

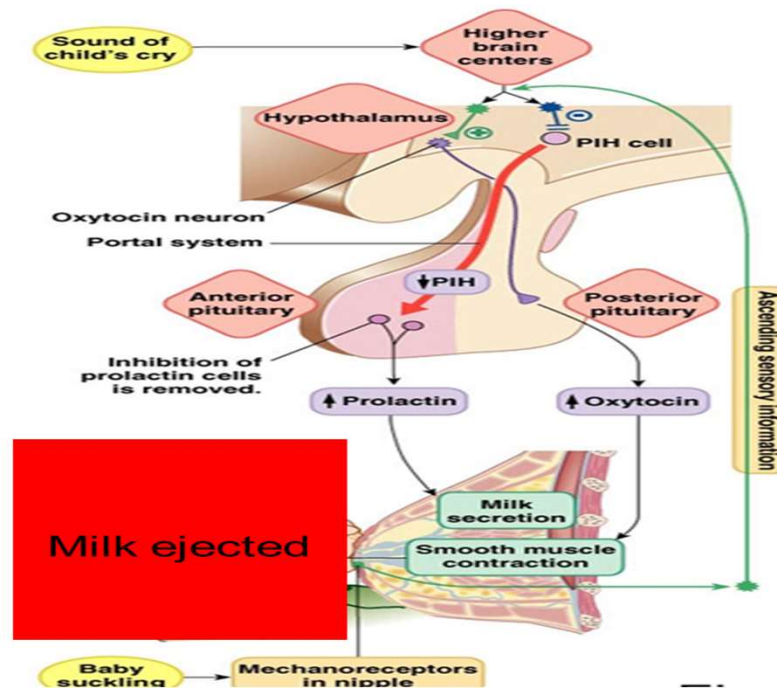


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पशुधनं नित्यं सर्वलोकोपकारकम्।

Lactation



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Lactation

- LACTATION is defined as the **secretion of milk from the mammary glands**. It usually refers to the period post-partum that a animal lactates and **nurses her calf with udder milk**.
- To provide nutrition & immune protection

Physiology of lactation

The physiological basis of lactation is divided into four phases:

1. Formation of mammary gland (**mammogenesis**).
2. Synthesis and secretion from the breast alveoli (**lactogenesis / galactorrhea** - milk production).
3. Ejection of milk (**galactokinesis**).
4. Maintenance of milk production (**galactopoiesis**). It requires prolactin hormone.

Physiology of lactation contd...

Mammogenesis

- Pregnancy is associated with a remarkable growth of both the ductal and lobuloalveolar systems.
- An intact nerve supply is not essential for growth of the mammary glands during pregnancy.

Physiology of lactation contd...

Lactogenesis

- Milk secretion actually starts on 3rd or 4th postpartum day.
- Around this time, the breasts become engorged, tense, tender and feel warmth.
- When the progesterone and estrogen are withdrawn following delivery, prolactin begins its milk secretory activity.

Contd...

- The secretory activity is enhanced directly or indirectly by growth hormone, thyroxine, glucocorticoids and insulin.
- Prolactin stimulates mammary glandular ductal growth and epithelial cell proliferation and induces milk protein synthesis.

There are 2 stages of lactogenesis :

Stage 1:

- Occurs by mid pregnancy.
- Mammary gland becomes competent to secrete milk.
- Lactose, total protein, and immunoglobulin concentrations increase within the secreted glandular fluid, whereas sodium and chloride concentrations decrease.
- High circulating levels of progesterone and estrogen hold the secretion of milk in check.

Stages of lactogenesis contd...

Stage 2 (day 2 or 3 to day 8 after birth):

- Occurs around the time of delivery.
- Onset of copious milk secretion.
- Blood flow, oxygen, and glucose uptake increase, and citrate concentration increases sharply.
- Progesterone plays a key role.
- Removal of the placenta is necessary for the initiation of milk secretion; however, the placenta does not inhibit established lactation control.

Stages of lactogenesis contd...

- Work by Haslam and Shyamala reveals that progesterone receptors are lost in lactating mammary tissues, thus decreasing the inhibitory effect of circulating progesterone.
- In addition, maternal secretion of insulin, growth hormone (GH), cortisol, and parathyroid hormone (PTH) facilitates the mobilization of nutrients and minerals that are required for lactation.
- Endocrine control switches to autocrine (supply-demand)

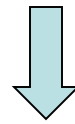
Physiology of lactation contd...

Galactokinesis

- Discharge of milk from the mammary glands depends not only on the suction exerted by the baby during suckling but also on the contractile mechanism which expresses the milk from the alveoli into the ducts.

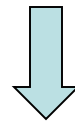
During suckling, a conditioned reflex is set up:

Ascending impulses from the nipple and areola

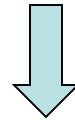


thoracic sensory (4, 5 and 6) afferent neural arc

paraventricular and supra optic nuclei of the hypothalamus



Oxytocin from the posterior pituitary produces contraction of the myoepithelial cells of the alveoli and the ducts containing milk. ("**milk ejection**" or "**milk let down**" reflex)



Milk is forced down into the ampulla of lactiferous ducts, wherefrom it can be expressed by the mother or sucked by The baby.

Neural reflex arc

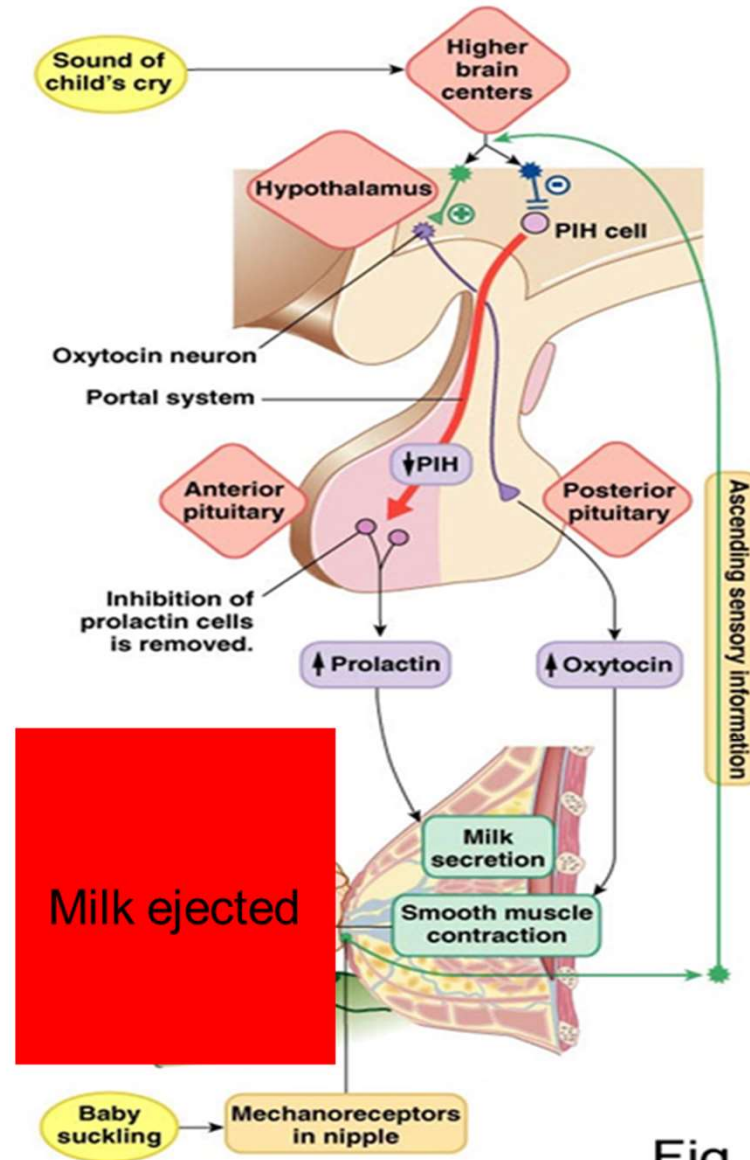
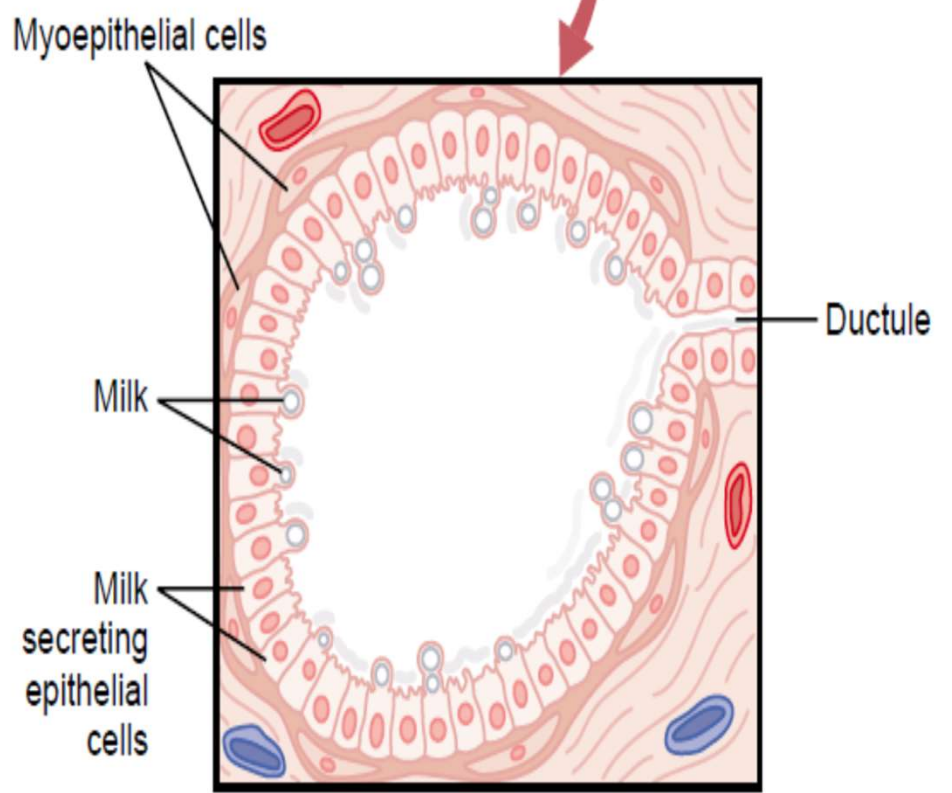
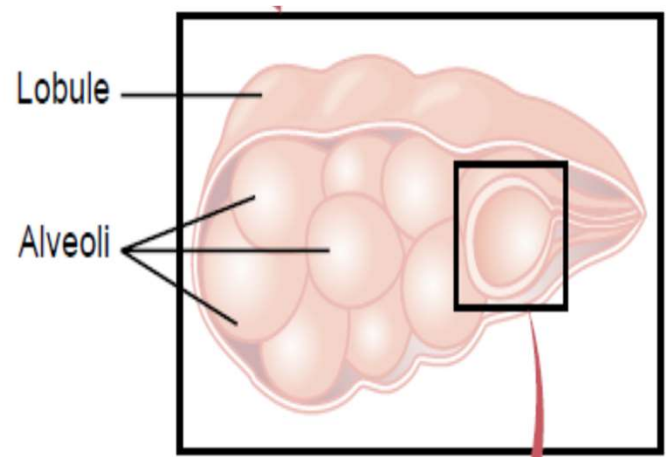
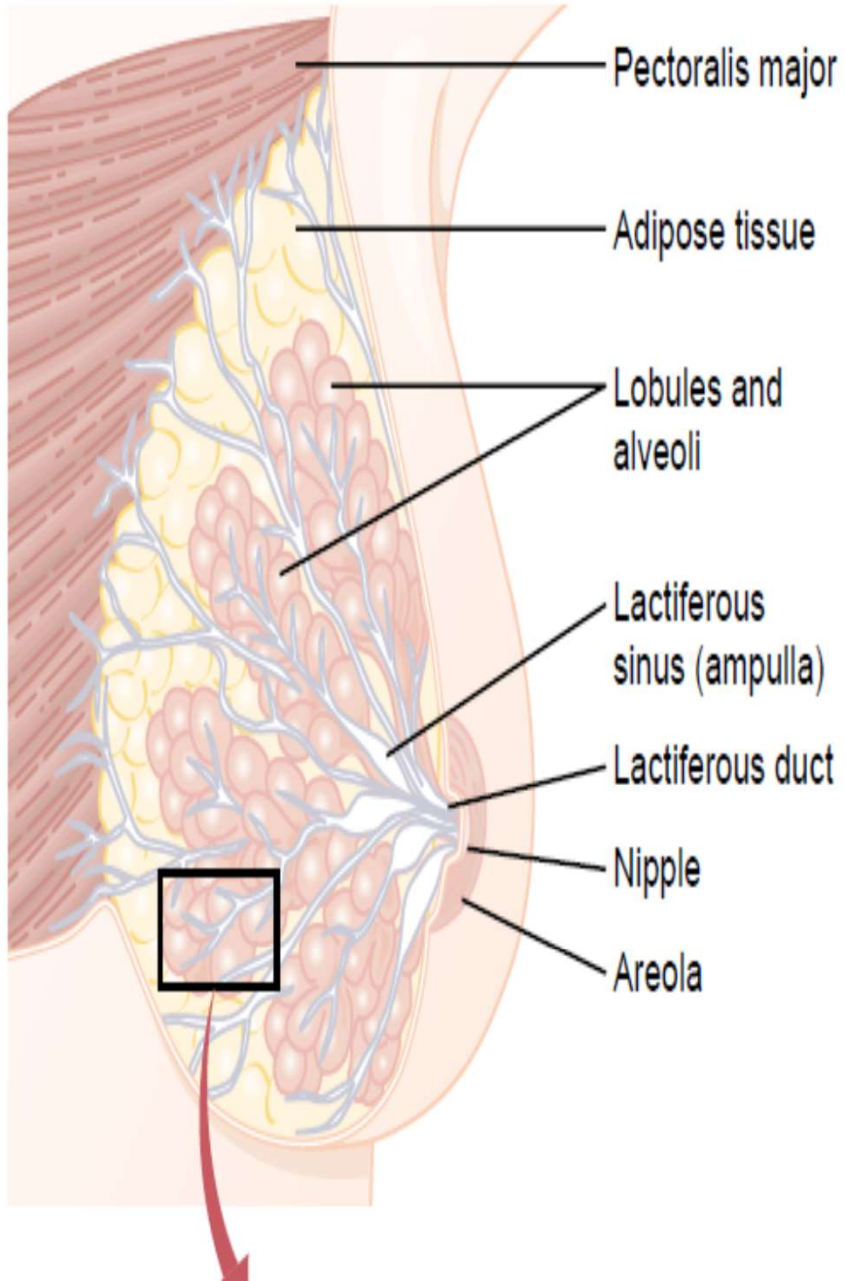


Fig. 26-23



Lactation contd...

- Presence of the infant or the infant's cry can induce letdown without suckling.
- A sensation of rise of pressure in the breasts by milk experienced by the mother at the beginning of the sucking is called "draught".
- The milk ejection reflex is inhibited by factors such as pain, breast engorgement or adverse psychic condition.

Physiology of lactation contd...

Galactopoiesis

- Prolactin appears to be the single most important galactopoietic hormone.
- Continuous suckling is essential for removal of milk from glands, also release prolactin.
- Secretion is the continuous process unless suppressed by congestion or emotional disturbances.

PSYCHOLOGY OF LACTATION

- Lactation is a psychology phenomenon
- Most women suffer from post partum depression(PPD) after the delivery of their child
- The signs can be quite severe – excessive mood swings, crying, over eating, loss of appetite, insomnia & sometimes even leading to difficulty in bonding with kid.

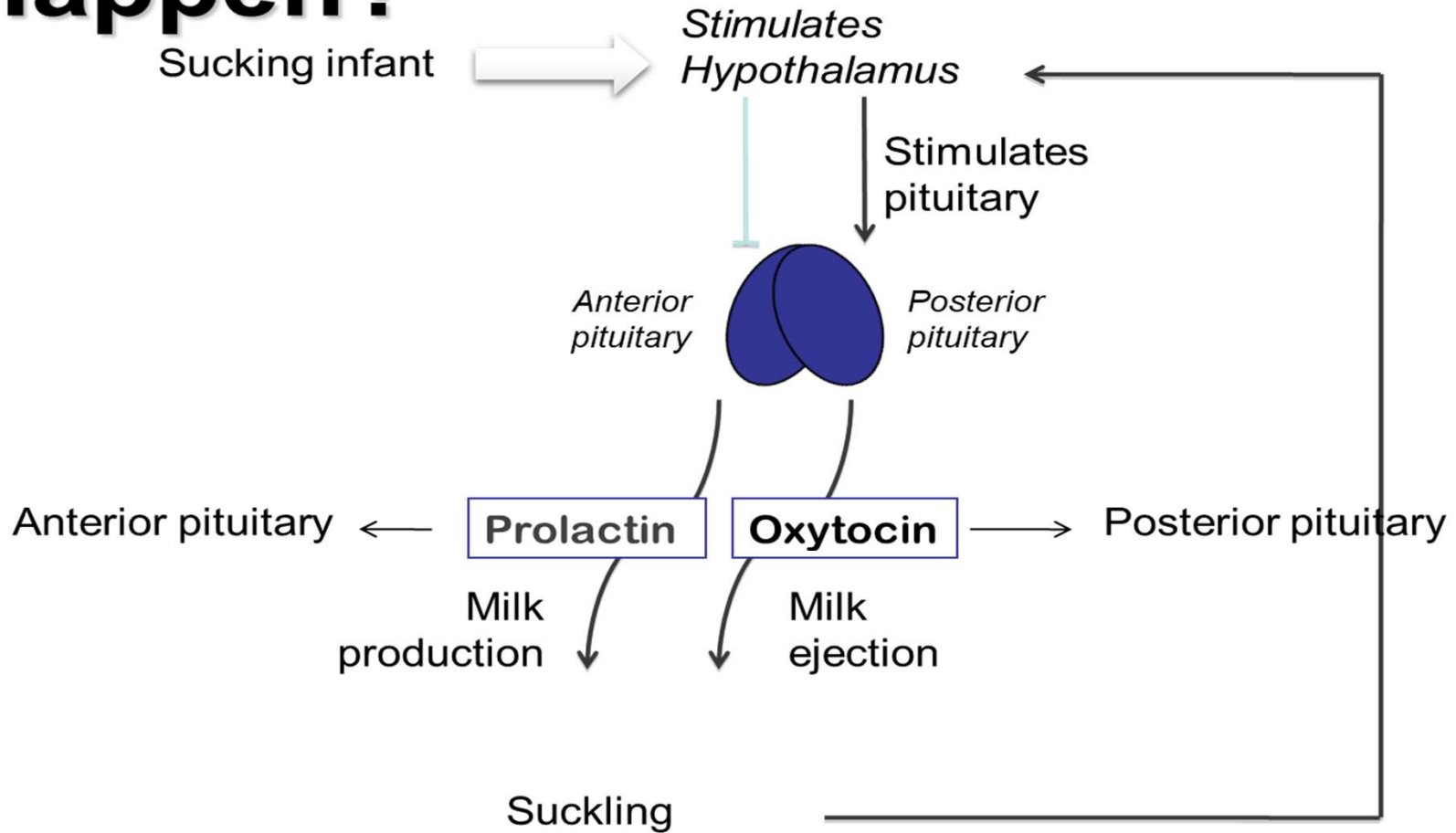
PSYCHOLOGY OF LACTATION

- In India most PPD cases go unreported.
- Breast feeding can help greatly to recover from this.

Milk production

- A healthy mother will produce about 500-800 ml of milk/day with about 500 Kcal /day.
- This requires 600 Kcal/day for the mother which must be made up from the mother's diet or from her body store.
- For this purpose a store of about 5 kg of fat during pregnancy is essential to make up any nutritional deficit during lactation.

How Does Lactation Happen?



HORMONAL CONTROL OF LACTATION

HORMONE	SOURCE	ACTIVITY
ESTROGEN	Ovary & Placenta	Stimulates breast development during pregnancy
PROGESTERONE	Ovary & Placenta	Stimulates breast development during pregnancy
PROLACTIN	Anterior Pituitary Gland	Stimulates MILK PRODUCTION
OXYTOCIN	Posterior Pituitary Gland	"Let down reflex" - MILK EJECTION. & Facilitates uterus to return normal size

What is Let-down reflex?

- The **let-down reflex** also referred to as **milk-ejection**, is an involuntary natural reaction that occurs when the baby breastfeeds.
- The action of the infant sucking the breast sends a message to the hypothalamus in the brain to release the hormones **prolactin and oxytocin**.

COLOSTRUM

- Produced first few hours to few days after parturition of the baby.
- Thick & yellowish fluid that secretes from the mammary gland, this differs from the regular milk and is called as **COLOSTRUM**.
- Colostrum will gradually change to become mature milk in **3-4 days**.
- Quantity- **10 to 40 ml**.
- Rich in protein, DHA, vitamin A & K, sodium chloride and less in fat, niacin, pantothenic acid, Biotin, riboflavin, potassium & lactose.
- Vitamin C same as mature milk



Thank
You