

NUTRITION DURING LACTATION:  
CONDITIONS AND INTERVENTIONS  
CHAPTER 7  
NUTD238



# Common Breastfeeding Conditions

# Sore nipples

- In most women it is transient and usually subsides by the end of the 1<sup>st</sup> week
- **Need for evaluation when:**
  - Severe nipple pain
  - Presence of nipple cracks
  - Pain that persists throughout a feeding
  - Pain that is not improved by the end of the 1<sup>st</sup> week

- Main causes of persistent nipple pain :
  - Poor latch
  - Poor positioning of the infant
  - Infection (*staphylococcus aureus*)
  - Pumping with too much suction or incorrect breast flange size
  - A disorganized or dysfunctional suck
  - Dermatologic abnormalities

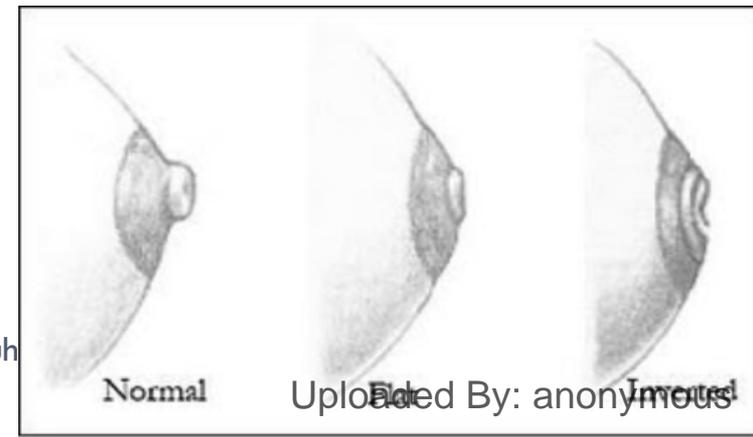
Prevention: proper baby positioning “good latch”



- Proper cleaning of the breast- daily washing with warm water only
  - Cleansing products can irritate the nipple; some creams can cause an allergic reaction and skin irritation
  - Plastic-backed breast pads, used to prevent milk leakage, can trap moisture and inhibit air flow to the nipple
  
- Strategies to manage nipple pain:
  - Let breasts air-dry after nursing
  - Rub expressed milk or an all-purpose ointment (not petroleum-based) on nipples
  - Use warm compresses on sore nipples

# Flat or inverted nipples

- Nipples do not extend very far into the baby's mouth
- If we have good latch- this should not be a problem
- If baby is struggling with the latch-
  - Hoffman technique
  - use breast pump to draw nipple out



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# Letdown failure

- Not common
- Stress, distraction, alcohol can inhibit oxytocin
- Oxytocin spray through nose, *stimulate oxytocin and milk letdown, can only be used for a few days*
- Prolonged letdown failure can lead to lactation suppression

## □ To enhance letdown:

- Try different nursing positions
- Play soothing music that the mother can focus on while nursing
- Have the partner rub his knuckles down her spine
- Get out of the house. Most babies enjoy a walk.
- Arrange for some time alone
- Decrease number of caffeinated beverages and increase water consumption for a few weeks

# Hyperactive letdown

- Milk streams from breast as feeding begins
  - Infant may be overwhelmed by the volume- choke, cough, or gulp (gas pain due to too much air swallowing)
  
- Milk released from breast when baby is not nursing
  
- **Management:**
  - Remove baby from breast until flow is slower
  - Express milk until flow is slow

# Hyperlactation

- Milk volume being produced by the mother far exceeds the intake of the baby
- **Signs may include:**
  - A hyperactive letdown
  - Chronic plugged ducts
  - Leaking in between feedings
  - Pain with letdown or deep in the breast
  - Breasts that are not drained completely during a feeding

## □ Symptoms in the baby include:

- Choking, coughing, or gulping
- Spitting up
- Poor wt gain due to high volume of low-fat milk (foremilk)
- Difficulty maintaining latch- arch back off of the breast
- Excessive gas
- Green frothy stools from rapid transit time
- If intake of high volume of low-fat milk continues over time- baby may develop colitis



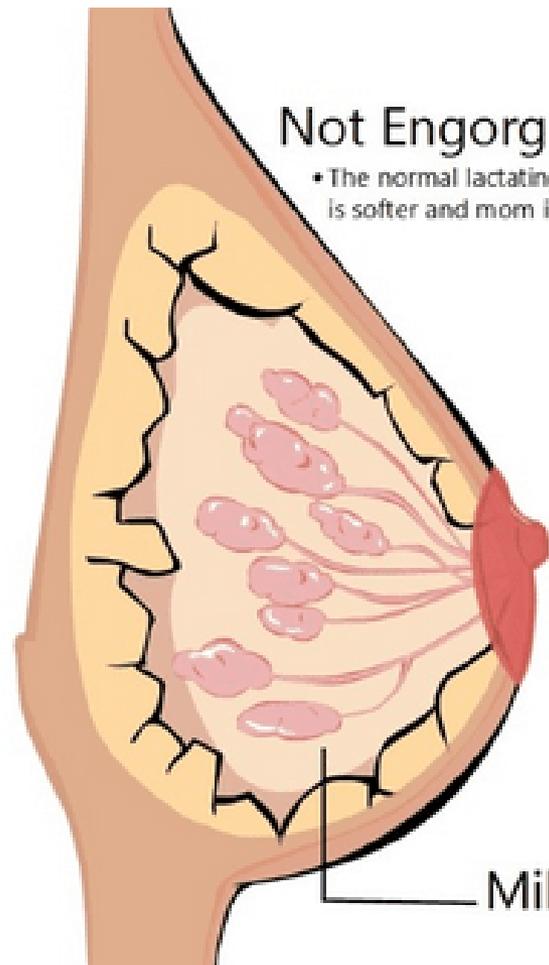
□ **Management (reduce production):**

- Let baby nurse on only one side during feedings
- Have the mother express milk on the other side only for comfort
- Cabbage leaves or cold compresses may be used

# Engorgement

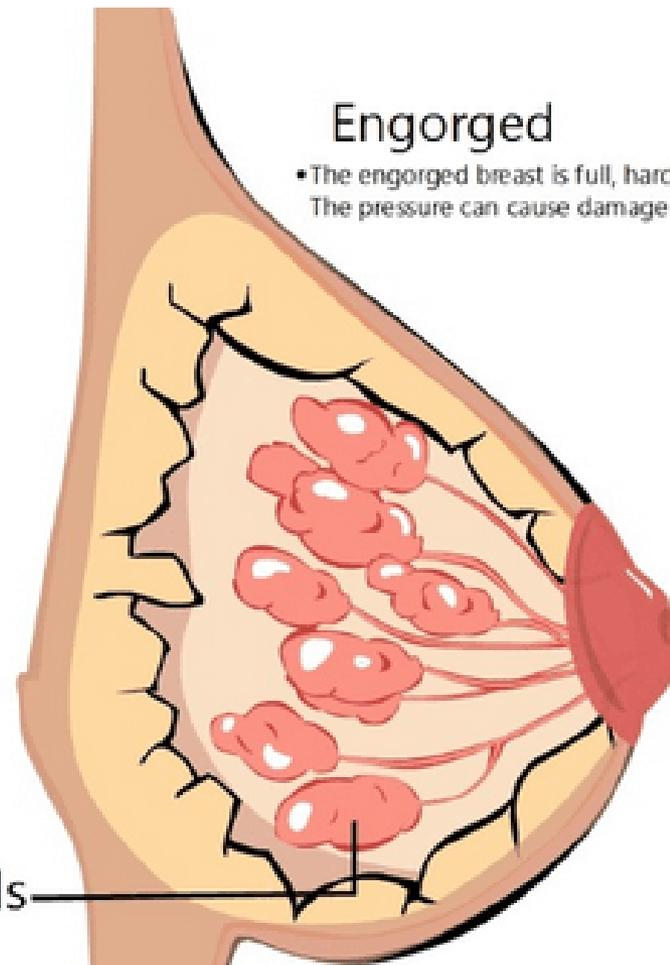
- Breasts are overfilled with milk
- Common in first-time mothers: from day 2-14
  
- **Reasons:**
  - Supply and demand is not yet established- overproduction present
  - Infrequent removal of milk from the breast because of mother-infant separation, sleepy baby, sore nipples, improper BF techniques
  
- Results in discomfort, difficulty in establishing milk flow, and difficulty in latch-on

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### Not Engorged

- The normal lactating breast is softer and mom is comfortable.



### Engorged

- The engorged breast is full, hard and sore. The pressure can cause damage to the cells.

Milk glands

- **Prevention:** nurse infant frequently; express milk every few hours if infant is not available
- Severe engorgement inhibits milk flow because the swollen tissue is compressing the milk ducts- *not because the mother is failing to experience the letdown or milk ejection reflex*

## □ Treatment:

- Express milk until breasts are no longer hard before putting the infant to breast- easier for baby to latch on
- Use analgesics to reduce pain from engorgement
- Warm shower, warm compresses with massage before feedings: relieve pressure trigger milk flow
- Application of cold compresses or gel packs between feedings helps to reduce pain and swelling

# Cabbage leaves

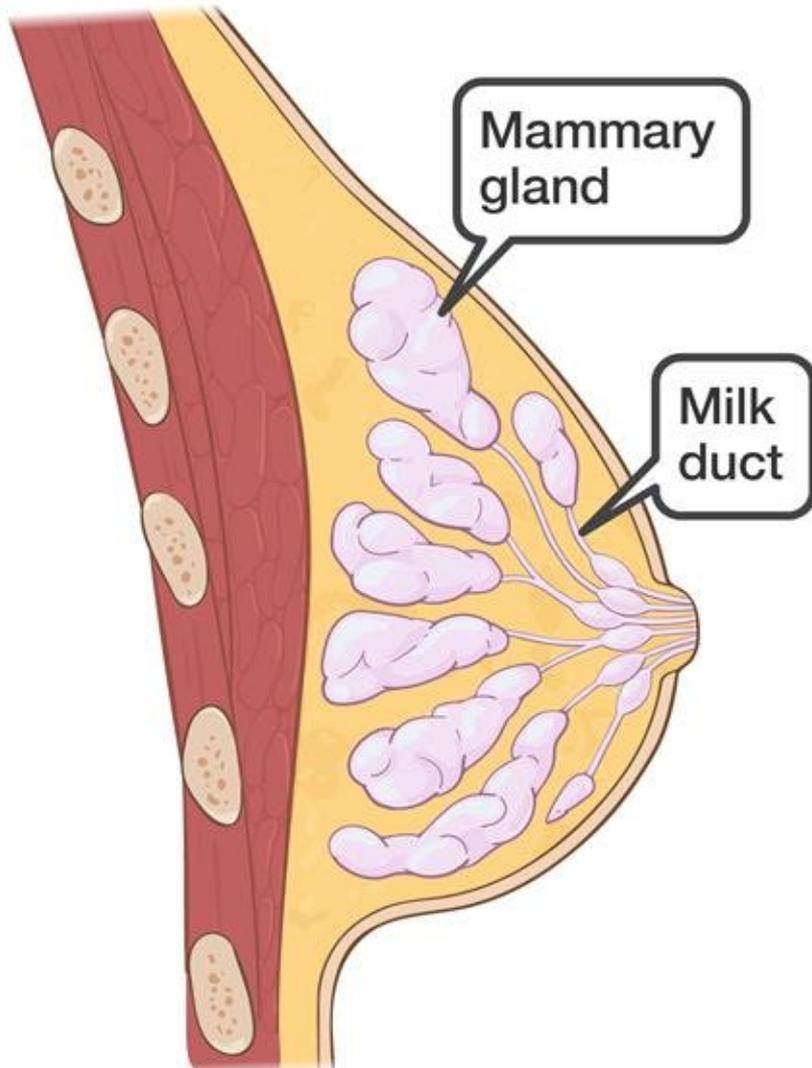
- Unknown mechanism: reduce discomfort and swelling associated with engorgement
- Raw leaves are applied directly to the breast until they wilt; approximately 20 mins
- Should be used only 2-3x/ 24hrs to prevent reduction in milk supply

# Plugged duct

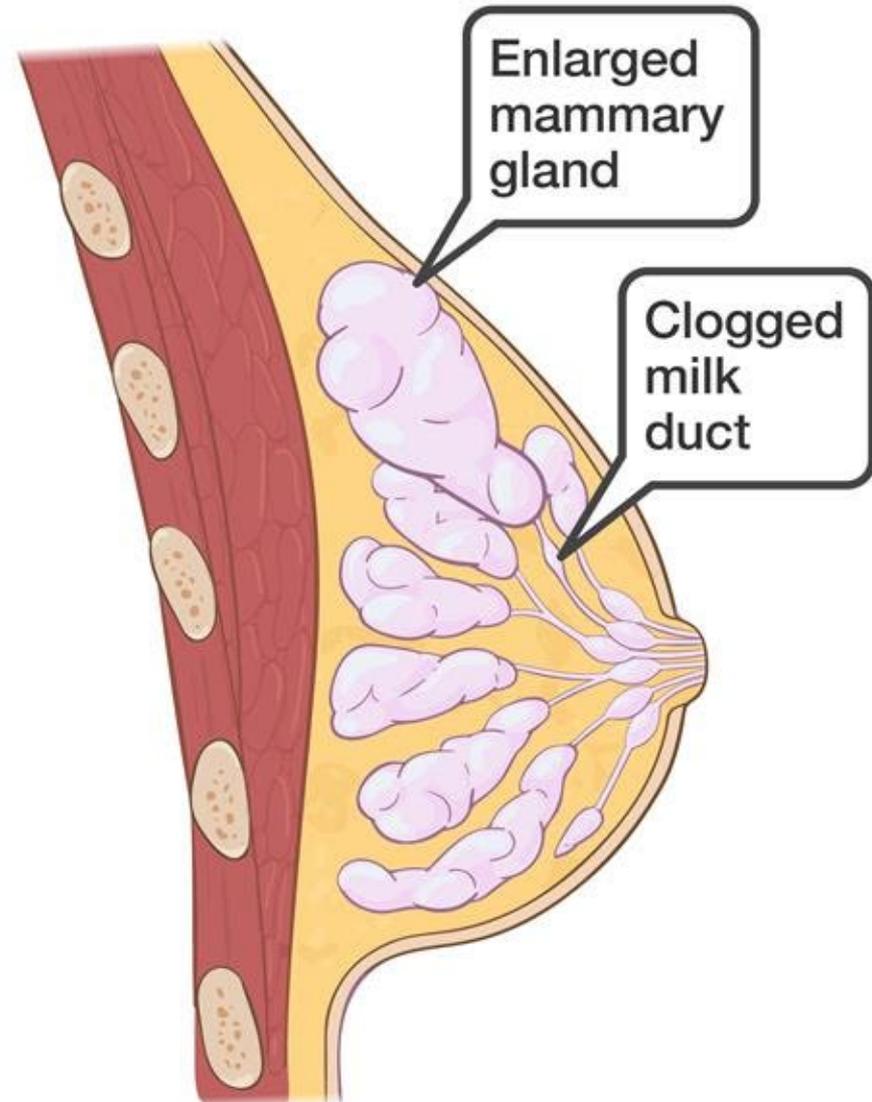
- Localized blockage of milk resulting from milk *stasis* (*milk remaining in the ducts*)
  
- **Treatment:**
  - Gentle massage
  - Warm compresses
  - Complete emptying of the breast
  - Change nursing positions to facilitate emptying of the breast
  - Use Lecithin 1 Tbsp/d

→ If this condition is not resolved- it will lead to **mastitis**

Normal



Plugged Duct



# Mastitis

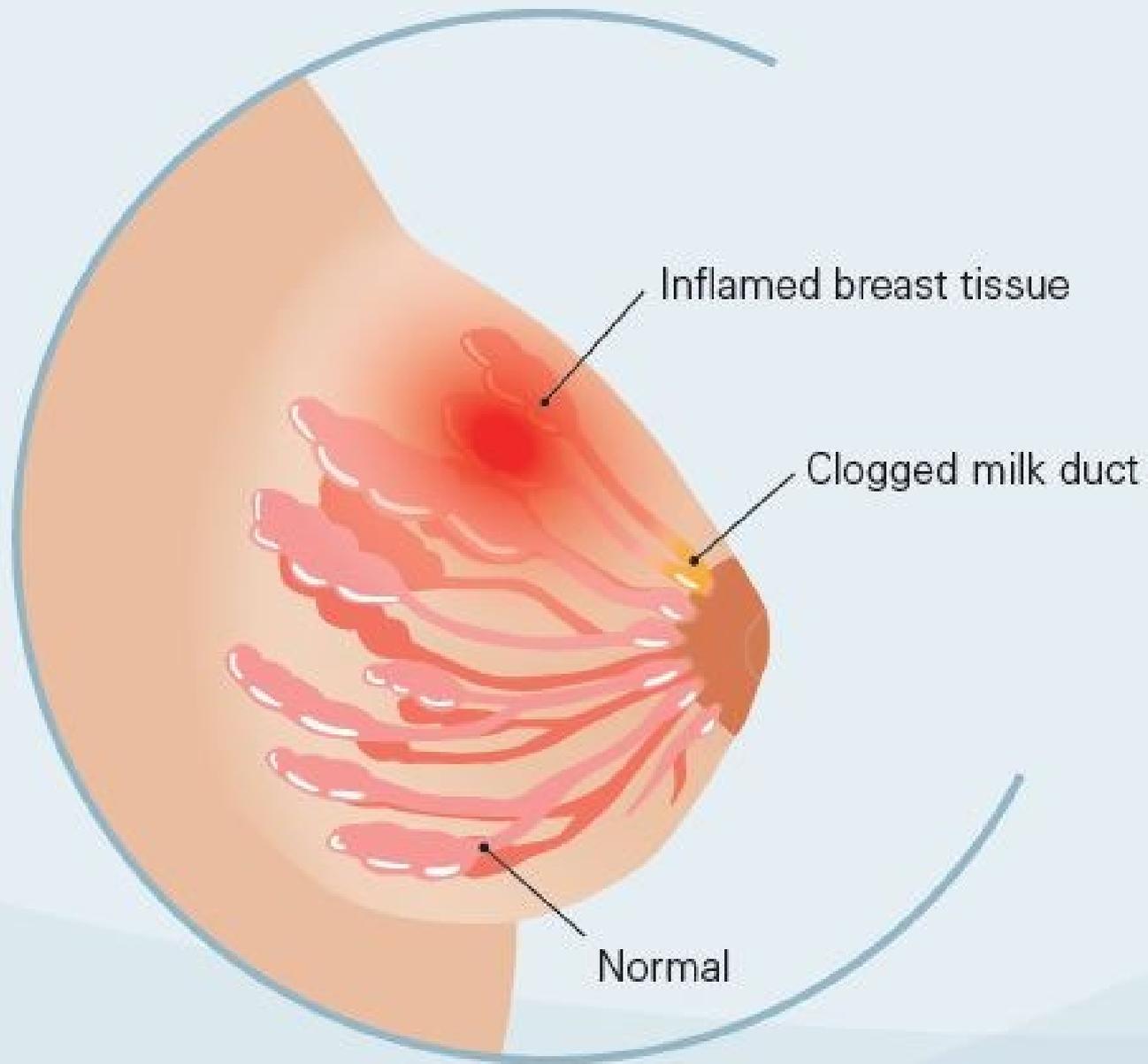
- Inflammation of the breasts; most common in BF women
- Infective or non-infective
  - Some women get mastitis after having cracked or sore nipples
  - Some get it without any obvious problem on the surface of the breast
- Cases of mastitis are usually accompanied by a fever and flu-like symptoms

## □ **Reasons:**

- Missing a feeding or the infant sleeping through the night may precipitate engorgement, plugged ducts, and then mastitis
- Restriction from a tight bra or clothing

## □ **Symptoms**

- Tender, hot, enlarged, hard, wedge-shaped area in the breast
- An area of redness on the surface of the breast



Lactation mastitis: an inflammatory condition of the breast  
Uploaded By: anonymous

## □ **Management:**

- Continue breastfeeding: if too painful- express milk
- Use same techniques as with engorgement
- Ibuprofen: helps with the pain and inflammation
- Adequate rest, fluids, and nutrition

- Mild cases (symptoms present < 24 hrs): **efficient milk emptying may be sufficient to resolve the mastitis**
- If symptoms do not improve within 24hrs: antibiotics should be started
- Delays in seeking treatment for mastitis- development of abscess and recurrent mastitis
- **Avoid abrupt weaning**

**Table 7.1** Comparison of symptoms of engorgement, plugged duct, and mastitis

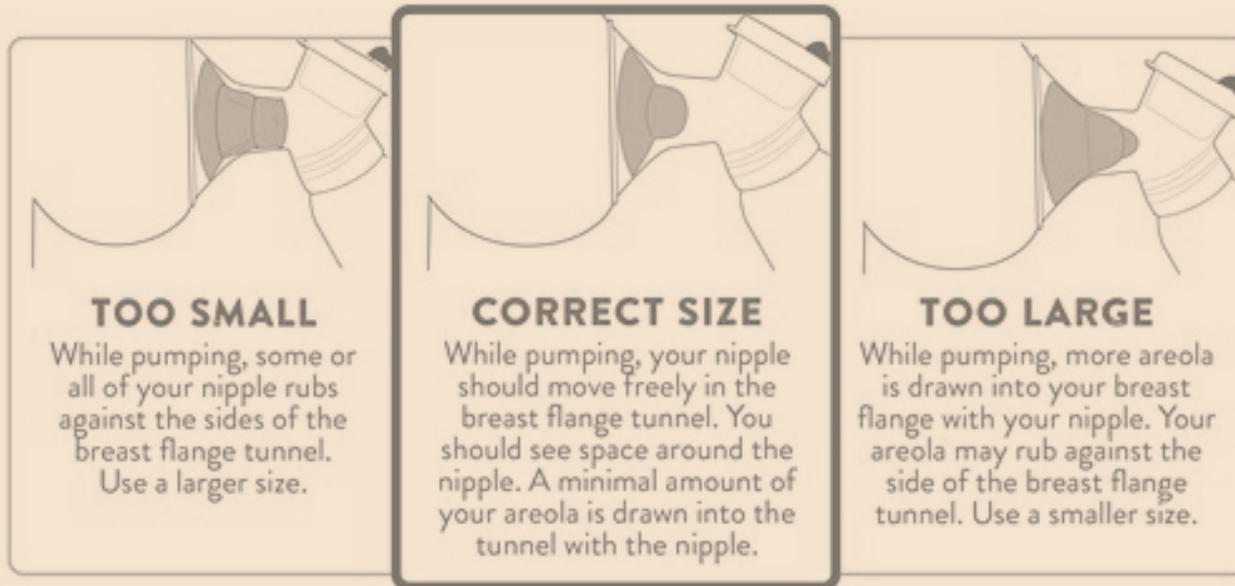
Characteristics	Engorgement	Plugged Duct	Mastitis
Onset	Gradual, immediately postpartum	Gradual, after feedings	Sudden, after 10 days
Site	Both breasts	One breast	Usually one breast
Swelling and Heat	Generalized	May shift, little or no heat	Localized, red, hot, swollen area on breast
Pain	Generalized	Mild, but localized	Intense, but localized
Body Temperature	No fever	No fever	Fever (>101°F)
Other Symptoms	Feels well	Feels well	Flu-like symptoms

# Low milk supply

- *Real or perceived* insufficient milk supply is the **most common** reason for BF cessation
  
- **Causes:**
  - Insufficient frequency of feeding/ pumping
  - Inefficient emptying of the breast- poor latch/ incorrect flange size
  - Stress

# What Does Proper Flange Fit Look Like?

If you are not using a correct flange size, you may have difficulty expressing your milk and you may feel discomfort while pumping.



## □ Strategies for management:

- Encourage mother to breastfeed/ pump esp when nursing is not effective
- Evaluate diet and fluid intake
- Encourage resting and relaxing techniques
- Check medications/contraceptive used
  - Estrogen- inhibits milk production
  - Progesterone only birth control pills do not cause this

# Galactagogues

- Drug/herb which increases milk supply
- Used only after evaluating cause of low supply and when ↑ frequency of BF and pumping has not solved the problem/ given only after evaluation by physician
- **Metoclopramide (common medication used as a Galactagogue):** → stimulates prolactin production
  - May cause fatigue, drowsiness, diarrhea, headaches, confusion, anxiety and depression
  - Usual dose 10mg taken 3-4x/d for 2 wks with a taper over 4-5days

# Maternal medications

- Most medications taken by mother are excreted in BM → concern that this is a cause for premature cessation of BF

**→ Recommendation that a mother should stop BF to take medication is never required and should be a last resort**

# Analyze the risk of an infant's exposure to a drug excreted in BM

- How much of the drug is excreted in milk?
- At the level of excretion, what is the risk of adverse effects?
  
- **Variables to examine this include:**
  - The pharmacokinetic properties of the drug
  - Plasma ratio of the drug (in milk: in maternal plasma)
  - Amount of the drug in the BM that the infant ingests
  - Infant's ability to absorb, detoxify, & excrete the agent
  - Dose, strength, and duration of dosing
  - Infant's age, feeding pattern, total diet, and health



□ **Test of safety:**

- Measure infant's plasma drug [ ]
- Side effects from the drug on the infant

□ Medications contraindicated (should not be used) during BF include:

- radioactive isotopes
- drugs of abuse
- drugs that suppress lactation

- 
- If a BF mother needs a specific medication, and the hazards to the infant are minimal, **she should take the medication after BF**, at the lowest effective dose, and for the shortest duration
  - Safer alternative medications can be recommended as a substitute for drugs with known adverse effects on infants

- Possible to choose alternative routes for administration of a medication to reduce exposure
  - Use of an inhalant instead of a drug taken by mouth, or a topical application rather than oral dosing- reduces infant exposure

**Any decision to limit a mother's BF must be justified by the fact that the risk to her baby clearly outweighs the benefits of BF**

**Table 7.3** Minimizing the effect of maternal medication<sup>18</sup>

1. **Avoid long-acting forms:** Accumulation in the infant is a genuine concern because the infant may have more difficulty excreting a long-acting form of a drug, which usually requires detoxification in the liver.
2. **Schedule doses carefully:** Check usual absorption rates and peak blood levels of the drug, and schedule the doses so that the least amount possible gets into the milk. In order to minimize milk levels of most drugs, the safest time for a mother to take the drug is usually immediately after her infant nurses.
3. **Evaluate the infant:** Watch for any unusual signs or symptoms, such as changes in feeding pattern or sleeping habits, fussiness, or rash.
4. **Choose the drug that produces the least amount in the milk.**

# Herbal remedies

- **Limited scientific information on these**
- Risk of using some herb remedies may outweigh the potential benefits
  - **Natural does not mean safe**
- Toxic effect not due to herb itself- **due to contamination** with heavy metals, microbial toxins, or misidentified plants
- Herbal gels or creams for use on nipple- ingested by infant → not recommended

**Table 7.4** Herbs traditionally used to affect milk production<sup>\*32,33</sup>

**Herbs to Promote Milk Flow**

Anise  
Astralagus  
Milk thistle  
Caraway  
Celery root and seed  
Chaste tree berry (chasteberry) or monk's pepper  
Fennel  
Fenugreek  
Goat's-rue  
Hollyhoc  
Hibiscus flower  
Lemongrass  
Marshmallow  
Stinging nettle  
Raspberry  
Rauwolfia  
Verbena

**Herbs that Reduce Milk Flow**

Castor bean  
Jasmine flower  
Fresh parsley  
Sage

**Table 7.6** Herbal teas considered safe during lactation<sup>18</sup>

Tea	Origin/Use
Chicory	Root/caffeine-free coffee substitute
Orange spice	Mixture/flavoring
Peppermint	Leaves/flavoring (limit duration use)
Raspberry	Fruit/flavoring
Red bush tea	Leaves, fine twigs/beverage
Rose hips	Fruits/vitamin C

# Alcohol

- Passes quickly to BM
- Level in BM matches maternal plasma levels
- As it clears from blood it clears from milk
- 54kg woman: 2-3 hrs to eliminate alcohol from 1 serving from her body
- Pumping milk after drinking and discarding it: ***alcohol can still be found in BM as long as mother has it in her system***

- Negative effect of alcohol on **milk supply and letdown** → hormonal disruption (oxytocin and prolactin)
- Effects odor of BM and volume consumed by infant
- Effects infant sleep- wake patterns
- Mothers should not BF when intoxicated: **plan ahead**; wait till alcohol is out of system

# Nicotine (cigarette smoking)

- Smokers- less likely to BF than nonsmokers
- Health risks on infant include otitis media
- Exacerbations of asthma, respiratory infections, and GI dysregulation such as colic and acid reflux
- Lower milk output has been reported- *which component causes this is unknown*
- **It is not ideal to smoke and breastfeed, but it is worse to smoke and not breastfeed**

# Nicotine (cigarette smoking)

- Lower fat content in BM has been reported
- Infants show poorer growth
- Changes in odor and flavor might affect BM intake
- Sleep patterns might be affected
- Nicotine level in BM is higher than that in mother plasma
- Increase infant exposure to organochloride pesticides, PCBs through BM and secondhand smoke

# Marijuana and other drugs

- Active ingredient transferred to BM
- Metabolized by infant
- Higher content in BM than maternal plasma
- Evidence from animal studies on impaired DNA and RNA formation
- Decrease in infant motor development at 1 yr
- Drug is contraindicated during lactation
- Cocaine, heroin, amphetamines → all contraindicated during lactation

# Caffeine

- Moderate intake- not a problem for most BF mothers and babies
- Moderate doses- low level in infant
- Infant's ability to metabolize caffeine does not fully develop until 3-4 mos of age: caffeine can accumulate in the infant
- A dose of caffeine equivalent to a cup of coffee results in BM levels of 1% of the level in maternal plasma → lower level in infant

- Hyperactive, fussy infant
- No long-term effects
- Some infants are more sensitive than others to effect of caffeine: mother should respond according to infant symptoms
  - Most infants tolerate <750ml coffee/d

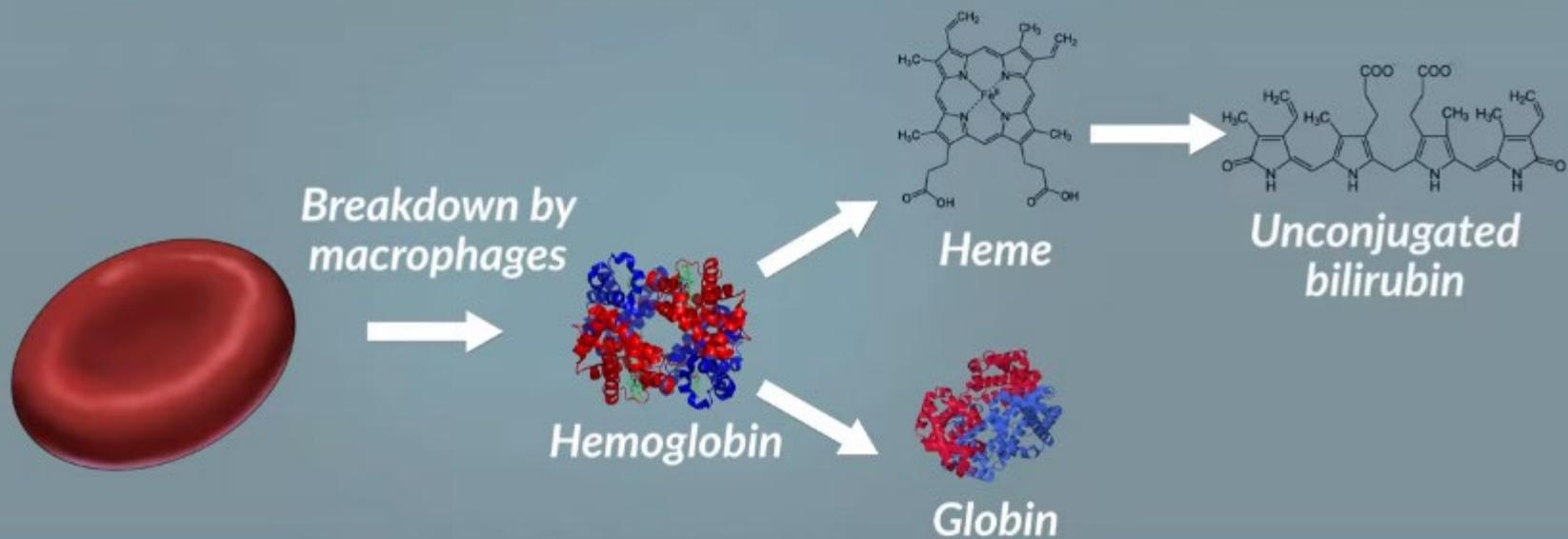
# Neonatal jaundice

- Yellow discoloring of the skin caused by too much bilirubin in the blood  $>5-7\text{mg/dl}$ 
  - Bilirubin byproduct of hemoglobin breakdown
- In utero- higher levels of hemoglobin in blood to deliver  $\text{O}_2$  to fetus
- After birth- baby breathes  $\text{O}_2$  and need for high levels of hemoglobin is gone- erythrocytes are destroyed and bilirubin is formed
- The insoluble form of bilirubin is removed from circulation by the liver: *conjugates bilirubin to a water-soluble form and excretes it via the bile- stool/ can also be removed through urine*

- Common condition; usually resolves on its own with minimal intervention
- If level remains high for long → can cause neurological damage (unconjugated bilirubin is a neurotoxin) and death in infants



# Bilirubin metabolism



**Table 7.10** Risk factors for severe hyperbilirubinemia<sup>82</sup>

**Major Risk Factors**

- Predischarge total serum bilirubin (TSB) or transcutaneous bilirubin (TcB) in the high-risk zone
- Jaundice observed in the first 24 hours of life
- Blood group incompatibility with positive direct antiglobulin test, other known hemolytic disease, elevated ETCO
- Gestational age 35–36 weeks
- Previous siblings received phototherapy
- Cephalohematoma or significant bruising
- Exclusive breastfeeding, particularly if nursing is not going well and weight loss is excessive
- East Asian race

**Minor Risk Factors**

- Predischarge total serum bilirubin (TSB) or TcB in the high intermediate risk zone
- Gestational age 37–38 weeks
- Jaundice observed before discharge
- Previous sibling with jaundice
- Macrosomic infant of a diabetic mother
- Maternal age  $\geq 25$  years
- Male gender

**Decreased Risk Factors**

- TSB or TcB level in the low-risk zone
- Gestational age  $\geq 41$  weeks
- Exclusive bottle feeding
- Black race
- Discharge from hospital after 72 hours
- Oxytocin used in labor

# Neonatal predisposition to hyperbilirubinemia

1. Bilirubin production in the neonate is double that of an adult because of breakdown of fetal erythrocytes
- **In the liver:**
  2. Uptake of insoluble bilirubin is limited because of a reduction in the [ligandin]- a bilirubin-binding protein
  3. Conjugation to a water-soluble form is limited because of deficient activity of the enzyme uridine diphosphoglucuronosyl transferase (UDPGA) which is responsible for bilirubin conjugation
4. Excretion of bilirubin is delayed because of an enzyme present in the intestine of the newborn, beta glucuronidase, which converts conjugated bilirubin back into its unconjugated state, which is reabsorbed

# Physiologic vs. pathologic newborn jaundice

## 1. Physiologic:

- ❑ Excessive bilirubin is deposited in tissues including skin, muscles, and mucous membranes of the body → yellowish color
- ❑ Temporary condition
- ❑ Resolves within a few days without treatment
- ❑ In healthy newborn- average total serum bilirubin (TSB) level usually peaks on the 3<sup>rd</sup>-4<sup>th</sup> days of life and declines over the 1<sup>st</sup> wk after birth

## 2. Pathologic:

- ❑ Begins earlier (sometimes before 24hrs of birth); rapid rise in TSB [ ] and a TSB level >17mg/dl
- ❑ Prolonged jaundice

□ **Possible causes of pathologic jaundice include:**

- Hemolytic disease of the newborn
- Hemorrhage, bruising
- Inborn errors of metabolism e.g., galactosemia/conjugation defects
  - Enlarged liver, impaired liver function
- Congenital hypothyroidism
  - Hypothyroidism causes decreased rate of bilirubin conjugation, slows gut motility and impairs feeding, all contributing to jaundice.

- Frequent BF can continue during diagnosis and treatment of pathologic jaundice- *milk stimulates bowel movements and quick elimination of bilirubin from the body*
- In galactosemia- BF is contraindicated !!!

# Jaundice and Breastfeeding

- Jaundice in the breastfed infant has been divided into 2 types based on the age of onset
  1. **Early onset: “Breastfeeding jaundice” : lactation failure**
  2. **Late onset: “Breast-milk jaundice”**

# 1. Early jaundice: “breastfeeding jaundice”

- Lack of **optimal BF** which should start in 1<sup>st</sup> hrs of life:
  - Optimal feeding: 8-12times/d for first 1-2weeks, good positioning for adequate milk transfer, wt loss of <8% of BW
  - **Mild dehydration**
  - **Inadequate BF can reduce stooling** → increase hepatic circulation of bilirubin
  - **Inadequate BF (state of partial starvation)** → increases intestinal absorption of bilirubin

- Delay in initiation of BF & admin of water to infants- **decrease BF frequency**
- hyperbilirubinemia → lethargy → poor feeding → ↓ BF frequency and milk production- **vicious cycle**

**Table 7.12** Management outline for early jaundice while breastfeeding (breast-nonfeeding jaundice)

1. Monitor all infants for initial stooling. Stimulate stool if no stool in 24 hours.
2. Initiate breastfeeding early and frequently. Frequent, short feeding is more effective than infrequent, prolonged feeding, although total time may be the same.
3. Discourage water, dextrose water, or formula supplements.
4. Monitor weight, voidings, and stooling in association with breastfeeding pattern.
5. When bilirubin level approaches 15 mg/dl, stimulate stooling, augment feeds, stimulate breast milk production with pumping, and use phototherapy if this aggressive approach fails and bilirubin exceeds 20 mg/dl.
6. Be aware that no evidence suggests early jaundice is associated with “an abnormality” of the breast milk, so withdrawing breast milk as a trial is only indicated if jaundice persists longer than 6 days or rises above 20 mg/dl or the mother has a history of a previously affected infant.

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## 2. Late onset: breast-milk jaundice

- Stools are normal
- Not associated with weight
- The following factors may contribute to BM jaundice:
  - ▣ *An unusual metabolite of progesterone in BM that inhibits activity of the enzyme (UDPGA) that conjugates bilirubin*
  - ▣ *Increased enterohepatic circulation of bilirubin*
  - ▣ *Individual variations in the infant's ability to process bilirubin*

- If diagnosis of BM jaundice is in doubt or the total serum bilirubin (TSB) level becomes markedly high-  
*a short, temporary interruption of BF (12-24 hrs) while monitoring bilirubin levels is recommended; mother should continue to express milk to maintain production*
- **Treatment goal:** lower TSB levels substantially to limits set for the infant's age and level of risk

**Table 7.11** Comparison of early and late jaundice associated with hyperbilirubinemia while breastfeeding

	Early Jaundice	Late Jaundice
Onset	Occurs 2–5 days of age	Occurs 5–10 days of age
Duration	Transient: 10 days	Persists >1 month
Incidence	More common with first child; approximately 60% of U.S. newborns become clinically jaundiced	All children of a given mother
Feeding	Infrequent feeds Receiving water or dextrose water	Milk volume not a problem  May have abundant milk supply No supplements
Stools	Stools delayed and infrequent	Normal stooling
Total Serum Bilirubin	Peaks <15 mg/dL None or phototherapy	May be >20 mg/dL Treatment: phototherapy Discontinue breastfeeding temporarily Rarely, exchange transfusion.
Associations	Low Apgar scores, water or dextrose water supplement, prematurity	None identified

# Prevention and treatment

## □ Phototherapy:

- Place newborn under special fluorescent lights that assist in removing jaundice from the skin
- The light is absorbed by the bilirubin, changing it to a water-soluble product, which can then be eliminated without having to be conjugated by the liver

# Phototherapy



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## □ Continued Breastfeeding

- Benefits of early and frequent BF in the 1<sup>st</sup> days of life for prevention of hyperbilirubinemia through maintaining hydration and stimulating the passage of stool
- **The passage of stool in the newborn is important** because there are 450mg of bilirubin in the GIT of the avg newborn- must be removed to avoid reabsorption from gut and into serum

# Breastfeeding multiples

- Mother can provide nourishment for more than one infant
- **Frequency** and **effectiveness** of BF → for more milk supply
- **Main obstacle** is not milk supply– it's time and fatigue of the mother: organization, stress management
- Challenge: preterm delivery and medical complications that interfere with BF: initiation may be in ICU

# Milk collection and storage

**Table 7.15** Guidelines for storage of human milk for home use

Breast Milk	Room Temperature	Refrigerator	Freezer
Freshly expressed into a closed container	6–8 hr @ 78° F or lower	3–5 days @ 39° F or lower	2 weeks in freezer compartment inside refrigerator 3–6 months in freezer section of a refrigerator with separate door 6–12 months in deep freezer at 0° F
Previously frozen—thawed in refrigerator but not warmed or used	4 hr or less	Store in refrigerator 24 hr	Do not refreeze
Thawed outside refrigerator in warm water	For completion of feeding	Hold for 4 hr or until next feeding	Do not refreeze
Infant has begun feeding	Use only for completion of feeding and then discard	Discard	Discard

# INFANT ALLERGENS

Protection from *allergic diseases* is one of the most important benefits of breastfeeding

## TABLE 7.12 ▶ Possible reasons for allergy-preventive effects of breastfeeding<sup>101, 102</sup>

- Low content of allergens
- Transfer of maternal immunity
- Long-chain fatty acids and IGA in breast milk protect against inflammation and infections
- Regulation of infant immunity
- Influence on gut microbial flora

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# Infant allergies

- Allergic diseases- *conditions resulting from hypersensitivity to a physical or chemical agent*
- Most common food allergens: cow's milk, wheat, eggs, peanuts, soybeans, tree nuts (almonds, walnuts)

# The development of infant food allergy is influenced by

- Genetic risk for allergy
- Duration of BF
- Time for introduction of complementary foods
- Smoking during pregnancy
- Air pollution
- Exposure to infectious disease
- Maternal diet and immune systems

- No strong evidence to support recommendation of avoiding major food allergens- diet of BF mother
- Research findings: presence of food proteins in BM is common, but can be highly variable between women consuming the same dose of food
  - Advice to BF mothers with a family history of allergies regarding **elimination of common allergens in their own diets** should be individualized
- No family history of allergies → no need to avoid food allergen

# Food intolerance

- **INTOLERANCE** : An adverse reaction involving digestion or metabolism but not the immune system.
- Concern about gassy foods has no scientific basis- *neither fiber nor gas* are absorbed from maternal GIT- do not enter BM
- Garlic and spices may pass into BM- occasional objection by infant
- Study findings- garlic, onions, cabbage, broccoli, beans- associated with infant colic

- Melon, peaches may cause colic and diarrhea in the infant
- Red pepper has been reported to cause dermatitis in the BF infant within an hour of milk ingestion

→ If suspected reaction to specific food is present-keep track and record symptoms

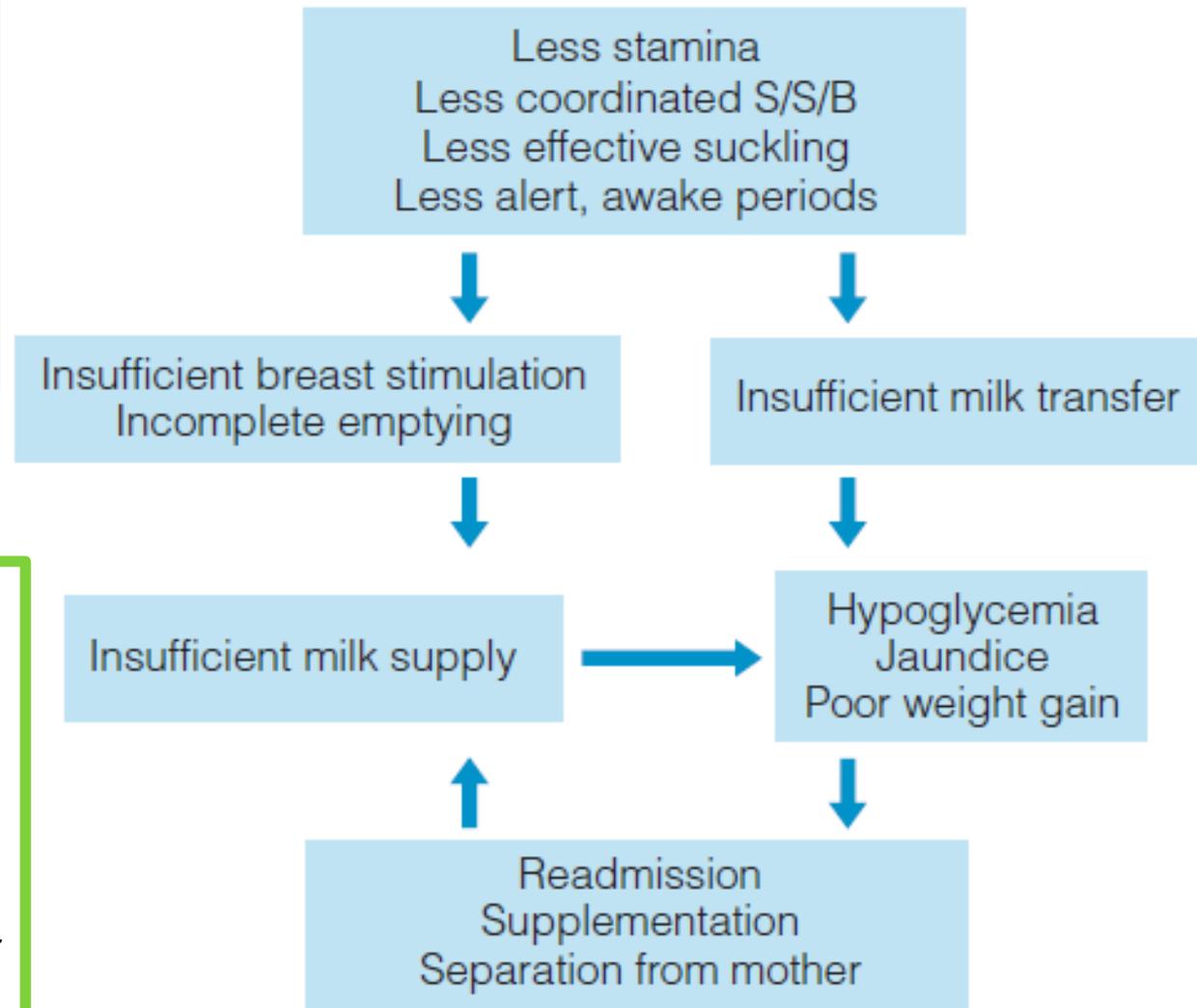
# Late-preterm infants

- Infants born 34-37wks
- Have subtle immaturity-makes establishing BF difficult; places baby at risk of insufficient feeding, jaundice, hypoglycemia, and poor weight gain
- ***Main emphasis in postpartum care → building & maintaining the milk supply and feeding the infant***

## Near-Term Breastfeeding Cascade

- Infants may have cardiorespiratory instability
- Poor temperature control
- Lower glycogen and fat stores to prevent hypoglycemia
- An immature immune system

- Pumping after each feeding or every 3 hrs- to build milk supply
- Need of specific feeding schedule
- Wake infant every 2-4hrs
- Weigh infant before and after feeding to assess milk transfer



# Human milk and preterm infants

- Benefits of BM- most apparent in these cases
- **The composition of milk** is higher in protein, slightly lower in lactose, and higher in E content compared to the milk of full-term delivery infants

- 
- Once growth is established, the nutritional needs of the preterm infant exceed the content of BM for protein, Ca, P, Mg, Na, Cu, Zn, B2, B6, folic acid, and vitamins C, D, E, and K
    - Human milk fortifiers are available that provide additional protein, minerals, and vitamins



- The challenges of feeding LBW infants include:
  - Provision of adequate calorie and nutrient intake
  - Establishing and maintaining an adequate milk supply
  
- **Strategies to improve BF include:**
  - Provide parents with information necessary to make an informed decision to breastfeed
  - Assist the mother with the establishment and maintenance of milk supply
  - Ensuring correct BM management (storage and handling) techniques
  - Provide skin-to-skin contact and opportunities for non-nutritive sucking at the breast
  - Measure milk transfer

# Medical contraindication for BF

**Table 7.14** Summary of medical contraindications to breastfeeding in the United States

Problem	OK to Breastfeed in U.S.?	Condition
<b>Infectious Diseases</b>		
Acute infectious disease	Yes	Respiratory, reproductive, gastrointestinal infection
HIV	No	HIV-positive in developed countries
Active tuberculosis	Yes	After mother has received 2 or more weeks of treatment
<b>Hepatitis</b>		
A	Yes	As soon as mother receives gamma globulin
B	Yes	After infant receives HGIB; first dose of hepatitis B vaccine should be given before hospital discharge
C	Yes	If no co-infections (e.g., HIV)
Veneral warts	Yes	
<b>Herpes viruses</b>		
Cytomegalovirus	Yes	
Herpes simplex	Yes	Except if lesion on breast
Varicella-zoster (chickenpox)	Yes	As soon as mother becomes noninfectious
Epstein-Barr	Yes	
Toxoplasmosis	Yes	
Mastitis	Yes	
Lyme disease	Yes	As soon as mother initiates treatment
HTLV-I	No	
<b>Over-the-Counter/Prescription Drugs and Street Drugs</b>		
Antimetabolites	No	
<b>Radiopharmaceuticals</b>		
Diagnostic dose	Yes	After radioactive compound has cleared mother's plasma
Therapeutic dose	No	
Drugs of abuse	No	Exceptions: cigarettes, alcohol
Other medications	Yes	Drug-by-drug assessment
<b>Environmental Contaminants</b>		
Herbicides	Usually	Exposure unlikely (except workers heavily exposed to dioxins)
Pesticides	Usually	Exposure unlikely

# Case of HIV

- **Developed countries:** substitutes available, affordable supportive environment → alternative to BF (*do not BF*)
  
- **Developing countries:** substitutes unavailable, expensive; no supportive environment: water supply, fuel, contamination, safety...
  - WHO, UNICEF: “Exclusive BF is recommended for HIV-infected women for the first 6 months of life unless replacement feeding is acceptable, feasible, affordable, sustainable and safe for them and their infants before that time”
  - Lower mortality with BF
  - In certain populations, the benefits of breastfeeding may outweigh the risk of HIV transmission