

# Newborn Nutrition and Feeding

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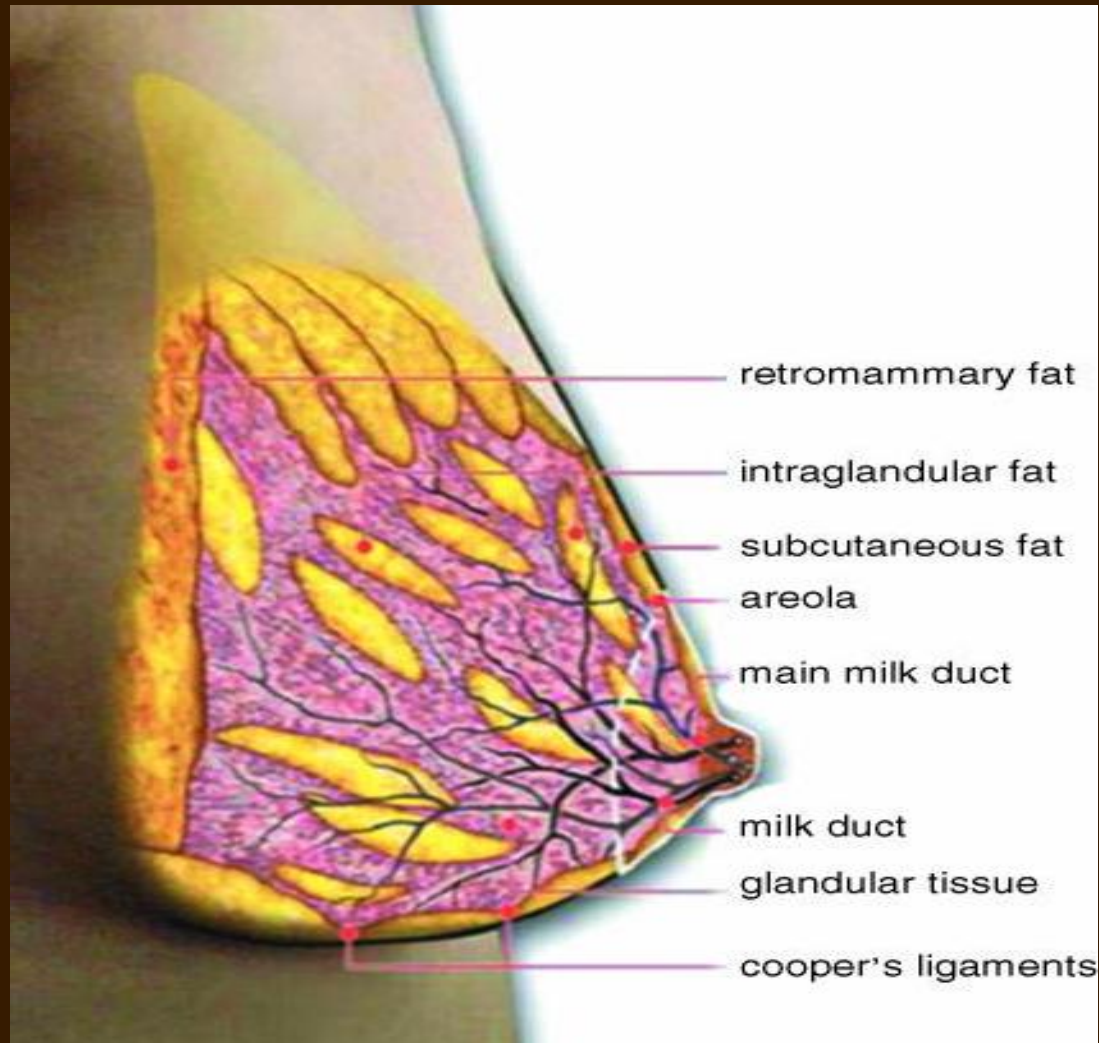
# Objectives

- After the class, students can understand
  - Anatomy of female breast
  - Physiology of lactation
  - Benefits of breastfeeding
  - Elements in breast milk
  - Elements of successful breastfeeding
  - Breast care
  - Contraindication of breastfeeding
  - Formula feeding

# Recommendations for Infant Nutrition

月齡	HM/ day	Formula /day	Per formula	水果類	蔬菜類	五穀類	蛋豆魚肉肝類
1	7	7	90-140ml				
2	6	6	110-160ml				
3	6	5	110-160ml				
4-6	5	5	170-200ml	果汁1-2 茶匙	青菜湯 1-2茶匙	麥糊或米糊3/4-1 碗	
7-9	4	4	200-250ml	果汁或 果泥1-2 茶匙	青菜湯 或青菜 泥1-2湯 匙	稀飯,麵條,麵線 1.25-2碗 吐司麵包2.5-4片 饅頭2/3-1個 米糊,麥糊2.5-4碗	蛋黃泥2-3個 豆腐1-1.5個四方塊 豆漿1-1.5杯(240- 360ml) 魚肉肝泥1-1.5兩 魚鬆肉鬆0.5-0.6兩
10	3	3	200-250ml	果汁或 果泥2-4 茶匙	剁碎蔬 菜2-4湯 匙	稀飯,麵條,麵線2- 3碗 乾飯1-1.5碗 吐司麵包4-6片 饅頭1-1.5個 米糊,麥糊4-6碗	蒸全蛋1.5-2個 豆腐1.5-2個四方塊 豆漿1.5-2杯(360- 480ml) 魚肉肝泥1-2兩 魚鬆肉鬆0.6-0.8兩
11	2	3					
12	1	2					

# Anatomy of Breast



Ramsay, D.T., Kent, J.C., Hartmann, R.A., & Hartmann, P.E. (2005). Anatomy of the lactating human breast redefined with ultrasound imaging. *J Anat*, 206, 525–534.

# Anatomy of Breast

- About 9 milk ducts (4-18)
- Differences in diameters of milk ducts between mothers
- Milk ducts are not enlarged during lactation

# Anatomy of Breast

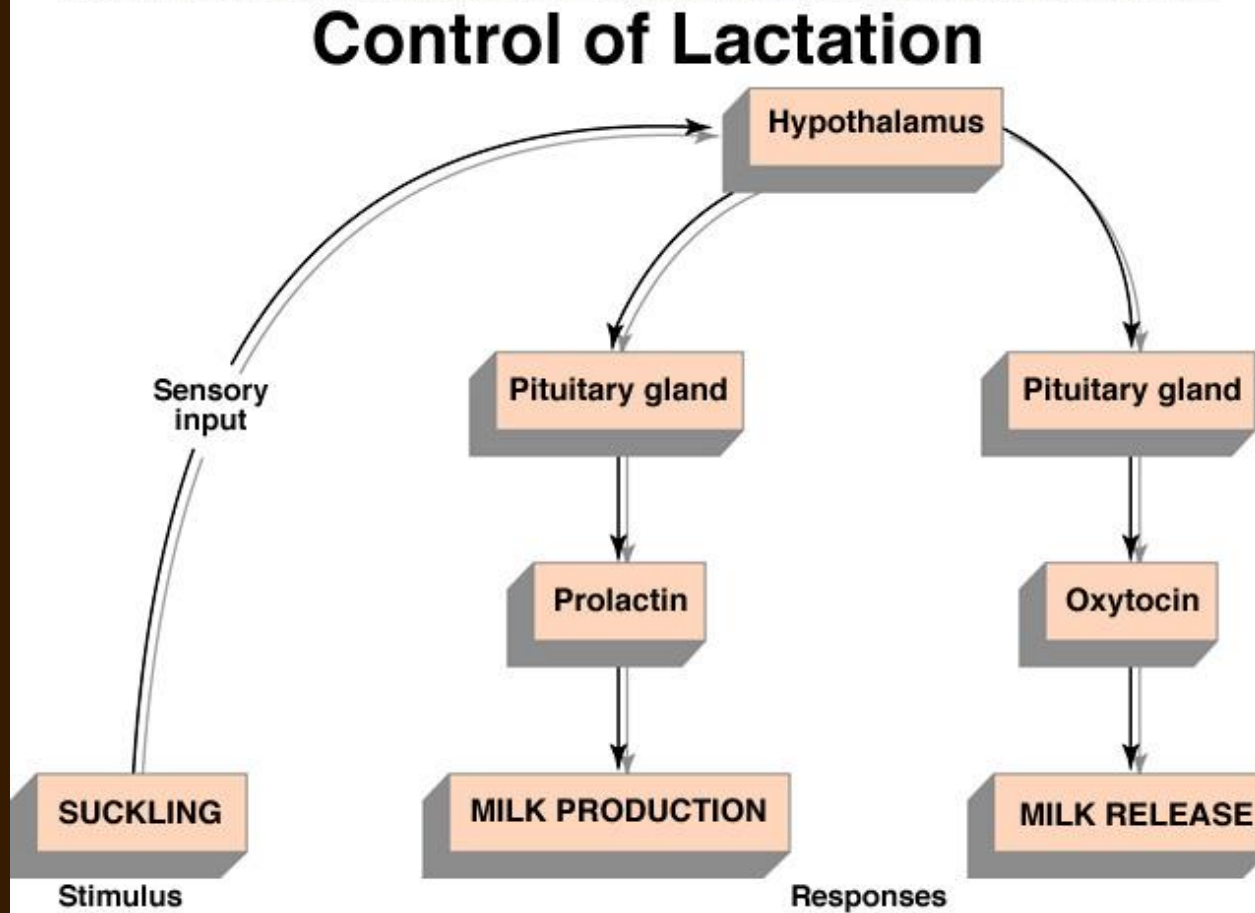
- Milk ducts at the base of the nipple are easy to occlude because they are superficial, small, and easily compressed
- Ducts branch under the areola, not display sac-like appearance, function for transportation rather than storage

# Anatomy of Breast

- Ducts are not in a radial pattern, may lay under one another
- Glandular : adipose tissue = 2:1

# Physiology of Lactation

Byer/Shainberg/Galliano *Dimensions Of Human Sexuality*, 5e. Copyright © 1999. The McGraw-Hill Companies, Inc. All Rights Reserved.





# Physiology of Lactation

- Estrogen & progesterone
  - Decrease in E & P triggers the release of prolactin

# Physiology of Lactation

- Prolactin (anterior pituitary)
  - Synthesize (not during pregnancy) and secrete milk
  - Respond to infant sucking

# Physiology of Lactation

- Oxytocin (posterior pituitary)
  - Cause milk ejection (let-down reflex)
  - Uterine contraction

# Benefits of Breastfeeding

- Infant
  - Enhance maturation of GI tract & lower GI illnesses
  - Protect from diseases in ear, respiratory tract, urinary tract, bacterial meningitis, bacteremia, atopic diseases, allergy, cancers, IDDM,

# Benefits of Breastfeeding

- Infant
  - Enhance cognitive development, jaw development
  - Decrease obesity

# Benefits of Breastfeeding

- Mother

- Decrease risk of breast and ovarian cancer, PPH
- Enhance weight loss
- Delay fertility
- Increase bone density
- Bonding

# Breastfeeding Rates

In 1994	Exclusive	Mixed
In hospital	29.42%	57.57%
One month	33.21%	54.17%
Four months	16.93%	27.52%
Six months	13.13%	19.82%

# Nutrition Provided from Human Milk to Infant

營養素	6到8個月	8到11個月	12到23個月
能量	71	45	29
蛋白質	79	58	43
維他命A	100	100	75
葉酸	100	100	76
菸鹼酸	25	16	9
胡蘿蔔素	60	47	27
維他命B6	20	12	6
維他命B12	100	100	94
維他命C	100	84	60
維他命D	6	4	3
鈣	36	28	36
鐵	3	3	2
鈉	39	27	16

母親完全吃素者可能維他命B12量不夠；  
母親攝取胡蘿蔔素及維他命B6不夠者，  
嬰兒體內含量可能不夠



# Immune Properties

- White blood cells
  - B lymphocytes
  - Macrophages
  - Neutrophils
  - T lymphocytes

# Immune Properties

- Molecules
  - IgAs
  - B12-binding protein
  - Bifidus factor
  - Fatty acids
  - Fibronectin

# Immune Properties

- Molecules
  - Interferon-gamma
  - Hormones and growing factors
  - Lactoferrin
  - Lysozyme
  - Mucins
  - oligosaccharides

# Feeding-readiness

- Baby cues
  - Hand-to-mouth or hand-to-hand movements
  - Sucking motions
  - Rooting
  - Mouthing

# Feeding-readiness

- Mother feelings
  - Tugging/soreness of nipples, not pain
  - Milk is in
  - Softer or lighter breasts after feeding
  - Relaxed or sleepy during feeding
  - Uterine cramping, increase in lochia flow

# Positioning and Latch on

- Sitting straight up
- Clutch hold/football hold
- Cradle hold
- Lying down

# Successful Feeding

- Frequency
  - 8-12 times/24 hours
  - At least every 3 hours during the day and 4 hours at night
  - Demand feeding after stabilization

# Successful Feeding

- Duration?
  - About 15-20 minutes per breast or 30-40 per feeding



# Successful Feeding

- When to stop
  - Slowed suck and swallow
  - Softened breast(s)
  - Baby falls asleep or release the nipple

# Successful Feeding

- Supplements, bottles, pacifiers
  - No need to bottle-feed more
  - Nipple confusion

# Successful Feeding

- Cup feeding

# Successful Feeding

- Express breast milk
  - Methods
    - Assemble a pump

# Successful Feeding

- Store breast milk
  - Store
    - Up to 8 hours at room temperature
    - Refrigerated for 5 days
    - Freeze in a fridge with separate door for 3-6 months
    - Freeze in a deep freezer for 6-12 months

# Successful Feeding

- Store breast milk
  - Thaw
    - Gradually thaw in fridge or in warm water, no microwaves
    - Use within 24 hours if thaw in fridge, thawed in warm water can be refrigerated for use within 4 hours
    - Shake before use
    - Should not be refrozen

# Successful Feeding

- Fussy baby
  - Hungry
  - Inappropriate position
  - The nipples do not extend far enough
  - GI distress

# Successful Feeding

- Slow weight gain
  - Inadequate breastfeeding
  - Illness, infection, malabsorption, disease requires energy needs
  - Breast issues



# Successful Feeding

- Jaundice
  - After 24 hours of age, peaks by the 3rd day
  - Early jaundice
    - Relate to insufficient breastfeeding and infrequent stooling
      - Fed at least 8-12 times/24 hours
      - Use feeding devices during nursing
  - Late-onset jaundice
    - No intervention needed or stop 12-24 hours

# Successful Breastfeeding

- Infant
  - Well hydrated
  - Lose  $<7\%$  of weight during the first 3 days
  - Gains 20-28 gm/day after the milk is in
  - Fed 8-12 times/24 hours
  - Audible swallowing
  - At least 1 wet diaper and 1 stool during the first 3 days then 6-8 wet diapers/24 hours

# Successful Breastfeeding

- Mother
  - Intact nipples, full and soft breasts (not engorged), no signs of infection
  - Tugging sensation during feeding
  - Feel let-down, uterine cramping, lochia flowing, thirsty, relaxed

# Breast Care

- Breast cream
  - Not use on nipples
  - Not use routinely
    - Block the natural oil secreted by the Montgomery glands

# Breast Care

- Flat or inverted nipple correction
  - Breast shells
    - Worn inside a bra, worn 30 mins prior to feeding
  - Hoffman technique
  - Breast pump
  - Pulling back on breast tissue at latch-on
  - Nipple shield
    - Use only temporarily

# Breast Care

- Milk leakage

# Breast Care

- Breast engorgement
  - Causes
    - Late start of breastfeeding
    - Not feeding frequently enough
    - Breasts are not empty after feeding

# Breast Care

- Breast engorgement
  - Management
    - Take pain relievers, use cold, wear bra
    - Use heat, massage, and express/let out milk before feeding
    - Empty breast after feeding



# Breast Care

- Sore nipples
- Plugged milk ducts

# Diet during Nursing

一般期與哺乳期營養素需求及六大類食物分配比較表

	一般時期	產後哺乳期	食物份量說明
熱量 (大卡)	1500~1800	2000~2300	
蛋白質 (公克)	56~68	71~83	
醣類 (公克)	206~248	275~316	
脂肪 (公克)	50~60	69~79	
奶類	1杯	1~2杯	1杯=240c.c.
五穀根莖類	2.5~3碗	3.5~4碗	1碗=飯1碗=麵2碗=中型饅頭 1個=薄片土司麵包4片
肉魚蛋豆類	4份	4~6份	1份=熟的肉或家禽或魚肉30 公克 (生重約1兩，半個手掌 大)=蛋1個=豆腐1塊 (4小 格)
蔬菜類	3份	4~5份	1碟=蔬菜100公克 (約3兩)
水果類	2份	2~3份	1個=橘子1個=土芭樂1個
油脂類	2湯匙	2~3湯匙	1湯匙=15公克烹調用油

# Diet during Nursing

出自：食品資訊網

每100公克食物所含熱量與營養素的含量比較								
食物	熱量 (卡路里)	蛋白質	脂肪	鈣質	鐵質	維生素 A	維生素 B群	維生素 C
五穀根莖類	●●●●	●	●	●	●	●	●	●
汽水 可樂	●●	●	●	●	●	●	●	●
後腿瘦肉	●●●	●●●●	●●●	●	●	●	●●●	●
魚	●●●	●●●●	●●●●	●	●	●	●	●
蛋	●●●	●●●	●●●●	●●●	●	●●	●●	●
全脂奶	●●	●	●●●	●●●●	●	●	●	●
豬肝	●●●	●●●●	●●	●	●●●●	●●●●	●●●●	●●●●
豆腐	●●	●●	●●●	●●●●	●●	●	●	●
深綠色 深 黃紅色蔬菜	●	●	●	●●●●	●	●●●	●●	●●
淺綠色蔬菜	●	●	●	●●●	●	●	●	●●
深黃色水果 如：木瓜、 芒果	●	●	●	●●	●	●●●	●●	●●●●
枸櫞類水果 如：橘子、 柳丁	●	●	●	●●	●	●●●	●●	●●●●
蘋果	●	●	●	●	●	●	●●	●

●●●● 非常豐富   ●●● 豐富   ●● 中等   ● 少量   ● 微量   ● 沒有

# Contraindications for breastfeeding

- Infant
  - Galactosemia

# Contraindications for breastfeeding

- Mother
  - Active tuberculosis
  - HIV infection
  - Human T-cell lymphotropic virus type I or II infection
  - Active herpes lesions on breasts
  - Receiving chemotherapy or radioactive isotopes
  - Drug abuse

# Formula Feeding

- Feeding patterns
  - 15-30 ml per feeding during the first 24 hours
  - Feed every 3-4 hours then increase intervals

# Formula Feeding

- Feeding technique
  - Formula should drip rather than flow from the nipple
  - Wash hands and clean the bottle and nipple
  - Warm formula, no microwaves
  - Hold in semi-reclining position
  - Keep the bottle tipped and avoid air in the nipple
  - Burp the baby
  - Hold upright for about 30 min after feeding

# Formula Feeding

- Observe for yellow and soft firm stool



# Summary

- Lactation is a combined function of estrogen, progesterone, prolactin, and oxytocin
- When infant is well hydrated, lose  $<7\%$  of weight during the first 3 days, gains 20-28 gm/day after the milk is in, fed 8-12 times/24 hours, audible swallowing, at least 1 wet diaper and 1 stool during the first 3 days then 6-8 wet diapers/24 hours indicate successful feeding.
- Breast care should be started during pregnancy.

# Nipple Concerns



<http://pippetop.com/shop/index.php?act=viewDoc&docId=6>



[http://www.steadyhealth.com/articles/user\\_files/4540/Image/sore%20nipple%202.jpg](http://www.steadyhealth.com/articles/user_files/4540/Image/sore%20nipple%202.jpg)

<http://www.netterimages.com/images/vtn/000/000/010/10713-150x150.jpg>

# Nipple correction



Philips Avent Breast Shells



Ameda Breast Shells



Medela TheraShells Breast Shells



Pipetop



Nipple Shield



# Summary page

- Anatomy of female breast
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