

Prenatal Development Timeline

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|---|--|--|---|
| ■ Nervous | ■ Cardiovascular | ■ Muscular | ■ Early Events |
| ■ Special Senses | ■ Respiratory | ■ Skeletal | ■ Growth Parameters |
| ■ Blood & Immune | ■ Gastrointestinal | ■ Endocrine | □ General |
| ■ Skin/Integument | ■ Renal/Urinary | ■ Reproductive | ■ Movement |

Unit 1: The First Week	
Day 0	<ul style="list-style-type: none"> ■ Embryonic period begins ■ Fertilization resulting in zygote formation
Day 1	<ul style="list-style-type: none"> ■ Embryo is spherically shaped and called a morula comprised of 12 to 16 blastomeres
Day 2	<ul style="list-style-type: none"> ■ Early pregnancy factor (EPF) ■ Activation of the genome ■ Blastomeres begin rapidly dividing
Day 3	<ul style="list-style-type: none"> ■ Compaction
Day 4	<ul style="list-style-type: none"> ■ Embryonic disc ■ Hypoblast & epiblast ■ Inner cell mass ■ See where the back and chest will be
Day 5	<ul style="list-style-type: none"> ■ Hatching blastocyst
Day 6	<ul style="list-style-type: none"> ■ Embryo attaches to wall of uterus ■ Solid syncytiotrophoblast & cytotrophoblast
1 week	<ul style="list-style-type: none"> ■ Chorion ■ Chorionic cavity ■ Extra-embryonic mesoderm (or mesoblast) ■ Placenta begins to form
Unit 2: 1 to 2 Weeks	
1 week, 1 day	<ul style="list-style-type: none"> ■ Amnioblasts present; amnion and amniotic cavity formation begins ■ Bilaminar embryonic disc ■ Positive pregnancy test
1 week, 2 days	<ul style="list-style-type: none"> ■ Corpus luteum of pregnancy ■ Cells in womb engorged with nutrients ■ Exocoelomic membrane ■ Isolated trophoblastic lacunae □ Embryonic disc 0.1 mm diameter
1 week, 4 days	<ul style="list-style-type: none"> ■ Intercommunicating lacunae network ■ Longitudinal axis ■ Prechordal plate ■ Trophoblastic vascular circle
1 week, 5 days	<ul style="list-style-type: none"> ■ Implantation complete □ Embryonic disc diameter: 0.15 to 0.20 mm
1 week, 6 days	<ul style="list-style-type: none"> ■ Blood islands in umbilical vesicle ■ Angiogenesis in chorionic mesoblast ■ Blood vessels in villi

	Connecting stalk
	Primordial blood vessels
	Amnion with single cell layer
	Chorionic villi
2 weeks	Embryonic epiblast gives rise to primitive streak and primitive node and
	Yolk sac
	Yolk sac

Unit 3: 2 to 3 Weeks

2 weeks, 1 day	3 germ layers
	Cloacal membrane
	Primitive groove
	Rostral-caudal orientation
2 weeks, 2 days	Erythroblasts in yolk sac
	Three types of blood-forming cells in yolk sac
	Primordial germ cells
	Allantoic diverticulum
	Allantoic diverticulum
	Amnion with two cell layers
	Notochordal process
	Secondary villi
2 weeks, 4 days	Foregut, midgut, and hindgut
	Uteroplacental circulation well established
	Prechordal plate with 1 retinal field
	Brain is first organ to appear
	Caudal eminence
	Neural ectoderm
	Neural groove and neural folds
	Notochordal and neurenteric canals
	Notochordal plate
	Connecting stalk
	Primitive pit (or notochordal pit)
2 weeks, 5 days	Prechordal plate with 2 retinal fields
2 weeks, 6 days	Numerous blood islands in umbilical vesicle
	Septum transversum (primitive diaphragm)
	Foregut
	Oropharyngeal membrane
	Pharyngeal pouch 1
	Stomodeum forming
	Blood vessels emerge simultaneously in umbilical vesicle, embryo proper, amnion, and connecting stalk
	Common umbilical artery
	Dorsal aortae (paired)
	First pair of aortic arches

	Heart: Cardiogenic plate, cardiac jelly, myocardial mantle, and endocardial plexus
	Left ventricle, right ventricle, conotruncus
	Paired pericardial cavities
	Paired tubular heart
	Hindbrain with four rhombomeres
	Isthmus rhombencephali demarcates midbrain and hindbrain
	Mesencephalon (or midbrain)
	Neural cord within caudal eminence
	Neural groove deepens substantially
	Primary neuromeres
	Three main divisions of brain
	Cephalic and caudal folds
	Neural crest: Rostral and facial
	Primitive streak reaches neurenteric canal
	Somites with central somitocoels: Pairs 1 through 3

Unit 4: 3 to 4 Weeks

3 weeks, 1 day	Thyroid primordium emerges from floor of pharynx
	Nephrogenic cord emerges (at 10 somites)
	Cloaca
	Common coelomic cavity divides into peritoneal, pericardial, and pleural cavities
	Liver: Hepatic plate (endoderm)
	Midgut emerging
	Pharyngeal arches 1 and 2
	Pharyngeal cleft 1
	Second pharyngeal cleft and pouch
	Pharyngeal groove and ridge with laryngotracheal sulcus
	Respiratory outgrowth
	Atria (right and left) far apart
	Bulbis cordis
	Endocardial tubes fuse forming tubular heart
	Heart begins beating
	Pericardial sac
	Pericardium
	Primary head vein
	Sinus venosus
	Tubular heart begins folding
	Umbilical arteries
	Umbilical veins (right and left)
	Optic primordia fill neuromere D2
	Otic pits
	Chiasmatic plate

	Mesencephalic flexure
	Neural tube
	Neuromeres D1 and D2 (in diencephalon)
	Optic sulcus in forebrain
	Pontine region identifiable near cranial nerves VII and VIII
	Segment D in rhombencephalon
	Some secondary neuromeres
	Superior colliculus
	Telencephalon
	Telencephalon (or telencephalic) medium
	Body cavities
	Hyoid arch
	Mandibular arch and maxillary process
	Neural crest: Trigeminal, facioacoustic, glossopharyngeal-vagal, and occipitospinal
	Somites: Pairs 4 through 12
3 weeks, 3 days	Primordial germ cells begin moving from umbilical vesicle to hindgut
	Face: Maxillary and mandibular processes (bilaterally)
	Cloacal membrane
	Mesonephric duct emerges from nephrogenic cord
	Nephric vesicles
	Cystic primordium
	Hepatic diverticulum
	Liver
	Membrane between future mouth and throat may begin to rupture
	Angiogenesis along surface of central nervous system
	Aortic sac
	Atrioventricular canal
	Capillary plexus begins forming around brain and spinal cord
	Conotruncus
	Conus cordis emerging from right ventricle
	Endocardium
	Heart contractions produce peristaltic blood flow
	Internal carotid arteries
	Interventricular septum
	Primordium of myocardium
	Sinus venosus separating from left atria
	Trabeculated outpouches along primary cardiac tube representing primordia of left and right ventricles
	Trigeminal and otic arteries
	Facio-vestibulocochlear ganglia (CN VII, CN VIII)
	Glossopharyngeal and vagal ganglia

	<ul style="list-style-type: none"> Optic evagination (starting at 14 somites)
	<ul style="list-style-type: none"> Otic vesicle
	<ul style="list-style-type: none"> Trigeminal ganglia (CN V)
	<ul style="list-style-type: none"> Neural crest: Optic crest emerges during Carnegie Stages 11 and 12
	<ul style="list-style-type: none"> Nose: Nasal plate
	<ul style="list-style-type: none"> Optic vesicles form (17 to 19 somites)
	<ul style="list-style-type: none"> Adenohypophysial pouch
	<ul style="list-style-type: none"> Adenohypophysis
	<ul style="list-style-type: none"> Lamina terminalis
	<ul style="list-style-type: none"> Mesencephalon contains tectum and tegmentum
	<ul style="list-style-type: none"> Neural crest production and migration continue
	<ul style="list-style-type: none"> Neurohypophysial primordia
	<ul style="list-style-type: none"> Neuropore (near brain) closes
	<ul style="list-style-type: none"> Notochord
	<ul style="list-style-type: none"> Segmentation of mesoblast alongside neural tube bilaterally
	<ul style="list-style-type: none"> Somites: Pairs 13 through 20
3 weeks, 3 days - 5 weeks, 6 days	<ul style="list-style-type: none"> All eight rhombomeres (Rh 1 through Rh 7, Rh D) - Present in stages 11 through 17
3 weeks, 5 days	<ul style="list-style-type: none"> Telopharyngeal bodies
	<ul style="list-style-type: none"> Alimentary epithelium invades stroma of liver
	<ul style="list-style-type: none"> Alimentary epithelium proliferates in primordia of stomach, liver, and dorsal pancreas
	<ul style="list-style-type: none"> First part of pancreas
	<ul style="list-style-type: none"> Gastric portion of foregut elongates (25 to 28 somites)
	<ul style="list-style-type: none"> Hepatic primordium with abundant vascular plexus
	<ul style="list-style-type: none"> Omental bursa
	<ul style="list-style-type: none"> Oropharyngeal membrane is ruptured
	<ul style="list-style-type: none"> Pharyngeal arch 3
	<ul style="list-style-type: none"> Pharyngeal arches with dorsal and ventral parts
	<ul style="list-style-type: none"> Umbilical vesicle elongates
	<ul style="list-style-type: none"> Cervical sinus
	<ul style="list-style-type: none"> Laryngotracheal groove
	<ul style="list-style-type: none"> Lung bud
	<ul style="list-style-type: none"> Tracheo-esophageal septum
	<ul style="list-style-type: none"> Atrioventricular canal
	<ul style="list-style-type: none"> Common cardinal veins (right and left)
	<ul style="list-style-type: none"> Descending aorta
	<ul style="list-style-type: none"> Heart circulates blood to and from central nervous system, umbilical vesicle, and chorion
	<ul style="list-style-type: none"> Hepatocardiac channels (right and left)
	<ul style="list-style-type: none"> Rostral and caudal cardinal veins along brain and spinal cord feeding common cardinal veins
	<ul style="list-style-type: none"> Septum primum and foramen primum sometimes present

	<ul style="list-style-type: none"> Septum primum, foramen primum
	<ul style="list-style-type: none"> Sinu-atrial foramen prevents backflow into sinus venosus
	<ul style="list-style-type: none"> Sinus venosus collects venous blood from entire embryo
	<ul style="list-style-type: none"> Superior vena cava, inferior vena cava, and sinus venosus collecting all venous blood
	<ul style="list-style-type: none"> Unidirectional circulation
	<ul style="list-style-type: none"> Vitelline arteries and veins
	<ul style="list-style-type: none"> Hypoglossal cord (CN XII) enters pharyngeal arch 4
	<ul style="list-style-type: none"> Otocyst nearly closed
	<ul style="list-style-type: none"> Nasal discs form part of ectodermal ring
	<ul style="list-style-type: none"> Optic vesicles covered by sheath (formed by mesencephalic and optic crest)
	<ul style="list-style-type: none"> Brain involves 40% of neural tube
	<ul style="list-style-type: none"> Brain: Embryonic commissural plate
	<ul style="list-style-type: none"> Ectodermal ring complete
	<ul style="list-style-type: none"> Hypoglossal nucleus (CN XII)
	<ul style="list-style-type: none"> Lowermost spinal cord formation begins
	<ul style="list-style-type: none"> Mamillary recess
	<ul style="list-style-type: none"> Marginal layer in rhombencephalon
	<ul style="list-style-type: none"> Mesencephalic flexure at 90 degrees
	<ul style="list-style-type: none"> Mesencephalon with two neuromeres: M1 and M2
	<ul style="list-style-type: none"> Motor neurons in basal plate of rhombencephalon
	<ul style="list-style-type: none"> Neural tube closes (lower back)
	<ul style="list-style-type: none"> Neurofibrils form in rhombencephalon
	<ul style="list-style-type: none"> Primary neurulation ends
	<ul style="list-style-type: none"> Primordia of ventral thalamus and subthalamus in diencephalon
	<ul style="list-style-type: none"> Sulcus limitans
	<ul style="list-style-type: none"> Sulcus limitans in midbrain
	<ul style="list-style-type: none"> Somites: Pairs 21 through 29
	<ul style="list-style-type: none"> Upper limb primordium at level of somites 8 to 10
	<ul style="list-style-type: none"> Progressively C-shaped embryo
4 weeks	<ul style="list-style-type: none"> Spleen primordia
	<ul style="list-style-type: none"> Thymic primordia
	<ul style="list-style-type: none"> Lower lip forms from merging of mandibular processes
	<ul style="list-style-type: none"> Melanoblasts in epidermis
	<ul style="list-style-type: none"> Gonadal ridge extends from C-7 to T-8 levels
	<ul style="list-style-type: none"> Primordial germ cells migrate to mesonephric ridges
	<ul style="list-style-type: none"> Primordial germ cells number several hundred
	<ul style="list-style-type: none"> Urorectal septum
	<ul style="list-style-type: none"> Thyroid bilobed and attached to pharynx by thyroglossal duct
	<ul style="list-style-type: none"> Diaphragm primordia
	<ul style="list-style-type: none"> Glomeruli emerge in mesonephros

	<ul style="list-style-type: none"> Mesonephric duct attached to cloaca
	<ul style="list-style-type: none"> Nephric tubules now S-shaped
	<ul style="list-style-type: none"> Urogenital sinus
	<ul style="list-style-type: none"> Urorectal cleavage line
	<ul style="list-style-type: none"> Diverticulum ilei marks division between foregut and hindgut
	<ul style="list-style-type: none"> Intestines growing in length
	<ul style="list-style-type: none"> Mesentery from end of duodenum to proximal half of colon
	<ul style="list-style-type: none"> Opening between gut and umbilical vesicle decreases
	<ul style="list-style-type: none"> Pancreas: Ventral pancreas
	<ul style="list-style-type: none"> Pharyngeal pouches 1 through 4
	<ul style="list-style-type: none"> Pharynx
	<ul style="list-style-type: none"> Pleuroperitoneal canals
	<ul style="list-style-type: none"> Stalk of umbilical vesicle lengthens and narrows
	<ul style="list-style-type: none"> Stomach assumes shape of a spindle
	<ul style="list-style-type: none"> Umbilical vesicle at height of development
	<ul style="list-style-type: none"> Vitelline duct
	<ul style="list-style-type: none"> Bronchial buds
	<ul style="list-style-type: none"> Mesenchyme from coelomic epithelium surrounds esophagus and lung buds
	<ul style="list-style-type: none"> Trachea
	<ul style="list-style-type: none"> Anterior, middle, and posterior cerebral plexuses
	<ul style="list-style-type: none"> Aorta branches include dorsal intersegmental, lateral segmental, and ventral segmental arteries
	<ul style="list-style-type: none"> Aortic arches 4 and 6
	<ul style="list-style-type: none"> Artery from the common iliac artery feeds each lower limb bud
	<ul style="list-style-type: none"> Atrioventricular bundle
	<ul style="list-style-type: none"> Cardiac contractions still under myogenic control
	<ul style="list-style-type: none"> Celiac artery, superior and inferior mesenteric arteries
	<ul style="list-style-type: none"> Circulatory system "well established"
	<ul style="list-style-type: none"> Common iliac arteries (right and left, from dorsal aorta bifurcation)
	<ul style="list-style-type: none"> Contractions well coordinated and sequential from sinus venosus to atria to ventricles
	<ul style="list-style-type: none"> Ductus venosus
	<ul style="list-style-type: none"> Functioning two-chamber heart
	<ul style="list-style-type: none"> Gas exchange through placenta begins
	<ul style="list-style-type: none"> Gelatinous reticulum (or cardiac mesenchyme)
	<ul style="list-style-type: none"> Heart chambers bulging with fluid
	<ul style="list-style-type: none"> Heart now functions as two parallel pumps
	<ul style="list-style-type: none"> Heart: Atrioventricular cushions (rostroventral and caudodorsal)
	<ul style="list-style-type: none"> Heart: Myocardium wall 3 to 4 cells thick

	<ul style="list-style-type: none"> Primary head veins (right and left) drain anterior, middle, and posterior cerebral plexuses and feed precardinal veins
	<ul style="list-style-type: none"> Small arteries emerging throughout mesoderm
	<ul style="list-style-type: none"> Ventricle walls trabeculated
	<ul style="list-style-type: none"> Vertebral arteries
	<ul style="list-style-type: none"> Vitelline veins empty exclusively into hepatic plexus
	<ul style="list-style-type: none"> Most cranial nerve ganglia
	<ul style="list-style-type: none"> Trigeminal, glossopharyngeal, and vagal preganglia
	<ul style="list-style-type: none"> Basement membrane of otic disc surrounds otic vesicle
	<ul style="list-style-type: none"> Endolymphatic appendage
	<ul style="list-style-type: none"> Otic invagination
	<ul style="list-style-type: none"> Otic vesicle closes
	<ul style="list-style-type: none"> Terminal-vomeronasal neural crest
	<ul style="list-style-type: none"> Brain: Commissural plate
	<ul style="list-style-type: none"> Cerebellum
	<ul style="list-style-type: none"> Common afferent tract
	<ul style="list-style-type: none"> Fourth ventricle
	<ul style="list-style-type: none"> Interstitial nucleus (part of medial longitudinal fasciculus)
	<ul style="list-style-type: none"> Isthmus rhombencephali (a new neuromere)
	<ul style="list-style-type: none"> Oculomotor (CN III) and trochlear nuclei (CN IV) in mesencephalon (midbrain) and isthmus respectively
	<ul style="list-style-type: none"> Retinal and lens discs
	<ul style="list-style-type: none"> Amnion surrounds connecting stalk and vitelline stalk
	<ul style="list-style-type: none"> Hyoid arch subdivides into dorsal and ventral segments
	<ul style="list-style-type: none"> Limb buds - the first sign of arms and legs
	<ul style="list-style-type: none"> Lower limb buds
	<ul style="list-style-type: none"> Umbilical cord emerging
	<ul style="list-style-type: none"> Upper and lower limb buds











































Unit 5: 4 to 5 Weeks

4 weeks, 4 days	<ul style="list-style-type: none"> Thymus
	<ul style="list-style-type: none"> Parathyrogenic zones
	<ul style="list-style-type: none"> Thyroglossal duct
	<ul style="list-style-type: none"> Thyroid pedicle lengthens
	<ul style="list-style-type: none"> Dorsal contour develops depression at level of sclerotomes 4 and 5
	<ul style="list-style-type: none"> Muscular plates between upper and lower limb buds
	<ul style="list-style-type: none"> Glomerular capsules, partially vascularized
	<ul style="list-style-type: none"> Mesonephric corpuscle
	<ul style="list-style-type: none"> Metanephrogenic cap emerges from ureteric bud
	<ul style="list-style-type: none"> Ureteric buds
	<ul style="list-style-type: none"> Angiogenesis within peri-esophageal mesenchyme
	<ul style="list-style-type: none"> Epiploic foramen
	<ul style="list-style-type: none"> Lesser sac (omental bursa)
	<ul style="list-style-type: none"> Small intestine forming coils

	■ Tongue: Hypopharyngeal eminence
	■ Arytenoid swellings (right and left)
	■ Capillary network surrounds pulmonary mesenchyme
	■ Epithelial lamina of larynx
	■ Lungs: Right and left primary (or main stem) bronchi
	■ Mesenchyme covering esophagus and respiratory tree separates
	■ Mesenchyme surrounds bronchi
	■ Pleura (mesothelium) surrounds part of mesenchyme
	■ Right main bronchus longer than left
	■ Atria walls thin, ventricle walls thick and trabeculated
	■ Atrioventricular cushions not fused
	■ Common pulmonary vein drains pulmonary plexuses into left atrium
	■ Conotruncal ridges or cushions (remnants of cardiac jelly)
	■ Epicardium
	■ Left subclavian artery feeds left axillary artery, left vertebral artery, and left thyrocervical trunk
	■ Outflow tract still with one lumen
	■ Posterior communicating arteries
	■ Pulmonary arch (sixth aortic arch) forms from aorta and aortic sac
	■ Pulmonary capillary network fed by pulmonary arteries, drain into left atrium
	■ Sinu-atrial (SA) node
	■ Superior mesenteric artery and vein
	■ Upper limb buds with early marginal blood vessel
	■ Brachial plexus
	■ Cervical plexus
	■ Dorsal roots
	■ Hypoglossal nerve roots unite (CN XII)
	■ Lens and retina invaginate to form optic cup
	■ Primordium of cochlear duct
	■ Rami communicantes
	■ Spinal nerves reach muscle primordia
	■ Upper limb buds innervated
	■ External ear: Auricular hillocks merging
	■ Eyes located on sides of head
	■ Lens pits
	■ Lens vesicle open to surface (lens pore)
	■ Nose: Nasal pits
	■ Nose: Nasal plate (or disc) flat or concave
	■ Pigment in retina (external layer of optic cup)
	■ D1 and D2 no longer identifiable within diencephalon
	■ 75% of midbrain covered by marginal layer

	■ All 16 secondary neuromeres
	■ Brain enlarges 50% since Carnegie Stage 13
	■ Brain: Cerebral hemispheres appear and begin rapid growth
	■ Brain: Lateral ventricles
	■ Cerebellum with intermediate and ventricular layers
	■ Cerebellum: Primordium found in alar plate of rhombomere 1
	■ Corpora striata primordia connected by commissural plate
	■ Cranial nerve 3
	■ Di-telencephalic sulcus
	■ Dorsal and ventral thalami
	■ Dorsal funiculus
	■ Hypothalamic sulcus
	■ Hypothalamus
	■ Mamillary region
	■ Medial and lateral longitudinal fasciculi
	■ Median ventricular eminence
	■ Pontine flexure
	■ Preoptic sulcus extends between optic evaginations
	■ Preoptico-hypothalamo-tegmental tract
	■ Primary meninx surrounds most of brain
	■ Rhombic lip
	■ Spinal cord wall with three zones: ventricular (ependymal) zone, mantle (intermediate) zone, and marginal zone
	■ Subthalamus with medial striatal ridge emerging
	■ Synencephalon
	■ Tegmentum
	■ Tentorium cerebelli, medial portion
	■ Terminal-vomeronasal crest contacts brain (olfactory area)
	■ Torus hemisphericus (TH)
	■ Velum transversum
	■ Ventral longitudinal fasciculus
	■ Ventral segment of hyoid arch subdivides
4 weeks, 5 days	■ Primordium of antitragus emerges from ventral subsegment of hyoid arch
	■ Gonad framework found in coelomic epithelium
	■ Thyroid detached from epithelium of pharynx in some embryos
	■ Lower limb bud rounded proximally and tapered distally
	■ Mesenchymal skeleton in upper and lower limbs
	■ Right and left neural processes
	■ Sclerotomic material around notochord (rhombomere D level)

	<ul style="list-style-type: none"> Vertebrae well defined
	<ul style="list-style-type: none"> Vertebral centra
	<ul style="list-style-type: none"> Primary urogenital sinus
	<ul style="list-style-type: none"> Ureteric bud extends to pelvis of the ureter
	<ul style="list-style-type: none"> Bladder and rectum are separating caudal to ureters
	<ul style="list-style-type: none"> Dense mesenchyme surrounds much of gastrointestinal tract
	<ul style="list-style-type: none"> Esophagus elongates, passes dorsal to carina and between main stem bronchi
	<ul style="list-style-type: none"> Gall bladder and cystic duct
	<ul style="list-style-type: none"> Liver: Hepatic ducts
	<ul style="list-style-type: none"> Ventral pancreas appears as an offshoot of the cystic duct
	<ul style="list-style-type: none"> Lobar bud swellings denote areas of secondary bronchi
	<ul style="list-style-type: none"> Remnants of coelomic epithelium forming visceral pleura
	<ul style="list-style-type: none"> Atrioventricular cushions apposed
	<ul style="list-style-type: none"> Blood flow divided into right and left streams through atrioventricular canal, ventricles, outflow tract, and aortic sac
	<ul style="list-style-type: none"> Blood vessels penetrate diencephalon
	<ul style="list-style-type: none"> Capillary plexus surrounds esophagus
	<ul style="list-style-type: none"> Capillary plexus surrounds lung buds
	<ul style="list-style-type: none"> Cardiac mesenchyme surrounds ventricles and outflow tract
	<ul style="list-style-type: none"> Coronary arteries (terminal end)
	<ul style="list-style-type: none"> Foramen secundum begins in septum primum
	<ul style="list-style-type: none"> Left ventricle with thicker walls and greater volume than right
	<ul style="list-style-type: none"> Right subclavian artery originates from brachiocephalic artery and feeds right thyrocervical trunk and axillary and vertebral arteries
	<ul style="list-style-type: none"> Semilunar cusps
	<ul style="list-style-type: none"> Capsule present around lens
	<ul style="list-style-type: none"> Corneal epithelium overlying optic cup
	<ul style="list-style-type: none"> Ear: Endolymphatic duct
	<ul style="list-style-type: none"> Geniculate and vestibulocochlear ganglia separating
	<ul style="list-style-type: none"> Lens body now present containing some lens fibers
	<ul style="list-style-type: none"> Lower limb buds innervated
	<ul style="list-style-type: none"> Optic stalk
	<ul style="list-style-type: none"> Utricle, endolymphatic duct, and endolymphatic sac
	<ul style="list-style-type: none"> Utriculo-endolymphatic fold
	<ul style="list-style-type: none"> External ear primordia emerges from caudolateral portion of mandibular arch
	<ul style="list-style-type: none"> Face: Lateral and medial nasal processes bilaterally
	<ul style="list-style-type: none"> Lateral nasal processes along dorsolateral lip of nasal pits
	<ul style="list-style-type: none"> Lens vesicles closed, pores absent

	 Nose: Nasal discs recede forming nasal pits
	 Optic chiasm
	 Adult lamina terminalis
	 Amygdaloid area
	 Cerebellar plate
	 Cerebellum with marginal layer
	 Fibers of dorsal funiculus reach level of C1
	 First axodendritic synapses in cervical spinal cord
	 First nerve fibers
	 Habenular nucleus
	 Habenulo-interpeduncular tract
	 Lateral striatal ridge (derived from telencephalon and comprised mainly of neostriatum)
	 Lateral ventricular eminence
	 Locus caeruleus
	 Longitudinal zones in diencephalon
	 Marginal layer throughout most of diencephalon
	 Material for sympathetic trunks scattered in cervical region
	 Median striatal ridge (paleostriatum)
	 Mesencephalic tract of CN 5
	 Most cranial nerves seen
	 Olfactory fibers reach brain
	 Optic groove (also called preoptic recess)
	 Postoptic recess
	 Primordium of epiphysis
	 Rhombomeres still identifiable
	 Superior colliculi and its commissure
	 Superior medullary velum
	 Supramamillary commissure
	 Synapses among motor neurons in spinal cord
	 Tectobulbar tract
	 Tentorium
	 Third ventricle
	 Trigemino-cerebellar tract
	 Trochlear nerve root and decussation (CN IV)
	 Hand plate emerges from distal upper limb bud
	 Frontonasal prominence
5 weeks	 Arytenoid and epiglottal swellings
	 Lobar pattern mimics adult pattern
	 T-shaped laryngeal inlet
	 Pacemaker cells
Unit 6: 5 to 6 Weeks	
5 weeks, 2 days	 Apical epidermal ridges
	 Mammary ridge

	<ul style="list-style-type: none"> Maxillary and premaxillary fields still widely separated
	<ul style="list-style-type: none"> Nipples emerge from mammary crest
	<ul style="list-style-type: none"> Gonad region separates from mesonephros
	<ul style="list-style-type: none"> Gonadal primordium
	<ul style="list-style-type: none"> Labioscrotal swelling
	<ul style="list-style-type: none"> Urogenital fold and groove
	<ul style="list-style-type: none"> Suprarenal gland: Cortex primordium
	<ul style="list-style-type: none"> Suprarenal gland: Medulla
	<ul style="list-style-type: none"> Thyroid detaches from pharynx
	<ul style="list-style-type: none"> Thyroid with right and left lobes connected by an isthmus
	<ul style="list-style-type: none"> Cartilage in mandibular arch
	<ul style="list-style-type: none"> Hand area with central carpal region and digital plate with marginal vein
	<ul style="list-style-type: none"> Pre-chondrocranium: Otic capsule, nasal capsule, and parachordal condensations
	<ul style="list-style-type: none"> Primordia of primary palate
	<ul style="list-style-type: none"> Ribs: Primordia now present for all 12 pairs
	<ul style="list-style-type: none"> Vertebral column with 36 levels of ganglia and myotomes
	<ul style="list-style-type: none"> Extra-ocular pre-muscle masses receive cranial nerve fibers [oculomotor (CN III), trochlear (CN IV), and abducens (CN VI) nerves]
	<ul style="list-style-type: none"> Gluteal mesoderm
	<ul style="list-style-type: none"> Infrahyoid pre-muscle masses
	<ul style="list-style-type: none"> Limb mesoderm
	<ul style="list-style-type: none"> Sternocleidomastoid-trapezius pre-muscle mass with spinal accessory nerve (CN11)
	<ul style="list-style-type: none"> Thigh and thigh mesoderm
	<ul style="list-style-type: none"> Tongue pre-muscle mass
	<ul style="list-style-type: none"> Metanephros at level of sacrum
	<ul style="list-style-type: none"> Urethral plate
	<ul style="list-style-type: none"> Lesser omentum (ventral mesogastrum)
	<ul style="list-style-type: none"> Peritoneal cavity
	<ul style="list-style-type: none"> Rectum
	<ul style="list-style-type: none"> Stomach: Greater and lesser curvatures
	<ul style="list-style-type: none"> Yolk stalk disappears
	<ul style="list-style-type: none"> Bronchial tree expanding
	<ul style="list-style-type: none"> Cervical sinus diminished in size
	<ul style="list-style-type: none"> Epiglottis
	<ul style="list-style-type: none"> Primitive Larynx
	<ul style="list-style-type: none"> Anterior, middle, and posterior cerebral arteries
	<ul style="list-style-type: none"> Atrioventricular (AV) node
	<ul style="list-style-type: none"> Atrioventricular cushions fuse with interventricular septum
	<ul style="list-style-type: none"> Circle of Willis almost complete
	<ul style="list-style-type: none"> Conotruncal septum

	<ul style="list-style-type: none"> Endocardial cushions (rostroventral and caudodorsal) begin fusing around atrioventricular canal forming right and left atrioventricular canals and two separate blood streams
	<ul style="list-style-type: none"> External carotid artery
	<ul style="list-style-type: none"> Foramen primum disappearing
	<ul style="list-style-type: none"> Hepatic portal vein
	<ul style="list-style-type: none"> Infundibulum of right ventricle
	<ul style="list-style-type: none"> Jugular lymph sac
	<ul style="list-style-type: none"> Lateral atrioventricular cushions
	<ul style="list-style-type: none"> Mesencephalic artery
	<ul style="list-style-type: none"> Myelencephalic artery
	<ul style="list-style-type: none"> Perilental blood vessels
	<ul style="list-style-type: none"> Primitive cavernous sinus drains primitive maxillary and supraorbital veins
	<ul style="list-style-type: none"> Primitive renal plexus
	<ul style="list-style-type: none"> Right ventricle feeds sixth (pulmonary) aortic arches; left ventricle feeds fourth aortic arches
	<ul style="list-style-type: none"> Semilunar valves (aortic and pulmonary) are forming
	<ul style="list-style-type: none"> Ventricles each with three parts: inlet, trabecular pouch, and outflow tract
	<ul style="list-style-type: none"> Ventricles enlarge and deepen side-by-side forming an ever growing interventricular septum
	<ul style="list-style-type: none"> Celiac plexus
	<ul style="list-style-type: none"> Cochlear nerve present
	<ul style="list-style-type: none"> Femoral and obturator nerves innervate rostralateral part of lower limb
	<ul style="list-style-type: none"> Hypoglossal nerve (CN XII) reaches tongue
	<ul style="list-style-type: none"> Intercostal nerves
	<ul style="list-style-type: none"> Lumbar and sacral plexuses
	<ul style="list-style-type: none"> Musculocutaneous, radial, ulna, and median nerves enter upper limb bud
	<ul style="list-style-type: none"> Nasal pits face more ventrally, still widely separated
	<ul style="list-style-type: none"> Nasofrontal groove
	<ul style="list-style-type: none"> Olfactory fibers connect nasal pits with brain
	<ul style="list-style-type: none"> Olfactory fibers enter brain
	<ul style="list-style-type: none"> Olfactory tubercle present
	<ul style="list-style-type: none"> Peroneal and tibial nerves innervate caudomedial part of lower limb
	<ul style="list-style-type: none"> Phrenic nerve
	<ul style="list-style-type: none"> Pigment in retina visible externally
	<ul style="list-style-type: none"> Primordium of cochlear pouch
	<ul style="list-style-type: none"> Tibial nerve innervates foot area
	<ul style="list-style-type: none"> Auricular hillocks on hyoid arch (antitragus and helix)
	<ul style="list-style-type: none"> Auricular hillocks on mandibular arch (tragus and crus)
	<ul style="list-style-type: none"> Blind nasal sac
	<ul style="list-style-type: none"> Nasal fin

	■ Alar lamina emerging with dense rhombic lip
	■ All cranial nerves identifiable
	■ Archipallium, paleopallium, and neopallium
	■ Area epithelialis
	■ Brain: Primordial plexiform layer in area of future temporal lobe
	■ Cajal-Retzius cells
	■ Commissure of the trochlear nerve
	■ Diencephalic subthalamic nucleus
	■ Dorsal and ventral thalami separated by groove
	■ Dorsal funiculus fibers reach medulla oblongata
	■ Epiphysis cerebri
	■ Glial cells identifiable adjacent to neurons
	■ Greater petrosal nerve
	■ Hippocampus: Gyrus dentatus
	■ Infundibular recess and infundibulum
	■ Interventricular foramen large
	■ Marginal ridge
	■ Medial and lateral ridges of corpus striatum are continuous
	■ Median forebrain bundle
	■ Neurohypophysial outgrowth
	■ Olfactory tubercle
	■ Pontine flexure deepens
	■ Posterior commissure
	■ Recurrent laryngeal nerve
	■ Reticular formation more defined
	■ Retinal fissure closes
	■ Splanchnic nerve
	■ Sulcus limitans hippocampi
	■ Superior laryngeal nerve
	□ Second pharyngeal arch more prominent
	□ Third pharyngeal arch recedes
5½ weeks	□ Initial tooth formation
5½ weeks - 6 weeks	■ Subtle movement begins
5 weeks, 5 days - 7 weeks, 1 day	■ Melanocytes in epidermis
5 weeks, 6 days	■ Facial growth centers grow and begin merging forming nose and upper jaw
	■ Genital eminence forms phallus or genital tubercle
	■ Gonad grows into oval shape with irregular surface
	■ Auditory ossicles identifiable in mesenchyme
	■ Cartilage in occipital sclerotomes (1-4)
	■ Digital rays in hand plate
	■ Femur: Chondrification begins
	■ Foot with rounded digital plate

	□ Hypoglossal foramen (or canal) through sclerotome 4 (area of future occipital bone)
	□ Odontogenic epithelium emerges in six areas (four maxillary and two mandibular)
	□ Primary palate components (right and left) fuse in midline
	□ Primitive palatine groove
	□ Primordium of cartilage within nasal septum
	□ Vertebral centra begin chondrification
	■ Primordia of orbital muscles
	■ Calices
	■ Mesonephros can produce urine
	■ Pelvis of the ureter with three main divisions
	■ Vesico-urethral canal
	■ Biliary ducts within liver
	■ Dorsal and ventral pancreas fuse but retain separate ducts
	■ Duodenum enlarges proximal to and distal to bile and pancreatic ducts
	■ Esophagus developing a submucous coat surrounding epithelium
	■ Intestinal loop begins umbilical herniation
	■ Primordial vermiform appendix
	■ Stomach regions include gastric canal, fundus, corpus (or body), and pyloric antrum
	■ Trachea: Precursors of tracheal cartilages
	■ Condensing mesenchyme around junction between left and right atria and cardiac tube is precursor to mitral and tricuspid valves
	■ Outflow tract rotates counterclockwise
	■ Right and left atrioventricular canals totally separated
	■ All parasympathetic cranial nerve ganglia identifiable
	■ All spinal nerves present
	■ Cell islands in olfactory tubercle
	■ Crescentic lens cavity
	■ Genuiculate ganglion separate from vestibulocochlear nerve
	■ Globular process emerges from each medial nasal process
	■ Nasal fin connecting nasal disc and surface epithelium
	■ Nasofrontal grooves
	■ Olfactory tubercle with cellular islands
	■ Hyomandibular groove enlarges (onset of concha and external auditory meatus formation)
	■ Medial rims of nasal pits form nasal septum
	■ Nostril becomes continuous with nasal sac
	■ Primary lens fibers
	■ Retinal fissure closed

	■ Capillaries between adenohypophysis and hypothalamus
	■ Commissure of the oculomotor nerves
	■ Cortical nucleus in amygdaloid body
	■ Dentate and isthmic nuclei in cerebellum
	■ Dura begins forming in basal area
	■ Epiphysis cerebri with intermediate layer
	■ First hint of septal nucleus
	■ Frontal and temporal poles of cerebral hemispheres
	■ Gustatory fibers separate from common afferent tract
	■ Hemispheric stalk
	■ Intermediate layer in tectum mesencephali
	■ Interventricular foramen
	■ Mesencephalon with intermediate layer
	■ Somites: Pairs 38 and 39
	■ Spinal cord reaches caudal tip of body
	■ Subarachnoid space
	■ Synapses in spinal cord between interneurons and primary afferent neurons
	■ Ventral thalamus with intermediate layer
	■ Anterior choroid artery
6 weeks	■ Blood forming in liver
	■ Milk lines
	■ Handplates develop subtle flattening
	■ Medial skull cartilages: Parachordal, hypophyseal, and trabecular
	■ Tooth buds (primary teeth)
	■ Intestines fill base of umbilical cord
	■ Crown-heel length 1.6 cm

Unit 7: 6 to 7 Weeks

6 weeks, 2 days	■ Angiogenesis begins inside gonads
	■ Gonad grows into oval shape with irregular surface
	■ Ostium (abdominal) of uterine tube at rostral end of paramesonephric duct (in female embryos)
	■ Paramesonephric duct forms from rostral end of mesonephric duct
	■ Testicular cords in gonads of male embryos
	■ Testicular cords in male gonad
	■ Elbow regions sometimes identifiable
	■ Embryo with cervical and lumbar flexures
	■ Embryo with dorsal concavity
	■ Finger rays with early interdigital notching
	■ Humerus, radius, and ulna
	■ Humerus: Chondrocytes in phases one through three
	■ Scapula and clavicle









































	□ Semicircular ducts form in order: anterior, posterior, and lateral
	□ Sternum: Episternal cartilage created from fusion of right and left sternal bars
	□ Tibia and fibula
	□ Toe rays sometimes present
	■ Deltoid muscle
	■ External and internal abdominal oblique muscles
	■ Levator scapulae muscle
	■ Longus cervicis and semispinalis cervicis muscles
	■ Pectoralis major muscles
	■ Platysma muscle
	■ Rectus abdominis muscle
	■ Rectus capitus posterior and semispinalis capitis muscles
	■ Serratus anterior muscles
	■ Splenius and longissimus muscles
	■ Stapedius muscle
	■ "Common excretory duct is disappearing"
	■ Cloacal membrane ruptures (stages 18-19)
	■ Primordia of secretory tubules
	■ Esophagus with muscular and submucous coats
	■ Submandibular gland primordia
	■ Bronchial tree with subsegmental buds
	■ Bronchial tree with well established segmental bronchi
	■ Lingula of left upper lobe
	■ Aortic and pulmonary valves assuming shape of a cup
	■ Brachiocephalic veins, right and left
	■ Inferior vena cava
	■ Interventricular septum: membranous part begins forming
	■ Left coronary artery arises from aorta
	■ Mesenchyme ridges in place of future mitral and tricuspid valves
	■ Pulmonary and aortic blood flows completely separate
	■ Secondary interventricular foramen sometimes closing (stage 18-21) interventricular septum
	■ Septum secundum and foramen ovale (stages 18-21)
	■ Bucconasal membrane
	■ Bucconasal membrane detaches opening up nasal airway
	■ Crus commune
	■ Ethmoidal epithelium emerges from upper medial nasal wall
	■ Frontonasal angle (marks location of future nasal bridge)

	<ul style="list-style-type: none"> Mesenchyme thickenings mark beginning of "sclera and its muscular attachments"
	<ul style="list-style-type: none"> Nasal tip emerges
	<ul style="list-style-type: none"> Nerve fibers in retina
	<ul style="list-style-type: none"> Optic fibers
	<ul style="list-style-type: none"> Retina's outer lamina heavily pigmented
	<ul style="list-style-type: none"> Vomer nasal nerve and ganglion
	<ul style="list-style-type: none"> Vomer nasal organ marked by groove and located in fold of lower medial nasal wall
	<ul style="list-style-type: none"> Choanae
	<ul style="list-style-type: none"> Conjunctival sac marked by groove
	<ul style="list-style-type: none"> Cornea and conjunctiva
	<ul style="list-style-type: none"> Ear: Stapes primordium surrounds stapedia artery
	<ul style="list-style-type: none"> External ear: Crus helices forming from auricular hillocks two and three (from mandibular arch)
	<ul style="list-style-type: none"> Eyelid folds sometimes present
	<ul style="list-style-type: none"> Nasal fin splits forming choanae and bucconasal membrane
	<ul style="list-style-type: none"> Nasolacrimal duct begins as epithelial strand emanating from nasomaxillary groove
	<ul style="list-style-type: none"> Nostrils, nasal wings, and nasal septum easily seen
	<ul style="list-style-type: none"> Olfactory bulb sometimes with olfactory ventricle
	<ul style="list-style-type: none"> Primary lens fibers filling lens vesicle cavity
	<ul style="list-style-type: none"> Adenohypophysis no longer open to pharyngeal cavity
	<ul style="list-style-type: none"> Archistriatum
	<ul style="list-style-type: none"> Brain: Dentate nucleus in internal cerebellar swellings
	<ul style="list-style-type: none"> Brain: Pineal recess emerges representing anterior lobe of epiphysis
	<ul style="list-style-type: none"> Cerebrospinal fluid production begins
	<ul style="list-style-type: none"> Choroid plexuses in fourth and lateral ventricles
	<ul style="list-style-type: none"> Corpus striatum much larger extending to preoptic sulcus; has subtle groove
	<ul style="list-style-type: none"> External cerebellar swellings contain future flocculus
	<ul style="list-style-type: none"> Four amygdaloid nuclei
	<ul style="list-style-type: none"> Fourth ventricle: Choroid folds
	<ul style="list-style-type: none"> Hippocampus reaches olfactory region
	<ul style="list-style-type: none"> Interpeduncular fossa
	<ul style="list-style-type: none"> Neurohypophysis walls are folded
	<ul style="list-style-type: none"> Nucleus ambiguus of the vagus (CN10)
	<ul style="list-style-type: none"> Prosencephalic septum
	<ul style="list-style-type: none"> Red nucleus
	<ul style="list-style-type: none"> Substantia nigra
	<ul style="list-style-type: none"> Supra-optic commissure
6½ weeks	<ul style="list-style-type: none"> Volar pads on palms
6 weeks, 5 days	<ul style="list-style-type: none"> Greater thymic bud
	<ul style="list-style-type: none"> Cheeks form by merging of maxillary and mandibular processes

	<input type="checkbox"/> Mammary gland primordium
	<input type="checkbox"/> Mammary ridge disappears leaving only mammary gland primordium
	<input type="checkbox"/> Female duct
	<input type="checkbox"/> Gonads extend from levels T-10 to L-2
	<input type="checkbox"/> Rete ovarii (in female embryos)
	<input type="checkbox"/> Rete testis begins emerging from seminiferous cords (Stage 19-23) (in male embryos)
	<input type="checkbox"/> Tunica albuginea in male embryos
	<input type="checkbox"/> Suprarenal gland: Cortex
	<input type="checkbox"/> Suprarenal gland: Medulla populated by prechromaffin cells
	<input type="checkbox"/> Beginnings of occipital and sphenoid bones
	<input type="checkbox"/> Bilateral cartilaginous sternal bars tie ribs together; sternal bars join cranially to form the episternal bar in the midline
	<input type="checkbox"/> Cartilage within otic capsule envelops semicircular canals and cochlear duct
	<input type="checkbox"/> Cartilaginous styloid process
	<input type="checkbox"/> Ear: Cartilaginous malleus, incus, and stapes (the middle ear ossicles)
	<input type="checkbox"/> Ectomeninx covers lateral and dorsal surfaces of brain (laying the foundation for the flat bones of the skull)
	<input type="checkbox"/> Intervertebral discs form from caudal condensed portion of sclerotomes
	<input type="checkbox"/> Ischium and ilium
	<input type="checkbox"/> Labiodental lamina: Inner dental lamina and outer labiokingival band
	<input type="checkbox"/> Laryngeal cartilages
	<input type="checkbox"/> Limbs point forward (ventrally)
	<input type="checkbox"/> Orbitosphenoid cartilage located within ectomeninx near optic stalk
	<input type="checkbox"/> Ossification begins in maxilla (stages 19 -20)
	<input type="checkbox"/> Primitive palate (or intermaxillary segment)
	<input type="checkbox"/> Rib primordia become cartilaginous
	<input type="checkbox"/> Ribs each have an identifiable head and shaft
	<input type="checkbox"/> Trachea: Tracheal cartilage
	<input type="checkbox"/> U-shaped labiodental lamina form along upper and lower oral cavity
	<input type="checkbox"/> Vertebral column represented by cartilaginous centrum, neural arch, and short transverse process
	<input type="checkbox"/> Esophagus: Muscularis layer adjacent to esophageal plexus
	<input type="checkbox"/> Gluteal muscle group
	<input type="checkbox"/> Iliopsoas muscles
	<input type="checkbox"/> Infrahyoid muscles
	<input type="checkbox"/> Internal intercostal muscles
	<input type="checkbox"/> Limb extensor muscles located dorsally

	<ul style="list-style-type: none"> ■ Limb flexor muscles located ventrally
	<ul style="list-style-type: none"> ■ Midgut: Muscularis
	<ul style="list-style-type: none"> ■ Muscle tissue forming around phrenic nerve within septum transversum portion of diaphragm
	<ul style="list-style-type: none"> ■ Pharyngeal constrictor muscle
	<ul style="list-style-type: none"> ■ Premuscle mass of the muscles of mastication innervated by mandibular nerve
	<ul style="list-style-type: none"> ■ Quadratus lumborum muscle
	<ul style="list-style-type: none"> ■ Rhomboid and scalene muscles
	<ul style="list-style-type: none"> ■ Sternocleidomastoid and trapezius muscles distinct and innervated by separate branches of spinal accessory nerve (CN XI)
	<ul style="list-style-type: none"> ■ Thenar and hypothenar eminences
	<ul style="list-style-type: none"> ■ Tongue forms from swellings in floor of pharynx
	<ul style="list-style-type: none"> ■ Tongue: Extrinsic muscles identifiable
	<ul style="list-style-type: none"> ■ Tongue: Intrinsic muscles identifiable
	<ul style="list-style-type: none"> ■ Transversospinal and erector spinae muscle groups
	<ul style="list-style-type: none"> ■ Upper limb flexors innervated by musculocutaneous, median, and ulnar nerves
	<ul style="list-style-type: none"> ■ Major calyces, cranial and caudal, with collecting tubules within metanephrogenic mass
	<ul style="list-style-type: none"> ■ Mesonephros extends from T-9 to L-3
	<ul style="list-style-type: none"> ■ Metanephros extends from T-12 to L-2
	<ul style="list-style-type: none"> ■ Renal capsule covers distal collecting tubules
	<ul style="list-style-type: none"> ■ Renal vesicles form in part of metanephros
	<ul style="list-style-type: none"> ■ Ureter forms from "proximal segment of metanephric diverticulum"
	<ul style="list-style-type: none"> ■ Urogenital sinus comprised of three parts: Bladder, pelvic, and phallic portions
	<ul style="list-style-type: none"> ■ Anal folds adjacent to anal membrane
	<ul style="list-style-type: none"> ■ Anal membrane
	<ul style="list-style-type: none"> ■ Duodenum: "Assumes the shape of an arc"
	<ul style="list-style-type: none"> ■ Greater omentum
	<ul style="list-style-type: none"> ■ Lateral palatine process
	<ul style="list-style-type: none"> ■ Liver: rapid growth, right side greater than left
	<ul style="list-style-type: none"> ■ Median mandibular groove disappears as mandibular processes merge in midline
	<ul style="list-style-type: none"> ■ Palatine fossa (from pharyngeal pouch 2)
	<ul style="list-style-type: none"> ■ Primitive oral cavity
	<ul style="list-style-type: none"> ■ Primitive rima oris replaces stomodeum
	<ul style="list-style-type: none"> ■ Stomach wall layers: Mucosa, submucosa, muscularis, and serosa
	<ul style="list-style-type: none"> ■ Submandibular and parotid gland buds
	<ul style="list-style-type: none"> ■ Submandibular gland duct
	<ul style="list-style-type: none"> ■ Bronchial tree: First generation of subsegmental bronchi complete
	<ul style="list-style-type: none"> ■ Glottis, primitive

	<ul style="list-style-type: none"> ■ Lung sac, right: Oblique and horizontal fissures define upper, lower, and middle lobes
	<ul style="list-style-type: none"> ■ Lung sac: Apex and base
	<ul style="list-style-type: none"> ■ Lung, left: Oblique fissure defines upper and lower lobes ■ "Septum primum fuses with endocardial cushions" obliterating ostium primum and creating the ostium secundum
	<ul style="list-style-type: none"> ■ Apex of left ventricle ■ Circulus arteriosus (Circle of Willis) complete
	<ul style="list-style-type: none"> ■ External iliac arteries ■ Iliac lymph sac
	<ul style="list-style-type: none"> ■ Intercostal and subcostal arteries ■ Internal thoracic artery and costocervical trunk
	<ul style="list-style-type: none"> ■ Mesenteric lymph sac ■ Mesonephric artery feeds mesonephros, gonads, and suprarenal glands ■ Papillary muscles
	<ul style="list-style-type: none"> ■ Pontine, superior cerebellar, and anterior and posterior inferior cerebellar arteries replace myelencephalic and metencephalic arteries ■ Primitive marginal sinus drains diencephalon ■ Primitive tentorial sinus drains cerebral vesical ■ Primitive transverse and sigmoid sinuses
	<ul style="list-style-type: none"> ■ Pulmonary arteries (right and left) ■ Right coronary artery arises from aorta ■ Splenic vein ■ Tricuspid and mitral valves
	<ul style="list-style-type: none"> ■ Anterior chamber between iridopupillary membrane and thickened ectoderm ■ Auditory tube and primitive tympanic cavity form from tubotympanic recess pharyngeal pouch 1) ■ Celiac, superior mesenteric, and inferior mesenteric preaortic ganglia ■ Choana ■ Cochlear duct tip grows upward ■ Esophageal plexus formed by vagal nerves (CN X) ■ Facial nerve (CN VII) branches: Chorda tympani, greater petrosal, posterior auricular, and digastric ■ Facial nerve (CN VII) reaches cervicomandibular region ■ Glossopharyngeal nerve (CN IX) innervates stylopharyngeus premuscle mass ■ Hypoglossal nerve (CN XII) innervates separating tongue muscles ■ Linguo gingival groove ■ Nasolacrimal duct forms from maxillonasal groove ■ Nasolacrimal ducts extend from medial eyes to primitive nasal cavity




















	 Nerve fibers begin extending from retina
	 Optic fibers enter chiasmatic plate
	 Primitive nasal cavity
	 Primordial vitreous body
	 Superior, middle, and inferior cervical ganglia
	 Trigeminal nerve (CN V) with ophthalmic, maxillary, and mandibular divisions reach their destinations
	 Vagal trunks, anterior and posterior, extending into abdomen
	 Eyelids: Upper and lower lids present and growing
	 Sacculle and cochlear duct
	 Adenohypophysis: Lateral lobes of pars tuberalis
	 Adenohypophysis: Pars intermedia emerging
	 Brain: Internal capsule formation underway
	 Cerebral hemispheres cover half of diencephalon
	 Dorsal and ventral cochlear nuclei
	 Fourth ventricle: Lateral recesses
	 Ganglion of nervus terminalis
	 Globus pallidus externus in the diencephalon
	 Habenular commissure
	 Intermediate layer in dorsal thalamus
	 Lemniscal decussation
	 Lower limb nerves (femoral, obturator, sciatic, common peroneal, and tibial) identifiable
	 Medial accessory olivary nucleus
	 Neurohypophyseal bud
	 Nuclei of forebrain septum
	 Nucleus accumbens
	 Occipital pole of cerebral hemispheres
	 Optic stalk with barely discernible lumen
	 Paraphysis marks dividing line in roof between telencephalon and diencephalon
	 Primitive filum terminale
	 Radial nerve innervates upper limb extensors
	 Rhombomeres no longer distinguishable
	 Subcommissural organ
	 Zona limitans intrathalamica between dorsal and ventral thalami
6 weeks, 6 days	 Cloacal membrane ruptures
7 weeks	 Head rotates
	 Ovaries
	 The heart has four chambers and is nearly complete.
	 The heart rate peaks at 165 to 170 beats per minute.
	 Crown-heel length 2.2 cm
Unit 8: 7 to 8 Weeks	
7 weeks, 1 day	 Facial processes no longer distinguishable

	<ul style="list-style-type: none"> Ovaries full of primitive oogonia, intermediate pregranulosa cells, and mesenchyme
	<ul style="list-style-type: none"> Testes with short straight tubules
	<ul style="list-style-type: none"> Upper limbs with slightly flexed elbows
	<ul style="list-style-type: none"> Diaphragm: Central tendon
	<ul style="list-style-type: none"> Renal vesicles with S-shaped lumina
	<ul style="list-style-type: none"> Submandibular gland: Solid epithelial ducts enlarge and begin to branch
	<ul style="list-style-type: none"> Adenohypophysis with new capillaries on rostral surface
	<ul style="list-style-type: none"> Scalp vascular plexus
	<ul style="list-style-type: none"> Cochlear duct tip growing horizontally
	<ul style="list-style-type: none"> Lens cavity completely filled
	<ul style="list-style-type: none"> Optic commissure
	<ul style="list-style-type: none"> Optic fibers extend to optic chiasma
	<ul style="list-style-type: none"> Cornea with three layers
	<ul style="list-style-type: none"> Brain: Inferior colliculus (in mesencephalon)
	<ul style="list-style-type: none"> Cerebral hemispheres expand beyond lamina terminalis
	<ul style="list-style-type: none"> Cerebral hemispheres extend over two-thirds of diencephalon
	<ul style="list-style-type: none"> Interpeduncular groove
	<ul style="list-style-type: none"> Medial septal nucleus
	<ul style="list-style-type: none"> Nigrostriatal fibers
	<ul style="list-style-type: none"> Nucleus of diagonal band
	<ul style="list-style-type: none"> Sacrocaudal spinal cord formation (secondary neurulation) complete
	<ul style="list-style-type: none"> Sensory pathways: Cuneate and gracile decussating fibers
	<ul style="list-style-type: none"> Septum verum
	<ul style="list-style-type: none"> Spinothalamic tract
7 weeks, 1 day - 8 weeks	<ul style="list-style-type: none"> Stomach: Folds in stomach wall
7 weeks, 2 days	<ul style="list-style-type: none"> Arteries and veins of heart complete
7 weeks, 3 days	<ul style="list-style-type: none"> Volar pads begin to emerge on fingertips
	<ul style="list-style-type: none"> Chondrocranium with dorsum sellae and hypophysial fossa
	<ul style="list-style-type: none"> Dens (of second cervical vertebrae)
	<ul style="list-style-type: none"> Sternoclavicular joint and manubrium
	<ul style="list-style-type: none"> Trachea: Thyroid cartilage
	<ul style="list-style-type: none"> Wrists slightly flexed
	<ul style="list-style-type: none"> Gluteus medius and gluteus minimus muscles
	<ul style="list-style-type: none"> Iliacus muscles
	<ul style="list-style-type: none"> Mylohyoid and infrahyoid muscles
	<ul style="list-style-type: none"> Orbicularis oculi muscles
	<ul style="list-style-type: none"> Submandibular gland: Solid ducts with definitive branches
	<ul style="list-style-type: none"> Anterior and posterior choroid arteries









	■ Left superior vena cava disappears (Stages 21-23)
	■ Scalp vascular plexus moving toward vertex
	■ Cornea: Substantia propria layer
	■ Fibers of optic nerve reach brain
	■ Eyelids growing rapidly
	■ Anterior and inferior horns of lateral ventricle
	■ Brain: Insula within cerebral hemisphere
	■ C-shaped lateral ventricle
	■ Cerebral hemispheres cover 75% of diencephalon
	■ Cerebral hemispheres cover more than half of diencephalon
	■ Cortical plate within primordial plexiform layer
	■ Glial and neurilemmal (Schwann) cells within cranial nerves
	■ Globus pallidus internus
	■ Internal fiber layer of cerebellum
	■ Lateral olfactory tract
	■ Primordium of dentate nucleus
	■ Pyramidal cells in hippocampus
	■ Subthalamic nucleus proper, entopeduncular nucleus, and globus pallidus externus within subthalamus
	■ Sulcus transversus rhombencephali
	■ Ventral part of lateral geniculate body
7½ weeks	■ Fingertips thicken
	■ Plantar pads toes
	■ EKG pattern similar to adult
7 weeks, 5 days	■ Endolymphatic and jugular foramina
	■ Hands can reach one another and fingers can overlap
	■ Optic foramen, foramen rotundum, internal acoustic foramen
	■ Osteoblasts emerge
	■ Pelvis: Obturator foramen
	■ Obturator internus muscles
	■ Rectus femoris muscle
	■ Large glomeruli present within metanephros
	■ Submandibular gland: Secondary branching with lumen formation starting at oral end of duct
	■ Costodiaphragmatic recess of pleural cavity
	■ Chordae tendineae (Stages 22 and 23)
	■ Intradural veins (sinuses)
	■ Scalp vascular plexus 75% of the way to the vertex
	■ Cochlear duct's second loop growing upward
	■ Scleral condensation
	■ Tragus and antitragus taking shape
	■ Eyelids continue growing rapidly over the surface of the cornea

	■ Optic nerve acquires a sheath
	■ Brain: Claustrum
	■ Brain: Cortical plate within cerebral hemispheres
	■ Brain: Internal capsule with connections to epithalamus, dorsal thalamus, and mesencephalon
	■ Brain: Putamen
	■ Cerebral hemispheres cover 75% of diencephalon
	■ Commissural plate thickens
	■ Cortical plate expanding rapidly
	■ Folds in roof of third ventricle
	■ Nerve fibers between neopallial subplate and internal capsule
	■ Thalamocortical fibers
8 weeks	■ Ductus deferens
	■ Interstitial cells forming within testis
	■ Testicular tubules
	■ Male embryos are making testosterone already!
	■ Anterior inferior iliac spine
	■ Costal cartilage
	■ Enamel organ
	■ Femur: Head and acetabular fossa
	■ Glenoid fossa
	■ Greater trochanter
	■ Head of humerus
	■ Inguinal ligament
	■ Joint development: Cavitation underway in hip, knee, and ankle (in some embryos)
	■ Joint development: Cavitation underway in shoulder, elbow, and wrist (in some embryos)
	■ Nucleus pulposus (from notochord)
	■ Ossification underway in scapula and distal phalanges in some embryos
	■ Pubic symphysis
	■ Scapular spine and notch
	■ Skull: Foramen magnum (wide)
	■ Skull: Ossification underway in some embryos
	■ Superior and inferior pubic rami
	■ Ulna: Styloid process and olecranon
	■ Vertebrae cartilaginous (33 or 34 in number)
	■ Anterior digastric muscles
	■ Depressor anguli oris muscle
	■ Esophagus: Longitudinal muscles
	■ Obliquus superior capitis muscle
	■ Obturator externus, gluteus maximus, and hamstring muscles
	■ Posterior belly of the digastric muscle









	■ Psoas tendon
	■ Rectus sheath with anterior and posterior lamina
	■ Temporal and lateral pterygoid muscles
	■ Zygomaticus major muscle
	■ Kidneys at level of first three lumbar vertebrae
	■ Metanephros: Numerous large glomeruli
	■ Metanephros: Secretory tubules elongating and becoming convoluted
	■ Sinusal tubercle
	■ Urethra
	■ Gastrosplenic ligament
	■ Nerves reaching intestinal loop
	■ Submandibular gland: Lumen present in terminal portions of duct
	■ Submandibular gland: Mesodermal sheath surrounds gland
	■ Unfused uvula (edge of unfused palatine shelf) and secondary palate
	■ Pseudoglandular stage begins
	■ Azygos vein
	■ Blood supply to the brain closely resembles adult pattern
	■ Hemiazygos veins
	■ Inferior epigastric artery
	■ Inferior vena cava valve at junction of right atrium
	■ Scalp vascular plexus nearing vertex
	■ Submandibular glands: Angiogenesis begins around epithelial tree (ducts)
	■ Superior sagittal sinus
	■ Cochlear duct's 2.5 coils nearly complete
	■ Cranial nerve distribution mimics adult pattern
	■ Eye: Secondary vitreous body
	■ Lens: Secondary lens fibers emerging
	■ Retina: Eight layers present
	■ Retina: Four of the ten adult layers present
	■ Tympanic membrane
	■ Eyelids fusing laterally and medially
	■ Optic tract reaches ventral portion of lateral geniculate body
	■ "The rhombencephalon...presents striking resemblance to that of the newborn."
	■ Amygdala area
	■ Brain represents 43% of embryo
	■ Brain: Caudate nucleus and putamen within corpus striatum
	■ Cerebellar commissures
	■ Cerebellum with external germinal layer

	 Cerebral hemispheres cover lateral portion of diencephalon
	 Choroid plexus now lobular
	 Cortical plate covers nearly all of neopallial surface
	 Dura lines entire vertebral canal
	 Fasciculus cuneatus and fasciculus gracilis form the decussation of the medial lemnisci
	 Greater palatine nerve
	 Grey and white matter
	 Hippocampus reaches temporal pole
	 Inferior and superior cerebellar peduncles
	 Most cisterns present
	 Principal nucleus of inferior olivary nuclei
	 Pyramidal decussations
	 Right- and left-handedness emerges
	 Suprapineal recess
	 Suprascapular nerve
	 Vermis of cerebellum
	 Crown-heel length 4.3 cm
	 Embryonic Period Ends
	 The 8-week embryo has formed more than 4,000 permanent body parts.





Unit 9: 8 to 9 Weeks

8 weeks, 1 day	 Humerus: Bone marrow replaces cartilage
8 weeks, 1 day - 9 weeks	 Anal canal patent
8½ weeks	 Eyelids completely fused
	 Neurons synapse in cerebral cortex (marginal zone)
9 weeks	 Drinking fluid is becoming routine
	 Sucking the thumb
	 External capsule
	 Olivary nucleus with five components

Unit 10: 9 to 10 Weeks

9 weeks - 10 weeks	 Larynx recanalizes
10 weeks	 Palatine tonsils
	 Three-layered epidermis
	 Now, all the bones are getting harder
	 Tooth buds (secondary teeth)
	 Physiologic herniation ends
	 Commissure of the fornix
	 Crown-heel length 7.5 cm

Unit 11: 10 to 11 Weeks

10 weeks - 12 weeks	 Langerhans cells enter epidermis
10½ weeks	 Volar and plantar pads regress
11 weeks	 Intermediate layer
	 Intestines absorb water & glucose

	<ul style="list-style-type: none"> ■ Small intestine lined with villi Crown-heel length
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Unit 12: 11 to 12 Weeks

12 weeks	<ul style="list-style-type: none"> Sebaceous glands ■ Many different hormones are present in pituitary gland ■ All facial muscles in final positions ■ Bowel movements ■ Liver: Bile production begins ■ Corpus callosum ■ Crura cerebri ■ Myelination in spinal cord Crown-heel length 12 cm Head circumference 10 cm
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Unit 13: 3 to 4 Months

13 weeks	<ul style="list-style-type: none"> Teeth are growing Crown-heel length 15 cm
14 weeks	<ul style="list-style-type: none"> ■ Girls move their jaws more than the boys do ■ Cerebellum resembles adult structure Crown-heel length 17 cm
15 weeks	<ul style="list-style-type: none"> Crown-heel length 19.5 cm
16 weeks	<ul style="list-style-type: none"> ■ Quickening ■ Colon lined with villi ■ Canalicular stage begins Crown-heel length 21 cm

Unit 14: 4 to 5 Months

18 weeks	<ul style="list-style-type: none"> Apocrine sweat glands Sweat glands
19 weeks	<ul style="list-style-type: none"> Melanin production ■ Sulci on surface of cerebral hemispheres
20 weeks	<ul style="list-style-type: none"> ■ Peyer's patches ■ Surfactant production (low levels) Crown-heel length 28 cm Head circumference 20 cm

Unit 15: 5 to 6 Months

21 weeks	<ul style="list-style-type: none"> Periderm disappears Stratum corneum
22 weeks	<ul style="list-style-type: none"> ■ Cornea structure ■ Behavioral states
23 weeks	<ul style="list-style-type: none"> Brain weight 100 grams
24 weeks	<ul style="list-style-type: none"> Crown-heel length 34.5 cm

Unit 16: 6 to 7 Months

25 weeks	<ul style="list-style-type: none"> ■ Intestinal lining contains all adult cell types
26 weeks	<ul style="list-style-type: none"> ■ Terminal sac stage begins
28 weeks	<ul style="list-style-type: none"> Crown-heel length 39.5 cm

Unit 17: 7 to 8 Months	
30 weeks	<input type="checkbox"/> Head circumference 30 cm
32 weeks	<input checked="" type="checkbox"/> Esophagus: Lower esophagus muscles functional
	<input type="checkbox"/> Crown-heel length 45 cm
Unit 18: 8 to 9 Months	
36 weeks	<input checked="" type="checkbox"/> Surfactant production accelerates
	<input type="checkbox"/> Brain weight 300 grams
	<input type="checkbox"/> Crown-heel length 48.5 cm
Unit 19: 9 Months to Birth	
37 weeks	<input checked="" type="checkbox"/> Fetus drinks an estimated 15 oz (or 450cc) of amniotic fluid/day
38 weeks	<input checked="" type="checkbox"/> Heart beats 54 million times before birth
	<input checked="" type="checkbox"/> Spinal cord ends at third lumbar vertebrae
	<input type="checkbox"/> Brain weight 350 grams
	<input type="checkbox"/> Crown-heel length 50 cm
	<input type="checkbox"/> Head circumference 35 cm
	<input type="checkbox"/> Time to be born!
66 weeks, 5 days	<input checked="" type="checkbox"/> Premuscle cells form sheets representing muscles of facial expression