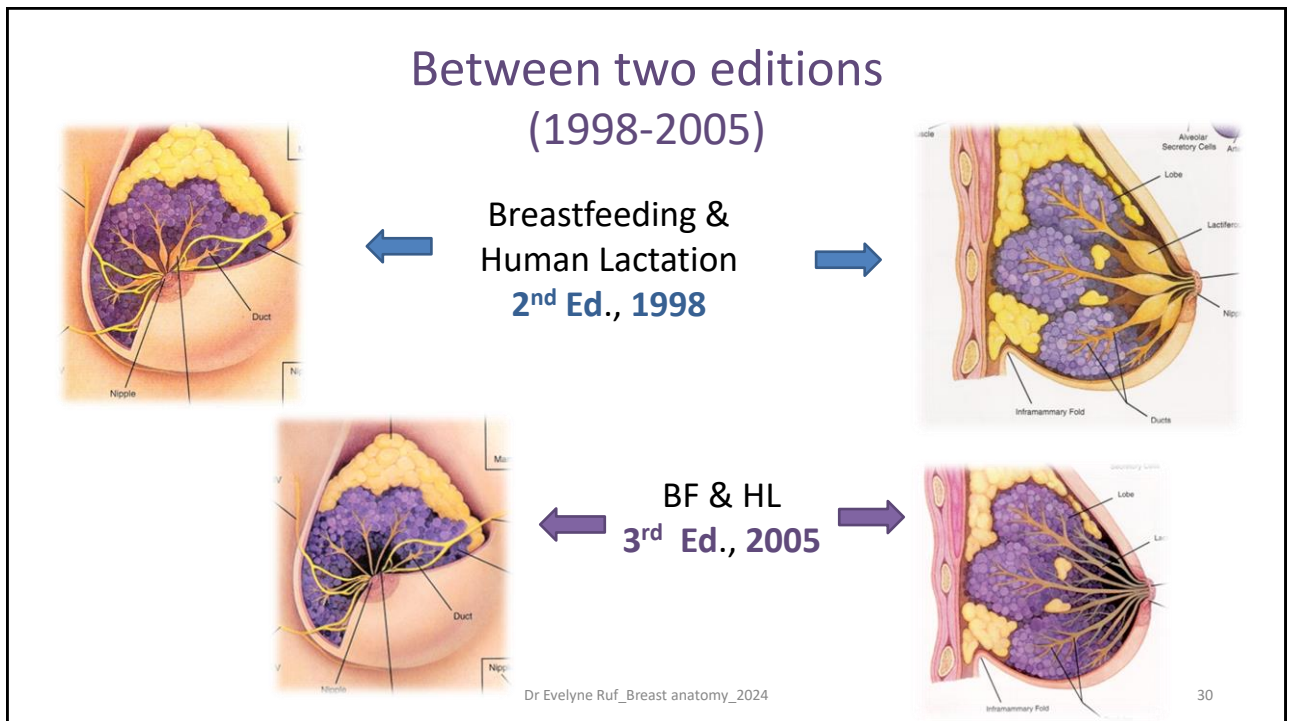
- Introduction
- External view
- Internal view ('new' anatomy)**
  - **Historical perspective**
  - **New research methodology**
  - **New findings**
  - **Clinical implications**
- Supply to the breast
- Histology

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## Historical Perspective

- All previous diagrams based on drawings published by Sir Astley Paston Cooper in 1840 (*“On the anatomy of the breast”*) from dissections done on cadavers.
- Hot wax was injected into the nipple pores (with different colours).
- The wax casts of milk ducts, ‘intertwined like roots of a tree’, had been laid out in an orderly manner for the artist to draw.

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## Historical Perspective (cont.)



Wax cast of lactating human breast  
(Cooper, 1840):

- Dilatation after nipple pore  
→ 'lactiferous sinuses'
- Milk ducts disposed in a radial or symmetrical pattern

**Fig. 1 Artist's impression of the lobes of the breast.** The ducts were injected with coloured wax prior to dissection (from Cooper, 1840).

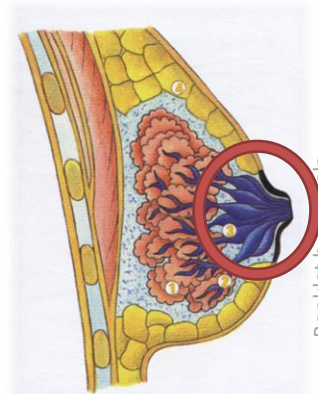
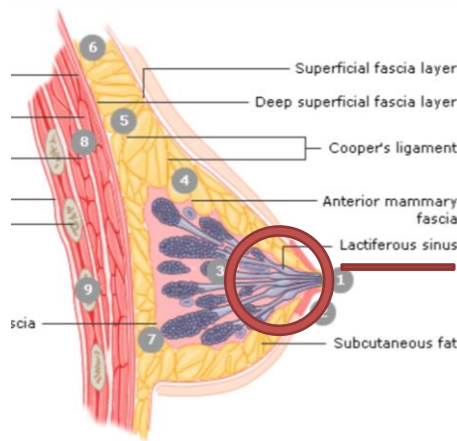
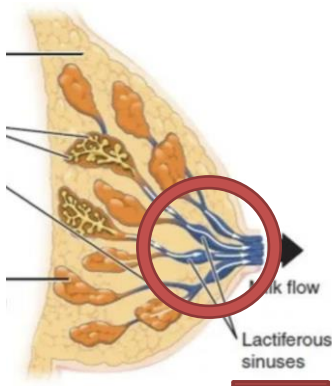
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## Historical Perspective (end)

Basis for all breast illustrations (until recently)



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## Plan

- Introduction
- External view
- Internal view ('new' anatomy)**
  - Historical perspective
  - **New research methodology**
  - New findings
  - Clinical implications
- Supply to the breast
- Histology

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WESTERN AUSTRALIA

## Breakthrough Research



Centre for Human Lactation  
Research and Translation

- Ramsay DT, Kent JC, Hartmann RA and Hartmann PE.  
**Anatomy of the lactating human breast redefined with ultrasound imaging.**  
*Journal of Anatomy* **2005** **206**:525-534.
- Geddes DT. **The use of ultrasound to identify milk ejection in women – tips and pitfalls.**  
*International Breastfeeding Journal* **2009** 4:5

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## Material and Method

- 21 mothers (exclusive BF 1- 6 months old babies)
- High resolution ultra-sound scanning
- For both breasts



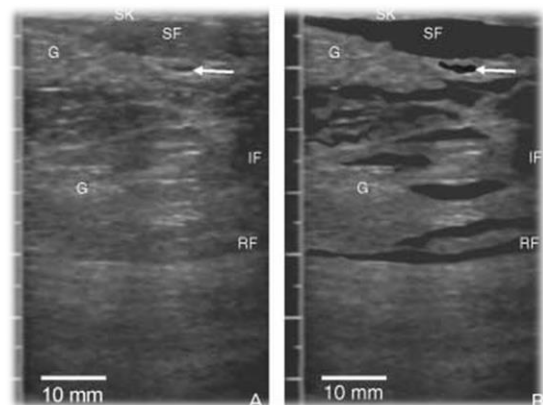
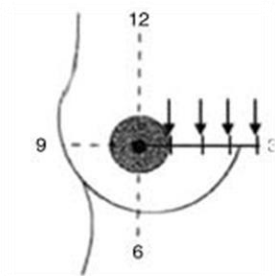
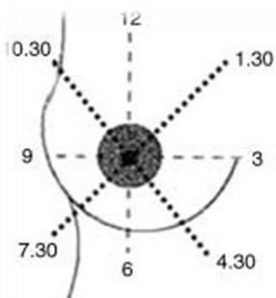
The University of Western Australia

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## Method



**Fig. 5 (A) Ultrasound image of tissues of the lactating breast.**

(B) The skin (SK) is shown as an echogenic (bright) line at the top of the image. The subcutaneous fat (SF) is less echogenic and situated below the skin. The intraglandular fat (IF) is of similar echogenicity to the subcutaneous fat. The glandular tissue is echogenic (G) while the milk duct (arrow) appears as a hypoechoic (low echo) tubular structure. The retromammary fat (RF) is a thin hypoechoic band along the chest wall.

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## Plan

- Introduction
- External view
- Internal view ('new' anatomy)**
  - Historical perspective
  - New research methodology
  - **New findings:**
    - **Parenchyma**
    - Supportive network
  - Clinical implications
- Supply to the breast
- Histology

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## FUNCTIONAL PART OF THE BREAST (PARENCHYMA)

- Ducts (from secretory units to nipple pores)
- Glandular tissue (milk production units)



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## Illustration following Ultrasound Imagery



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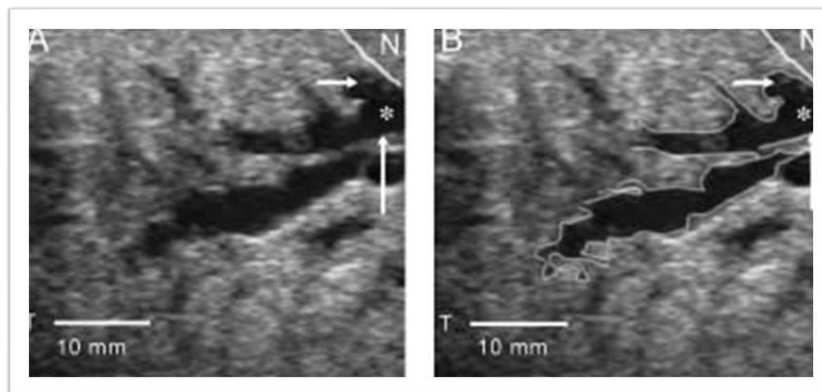
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## Ultrasound Appearance of Milk Ducts



**Fig. 2** (A) Ultrasound image of milk duct in the lactating breast. The duct appears as branching hypoechoic structure within echogenic glandular tissue. (B) The ducts focused on in this scan are outlined in white. The duct is traced from the nipple (N) to the periphery of the breast. The walls are echogenic (↑) and the lumen hypoechoic (asterisk). The first branch of this duct (→) is imaged almost directly under the nipple.

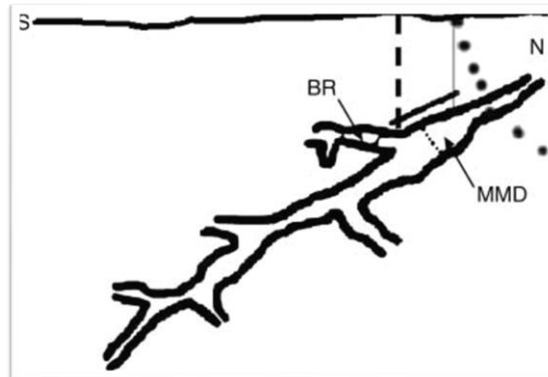
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## Measurements Done on Milk Ducts



**Fig. 3 Diagram of the milk duct coursing deep into the breast from the nipple (N).** Measurements were made of the depth (thin solid line) and diameter (dotted line) of the main milk duct (MMD) and the distance of the first branch (BR, thick solid line) from the base of the nipple. The diameter (double line) and depth from the skin (dashed line) of the first branch (BR) of the duct were also measured.

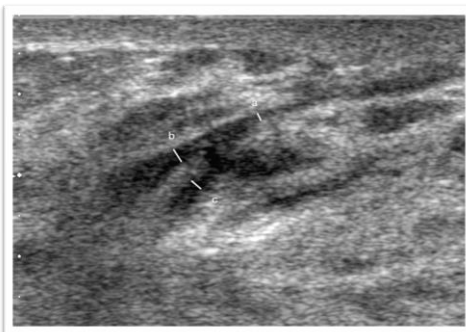
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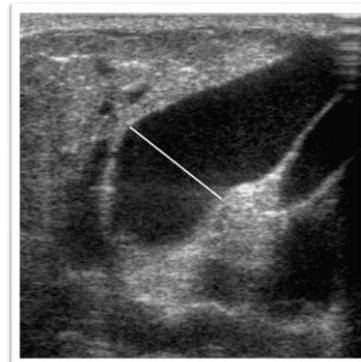
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## Milk Ducts Diameter Vary Between Women



Main milk duct: 0.4 mm (a).  
Merging milk ducts: 0.8 mm (b) and 0.75 mm (c).



Main milk duct: 9.2 mm  
N-B: Larger milk ducts produce longer milk ejection.

Geddes *International Breastfeeding Journal*  
2009 4:5 doi:10.1186/1746-4358-4-5

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## Detection of Milk Ejection by Ultrasound



### **Ultrasound scanning position for detection of milk ejection in the lactating breast.**

The breast that is not suckled/expressed is monitored using a high frequency linear array ultrasound transducer. The milk duct monitored is in the lateral portion of the breast near the base of the nipple. Minimal pressure must be used to avoid compression of the duct.

*Geddes International Breastfeeding Journal* 2009 4:5 doi:10.1186/1746-4358-4-5

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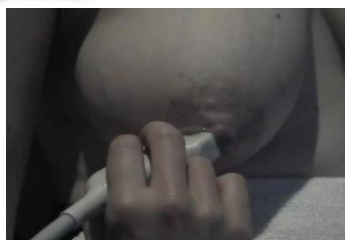
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## Detection of Milk Ejection by Ultrasound (cont.)



### **Photograph of the right areola of a lactating woman prior to milk ejection.**

The milk ducts directly superior to the nipple are very superficial and can be seen as bulging under the skin.



### **Photograph of the right areola of a lactating woman at milk ejection.**

Note the increased swelling of the areola. This is due to the superficial ducts expanding at milk ejection.

*Geddes International Breastfeeding Journal* 2009 4:5 doi:10.1186/1746-4358-4-5

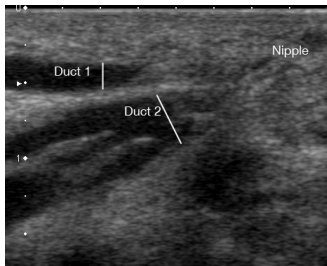
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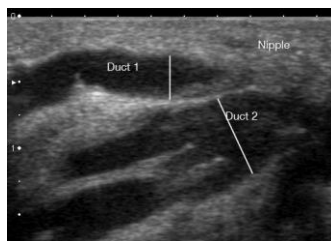


## Detection of Milk Ejection (cont.)



**Ultrasound image of milk ducts in the human lactating breast prior to milk ejection.**

Two main milk ducts are displayed on ultrasound. Duct 1 is more superficial (1.95 mm) than Duct 2 (3.72 mm).



**Ultrasound image of milk ducts [...] at milk ejection.**

Duct 1 has increased from 1.95 mm to 3.44 mm in diameter.

Duct 2 has increased from 3.72 mm to 6.24 mm.

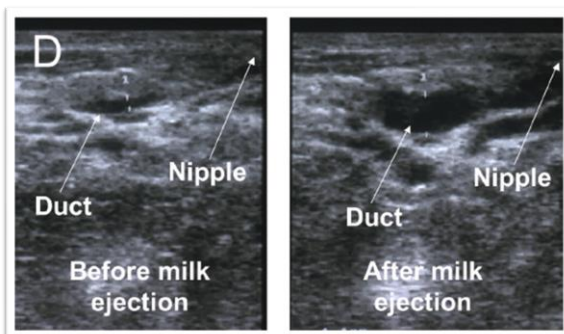
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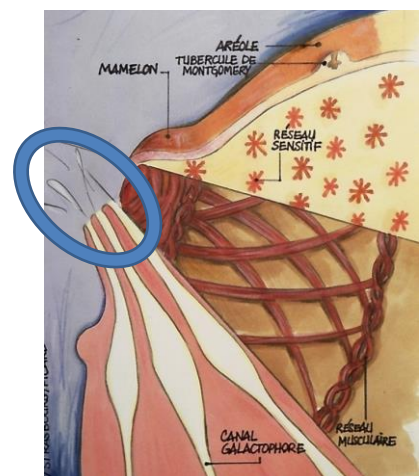
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## “Lactiferous Sinuses” Exist Only During the MER



N-B: Milk that is not removed flows backward up the collecting ducts [Core Curriculum, p. 86]



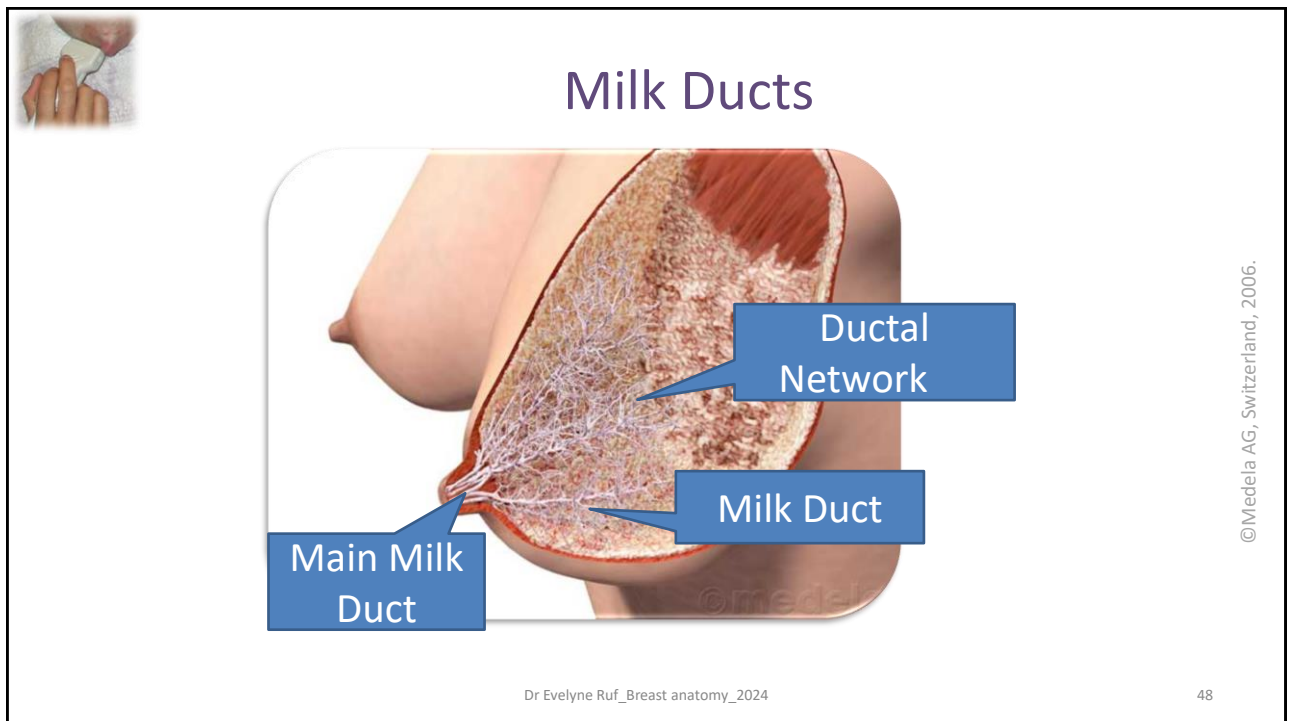
Action pour l'Allaitement, France

Geddes International Breastfeeding Journal 2009  
4:5 doi:10.1186/1746-4358-4-5

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## Milk Ducts (cont.)

- Ductal network: ducts not always arranged in a radial or symmetrical manner).

- **Complex** “like the intertwined roots [branches] of a tree”

Evelyne RUF (Jura 2023)

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## Milk Ducts (cont.)

- Ductal anatomy: **similar for each breast** but can vary greatly between women.
- Main **function of ducts: transport**, not storage of milk.
- Resting duct diameter (prior to milk ejection) can differ greatly between women (range: from 1 mm to 4.4 mm).
- At **milk ejection** the ducts **expand in diameter** (average 58%).

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## Milk ducts (cont.)

- The **main milk ducts** near the nipple are:
  - approximately 2 mm in diameter,
  - superficial,
  - branching close to the nipple,
  - easily compressed and occluded.
- The conventionally described '**lactiferous sinuses**' behind the **nipple do not exist**.
- The number of milk ducts that exit the nipple ranges **from 4 to 18 (average 9)**.

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## Glandular Tissue

- Grouped by **lobes** (4 to 18)\*
- Each lobe contains 20 to 40 **lobules**

*\*Still mentioned 15 to 25 in Core Curriculum and BF & Human Lactation (quoting Geddes 2007): mistake (see next slide)!*

- Each lobule contains 10 to 100 **alveoli**
- Each **alveolus** is lined by mammary secretory epithelial cells (**lactocytes**) which secrete the milk. *[see histology]*

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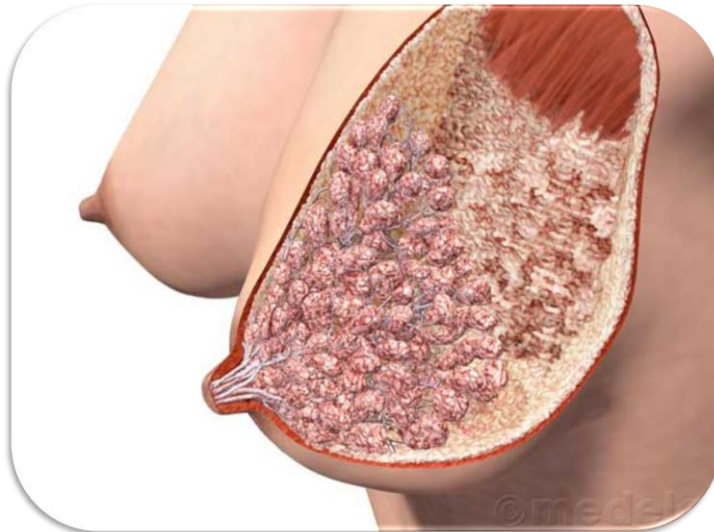
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## Glandular Tissue (end)



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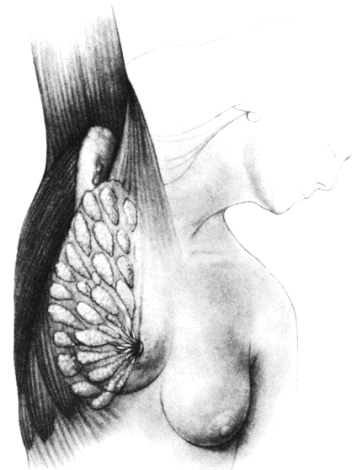
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## Axillary Tail, or Tail of Spence

- In 95% of women, the ducts ascend into the axilla, partly under the lateral border of the pectoralis majora.
- Occasionally the extension reaches until the apex of the axilla.



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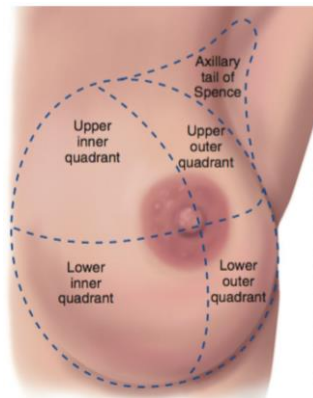
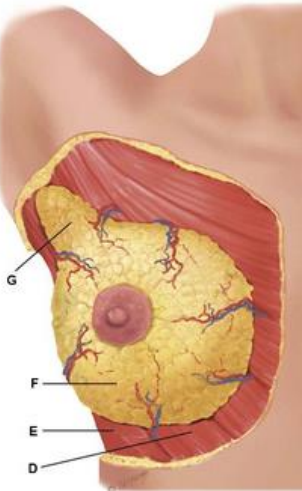
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Lawrence 2-6

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## Tail of Spence (end)

- Prolongation of upper outer quadrant in axillary direction



BF Atlas 2<sup>nd</sup> ed. 1002 h:  
engorgement of Tail of Spence

Quizlet

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## Plan

- Introduction
- External view
- Internal view ('new' anatomy)**
  - Historical perspective
  - New research methodology
  - **New findings:**
    - Parenchyma
    - **Supportive network**
  - Clinical implications
- Supply to the breast
- Histology

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## STRUCTURAL PART OF THE BREAST

- Fatty tissues
- Ligaments



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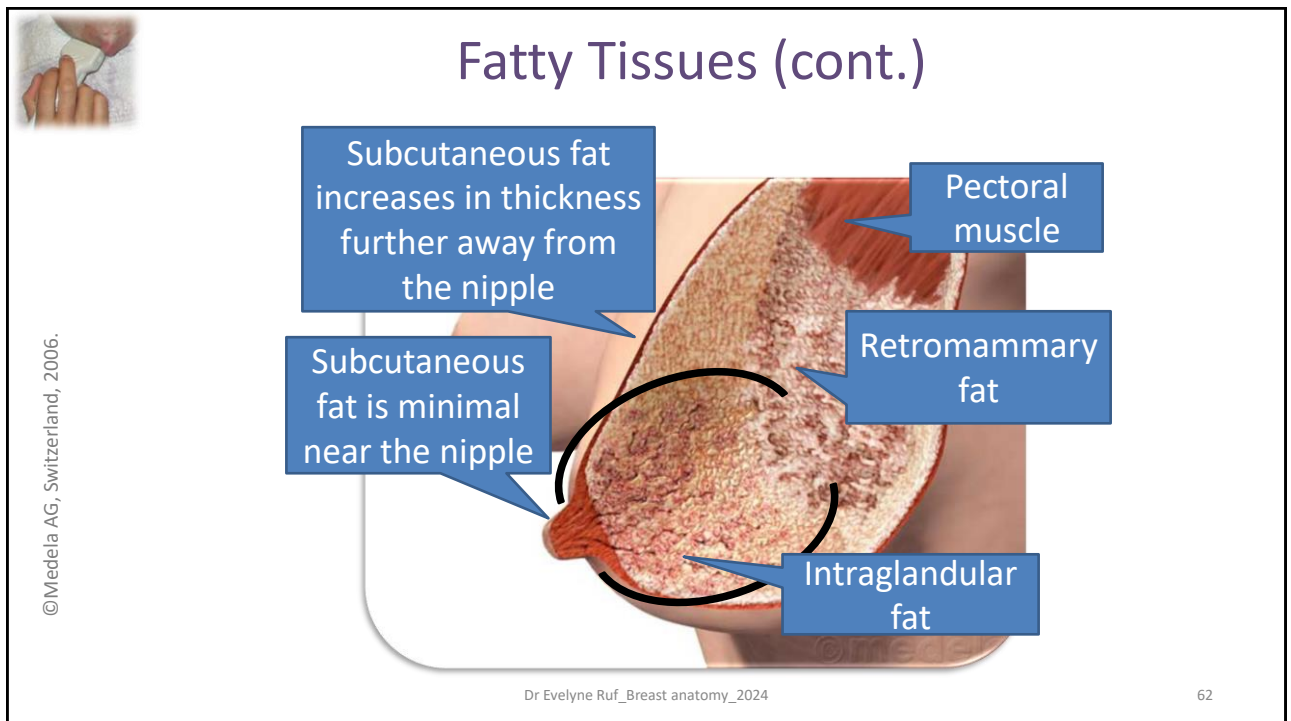
## Fatty Tissues

- Approximately 37% of the breast is fatty tissue.
- The amount of fatty tissue present is similar for each breast but can vary greatly between women.
- Fatty tissue is found in three areas: **subcutaneous**, **intraglandular** and **retromammary**.
- The intraglandular fat intermingles with the glandular tissue and is difficult to separate.

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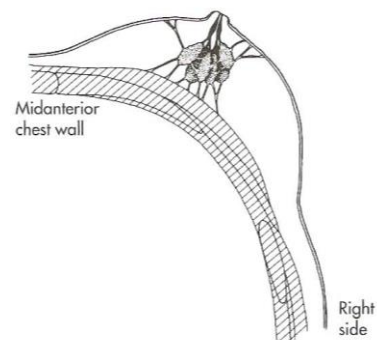
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## Cooper's Ligaments

- Named after Sir A. P. Cooper
- Also known as the **suspensory ligaments** (of Cooper)
- Provide a loose framework of connective tissue
- Radiate from the fibrous stroma of the breast to the skin, providing support for the fatty and glandular tissues.

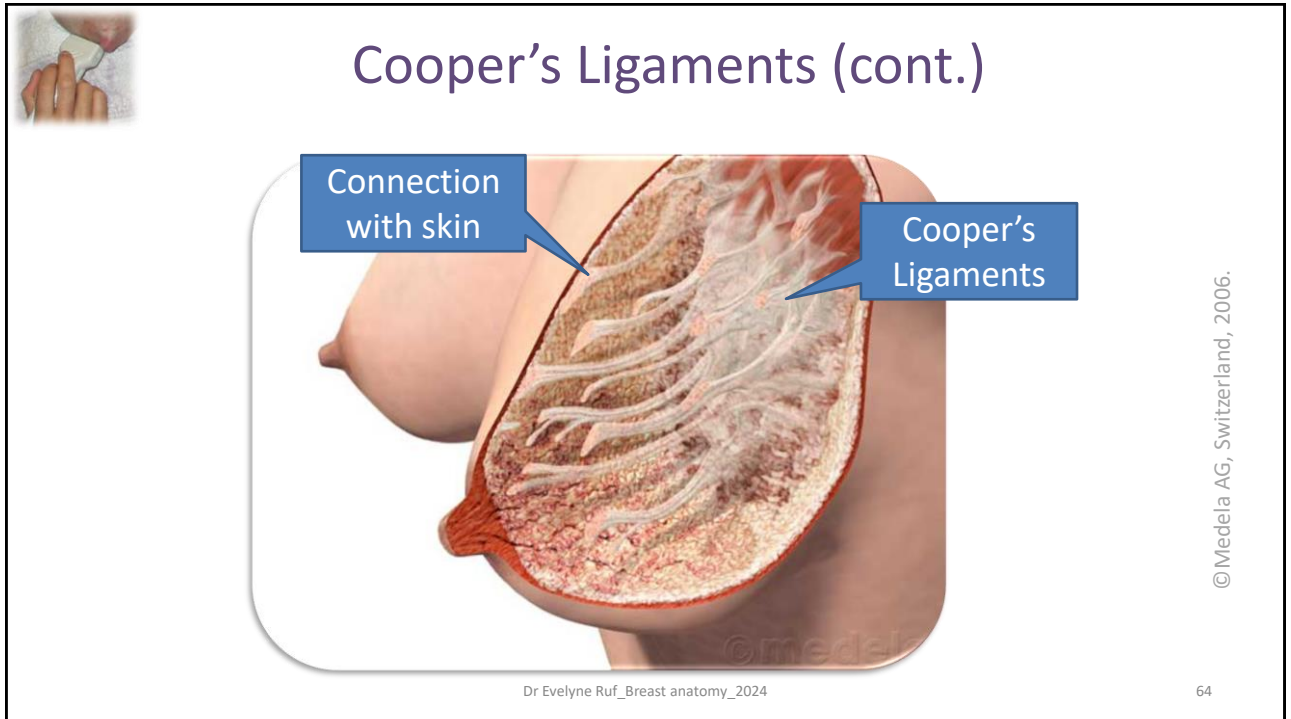


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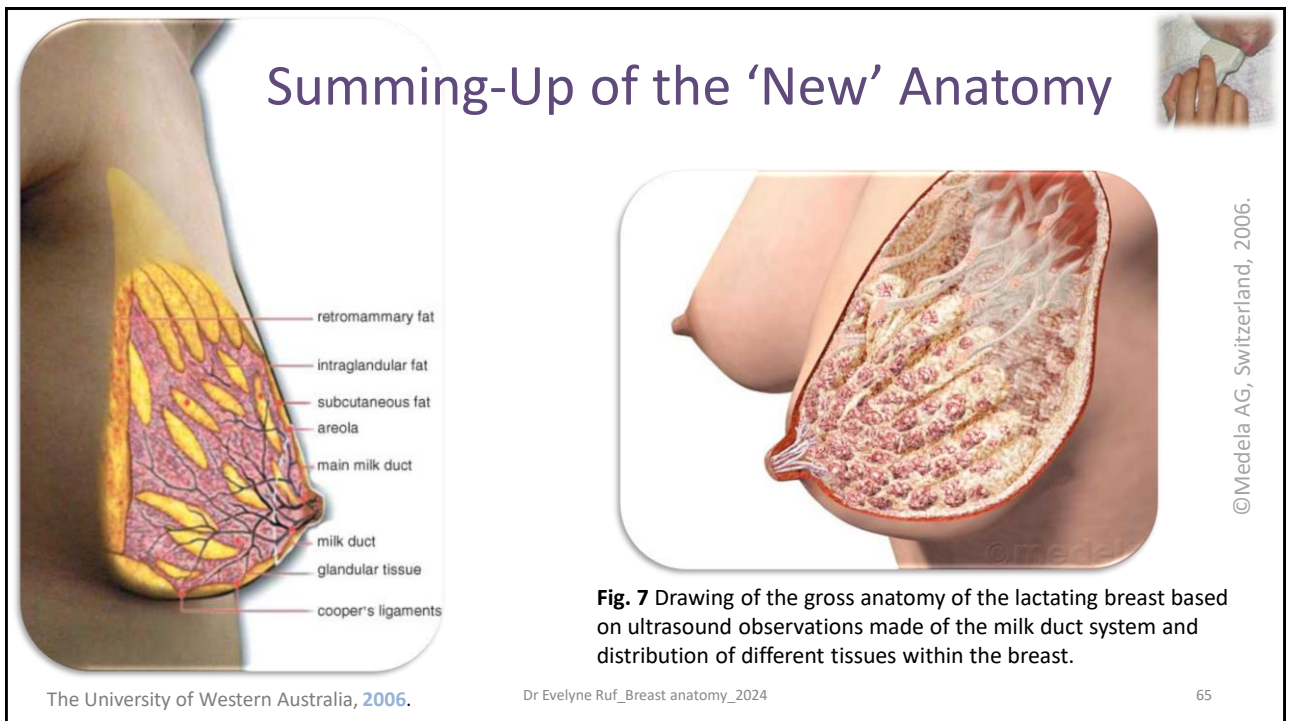
Lawrence 2-13

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## Plan

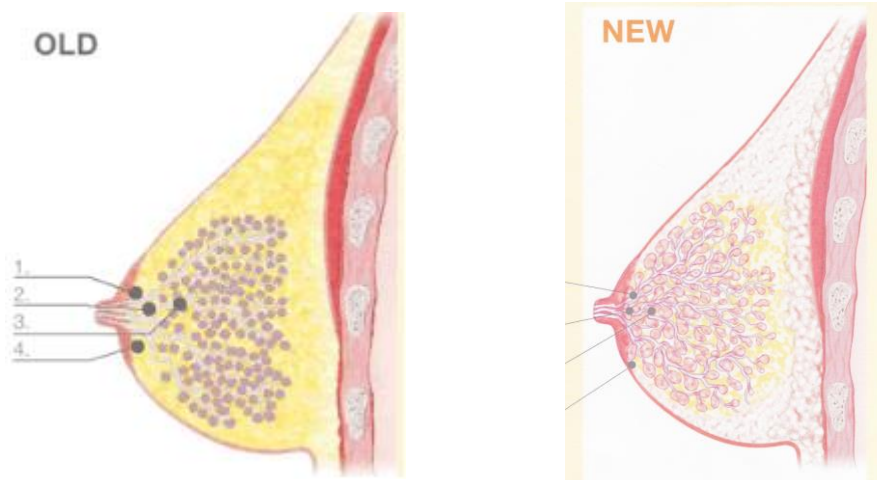
- Introduction
- External view
- Internal view ('new' anatomy)**
  - Historical perspective
  - New research methodology
  - New findings
  - **Clinical implications**
- Supply to the breast
- Histology

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## Comparison Old/New Anatomy

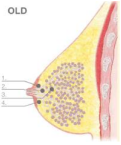


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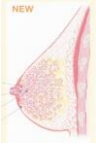
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## Comparison Old / New



- No branching of ducts until deep in the breast
- Lactiferous sinuses
- Glandular tissue starts deep in the breast
- Undifferentiated fatty tissue
- Even ratio of glandular to fatty tissue
- Even distribution of glandular tissue
- Ductal network depicted as radial and symmetrical
- **15 to 20 ducts** at the nipple

- Branching of ducts close to the nipple
- No lactiferous sinuses
- Glandular tissue starts close to the nipple
- Subcutaneous, intraglandular, retromammary fat
- Ratio of glandular to fatty tissue is 2:1
- 65% within 30mm of nipple
- Ductal network not always radial or symmetrical
- **4 to 18 ducts** exiting at the nipple (average 9)

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## Clinical Implications

- Number of milk ducts lower than previously believed  
→ **loss of only a few ducts has more consequences.**
- The intermingling of fat and glandular tissue may make **breast surgery more complex** in order to preserve a woman's future potential to breastfeed.
- Ducts superficial and compressible → **well fitted\* breast shield (flange) needed** during breast expression.

\* N-B: New concept (2022): 'well fitted' shield means same size as nipple (with some lubricant, e.g. mother's milk), instead of (previously) adding 4 mm and then nipple swells and part of the areola is attracted inside the tunnel.

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**A PARADIGM SHIFT IN ONE PRESENTATION**

**FLANGE SIZE ?**

**April 2022**

Nipple **SLIDING** inside the tunnel (but not rubbing)

Too large

Nipple

Areola

November 2024

BFF\_Dr Evelynne Ruf\_Best Practices to Support Milk Expression

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## Use of Ultrasound Scanning

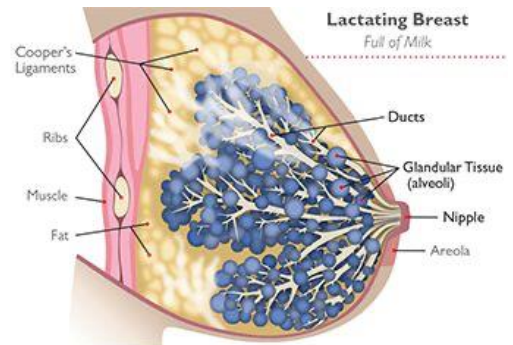
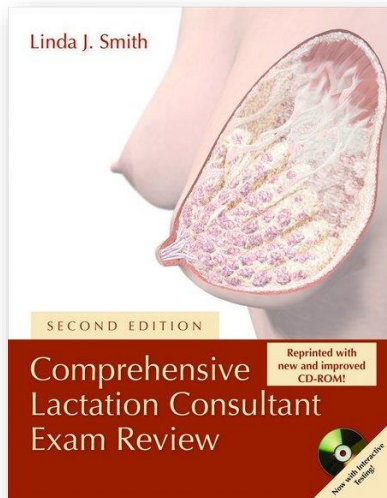
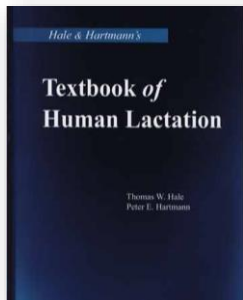
- **Detection of blockage of duct** (not easily compressed, like DVT)
- **Assessment of amount of glandular tissue** (for low milk supply, breast asymmetry...)
- Research on milk ejection reflex, role of **position of the nipple** in the mouth in relation with suck/swallow/breath cycle...  
*(already published, see session on infant suckling).*

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## Spreading of the New Anatomy



[wuxifhff.com/anatomy-and-physiology-of-breastfeeding/](http://wuxifhff.com/anatomy-and-physiology-of-breastfeeding/)

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## Plan

- Introduction
- External view
- Internal view ('new' anatomy)
- Supply to the breast**
  - **Blood supply**
  - **Lymphatic drainage**
  - **Innervation**
- Histology

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## Blood Supply

30%: lateral thoracic artery

Breast: highly vascular. Blood flow doubles by 24 weeks.

60% blood supply: internal mammary artery

Lawrence 2-14

Venous supply: parallel to arterial supply.

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## Lymphatic Drainage

Mainly to the axillary lymph nodes

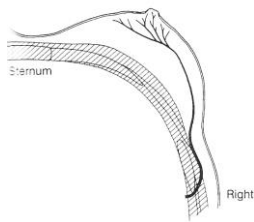
Lawrence 2-15

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## Innervation

Mainly branches IV, V, VI of intercostal nerves



Cross section of nerve supply

Lawrence 2-17

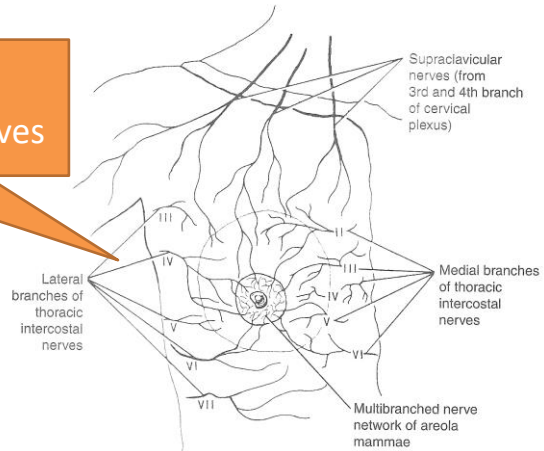


Figure 12-6 Innervation of the mammary gland

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Core Curriculum

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## Innervation (End)

Areola:  
branch IV of intercostal nerves

If scar at 7-8 o'clock:  
→ loss of sensation nipple and areola

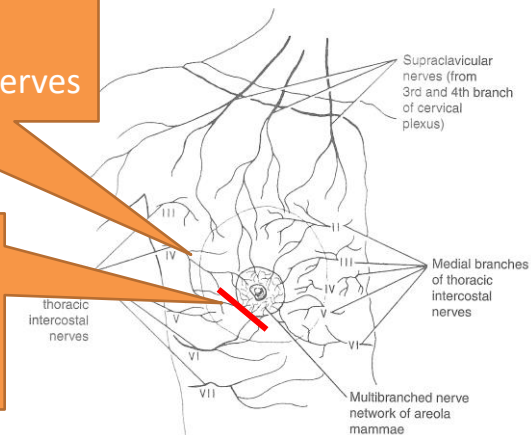


Figure 12-6 Innervation of the mammary gland

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## Plan


- Introduction
- External view
- Internal view ('new' anatomy)
- Supply to the breast
- Histology**



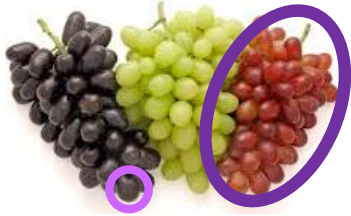
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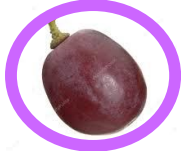
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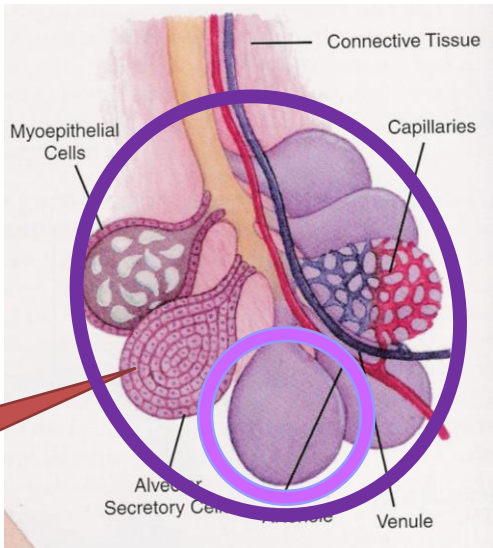
## Overview of a Lobule



Each lobule contains several alveoli (10 to 100)



Each alveolus is lined by lactocytes

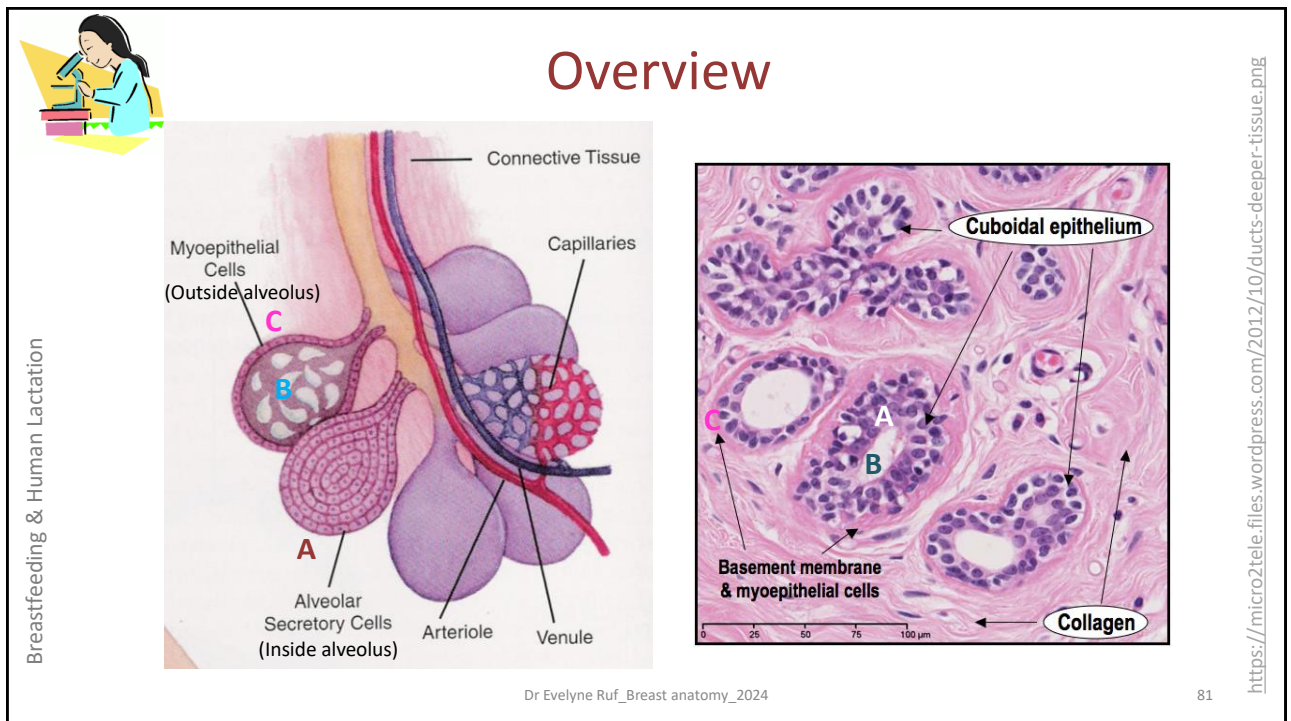


Breastfeeding & Human Lactation

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## Alveolus

- Consists of a continuous **single layer of lactocytes**.
- Delineated at the outside by the **basal lamina**.
- Lactocytes: **cuboidal/columnar** in shape.
- Coupled with **specialized cell junctions**, which are **tight** during established lactation, and **leaky** during pregnancy.

http://www.thevisualmd.com/spaw/uploads/images/MJ3316/thumb/1002784thumb.jpg

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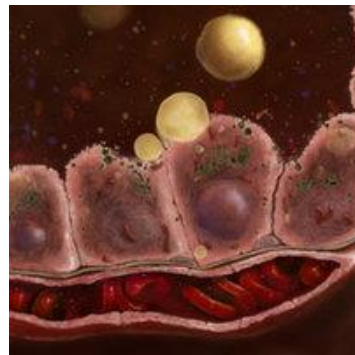
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## Lactocyte

- Basic unit of production
- Portion of the lactocyte directed towards the lumen is termed “**apical**” and the outer portion “**basal**”.
- Microvilli project from the apical surface of the cell into the lumen.
- Milk secretion occurs at the apical surface of the lactocyte.
- **! Increased intra-alveolar pressure** → flattens lactocytes and decreases/stops milk secretion.



See reference previous slide



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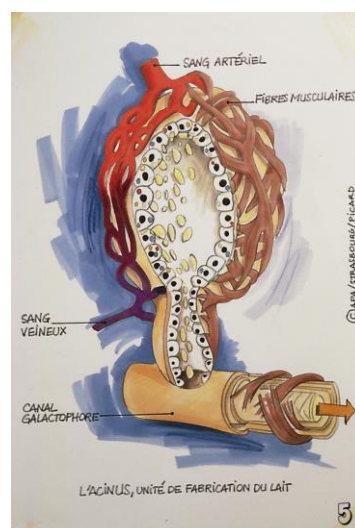
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## Myoepithelial Cells

- Surround the alveolus (‘outer layer’) and extend onto the milk ducts.
- Smooth muscle filaments, appearance differs depending on location:
  - Cells that surround the **alveoli** are **stellate** shaped.
  - Cells associated with **ducts** are **spindle** shaped, aligned longitudinally.



Action pour l'Allaitement, France

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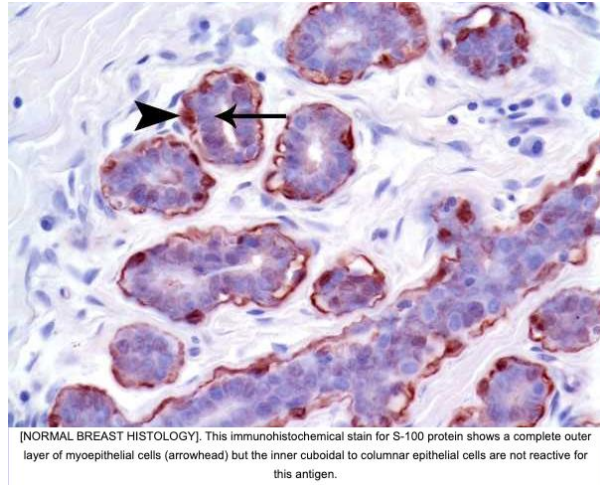
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## Myoepithelial Cells (cont.)

- Devoided of innervation
- Contraction effected by hormone oxytocin by binding to a receptor on the myoepithelial cell.
- Lactating breast highly sensitive to oxytocin (minute amount required)



[NORMAL BREAST HISTOLOGY]. This immunohistochemical stain for S-100 protein shows a complete outer layer of myoepithelial cells (arrowhead) but the inner cuboidal to columnar epithelial cells are not reactive for this antigen.

<https://www.pathpedia.com/education/eatlas/histology/breast/images.aspx>

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## Milk Ducts

- Form the pathway for milk to be transported to the nipple.
- Do not actively participate in either the secretion or modification of milk.
- Consist of an **inner layer of epithelium**, stratified squamous type in the nipple, **cuboidal** within the gland.
- Main ducts are supported by **fibrous connective tissue**.
- **Shape of duct varies** according to amount of milk (more irregular when less milk).

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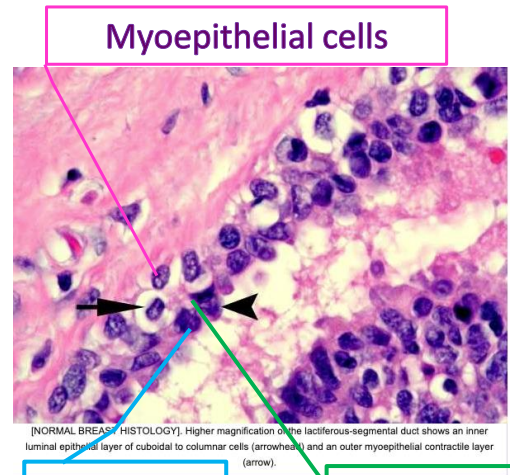
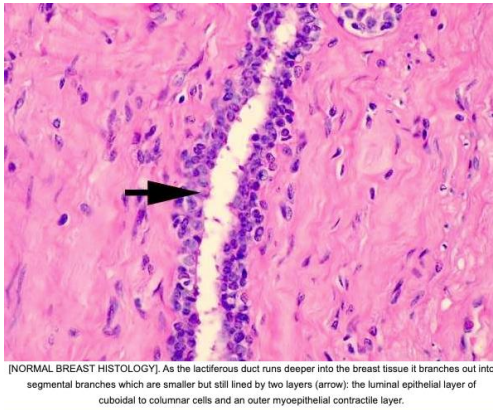
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## Milk Ducts (cont.)

<https://www.pathpedia.com/education/eatlas/histology/breast/images.aspx>



- Myoepithelial cells apposed to the basal lamina.
- Ductal cells form a single cell layer on the inner side of the basal lamina.

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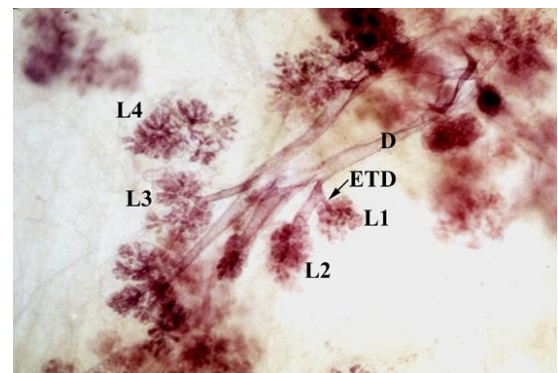
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## Milk Ducts (end)

- Terminal duct lobular unit (TDLU)
- Continuous basement membrane

Slice of human mammary tissue, the TDLU  
 D : duct, ETD: extra lobular terminal duct  
 L1-4: Lobules. L1 = 1mm in diameter



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## Nipple

- Contains numerous **sebaceous glands** independent of hair follicles, dense fibrous stroma containing **erectile smooth muscle tissue**, stratified **squamous epithelium** resembling skin but with increased **melanin** pigment.
- Stratified squamous epithelium extends into duct lumens for a short distance.
- Nipple is unpigmented before menarche, pigmentation increases after first menstrual cycle

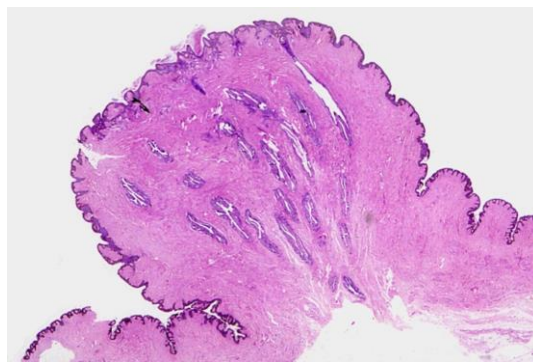
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## Nipple (end)



This histological section shows the nipple and some areola. Epithelium stains blue and stroma stains red. Note lactiferous duct at the surface of the nipple. It is **plugged with keratin**. This **mechanical barrier** prevents bacteria from entering the duct in non-lactating women.

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<https://www.memoragapp.com/flashcards/147371/Anatomy+and+Histology+of+the+Breast/>

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# BREAST ANATOMY & HISTOLOGY

Thank you!



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People love to get worked up about breastfeeding in public!  
But now we have the perfect solution to please  
both the lovers and the haters



**THE BOOB BEANIE**

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