



Our Team



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Disclosure

- This class will not refer to products, drugs, or devices of a commercial company with which we have a significant relationship.
- We have not accepted a fee from a commercial company for this class.
- Supported with funding from the Oklahoma State Department of Health.
- Mannel serves as Executive Director of the Oklahoma Mothers' Milk Bank, a statewide nonprofit.

How Does It Work?

Milk Production and Expression

- How the breast makes milk
- Indications for expression of milk
- Mechanics of expression
- Milk collection and storage
- Troubleshooting common problems



How the Breast Makes Milk

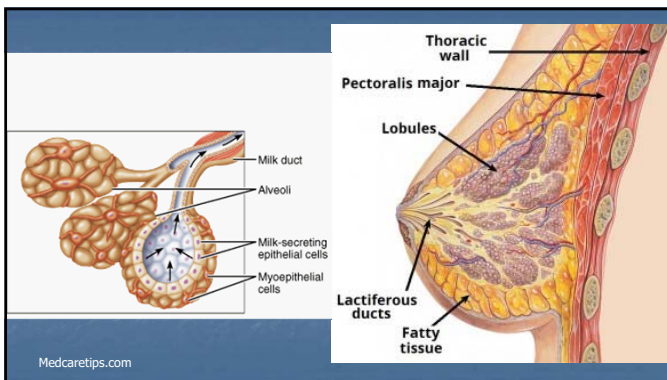
Mammogenesis

- "Mammae" = Latin term for breasts
 - *From infant's cry "mamma" in seeking the breast*
- Breast development begins during 4th week of fetal gestation
- Further development during puberty

Mammogenesis in Early Pregnancy

- Estrogen – ductal system
- Progesterone – lobes and alveoli
- Prolactin – nipple growth
- Placental lactogen – areolar growth

Transition of breast from non-secreting organ to secreting organ



Lactogenesis I

- Lactogenesis I = capacity of mammary gland to secrete milk from mid-pregnancy to late pregnancy
- Lactation occurs after 16 weeks of pregnancy
- Lactogenesis I continues until 2-3 days after birth

Colostrum

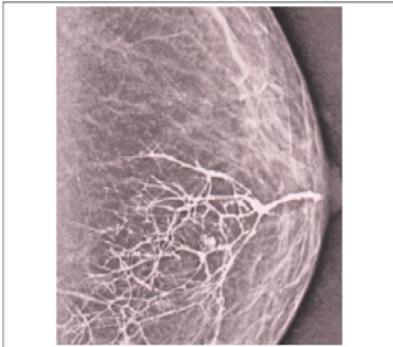
- Increased protein
 - Higher concentration of immunoglobulins
 - Overall dose to baby = 1 g/day
- Decreased fat
- Decreased lactose
- Low water/fluid volume



BabyCenter Australia

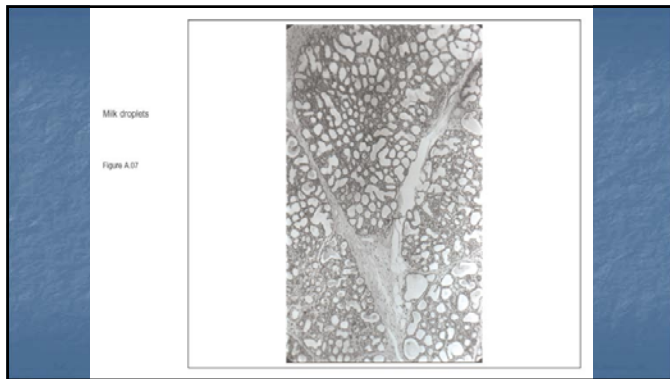
Milk ducts and ductules

Figure A.01



Lactogenesis II

- Onset of copious milk secretion after birth
- Milk volume increases rapidly, then abruptly levels off
- Triggered by a rapid drop of progesterone after delivery of placenta
- Occurs 2-3 days after birth



Transitional-Mature Milk

- Lower protein concentration
 - Overall dose to baby = 1 g/day
- Higher fat
 - Most recently made milk (end of feeding)
- Higher lactose
 - Less recently made milk (start of feeding)
- Higher water concentration (>85%)

Two clear plastic bottles of breastmilk are shown side-by-side. The bottle on the left has a white cap and contains a clear, colorless liquid. The bottle on the right has a yellow cap and contains a pale yellow liquid. They are placed on a white surface against a dark background.

Breastmilk at the beginning and end of a pumping session.
Jenny Holm-Larsen. Photo used with permission.

Milk is a Bioactive Substance

- Immunoglobulins
 - Secretory IgA, IgG, IgM, IgD, IgE
- White blood cells
 - T & B cells, neuts, lymphs, macrophages
- Enzymes - lactase
- Lactoferrin
- Oligosaccharides
- Hormones

A color micrograph showing various components of milk. There are several large, round cells with prominent nuclei, likely white blood cells. There are also many smaller, darker, and more irregularly shaped particles scattered throughout the field of view.

Balbach, MD - Light Microscopy



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Indications for Expression of Milk

Indications for Expression of Milk

- Delayed initiation of breastfeeding
- Interruption of breastfeeding
- Decreased milk supply
- Relief of engorgement
- Donating to a milk bank

Mammi, OU Medical Center

Hand Expression

- Most common form of milk expression
- Is more effective for expressing colostrum
- When mechanical breast pump not available
- Useful for stimulating milk release (MER) before using mechanical pump
- When used after pumping, more effectively drains the breast: "hands-on pumping"

Pumping with hand pump

Figure 1.13



Automatic Electric Pumps

- Double-pumping → ↑ milk collection
- Best for mothers working full-time
- Best for sustaining milk production (NICU moms)
- Faster pumping
- Less chance of injury

Milk Collection

Initiating and sustaining milk production for a preterm/sick infant:

- Double-pump w/ hospital-grade pump
- Initiate pumping w/in 6 hours of delivery
 - Consider starting with hand expression
- Hands-on pumping!
- Pump 8-10 times/day for 10-15 min each
- Practice kangaroo care daily
- Stimulate MER (breast massage, heat,...)

Pumping FAQs from moms

- **When do I count the start of a pumping session?**

Pumping time starts from beginning of last session to beginning of next session

- **How often do I need to clean/sanitize my pump parts?**

Sanitize pump once per day, rinse well after each use during the day

- **Should I take some type of herbal supplement to increase my milk supply?**

There is no evidence to support, some will exclude you as a milk donor

Rusty pipe syndrome

Figure A.08





Average Milk Volumes

PP Dy 1: 40 - 120 ml
PP Dy 2: 100 - 200 ml
PP Dy 3: 200 - 400 ml
PP Dy 5 - 10: 500 ml (~ 1oz/brst q 3 hrs)

By 1 month postpartum, most mothers are producing 700-800 ml/day.

- ABM Protocol #3: Supplementary Feedings in the Healthy Term Breastfed Neonate 2017

Average Infant Intake

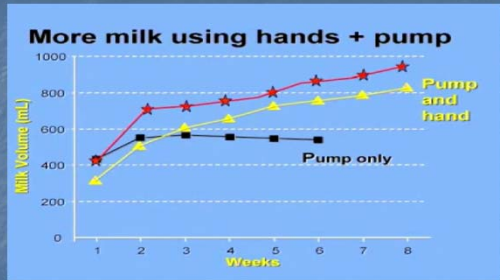
- Day 1: 2-10 ml/fdg
- Day 2: 5-15 ml/fdg
- Day 3: 15-30 ml/fdg
- Day 5: 30-60 ml/fdg

- ABM Protocol #3: Supplementary Feedings in the Healthy Term Breastfed Neonate 2017

Low or Decreasing Milk Production

- Insure frequent pumping (8-10x/day)
- Tips to elicit milk release
 - Relaxation tips
 - Breast massage, heat
 - Kangaroo care w/ baby
- Fatigue, stress, pain, anxiety/depression
- Rule out maternal medications
- Insure effective type of pump
- Hands-on pumping!

Marshall, OU Medical Center



Pain with Pumping

- Insure proper flange fit
- Decrease length of pumping sessions
- Decrease vacuum
- Insure vacuum is released or interrupted during pumping sessions
- Rule out infection

Hennepin, Ol Medical Center



OKLAHOMA
mothers' milk bank

www.okmilkbank.org
405-297-LOVE

13th milk bank in the U.S.!





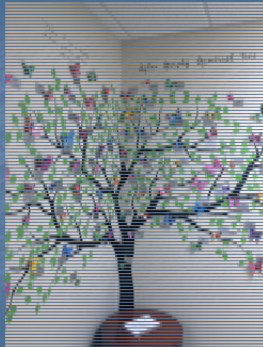
Our New Home!
940 NE 13th, Garrison Tower,
Ste 1220







Silas Murphy Memorial Tree



Unexpected Death In Utero



Oklahoma Mothers' Milk Bank
