


Prenatal Development Timeline

■ 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 Embryo is spherically shaped with 12 to 16 cells
Day 1 - Day 1	<ul style="list-style-type: none"> Fertilization - development begins with a single-cell embryo!!!
Day 2	<ul style="list-style-type: none"> Early pregnancy factor (EPF) Activation of the genome Blastomeres begin rapidly dividing Zygote divides into two blastomeres (24 - 30 hours from start of fertilization)
Day 3	<ul style="list-style-type: none"> Compaction
Day 4	<ul style="list-style-type: none"> Embryonic disc Free floating blastocyst 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	 Implantation complete
	 Yolk sac
	 Embryonic disc diameter: 0.15 to 0.20 mm
1 week, 6 days	 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
	 Neural plate induced by notochordal process
	 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
	Beginnings of the heart can be seen
	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
	Forebrain, midbrain, and hindbrain
	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
3 weeks	Blood and blood vessels

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
	Bulbus cordis
	Circulatory system function begins
	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
	 Thyroid complete
	 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
	 Optic evagination (starting at 14 somites)
	 Otic vesicle
	 Trigeminal ganglia (CN V)
	 Neural crest: Optic crest emerges during Carnegie Stages 11 and 12
	 Nose: Nasal plate
	 Optic vesicles form (17 to 19 somites)
	 Adenohypophysial pouch
	 Adenohypophysis
	 Lamina terminalis
	 Mesencephalon contains tectum and tegmentum
	 Neural crest production and migration continue
	 Neurohypophysial primordia
	 Neuropore (near brain) closes
	 Notochord
	 Segmentation of mesoblast alongside neural tube bilaterally
	 Somites: Pairs 13 through 20
3 weeks, 3 days - 5 weeks, 6 days	 All eight rhombomeres (Rh 1 through Rh 7, Rh D) - Present in stages 11 through 17
3 weeks, 5 days	 Telopharyngeal bodies
	 Alimentary epithelium invades stroma of liver
	 Alimentary epithelium proliferates in primordia of stomach, liver, and dorsal pancreas
	 First part of pancreas
	 Gastric portion of foregut elongates (25 to 28 somites)
	 Hepatic primordium with abundant vascular plexus
	 Omental bursa
	 Oropharyngeal membrane is ruptured
	 Pharyngeal arch 3
	 Pharyngeal arches with dorsal and ventral parts
	 Umbilical vesicle elongates
	 Cervical sinus
	 Laryngotracheal groove
	 Lung bud





































	 Tracheo-esophageal septum
	 Atrioventricular canal
	 Common cardinal veins (right and left)
	 Descending aorta
	 Heart circulates blood to and from central nervous system, umbilical vesicle, and chorion
	 Hepatocardiac channels (right and left)
	 Rostral and caudal cardinal veins along brain and spinal cord feeding common cardinal veins
	 Septum primum and foramen primum sometimes present
	 Septum primum, foramen primum
	 Sinu-atrial foramen prevents backflow into sinus venosus
	 Sinus venosus collects venous blood from entire embryo
	 Superior vena cava, inferior vena cava, and sinus venosus collecting all venous blood
	 Unidirectional circulation
	 Vitelline arteries and veins
	 Hypoglossal cord (CN XII) enters pharyngeal arch 4
	 Otocyst nearly closed
	 Nasal discs form part of ectodermal ring
	 Optic vesicles covered by sheath (formed by mesencephalic and optic crest)
	 Brain involves 40% of neural tube
	 Brain: Embryonic commissural plate
	 Ectodermal ring complete
	 Hypoglossal nucleus (CN XII)
	 Lowermost spinal cord formation begins
	 Mamillary recess
	 Marginal layer in rhombencephalon
	 Mesencephalic flexure at 90 degrees
	 Mesencephalon with two neuromeres: M1 and M2
	 Motor neurons in basal plate of rhombencephalon
	 Neural tube closes (lower back)
	 Neurofibrils form in rhombencephalon
	 Primary neurulation ends
	 Primordia of ventral thalamus and subthalamus in diencephalon
	 Sulcus limitans
	 Sulcus limitans in midbrain
	 Somites: Pairs 21 through 29
	 Upper limb primordium at level of somites 8 to 10
	 Progressively C-shaped embryo
4 weeks	 Spleen primordia
	 Thymic primordia

	Lower lip forms from merging of mandibular processes
	Melanoblasts in epidermis
	Skin is so thin, you can see through it!
	Gonadal ridge extends from C-7 to T-8 levels
	Primordial germ cells migrate to mesonephric ridges
	Primordial germ cells number several hundred
	Urorectal septum
	Thyroid bilobed and attached to pharynx by thyroglossal duct
	Diaphragm primordia
	Glomeruli emerge in mesonephros
	Mesonephric duct attached to cloaca
	Nephric tubules now S-shaped
	Urogenital sinus
	Urorectal cleavage line
	Diverticulum ilei marks division between foregut and hindgut
	Esophagus primordia
	Intestines growing in length
	Mesentery from end of duodenum to proximal half of colon
	Opening between gut and umbilical vesicle decreases
	Pancreas: Ventral pancreas
	Pharyngeal pouches 1 through 4
	Pharynx
	Pleuroperitoneal canals
	Small & large intestines
	Stalk of umbilical vesicle lengthens and narrows
	Stomach assumes shape of a spindle
	Umbilical vesicle at height of development
	Vitelline duct
	Bronchial buds
	Lungs begin filling chest cavity
	Mesenchyme from coelomic epithelium surrounds esophagus and lung buds
	Trachea
	Anterior, middle, and posterior cerebral plexuses
	Aorta branches include dorsal intersegmental, lateral segmental, and ventral segmental arteries
	Aortic arches 4 and 6
	Artery from the common iliac artery feeds each lower limb bud
	Atrioventricular bundle
	Cardiac contractions still under myogenic control
	Celiac artery, superior and inferior mesenteric arteries
	Circulatory system "well established"

	Common iliac arteries (right and left, from dorsal aorta bifurcation)
	Contractions well coordinated and sequential from sinus venosus to atria to ventricles
	Functioning two-chamber heart
	Gas exchange through placenta begins
	Gelatinous reticulum (or cardiac mesenchyme)
	Heart chambers bulging with fluid
	Heart now functions as two parallel pumps
	Heart rate (about) 113 beats/min
	Heart: Atrioventricular cushions (rostroventral and caudodorsal)
	Heart: Myocardium wall 3 to 4 cells thick
	Primary head veins (right and left) drain anterior, middle, and posterior cerebral plexuses and feed precardinal veins
	Small arteries emerging throughout mesoderm
	Ventricle walls trabeculated
	Vertebral arteries
	Vitelline veins empty exclusively into hepatic plexus
	Most cranial nerve ganglia
	Trigeminal, glossopharyngeal, and vagal preganglia
	Basement membrane of otic disc surrounds otic vesicle
	Endolymphatic appendage
	Otic invagination
	Otic vesicle closes
	Terminal-vomeronasal neural crest
	Brain: Commissural plate
	Cerebellum
	Common afferent tract
	Fourth ventricle
	Interstitial nucleus (part of medial longitudinal fasciculus)
	Isthmus rhombencephali (a new neuromere)
	Oculomotor (CN III) and trochlear nuclei (CN IV) in mesencephalon (midbrain) and isthmus respectively
	Retinal and lens discs
	Amnion surrounds connecting stalk and vitelline stalk
	Amnion surrounds embryo
	Cervical flexure
	Hyoid arch subdivides into dorsal and ventral segments
	Limb buds - the first sign of arms and legs
	Lower limb buds
	Umbilical cord emerging
	Upper and lower limb buds

Unit 5: 4 to 5 Weeks	
4 weeks, 3 days	Early eyes
4 weeks, 3 days - 5 weeks	Germ cells migrate to gonads
4 weeks, 4 days	Thymus
	Parathyrogenic zones
	Thyroglossal duct
	Thyroid pedicle lengthens
	Dorsal contour develops depression at level of sclerotomes 4 and 5
	Muscular plates between upper and lower limb buds
	Glomerular capsules, partially vascularized
	Mesonephric corpuscle
	Metanephrogenic cap emerges from ureteric bud
	Ureteric buds
	Angiogenesis within peri-esophageal mesenchyme
	Epiploic foramen
	Lesser sac (omental bursa)
	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
	Sino-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)
	 Vertebrae well defined
	 Vertebral centra
	 Primary urogenital sinus
	 Ureteric bud extends to pelvis of the ureter
	 Bladder and rectum are separating caudal to ureters
	 Caecum
	 Dense mesenchyme surrounds much of gastrointestinal tract
	 Esophagus elongates, passes dorsal to carina and between main stem bronchi
	 Gall bladder and cystic duct
	 Liver: Hepatic ducts
	 Ventral pancreas appears as an offshoot of the cystic duct
	 Lobar bud swellings denote areas of secondary bronchi
	 Remnants of coelomic epithelium forming visceral pleura
	 Atrioventricular cushions apposed
	 Blood flow divided into right and left streams through atrioventricular canal, ventricles, outflow tract, and aortic sac
	 Blood vessels penetrate diencephalon
	 Capillary plexus surrounds esophagus
	 Capillary plexus surrounds lung buds
	 Cardiac mesenchyme surrounds ventricles and outflow tract
	 Coronary arteries (terminal end)
	 Foramen secundum begins in septum primum

	Left ventricle with thicker walls and greater volume than right
	Right subclavian artery originates from brachiocephalic artery and feeds right thyrocervical trunk and axillary and vertebral arteries
	Semilunar cusps
	Capsule present around lens
	Corneal epithelium overlying optic cup
	Ear: Endolymphatic duct
	Geniculate and vestibulocochlear ganglia separating
	Lens body now present containing some lens fibers
	Lower limb buds innervated
	Optic stalk
	Utricle, endolymphatic duct, and endolymphatic sac
	Utriculo-endolymphatic fold
	External ear primordia emerges from caudolateral portion of mandibular arch
	Face: Lateral and medial nasal processes bilaterally
	Lateral nasal processes along dorsolateral lip of nasal pits
	Lens vesicles closed, pores absent
	Nose: Nasal discs recede forming nasal pits
	Optic chiasm
	Adult lamina terminalis
	Amygdaloid area
	Brain with five main sections
	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	■ ACTH [adrenocorticotropin hormone]
	■ Growth hormone
	■ Pituitary gland
	□ Limb buds form hand plates
	■ Permanent kidneys
	■ Arytenoid and epiglottal swellings
	■ Bronchial tree branching accelerates
	■ Lobar pattern mimics adult pattern
	■ T-shaped laryngeal inlet
	■ Pacemaker cells
	□ Head is one third of entire embryo






































Unit 6: 5 to 6 Weeks



















5 weeks, 1 day	□ Wrist joints are forming
5 weeks, 2 days	□ Apical epidermal ridges
	□ Mammary ridge
	□ Maxillary and premaxillary fields still widely separated
	□ Nipples emerge from mammary crest
	■ Gonad region separates from mesonephros
	■ Gonadal primordium
	■ Labioscrotal swelling
	■ Urogenital fold and groove
	■ Suprarenal gland: Cortex primordium
	■ Suprarenal gland: Medulla
	■ Thyroid detaches from pharynx
	■ Thyroid with right and left lobes connected by an isthmus
	□ Cartilage in mandibular arch
	□ Hand area with central carpal region and digital plate with marginal vein
	□ Pre-chondrocranium: Otic capsule, nasal capsule, and parachordal condensations

	Primordia of primary palate
	Ribs: Primordia now present for all 12 pairs
	Vertebral column with 36 levels of ganglia and myotomes
	Extra-ocular premuscle masses receive cranial nerve fibers [oculomotor (CN III), trochlear (CN IV), and abducens (CN VI) nerves]
	Gluteal mesoderm
	Infrahyoid premuscle masses
	Limb mesoderm
	Sternocleidomastoid-trapezius premuscle mass with spinal accessory nerve (CN11)
	Thigh and thigh mesoderm
	Tongue premuscle mass
	Metanephros at level of sacrum
	Urethral plate
	Lesser omentum (ventral mesogastrum)
	Peritoneal cavity
	Rectum
	Stomach: Greater and lesser curvatures
	Yolk stalk disappears
	Bronchial tree expanding
	Cervical sinus diminished in size
	Epiglottis
	Primitive Larynx
	Anterior, middle, and posterior cerebral arteries
	Atrioventricular (AV) node
	Atrioventricular cushions fuse with interventricular septum
	Circle of Willis almost complete
	Conotruncal septum
	Endocardial cushions (rostroventral and caudodorsal) begin fusing around atrioventricular canal forming right and left atrioventricular canals and two separate blood streams
	External carotid artery
	Foramen primum disappearing
	Hepatic portal vein
	Infundibulum of right ventricle
	Jugular lymph sac
	Lateral atrioventricular cushions
	Mesencephalic artery
	Myelencephalic artery
	Perilental blood vessels
	Primitive cavernous sinus drains primitive maxillary and supraorbital veins
	Primitive renal plexus

















	<div></div> Right ventricle feeds sixth (pulmonary) aortic arches; left ventricle feeds fourth aortic arches
	<div></div> Semilunar valves (aortic and pulmonary) are forming
	<div></div> Ventricles each with three parts: inlet, trabecular pouch, and outflow tract
	<div></div> Ventricles enlarge and deepen side-by-side forming an ever growing interventricular septum
	<div></div> Celiac plexus
	<div></div> Cochlear nerve present
	<div></div> Femoral and obturator nerves innervate rostrolateral part of lower limb
	<div></div> Hypoglossal nerve (CN XII) reaches tongue
	<div></div> Intercostal nerves
	<div></div> Lumbar and sacral plexuses
	<div></div> Musculocutaneous, radial, ulna, and median nerves enter upper limb bud
	<div></div> Nasal pits face more ventrally, still widely separated
	<div></div> Nasofrontal groove
	<div></div> Olfactory fibers connect nasal pits with brain
	<div></div> Olfactory fibers enter brain
	<div></div> Olfactory tubercle present
	<div></div> Peroneal and tibial nerves innervate caudomedial part of lower limb
	<div></div> Phrenic nerve
	<div></div> Pigment in retina visible externally
	<div></div> Primordium of cochlear pouch
	<div></div> Tibial nerve innervates foot area
	<div></div> Auricular hillocks on hyoid arch (antitragus and helix)
	<div></div> Auricular hillocks on mandibular arch (tragus and crus)
	<div></div> Blind nasal sac
	<div></div> Nasal fin
	<div></div> Alar lamina emerging with dense rhombic lip
	<div></div> All cranial nerves identifiable
	<div></div> Archipallium, paleopallium, and neopallium
	<div></div> Area epithelialis
	<div></div> Brain: Primordial plexiform layer in area of future temporal lobe
	<div></div> Cajal-Retzius cells
	<div></div> Commissure of the trochlear nerve
	<div></div> Diencephalic subthalamic nucleus
	<div></div> Dorsal and ventral thalami separated by groove
	<div></div> Dorsal funiculus fibers reach medulla oblongata
	<div></div> Epiphysis cerebri
	<div></div> Glial cells identifiable adjacent to neurons
	<div></div> Greater petrosal nerve
	<div></div> 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, 4 days	 Cartilage formation
5 weeks, 5 days	 Nerve cells differentiating
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
	 Geniculate 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 isthmie 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	 Face withdraws from light touch around mouth
	 Blood forming in liver
	 Milk lines
	 Nipples along side of trunk
	 Adrenal glands
	 Glucagon in pancreas
	 Handplates develop subtle flattening
	 Joints
	 Medial skull cartilages: Parachordal, hypophyseal, and trabecular
	 Tooth buds (primary teeth)
	 Diaphragm is largely formed
	 Intestines fill base of umbilical cord
	 External ears
	 Synapses form in spinal 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
	 Hands polygon-shaped
	 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 capitis 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)
	 Mesenchyme thickenings mark beginning of "sclera and its muscular attachments"
	 Nasal tip emerges
	 Nerve fibers in retina
	 Optic fibers

	 Retina's outer lamina heavily pigmented
	 Vomeronasal nerve and ganglion
	 Vomeronasal organ marked by groove and located in fold of lower medial nasal wall
	 Choanae
	 Conjunctival sac marked by groove
	 Cornea and conjunctiva
	 Ear: Stapes primordium surrounds stapedia artery
	 External ear: Crus helices forming from auricular hillocks two and three (from mandibular arch)
	 Eyelid folds sometimes present
	 Nasal fin splits forming choanae and bucconasal membrane
	 Nasolacrimal duct begins as epithelial strand emanating from nasomaxillary groove
	 Nostrils, nasal wings, and nasal septum easily seen
	 Olfactory bulb sometimes with olfactory ventricle
	 Primary lens fibers filling lens vesicle cavity
	 Adenohypophysis no longer open to pharyngeal cavity
	 Archistriatum
	 Brain: Dentate nucleus in internal cerebellar swellings
	 Brain: Pineal recess emerges representing anterior lobe of epiphysis
	 Brainwave activity has begun
	 Cerebrospinal fluid production begins
	 Choroid plexuses in fourth and lateral ventricles
	 Corpus striatum much larger extending to preoptic sulcus; has subtle groove
	 External cerebellar swellings contain future flocculus
	 Four amygdaloid nuclei
	 Fourth ventricle: Choroid folds
	 Hippocampus reaches olfactory region
	 Interpeduncular fossa
	 Neurohypophysis walls are folded
	 Nucleus ambiguus of the vagus (CN10)
	 Prosencephalic septum
	 Red nucleus
	 Substantia nigra
	 Supra-optic commissure
6½ weeks	 The hands begin to move
	 Volar pads on palms
	 Bones first form in the collar bones and lower jaw
6 weeks, 5 days	 Greater thymic bud
	 Cheeks form by merging of maxillary and mandibular processes
	 Mammary gland primordium

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

	■ Limb flexor muscles located ventrally
	■ Midgut: Muscularis
	■ Muscle tissue forming around phrenic nerve within septum transversum portion of diaphragm
	■ Pharyngeal constrictor muscle
	■ Premuscle mass of the muscles of mastication innervated by mandibular nerve
	■ Quadratus lumborum muscle
	■ Rhomboid and scalene muscles
	■ Sternocleidomastoid and trapezius muscles distinct and innervated by separate branches of spinal accessory nerve (CN XI)
	■ Thenar and hypothenar eminences
	■ Tongue forms from swellings in floor of pharynx
	■ Tongue: Extrinsic muscles identifiable
	■ Tongue: Intrinsic muscles identifiable
	■ Transversospinal and erector spinae muscle groups
	■ Upper limb flexors innervated by musculocutaneous, median, and ulnar nerves
	■ Major calyces, cranial and caudal, with collecting tubules within metanephrogenic mass
	■ Mesonephros extends from T-9 to L-3
	■ Metanephros extends from T-12 to L-2
	■ Renal capsule covers distal collecting tubules
	■ Renal vesicles form in part of metanephros
	■ Ureter forms from "proximal segment of metanephric diverticulum"
	■ Urogenital sinus comprised of three parts: Bladder, pelvic, and phallic portions
	■ Anal folds adjacent to anal membrane
	■ Anal membrane
	■ Duodenum: "Assumes the shape of an arc"
	■ Greater omentum
	■ Lateral palatine process
	■ Liver: rapid growth, right side greater than left
	■ Median mandibular groove disappears as mandibular processes merge in midline
	■ Palatine fossa (from pharyngeal pouch 2)
	■ Primitive oral cavity
	■ Primitive rima oris replaces stomodeum
	■ Stomach wall layers: Mucosa, submucosa, muscularis, and serosa
	■ Submandibular and parotid gland buds
	■ Submandibular gland duct
	■ Bronchial tree: First generation of subsegmental bronchi complete
	■ 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
	<ul style="list-style-type: none"> "Septum primum fuses with endocardial cushions" obliterating ostium primum and creating the ostium secundum
	<ul style="list-style-type: none"> Apex of left ventricle
	<ul style="list-style-type: none"> Circulus arteriosus (Circle of Willis) complete
	<ul style="list-style-type: none"> External iliac arteries
	<ul style="list-style-type: none"> Iliac lymph sac
	<ul style="list-style-type: none"> Intercostal and subcostal arteries
	<ul style="list-style-type: none"> Internal thoracic artery and costocervical trunk
	<ul style="list-style-type: none"> Mesenteric lymph sac
	<ul style="list-style-type: none"> Mesonephric artery feeds mesonephros, gonads, and suprarenal glands
	<ul style="list-style-type: none"> Papillary muscles
	<ul style="list-style-type: none"> Pontine, superior cerebellar, and anterior and posterior inferior cerebellar arteries replace myelencephalic and metencephalic arteries
	<ul style="list-style-type: none"> Primitive marginal sinus drains diencephalon
	<ul style="list-style-type: none"> Primitive tentorial sinus drains cerebral vesical
	<ul style="list-style-type: none"> Primitive transverse and sigmoid sinuses
	<ul style="list-style-type: none"> Pulmonary arteries (right and left)
	<ul style="list-style-type: none"> Right coronary artery arises from aorta
	<ul style="list-style-type: none"> Splenic vein
	<ul style="list-style-type: none"> Tricuspid and mitral valves
	<ul style="list-style-type: none"> Anterior chamber between iridopupillary membrane and thickened ectoderm
	<ul style="list-style-type: none"> Auditory tube and primitive tympanic cavity form from tubotympanic recess pharyngeal pouch 1)
	<ul style="list-style-type: none"> Celiac, superior mesenteric, and inferior mesenteric preaortic ganglia
	<ul style="list-style-type: none"> Choana
	<ul style="list-style-type: none"> Cochlear duct tip grows upward
	<ul style="list-style-type: none"> Esophageal plexus formed by vagal nerves (CN X)
	<ul style="list-style-type: none"> Facial nerve (CN VII) branches: Chorda tympani, greater petrosal, posterior auricular, and digastric
	<ul style="list-style-type: none"> Facial nerve (CN VII) reaches cervicomandibular region
	<ul style="list-style-type: none"> Glossopharyngeal nerve (CN IX) innervates stylopharyngeus premuscle mass
	<ul style="list-style-type: none"> Hypoglossal nerve (CN XII) innervates separating tongue muscles
	<ul style="list-style-type: none"> Linguogingival groove
	<ul style="list-style-type: none"> Nasolacrimal duct forms from maxillonasal groove
	<ul style="list-style-type: none"> 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	 Feet polygon-shaped
	 Cloacal membrane ruptures
7 weeks	 Head rotates
	 Leg movements
	 B lymphocytes in liver
	 Ovaries
	 Testes begin to differentiate
	 Insulin in pancreas

	□ Foot plates notched
	■ Hiccups
	■ Tendons attach muscle to bone
	■ 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	<div>□ Facial processes no longer distinguishable</div> <div>□ Ovaries full of primitive oogonia, intermediate pregranulosa cells, and mesenchyme</div> <div>□ Testes with short straight tubules</div> <div>□ Upper limbs with slightly flexed elbows</div> <div>■ Diaphragm: Central tendon</div> <div>■ Renal vesicles with S-shaped lumina</div> <div>■ Submandibular gland: Solid epithelial ducts enlarge and begin to branch</div> <div>■ Adenohypophysis with new capillaries on rostral surface</div> <div>■ Scalp vascular plexus</div> <div>■ Cochlear duct tip growing horizontally</div> <div>■ Lens cavity completely filled</div> <div>■ Optic commissure</div> <div>■ Optic fibers extend to optic chiasma</div> <div>■ Cornea with three layers</div> <div>■ Brain: Inferior colliculus (in mesencephalon)</div> <div>■ Cerebral hemispheres expand beyond lamina terminalis</div> <div>■ Cerebral hemispheres extend over two-thirds of diencephalon</div> <div>■ Interpeduncular groove</div> <div>■ Medial septal nucleus</div> <div>■ Nigrostriatal fibers</div> <div>■ Nucleus of diagonal band</div> <div>■ Sacrocaudal spinal cord formation (secondary neurulation) complete</div> <div>■ Sensory pathways: Cuneate and gracile decussating fibers</div> <div>■ Septum verum</div> <div>■ Spinothalamic tract</div>
7 weeks, 1 day - 8 weeks	<div>■ Stomach: Folds in stomach wall</div>
7 weeks, 2 days	<div>■ Arteries and veins of heart complete</div>
7 weeks, 3 days	<div>□ Volar pads begin to emerge on fingertips</div> <div>□ Chondrocranium with dorsum sellae and hypophysial fossa</div> <div>□ Dens (of second cervical vertebrae)</div> <div>□ Sternoclavicular joint and manubrium</div>

	 The knee joints have arrived
	 Trachea: Thyroid cartilage
	 Wrists slightly flexed
	 Gluteus medius and gluteus minimus muscles
	 Iliacus muscles
	 Mylohyoid and infrahyoid muscles
	 Orbicularis oculi muscles
	 Submandibular gland: Solid ducts with definitive branches
	 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	 Hands begin to touch face
	 The hands touch each other as do the feet!
	 Fingertips thicken
	 Plantar pads toes
	 EKG pattern similar to adult
7 weeks, 4 days	 The fingers are free
7 weeks, 5 days	 Bone-forming cells called osteoblasts emerge
	 Bone-forming cells emerge
	 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
7 weeks, 6 days	 The toes are free
8 weeks	 Complex response to touch
	 More frequent hand-to-face contact
	 Mouth opens & closes
	 Squinting
	 The embryo floats and rolls over in the womb
	 Hairs first appear in eyebrows & around mouth
	 Skin multi-layered, loses transparency
	 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
	 The embryo's joints are similar to adult joints
	 Ulna: Styloid process and olecranon
	 Vertebrae cartilaginous (33 or 34 in number)
	 Anterior digastric muscles
	 Depressor anguli oris muscle
	 Diaphragm complete
	 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
	 Sinus tubercle
	 Urethra
	 Urine production and release
	 Gastrolial ligament
	 Nerves reaching intestinal loop
	 Peristalsis in large intestine
	 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
	 Occasional breathing motions begin
	 Pseudoglandular stage begins


















	<div></div> Azygos vein
	<div></div> Blood supply to the brain closely resembles adult pattern
	<div></div> Hemiazygos veins
	<div></div> Inferior epigastric artery
	<div></div> Inferior vena cava valve at junction of right atrium
	<div></div> Scalp vascular plexus nearing vertex
	<div></div> Submandibular glands: Angiogenesis begins around epithelial tree (ducts)
	<div></div> Superior sagittal sinus
	<div></div> Cochlear duct's 2.5 coils nearly complete
	<div></div> Cranial nerve distribution mimics adult pattern
	<div></div> Ear drum
	<div></div> Eye: Secondary vitreous body
	<div></div> Lens: Secondary lens fibers emerging
	<div></div> Retina: Eight layers present
	<div></div> Retina: Four of the ten adult layers present
	<div></div> Tympanic membrane
	<div></div> Eyelids fusing laterally and medially
	<div></div> Optic tract reaches ventral portion of lateral geniculate body
	<div></div> "The hindbrain "presents striking resemblance to that of the newborn."
	<div></div> "The rhombencephalon...presents striking resemblance to that of the newborn."
	<div></div> Amygdala area
	<div></div> Brain represents 43% of embryo
	<div></div> Brain: Caudate nucleus and putamen within corpus striatum
	<div></div> Cerebellar commissures
	<div></div> Cerebellum with external germinal layer
	<div></div> Cerebral hemispheres cover lateral portion of diencephalon
	<div></div> Choroid plexus now lobular
	<div></div> Cortical plate covers nearly all of neopallial surface
	<div></div> Dura lines entire vertebral canal
	<div></div> Fasciculus cuneatus and fasciculus gracilis form the decussation of the medial lemnisci
	<div></div> Greater palatine nerve
	<div></div> Grey and white matter
	<div></div> Hippocampus reaches temporal pole
	<div></div> Inferior and superior cerebellar peduncles
	<div></div> Most cisterns present
	<div></div> Principal nucleus of inferior olivary nuclei
	<div></div> Pyramidal decussations
	<div></div> Right- and left-handedness emerges
	<div></div> Suprapineal recess

	 Suprascapular nerve
	 Vermis of cerebellum
	 Crown-heel length 4.3 cm
	 Embryo contains approximately 1 billion (10^9) cells
	 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	 Bends hip & knee if sole of foot touched
	 Drinking fluid is becoming routine
	 Sucking the thumb
	 The young fetus now sighs, stretches, moves the head, opens the mouth, and moves the tongue
	 Tongue movement
	 Female fetuses have early reproductive cells in their ovaries
	 Thyroid gland weighs 2 grams
	 Small intestine peristalsis
	 External capsule
	 Face, hands, and feet sense light touch
	 Olivary nucleus with five components

Unit 10: 9 to 10 Weeks



















9 weeks - 10 weeks	 Early vocal cords
	 Larynx recanalizes
	 My weight will rise more than 75% this week
9½ weeks	 I yawn when I want
9 weeks, 4 days	 Yawns
10 weeks	 Eyes roll downward reflexively
	 Palatine tonsils
	 Fingernails and toenails begin to grow!
	 Three-layered epidermis
	 Tiny unique fingerprints have arrived!
	 Now, all the bones are getting harder
	 Tooth buds (secondary teeth)
	 Glomeruli formation begins
	 Physiologic herniation ends
	 Commissure of the fornix
	 Corpus callosum begins
	 Crown-heel length 7.5 cm

Unit 11: 10 to 11 Weeks














10 weeks - 12 weeks	 Langerhans cells enter epidermis
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








10½ weeks	—	 Volar and plantar pads regress
11 weeks	—	 The face now makes complex expressions
		 Immunological competence
		 Intermediate layer
		 Nose & lips completely formed
		 Now you can tell if your baby is a girl or a boy!
		 Thyroid gland weighs 12 grams
		 Intestines absorb water & glucose
		 Small intestine lined with villi
		 Auditory cells: inner & outer hair cells
		 Crown-heel length

Unit 12: 11 to 12 Weeks



















11 weeks - 12 weeks	—	 Weight increases by 60% this week
12 weeks	—	 Hands touch the mouth up to 50 times per hour
		 T lymphocytes leave thymus
		 Sebaceous glands
		 Many different hormones are present in pituitary gland
		 Thyroid gland produces hormone
		 Palate fuses
		 Upper limbs reach final proportion
		 All facial muscles in final positions
		 Bladder resembles smooth muscle
		 Bowel movements
		 Liver: Bile production begins
		 There are taste buds all over the mouth
		 Corpus callosum
		 Crura cerebri
		 Myelination in spinal cord
		 Crown-heel length 12 cm
		 Head circumference 10 cm

Unit 13: 3 to 4 Months










13 weeks	—	 Teeth are growing
		 Cilia lining airways
		 Most of body sensitive to touch
		 Crown-heel length 15 cm
14 weeks	—	 Girls move their jaws more than the boys do
		 Light touch to mouth evokes turn toward stimulus
		 4-lobed cerebral cortex
		 Cerebellum resembles adult structure
		 Crown-heel length 17 cm
		 Fat deposits in cheeks
15 weeks	—	 Stem cells arrive in bone marrow
		 Body fat emerges throughout the body
		 Glucagon in fetal bloodstream

	 Digestive enzymes
	 Crown-heel length 19.5 cm
16 weeks	 Quickening
	 Fat deposits upper & lower limbs
	 Tooth enamel
	 Colon lined with villi
	 Bronchial tree nearly complete
	 Canalicular stage begins
	 Hormonal stress response to invasive procedures
	 Crown-heel length 21 cm




Unit 14: 4 to 5 Months

17 weeks	 Retina has discrete layers
18 weeks	 Apocrine sweat glands
	 Cream-like substance protects skin
	 Sweat glands
	 Insulin secretion
	 Speaking motion of larynx
	 Corpus callosum complete
19 weeks	 Melanin production
	 Number of oogonia peak (at about 7 million) within fetal ovaries
	 Daily cycles in biological rhythms
	 Sulci on surface of cerebral hemispheres
20 weeks	 All skin layers and structures
	 Peyer's patches
	 Surfactant production (low levels)
	 Hearing and responding to sound begins
	 Hearing and responding to sound begins
	 Crown-heel length 28 cm
	 Head circumference 20 cm

Unit 15: 5 to 6 Months

20 weeks - 24 weeks	 Eyelids separate, eyes open and close
21 weeks	 Periderm disappears
	 Stratum corneum
21 weeks - 22 weeks	 If born prematurely from this point on, survival is possible
22 weeks	 Cornea structure
	 Behavioral states
23 weeks	 Brain weight 100 grams
24 weeks	 Blink-startle response; females before males
	 Crown-heel length 34.5 cm

Unit 16: 6 to 7 Months

25 weeks	 Intestinal lining contains all adult cell types
	 Rods & cones
	 The ability to taste

26 weeks	<ul style="list-style-type: none"> Additional fat deposits decrease wrinkles Tear production Terminal sac stage begins The ability to smell has arrived
26 weeks - 38 weeks	<ul style="list-style-type: none"> Brain weight increases 400% to 500%
27 weeks	<ul style="list-style-type: none"> Pupils react to light
28 weeks	<ul style="list-style-type: none"> Distinguishes sounds of different frequencies Crown-heel length 39.5 cm
Unit 17: 7 to 8 Months	
30 weeks	<ul style="list-style-type: none"> Breathing motions are common even though there is no air in the womb 6-layered cerebral cortex Head circumference 30 cm
32 weeks	<ul style="list-style-type: none"> Esophagus: Lower esophagus muscles functional Glomeruli formation complete Alveoli Memory - music preferences Crown-heel length 45 cm
Unit 18: 8 to 9 Months	
32 weeks - 36 weeks	<ul style="list-style-type: none"> Prenatal food affects newborn taste preferences
34 weeks	<ul style="list-style-type: none"> Rapid weight gain
35 weeks	<ul style="list-style-type: none"> Firm grip Amniotic fluid volume peaks
36 weeks	<ul style="list-style-type: none"> Surfactant production accelerates Brain weight 300 grams Crown-heel length 48.5 cm
Unit 19: 9 Months to Birth	
37 weeks	<ul style="list-style-type: none"> Fetus drinks an estimated 15 oz (or 450cc) of amniotic fluid/day
38 weeks	<ul style="list-style-type: none"> Air breathing begins By term, the typical umbilical cord measures 20 to 24 inches (50 to 60 cm) Heart beats 54 million times before birth Major circulatory changes Spinal cord ends at third lumbar vertebrae Brain weight 350 grams Crown-heel length 50 cm Fetus initiates labor Head circumference 35 cm Time to be born!
66 weeks, 5 days	<ul style="list-style-type: none"> Premuscle cells form sheets representing muscles of facial expression