3rd week	
Embryo	
Placenta	Primary site for exchange of gases & nutrients between the mother and the fetus.
Decidua (gravid endometrium)	Functional layer of the endometrium during pregnancy which is shed after parturition.
Arterio-capillary venous network:	Brings the fetal blood extremely close to the maternal blood.
Spiral endometrial arteries	•Blood is propelled in jet like fountains by the maternal blood pressure. •exchange of metabolites and gases with the fetal blood. (pressure of this entering blood is higher than that in the intervillous space).
Progesterone	Maintains pregnancy if the corpus luteum is not functioning well.
Estrogen	Stimulates uterine growth and development of the mammary glands.
HCS or Hpl	•Gives the fetus the priority on maternal blood glucose •promotes breast development for milk production.
HCG	•Maintains the corpus luteum •used as indicator of pregnancy.
Strong uterine contractions	•After birth compress uterine blood vessels to limit bleeding •cause the placenta to detach from the uterine wall
Fetal Cardiovascular	•**Before birth:** to serve prenatal needs •**at birth:** to permit modifications at birth, which establish the neonatal circulation
Two umbilical arteries	Carries deoxygenated blood from the fetus to the placenta
One umbilical vein	Carries oxygenated blood from the placenta to the fetus
After Aeration of the lungs at birth	•↑ In the pulmonary blood flow. • thinning in the wall of the pulmonary arteries. •↓ dramatic fall in pulmonary vascular resistance.
Bradykinin	•Has a contractile effect on smooth muscles of the ductus arteriosus. (Dependant on the high Oxygen saturation (50 mmhg) of the aortic blood).

Physio	
Nutrition of blastocyst	secretory cells in fallopian tube
Progesterone	•Effect on (SM) of isthmus •Provides nutrition to developing embryo (uterine secretory phase) •Development of decidual cells •Inhibits the contractility of the uterus •Development of the breast lobules. •Increase sensitivity of RC to CO2 •Decreases GAP junctions •Decreases Oxytocin receptor Decreases prostaglandins. •Increases Resting mem. Potential
Placenta	•Respiration • Nutrition • Excretion •Endocrine •Protection
Estrogen	•Enlargement of uterus, breast & external genitalia •Relaxation of pelvic ligaments in preparation for labor •Activation of the uterus (gap junctions) •stimulate uterine contractility •Increases Oxytocin receptors •Increases Prostaglandins
hCG	•maintain corpus luteum (↑estrogen & progesterone) till 13-17 weeks of gestation •Exerts interstitial (Leyding) cell-stimulating effect on testes of the male fetus (growth of male sex organs)
HCS/hPL	•Breast development •Weak growth hormone's action •Inhibits insulin sensitivity =↓ glucose utilization (cause maternal DM) •Promotes release of fatty acids
Relaxin	•Relaxation of symphysis pubic ligament (weak) •Softens the cervix at delivery (important for giving birth)
Prostacyclin (PGI2)+ Nitric oxide	uterine relaxation
Oxytocin	Gradual transition from passive relaxed to active excitatory muscle (↑responsiveness).
Prostaglandins	Central role in initiation & progression of human labour

4th week	
Endocrine Control of Lactation	**Prolactin:** •stimulates initial alveolar milk production •inhibits epithelial cell loss •maintain cellular differentiation
	Oxytocin: contracts the myoepithelial cells, forcing milk from the alveoli into the ducts and sinuses
During puberty (Mammogenesis)	1-**Estrogen** stimulate proliferation of ducts (MNM:ester=duck)and deposition of fat 2-**Progesterone** stimulate development of lobules 3- **Prolactin** also has role
During pregnancy (Mammogenesis)	1- **HCG** from placenta keep the corpus luteum secrete estrogen and progesterone 2-**Prolactin** with **estrogen** and **progesterone** stimulate growth and development of mammary alveoli and also HPL has a role
During lactation (Lactogenesis)	At parturition progesterone and estrogen levels drop and inhibitory action cease. Prolactin stimulate lactogenesis and lactation occur.
Mamogenesis	**Estrogen (placenta)** **1-**Growth & branching of ductal system (with GH) **2-** Fat deposition in the stroma
	Progesterone (placenta) Growth of lobule-alveolar system (budding of alveoli and secretory changes in epithelial cells) **Lobule-Alveolar System:** remove nutrients from the blood and transform these nutrients into the components of milk.
	Prolactin (anterior pituitary) main function is milk production stimulates •mammary gland growth, •proliferation of alveolar epithelial cells •gene expression which induce the synthesis of milk components (casein, lactose and lipids)
	Hpl (HCG): 1-Facilitate mammogenesis **2-** Delay milk production
Lactogenesis 1	expression of many genes involved in synthesis of milk components (increase in the uptake transport systems for amino acids, glucose, and calcium required for milk synthesis).
Lactogenesis 2	**1-**Further increase in expression of milk protein genes **2-** Glands absorb increased quantities of metabolic substrates from the blood. **3-**Movement of cytoplasmic lipid droplets and casein into alveolar Lumina **4-**Transfer of immunoglobulin **5-** Secretion of colostrum followed by milk (Suckling stimulates further increase in expression of genes involved in milk secretion with expansion of alveolar epithelium)

Hormonal Regulation of Lactogenesis	**Metabolic hormones (direct effect)** **GH->** its secretion is stimulated by progesterone 1-Increases production of IGF-1 by the liver and locally. 2-Mediate cell survival and ductal growth **Corticosteroids->** Involved in breast development (permissive action on milk protein synthesis) **Thyroxin->** Essential for milk production TRH increases leading to stimulation of PRL (nasal administration to treat inadequate lactation) **Insulin(low)->** Shunt of nutrients from storage depots to milk synthesis
	Mammary hormones **GH->** Progesterone stimulates its secretion, helps in growth of mammary glands **Lepti-> 1-**Increases during pregnancy (increase adipose tissue) **2-** Decreases with lactation **PTHrP-> 1-**Increases during lactation **2-**Mobilizes bone calcium **3-**Increase in alkaline phosphatase
Hormonal Regulation of Galactopoiesis	**Prolactin:** milking-induced surge is a direct link between the act of nursing (or milk removal) and the galactopoietic hormones involved in maintaining lactation. **GH:** support increase in synthesis of lactose, protein, and fat in the mammary gland **Glucocorticoids:** galactopoietic in physiological doses. **Thyroid Hormones:** galactopoietic **Estrogen:** in very low doses is galactopoietic. **Progesterone:** alone has no effect on galactopoiesis