

➤ MAMMARY GLANDS & LACTATION (Milk Production)

Mammary Glands

The **mammary glands** lie in the subcutaneous tissue of the **pectoral fat pad** (underneath the pectoral muscle of the chest) covered by skin. Each breast has a small projection, the **nipple**, where the ducts of the glands open to the surface. The pigmented area around each nipple is the **areola** and it has a granular appearance due to the large sebaceous glands found in this area. The mammary glands consist of separate lobes, each containing several **secretory lobules**. Ducts leave the lobules and converge into a single **lactiferous duct** in each lobe. The ducts meet to form a chamber called the **lactiferous sinus**. About 15-20 sinuses open into the surface of each nipple. Dense connective tissue and suspensory ligaments give the breast its overall shape.

Preparation of Breast for Milk Production

During pregnancy, the **mammary glands** in the breasts of the mother are prepared for lactation. In a non-pregnant woman, the breasts are primarily composed of **adipose (fat)** tissue. During and after pregnancy, the lobules of the mammary glands begin to produce milk. Milk is composed of water, fats, proteins, vitamins, minerals, and **lactose (milk sugar)**.

The milk produced during the first week after birth is called colostrum. **Colostrum** is high in protein, particularly immunoglobins (antibodies) that provide early protection against infection until the newborn's immune system develops (these antibodies convey passive immunity to the baby).

Lactation (Milk Production)

The epithelial cells that line the **alveoli** of the mammary glands synthesize milk. There is a duct system that carries the milk from the alveoli to the nipple. **Estriol and progesterone** secreted during pregnancy stimulate mammary gland development. **Prolactin** released from the mother's anterior pituitary stimulates milk production.

Milk Ejection Reflex

After pregnancy, milk is ejected from the breast during suckling in response to **oxytocin** stimulation. There are sensory nerves that lead from the nipple to the brain. The more the baby suckles, the more prolactin and oxytocin are released. The oxytocin (from the posterior pituitary of the mother) stimulates the contraction of the muscle-like cells (myoepithelial cells) that surround the alveoli and the ducts of the mammary glands. As the muscle-like cells contract, milk is forced from the alveoli through the ducts and out the nipple to the suckling infant.

Lactational Amenorrhea

Prolactin release from the anterior pituitary is regulated by the release of dopamine (or prolactin inhibiting factor) by the hypothalamus. Dopamine release from the hypothalamus inhibits prolactin release from the anterior pituitary. *So, during lactation, dopamine release from the hypothalamus is decreased (as compared to a woman who is not lactating) and this allows more prolactin to be secreted from the anterior pituitary and more milk to be produced by the mammary glands.*

If a woman suckles for a sufficient number of minutes per day, she is less likely to ovulate. That is, she will experience **lactational amenorrhea** (lack of menstrual cycles due to menstruation). The increased prolactin released during suckling seems to suppress GnRH and thus LH and FSH release (less likely for LH surge to occur = less likely for ovulation to occur).