



**National Institute of Lactation Education**  
**For India. By India. About India.**  
Professional Level Lactation Courses  
Internationally Recognized (IBLCE)  
Nationally Recognized (ALPI/ BEI/ CFSI Foundation)

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### **IBCLC Exam Topics Review**

**Please review these notes, and then GO DEEPER!!! Review the lactation support resources to prepare for the IBCLC Exam.**

#### **Lactation Support Resources**

- Comprehensive Lactation Consultant Exam Review
  - Smith
- Breastfeeding and Human Lactation
  - Wambach, Riordan
- Counseling the Nursing Mother
  - Swisher, Lauwers
- Breastfeeding Answers
  - Mohrbacher
- Breastfeeding Atlas
  - Wilson-Clay, Hoover
- Clinical Lactation Manual
  - Begin Ed India

#### **Anatomy and Physiology Review**

- Mammogenesis
- Secretory Differentiation
- Secretory Activation
- Galactopoiesis
- Involution
- Tanner's 5 Stages of Development
- Breast
  - 2-6th rib
  - Hypoplastic
    - 3-5 rib
- 2/3 of breast is parenchymal tissue
- Nipple
  - 4-18 pores in tip of nipple
- Montgomery Glands
  - Lubrication, bacteriostatic
- Cooper's Ligaments

- No longer lactiferous sinuses
  - Branching of the ducts
- Lateral thoracic artery
  - Provides 40 % of the blood supply
- Symmastia
  - Unibreast
- Poland Syndrome
  - Absence of the chest muscle on one side of the body
- Breast asymmetry
  - Is the areola really bulbous?
- 3 grades of inverted nipples
  - 1-evert manually
  - 2-more difficult to evert
  - 3- nipple cannot come out, never evert
- 4 Stages
  - Now have new names
  - 1-Secretory Differentiation
    - A. Lobular Proliferation (increase in estrogen and progesterone)
    - B. Alveoli to multiply, nipple/ areolar growth (Human placental lactogen, prolactin)
    - C. Mammary growth/ development (incr in progesterone)
  - 2-Secretory Activation
  - 3-Galactopoiesis
  - 4-Involution
- Where do hormones come from?
  - Pituitary (prolactin, growth hormone, thyroid stimulating hormone)
  - Ovaries (estrogen, progesterone)
  - Placenta (HPL, estrogen, progesterone)
  - High circulating plasma levels of progesterone allow for suppression of the secretory phase
  - once placenta passes this decreases and allows for milk production
- Prolactin Inhibiting factor
  - Dopamine inhibits prolactin secretion

### Stage 1

Progesterone	lobulo-aveolar growth
Prolactin	nipple growth, lactocyte differentiation
Human Placental Lactogen	areola changes, breast growth
Estrogen	ductal growth

### Stage 2

Prolactin	Lactose Synthesis
Cortisol	low levels cause more alpha-lactalbumin to be made, high levels inhibit
Insulin	lactose synthesis, maintenance and survival of lactocytes

- Prolactin
  - Produced in anterior pituitary
  - 200-400 ng/ml
  - Milk synthesis
  - Circadian Rhythm

- Prolactin Inhibiting Factor-dopamine released in response to fatigue, stress
  - Blocks secretion
  - Infant sucking can override
- Oxytocin
  - Love
  - Labor
  - Lactation
  - Posterior pituitary
  - Milk ejection
  - Stimulated by auditory stimuli
- Weaning
  - Less than 400 mL/day
  - Involution, 40 days after the last breastfeeding
  - Apoptosis of secretory cells
- Decrease in amount of alveoli after 35 years
- Nipple Bleb, sebaceous cyst
- Peau d orange
  - Orange skin
  - Advanced cancer
  - Not mastitis
  - CA can cause mastitis
- Eczema of breast
  - Red itchy scaly
  - Cortisone cream
- Paget's disease
  - Unilateral
  - Red, scaly
  - Affects nipple first
- Palates
  - Normal
  - Anterior Bubble
  - Posterior Bubble
  - High Palate
  - Channel Palate
- Polythelia
  - Many nipples
- Hypermastia
  - Large breasts

### **Lactation Equipment Review**

- Baby suck 1/second
- Negative pressure 50-155 mmHg
- Compression to remove milk
- Peristaltic tongue movement
- Effective pump creates a vacuum or pressure gradient
- Before MER
  - Lower suction, faster cycling

- After MER
  - High suction, slower cycling
- Oxytocin
  - Peaks every 6-10 mins
  - Baby elicits MER after 60 sec
- Prolactin
  - Essential for milk production
  - Delivery of placenta and suckling at breast
  - Double pumping increases level by 30%
- Marmet
- Morton Technique
- Heat massage stroking breast

### **Milk Storage Review**

- | <u>Pumped Milk</u>           | <u>Preterm</u> |
|------------------------------|----------------|
| ● Room temp 4-6 h            | 4 h            |
| ● Fridge 4-8 days            | 48 h           |
| ● Defrosted 24 h             | 24 h           |
| ● Freezer in Fridge 6 months | 3 months       |
| ● Deep 1 year                | 6 months       |
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- Power Pumping
    - Pump for 10-12 mins, rest 10-12 mins, 2 times daily
  - No vitamin E
    - Toxins can build up in baby, not water soluble
  - Haberman
    - Special needs bottle
    - For weak suck
  - Adiri Bottle
  - Weigh
    - Weigh 2xs before, weigh 2xs after
  - Sucking, something sweet, skin to skin reduces pain

### **Milk Composition Review**

- Milk based on growth of species
- Milk for human based on brain growth
- Low protein based on other milks
- Based on feed intervals
- Breast takes over the role of the placenta
- Signaled by the progesterone withdrawal
- Everything is mother's blood stream goes into placenta
- Menses
  - 5 days before menses
    - Sodium goes up
    - Potassium does down

- Lactose down
  - 20 days after menses
    - NA up slightly
    - K down slightly
    - Lactose down
- Exocytosis
  - Production of protein, lactose, electrolytes
- Colostrum
  - Laxative effect
  - Expels meconium
  - Establishes lactobacillus bifidus as gut bacteria
- Smells odors will be in milk
- Colors in milk
- Water in milk 87.5%
- Moms of baby boys
  - 25% more calories in milk

### Whey casein

90:10 Early lactation

60:40 Mature Milk

50:50 Late lactation

20:80 Cow's milk

### Human Milk Review

- Taurine
  - Not in cow's milk
- Alpha Lactalbumin
  - Human Milk
- Beta Lactoglobulin
  - Cow's milk
- Hamlet
  - Multimeric alpha lactalbumin
  - Tumor necrosis factor
  - Trail factor
  - Apoptosis ligand
- Tyrosine
- Phenylalanine
- Fat in Milk
  - 50% of calories
  - 4-5%
- Oligosaccharides
  - Each is linked to a particular virus
- Sialic Acid
  - High in colostrum, preterm milk
- Iron
- Own lactose and vit C
- It is lower in human milk but it is absorbed better
- Human milk is called white blood

- Has macrophages and lymphocytes
- Lactoferrin
  - found in breastmilk
- Bifidus factor
  - Positive
  - counteracts negative bacteria like E coli
- Host Resistance factors
- Immunoglobulins
  - IgA in human milk
- Enteromammary System
  - Allows baby to get a more milk strain of virus
- Thymus gland of breastfed baby twice the size of formula fed baby
- Milk mucins active against rotavirus
- Fat content rises later in lactation

### First Month Review

- Golden Hour
  - Most opportune time to begin breastfeeding
- Skin to Skin
  - Separation distress cry
  - Lower stress hormones
  - Stabilizes blood sugar and temp
- Baby are ventral feeders
  - Stomach to stomach, chest to chest
- Autonomous movements
  - Anti gravity movements

### Jaundice Review

- Fetal red blood cells break down quicker than mature red blood cells
  - Excreted as bile in feces
  - Every baby has slight jaundice as changing from fetal to adult hemoglobin
- Conjugated bilirubin
  - Direct
    - Liver is transformed
    - Water soluble
    - Excreted in stool/urine
    - Can be retransformed if not excreted quickly
- Unconjugated
  - Released in serum, travels to liver
- **RED FLAG**
  - Lack of stool
- Kernicterus
  - Yellow staining of brain matter
  - Bilirubin encephalopathy
    - Damage of brain tissue due to unconjugated bilirubin in bloodstream that goes to brain
- Best treatment

- Protein
- Power pump for colostrum

### **Blood Sugar Review**

- Low blood sugar
- 1-2 H blood sugar 28
- 3-23 H 40
- 24-47 H 41
- 48-72h 48

### **Engorgement Review**

- Engorgement happens in stage 2
  - In endocrine stage, due to hormones
  - Prolactin surge
  - Increase in milk volume
  - Interstitial edema
- physiological vs pathological
- Reverse pressure softening

### **First Weeks Review**

- Excessive weight loss
  - Occurs in 12% of babies
- More than 7%
  - Careful monitoring
  - Evaluate for breastfeeding problems
- Delayed milk (greater than 72 hours)
  - C Sections
  - Diabetes
  - High body mass
  - 1st time moms
  - Stress during delivery
- 74% of weight loss due to poor breastfeeding practices by mom or baby
- IVFs cause increase in infant weight loss, faster the IVF the more the baby lost
- Delaying first weight by 24 hours
  - Due to IVFs given during labor
- Placenta delivery plummets progesterone, increases prolactin
- Goal 750-800 mL per day
- Delayed milk
  - C section, diabetes, placental fragments, betamethasone injections ANC
- Impaired lactogenesis usually has to do with what happened in the hospital
  - Post glandular-delayed or infrequent milk removal

### **PCOS**

- High levels of estrogen
- Lack of breast growth
- Male hair pattern
- Type 2 DM

- Insulin levels affected
- Acne
  - 1/3 low, 1/3 no, 1/3 high
- Common metformin, glucophage

### **Theca lutein Cysts**

- Mom takes on masculine traits
- Cysts secrete male hormones
- 20 days after delivery

### **Blood Loss**

- C section
- Sheehan Syndrome
  - Infarct in pituitary gland
- Ergot alkaloids-to stop postpartum hemorrhage
- Betamethasone

### **Estrogen/ BCP**

- Will down the milk supply
- birth control-not started until after 6 weeks
- Progestin only pill
- After 6 months progestin-estrogen combo

### **Post Glandular**

- Lack of frequent stimulation
- Engorgement
- Frequent supplementation
- Misinterpreting growth spurts

### **Loss of Milk Supply**

- Hypothyroidism
- BCP
- Pregnancy again

### **Weight Review**

- Weight loss 10%
- Regain birth weight by 2 weeks
- Stop losing weight once milk comes in
- 2.5 x weight---24 hour calculation
- Divide by the number of feedings

### **Meds to stimulate prolactin**

- Metoclopramide
- Domperidone

### **Maximizing MER**

- Massage, Breast compressions



- Milk ejection reflection
- Setting up a routine
- Oxytocin nasal spray
  - Made by compounding pharmacist
- First choice
  - Supplementing at the breast
- 2nd choice
  - Finger feeding, cup, spoon
- 3rd choice
  - Paced bottle feeding

### **Neifert's Rule**

- 4 seedy stools
- By 4th day
- For 4 weeks

### **Feed the baby**

- Protect the milk supply
- Finesse the breastfeeding

### **Review: Challenges after 1st Month**

- Feeding times shorten
- 3 months-start to get distracted
- Teething can start as early as 4 months
- More feeding at night when crawling begins

### **Mastitis Review**

- Breast inflammation
- Bacteria into breast d/t crack
- 30% of moms will have it
- 10% of moms will wean
- Usually only seen on 1 breast
- Inflammation process
- Can lead to abscess
- Can be acute or chronic
- Infection in breast tissue, not in the milk
- Mastitis milk-elevated levels of protective components against illness
- Recurrent
  - Oversupply or milk stasis
  - Overuse of nipples creams and gel pads
- Breast abscess
  - Ineffective management of mastitis
  - Encapsulated inside breast

- Needle aspiration
- Sometimes needs a drain
- Caused by staph aureus
- Thrush
  - Overgrowth of Candida
  - Burning stinging
  - White mouth in baby
  - Sometimes babies mouth more obscure
  - Cause: after mom has antibiotics
  - Treatment:
    - Gentian violet
    - 40% are resistant to nystatin
    - Oral diflucan
- Return of menstruation
- Tandem Nursing
  - BF newborn first
  - Have a special box of activities for time when newborn is nursing
- After first month, episodic types of situations

## Safe Supplementation

- Unsafe practices
  - No instructions
  - Did not read package
  - Powdered formula not sterile
  - Ready to feed is sterile
  - Discard after held at room temp for 2 hours
- Types
  - Cow's Milk
  - Soy
  - Lactose free
- Protein allergy is different than lactose
- Hypoallergenic
  - Heat treated to breakdown the proteins
  - Expensive
  - Don't taste good
- First 12 months
  - No powdered formula in immunocompromised babies, or less than 2 months of age
  - [http://www.who.int/foodsafety/publications/micro/PIF\\_Bottle\\_en.pdf](http://www.who.int/foodsafety/publications/micro/PIF_Bottle_en.pdf)
- Most common sx
  - Constipation
  - Stool should be daily
  - Sometimes changing brands help
  - Gas/Colic

- Feeding in Disasters
  - BF is best
  - No clean water or sanitation
- 1/3 of 9 month old infants more obese
- 1/3 of 2 yr old obese
- Formula fed babies
  - 30,000 calories more than breastfed infants
  - Nix the clean plate club
  - Let toddlers eat as they please
- Cronobacter
  - Found in powdered formula
  - Not highly common
  - Susceptible babies in NICU
- Babies are overfed with formula
  - Faster flow
  - Baby can be put in food coma and sleep
  - Babies can be overfed and be overweight

### **Induced Lactation and Relactation**

- Mammary stimulation can cause the release of prolactin
- Nipple stimulation-release of prolactin and stimulation of oxytocin
- Maternal Hx
  - Previous hx of pregnancy
  - How many, how long
  - Hormonal imbalances
  - Any bf experiences
    - how long
    - when wean
    - any problems
- Nipple stimulation
- Start estrogen and progesterone (OCP)
- Stop before bf to trick body
- Begin with short sessions up to 15-20 mins
- Use massage and warm compress
- Every 3-4 hours
- Galactagogues
  - Domperidone
  - Metoclopramide
    - Depression can be a side effect
  - Sulpiride

- Signs and sx
  - MER
  - Breast fullness
  - Nipple pain
  - Menstrual cycle
  - Change in appetite or weight
  
- Newman-Goldfarb Protocol
  - 6 months before baby due
  - [https://www.asklenore.info/breastfeeding/induced\\_lactation/protocols4print.shtml](https://www.asklenore.info/breastfeeding/induced_lactation/protocols4print.shtml)
  - No pumping or herbs until 6 weeks before baby is due
  - 6 weeks before baby due stop taking pill, start taking domperidone
  - Stopping birth control pill will plummet progesterone and allow prolactin to be produced
  - Mother should continue 20 mg 4 times per day
  - Pump once at night too
  
- Relactation
  - How old is baby
  - How is baby being fed

## **Infant Challenges**

- Tongue Tie
  - Ankyloglossia
  - Type 1
  - Type 2
  - Type 3
  - Type 4
- What does the frenulum look like?
  - Watch a feeding
  - Observe mom's nipple tissue
  - Manage supply
  - Manage nipple erosion
- Cleft Lip
  - Midline defect
  - More prone to choking and nasal leakage
- Cleft Lip
- Cleft Palate
  - Special feed
  - Haebberman's feeder
- Torticollis
  - Trauma during birth
  - Wrong position in the womb
  - Baby always looking at same side
  - Muscular lump on one side of neck
  - Find position comfortable for baby and mom

- Hypertonic
- Hypotonic
  
- Dancer hold
  - Support underneath jaw and breast
  
- Pierre Robin Anomaly
  - Small jaw
  - Cleft palate
  - Downward displacement of tongue
  - Difficulty with feeding at breast
  
- Down Syndrome
  - Low muscle tone
  - Small stature
  - Crease across their palm
- Frequent feeding
  - Quiet environment
  - Modified football hold
  - Dancer hand position
  - Pump or hand express to get the letdown
  
- Cerebral Palsy
  - Rubella, Herpes, HIV, toxoplasmosis
    - virus/bacteria in mom
  - 20% in brain injury in birth process
  - Depends on severity for the breastfeeding process
- Congenital Heart Defects
  - Patent Ductus Arteriosus
    - Difficulty feeding
    - Breathing during feeding
    - Heart murmur
    - Blue or gray skin coloring
    - Sweating during feeding
    - Get mom pumping right away
    - Try baby at breast first

## **Growth Charts**

- Mom's expectations
- Cultural environment
- Double by 6 months
- Triple by year
- Birth weight by 10-14 days
  
- Gestational Diabetes

- Mimics type II diabetes
- Twice as likely to develop type II later on
- Zoloft and Lexapro
  - Best SSRIs for bf mothers

## **Maternal Milk Production**

- FIL factor will inhibit the milk production
- Perceived insufficiency
- Growth spurt
- Physiological milk production problems
  - Supplementation with formula
  - Separation
  - Unresolved engorgement
- Sage parsley and mint
  - Can inhibit milk supply
- Depo shot will inhibit milk supply
  - Supposed to receive at 6 weeks postpartum
- Newborn
  - Prematurity
  - Oral/facial anomalies
  - High bubble or channel palate
- Delayed Lactogenesis II
  - C/S
  - Labor augmentation
- Milk Bank
  - Non profit
  - Distribute to various locations
- Commercial Milk Bank
  - Prolacta
- Primarily nutritional
  - FTT
  - Premature babies
- Verbal hx
  - Serum screening
  - Pasteurization
- Heat Tx
  - Holder pasteurization
  - Batch #
  - Date
  - Donor
- Lactation Diet
  - 1800-2700 kcal per day
- Affected by diet
  - Selenium
  - Iodine

- Water soluble vitamins
- Fatty acids
- Preterm milk has 30% higher fat
- Soft stool due to fatty acids in BM
- 1000-1300 mg calcium per day
- More babies and longer babies breastfed the less risk for osteoporosis
- Vit D
  - 600 IU mom
  - 400 IU baby
- Vegans maybe at risk for iodine deficiency
- Need less iron than pregnant women bc not menstruating during nursing
- 50% iron in breastmilk as lactoferrin, more bioavailable to the baby
  - Formula only 7%
- Breastfeeding women lose more weight
- Vegetarian
  - Vitamin B12
  - D
  - Zinc
  - Iron
  - Calcium
  - Iodine
  - DHA
- Baby
  - Vit B12

## Allergies

- Food Intolerance
- Reproducible reaction to a food
- Food Allergies
  - Adverse reaction to food
  - Exposure to a given food
- IgE mediated
  - Hives reaction
  - Whole body response
  - Mucousy
  - Appear within a short period of time
  - Occurs every time the food is eaten
- IgG reactions
  - Delayed
  - Mediated by T cells
  - Large repetitive foods

- RDA
  - Recommended daily allowance
  - 1800-2700 based on body size and age
  - 55% Carb
  - 20-30% Fats
- Women who are deficient will have less milk volume
- IgE
  - More severe
  - Only 5%
  
- If mom ingested amphetamines
  - Pump and dump for 48 hours
- Cocaine
  - Pump and dump for 24 hours
- Mothers who are medicated more likely to leave hospital without early breastfeeding
  - Anesthesia and analgesic

### **Galactagogues**

- Domperidone
- Metoclopramide/ Reglan

### **Premature and Sick Infants**

- Premies
  - Slower gastric emptying time
  - Bolus vs slow infusion
  - Lipids stick to the tubing
  
- Galactosemia
  - Severe cases need to be weaned from human milk
  - Lactose/galactose free formula
  - Duarte can have some
  
- PKU
  - untreated, lead to intellectual disability
- Esophageal Atresia
  - Portions of esophagus don't fuse together

### **Prenatal Counseling and Decision Making**