

GLOSSARY OF KEY TERMS

- Adenohypophysis** Anterior portion of the pituitary derived from Rathke's pouch
- Alar plates** Sensory area in the dorsal region of the spinal cord and brain
- Allantois** Vestigial structure that serves as a respiratory organ for avian embryos. It extends from the ventral region of the urogenital sinus to the umbilicus. Later, its distal portion, the urachus, becomes a fibrous cord and forms the median umbilical ligament. If it remains patent, it may form a urachal fistula or cyst in this region.
- Alveolar cells** Cells lining the alveoli. Type I cells are involved in gas exchange; type II cells produce surfactant.
- Amnion** Membrane derived from the epiblast that surrounds the fluid-filled amniotic cavity around the embryo and fetus. The fluid cushions the fetus and forms a hydrostatic wedge to assist with dilation of the cervix during labor. The fluid itself can be used for analysis of fetal well-being.
- Amniocentesis** Procedure used to withdraw amniotic fluid for analysis of factors such as alpha-fetoprotein (AFP) and cells (chromosomes) that provide information about the status of the fetus
- Anencephaly** Neural tube defect in which the cranial neural folds fail to close, leading to tissue degeneration and little or no formation of higher brain centers, cerebral cortex, and other neurologic structures. The abnormality is lethal, but 70% of these defects can be prevented by daily maternal consumption of 400 μg of folic acid beginning 2 to 3 months prior to conception and continuing throughout pregnancy.
- Annulus fibrosus** Outer ring of fibrous tissue in an intervertebral disc
- Antimüllerian hormone** Another term for the müllerian-inhibiting substance produced by Sertoli cells that causes regression of the müllerian (paramesonephric) ducts in males
- Aortic arch** Branch from the aortic sac to the dorsal aorta traveling in the center of each pharyngeal arch. Initially, there are five pairs, but these undergo considerable remodeling to form definitive vascular patterns for the head and neck, aorta, and pulmonary circulation.
- Apical ectodermal ridge (AER)** Layer of thickened ectoderm at the distal tip of the limb that controls outgrowth of the limb by maintaining a rapidly proliferating population of adjacent mesoderm cells, that form the progress zone
- Apoptosis** Programmed cell death, e.g., between the digits
- Atresia** Congenital absence of an opening or lumen, e.g., gut atresia
- Autonomic nervous system** The sympathetic and parasympathetic nervous systems that control smooth muscle and glands
- Basal plates** Motor area in the ventral portion of the spinal cord and brain
- Bone morphogenetic proteins (BMPs)** Members of the transforming growth factor β family that serve as signal molecules for a number of morphogenetic events, e.g., including dorsalizing the CNS, participating in bone formation
- Bowman's capsule** Cup-shaped structure at the end of each proximal convoluted tubule that partially surrounds a glomerulus
- Brainstem** "Lower" centers of the brain, including the myelencephalon, pons of the metencephalon, and the mesencephalon
- Buccopharyngeal membrane** Membrane formed at the cranial end of the germ disc by adhesion between epiblast and hypoblast cells. Later, it covers the opening of the oral cavity and breaks down as the pharynx develops.
- Cardinal veins** System of anterior, posterior, and common cardinal veins that drain the head and body of the embryo in the late 3rd and early 4th weeks
- Cerebral aqueduct (of Sylvius)** Lumen of the mesencephalon that connects the 3rd and 4th ventricles. It often is the site for abnormalities that impede the flow of cerebrospinal fluid and cause hydrocephalus.
- Chondrocranium** Part of the neurocranium that forms the base of the skull that arises by first establishing cartilage models for the bones (endochondral ossification)
- Chorion** Multilayered structure consisting of the somatic layer of extraembryonic mesoderm, cytotrophoblast, and syncytiotrophoblast. It contributes the fetal portion of the placenta, including the villi and villus lakes.
- Chorion frondosum (leafy chorion)** Embryonic side of the chorion, where villi form
- Chorion laeve (smooth chorion)** Abembryonic side of the chorion, where villi regress, leaving a smooth surface
- Choroid plexuses** Vascularized structures formed in the lateral, 3rd, and 4th ventricles that produce cerebrospinal fluid
- Cloaca** Common chamber for the hindgut and urinary systems. Its anterior portion forms the urogenital sinus, and its posterior portion forms the anus.
- Cloacal membrane (plate)** Membrane formed at the caudal end of the embryo from adhesion between epiblast and hypoblast cells. Later, it covers the cloaca and eventually breaks down to form openings into the urogenital sinus and anus.
- Coloboma** Defect in the eye due to incomplete closure of the optic fissure. These defects usually are restricted to the iris.

Compaction Process whereby cells of the morula stage form tight junctions to seal themselves in preparation for forming and pumping fluid into the blastocyst cavity

Congenital malformation Synonymous with the term birth defect; refers to any structural, behavioral, functional, or metabolic disorder present at birth

Cranial nerves (CN) 12 pairs of nerves associated with the brain, all but two of which (the olfactory and optic) originate from the brainstem

Craniosynostosis Premature closure of one or more cranial sutures leading to abnormally shaped skulls. A major cause are mutations in fibroblast growth factor receptors (FGFRs).

Cryptorchidism Failure of one or both testes to descend to the scrotum

Cytotrophoblast Proliferative inner layer of the trophoblast

Deformations Altered development of structures caused by mechanical forces, e.g., clubbed feet resulting from too little room in the amniotic cavity.

Dermatome The dorsal portion of each somite that forms the dermis of the skin. Dermatomes are segmented and are supplied by spinal nerves from the segments at which they originated. This segmental pattern is maintained as the dermatomes migrate over the body. Thus, each region that they occupy on the skin also is called a dermatome and is innervated by the same spinal nerve that originally supplied the dermatome region of the somite.

Diaphysis Shaft of the long bones

Diencephalon Derived from the caudal portion of the prosencephalon (forebrain); forms the thalamus, hypothalamus, posterior lobe of the pituitary, optic stalks (nerves), and other structures

Dihydrotestosterone Converted from testosterone and responsible for differentiation of the mesonephric duct and external genitalia

Disruptions Term used to describe birth defects resulting from destructive processes that alter a structure that initially had formed normally, e.g., vascular accidents that cause bowel atresias, and amniotic bands that cause limb or digit amputations

Dizygotic twins Twins formed from two separate eggs; the most common form of twinning (66%)

Dorsal mesentery Double layer of peritoneum suspending the gut tube from the dorsal body wall from the

lower end of the esophagus to the rectum. Later, as the gut grows and rotates, some parts of the dorsal mesentery are lost as portions of the gut fuse to the posterior body wall, e.g. parts of the duodenum and colon.

Dorsal primary ramus Branch of a spinal nerve that innervates muscles derived from the epimere and skin over the back

Dorsal root Sensory fibers passing from a dorsal root ganglion to the spinal cord

Ectoderm One of the three basic germ layers that forms skin, the central nervous system, hair, and many other structures

Ectopic Something that is not in its normal position, e.g., an embryo's implantation site

Efferent ductules Tubules that connect the rete testes to the mesonephric duct for the passage of sperm from the seminiferous tubules to the epididymis. The tubules are derived from nephric tubules of the mesonephric kidney.

Endocardial cushions Structures consisting of loose connective tissue covered by endothelium that are responsible for most septation processes occurring in the heart

Endoderm One of three basic germ layers that forms the gut and its derivatives

Endochondral ossification Mechanism for forming bone by first establishing a cartilaginous model followed by ossification. This type of bone formation is characteristic of the bones of the limbs and base of the skull.

Epi-blast The dorsal (top) layer of cells that makes up the bilaminar germ disc during the 2nd week of development. The hypoblast forms the ventral layer. All tissues of the embryo are derived from the epi-blast.

Epibranchial placodes Four thickened regions of ectoderm lying dorsal to the pharyngeal arches that form sensory ganglia for cranial nerves V, VII, IX, and X

Epididymis Highly convoluted tube derived from the mesonephric duct and used for sperm storage

Epimere Dorsal musculature derived from the myotome portion of each somite that forms the extensor muscles of the back

Epiphysis An end of one of the long bones

Epiphyseal plate Cartilaginous region between the diaphysis and epiphysis of the long bones that continues to

produce bone growth by endochondral ossification until the bones have acquired their full length. Then these plates disappear (close).

Epi-pleic foramen (of Winslow) Opening between the lesser and greater sacs in the abdominal cavity located at the free margin of the lesser omentum between the duodenum and the liver. In its ventral border lie the common bile duct, hepatic artery, and portal vein (the portal triad).

Fibroblast growth factors (FGFs) Signal proteins in a large family having over 15 members. They are involved in a number of embryological events, including formation of the sutures and bones of the skull. Mutations in their receptors (FGFRs) cause a variety of craniofacial abnormalities, including many forms of craniosynostosis.

Fistula An abnormal passageway

Folic acid A B vitamin that can prevent approximately 70% of neural tube defects if taken as a 400 μ g supplement by women beginning 2 to 3 months prior to conception and continuing throughout pregnancy

Foramen cecum Pit at the junction of the anterior two thirds and posterior one third of the tongue representing the site of origin of the thyroid gland

Foramen ovale Opening in the interatrial septum that permits shunting of blood from right to left during fetal development

Fossa ovalis Depression on the right side of the interatrial septum formed when the septum primum and septum secundum are pressed against each other and the foramen ovale is closed at birth

Foregut Part of the gut tube beginning caudal to the pharynx just proximal to the lung bud and extending to a point just distal to the liver bud. It forms the esophagus, stomach, and part of the duodenum in addition to the lungs, liver, gallbladder, and pancreas, all of which form from diverticula (buds) off the gut tube.

Gastrulation Process of forming the three primary germ layers from the epi-blast involving movement of cells through the primitive streak to form endoderm and mesoderm

Germ layers Three basic cell layers of ectoderm, mesoderm, and endoderm derived from the process of gastrulation. These layers form all of the structures in the embryo.

- Glomerulus** Tuft of capillaries formed in Bowman's capsule at the end of each proximal convoluted tubule.
- Gray rami communicantes** Connections carrying postganglionic sympathetic fibers from ganglia in the sympathetic trunks to spinal nerves. Gray rami exist at all levels of the spinal cord.
- Greater omentum** Double layer of peritoneum formed from dorsal mesentery and extending down over the intestines from the greater curvature of the stomach. It serves as a storage site for fat and can wall off pockets of infection (the "policeman of the abdomen").
- Greater sac** Most of the abdominal cavity, with the exception of the lesser sac lying dorsal to the lesser omentum. The two sacs are connected via the epiploic foramen (of Winslow).
- Growth factors** Proteins that act as signal molecules; they usually are secreted and have their signals transduced by receptors on target cells.
- Gubernaculum** Condensation of mesenchyme extending from the testis to the floor of the scrotum that assists in descent of the testis from the posterior abdominal wall to the scrotum
- Hindgut** Part of the gut tube extending from the distal one third of the transverse colon to the upper portion of the anal canal. It forms part of the transverse colon, the descending colon, sigmoid colon, rectum, and upper part of the anal canal.
- Homeobox genes** Transcription factors that contain a homeobox, a specific DNA-binding motif (sequence) within a region called the homeodomain. These genes are important for patterning the embryonic axis, establishing different regions of the brain, determining the origin and type of gut derivatives, patterning the limbs, and other similar phenomena.
- Hydrocephalus** Increased amounts of cerebrospinal fluid in the brain, leading to increased intracranial pressure. Usually due to a block in the circulatory pattern of the fluid which most often occurs in the cerebral aqueduct of Sylvius in the mesencephalon. If the cranial sutures have not fused, the child's head enlarges, sometimes to great proportions if the pressure is not relieved.
- Hypomere** Musculature derived from the dorsolateral portion of each somite; forms muscles of the anterior body wall
- Hypertrophy** An increase in size of a part or organ
- Hyperplasia** An increase in cell number
- Hypoblast** Ventral layer of the bilaminar germ disc. It contributes to formation of the yolk sac and extraembryonic mesoderm, but not to tissues of the embryo.
- Hypospadias** An opening of the urethra along the ventral aspect of the penis or scrotum
- Inguinal canal** Oblique passageway from the lower abdomen to the scrotum for the testes; forms in females as well
- Inner cell mass** Cluster of cells segregated to one pole of the blastocyst and from which the entire embryo develops
- Intermaxillary segment** Formed from the medial nasal processes, it includes the philtrum region of the upper lip, the upper jaw component housing the four incisor teeth, and the primary palate.
- Intermediate column** Origin of the sympathetic cell bodies (lateral horn cells) in the spinal cord from T1 to L2
- Intermediate mesoderm** Mesoderm-derived layer lying between the paraxial and lateral plate layers and responsible for forming much of the urogenital system
- Intervertebral disc** Cushioning disc between each vertebra and the next; consists of a central gelatinous portion called the nucleus pulposus and an outer ring of fibrous tissue called the annulus fibrosus
- Intraperitoneal** Describes organs suspended in the abdominal cavity by a mesentery
- Karyotype** The chromosomal make-up of an individual
- Lateral plate mesoderm** Mesoderm-derived tissue that splits into the splanchnopleure (visceral) and somatopleure (somatic) layers surrounding the body cavity
- Laterality** The existence of right and left sides established during gastrulation in the 3rd week of development. Patients with defects in sidedness, such that they are primarily bilaterally right- or left-sided, have laterality sequences.
- Lesser sac** Space behind the lesser omentum that communicates with the rest of the abdominal cavity (greater sac) via the epiploic foramen (of Winslow)
- Lesser omentum** Double layer of peritoneum forming part of the ventral mesentery and extending from the liver to the proximal end of the duodenum and lesser curvature of the stomach
- Mantle layer** Inner layer of the neural tube containing neurons (gray matter)
- Marginal layer** Peripheral layer of the neural tube containing nerve fibers (white matter)
- Membranous ossification** Process of forming bone directly from mesenchyme. This process is characteristic of the flat bones of the cranial vault.
- Meningocele** Neural tube defect in which a sac of fluid-filled meninges protrudes through an opening in the skull or vertebrae
- Mesencephalon** One of the three primary brain vesicles that does not subdivide
- Mesenchyme** Any loosely organized tissue comprised of fibroblast-like cells and extracellular matrix, regardless of the origin of the cells
- Mesentery** Double layer of peritoneum that connects portions of the gut or other viscera to the body wall or to each other. Mesenteries provide pathways for nerves, blood vessels, and lymphatics to and from the viscera and help to support the organs in the abdomen.
- Mesoderm** One of three basic germ layers that forms blood vessels, bone, connective tissue, and other structures.
- Mesonephros** Primitive kidney that forms tubules and ducts in the thoracic and lumbar regions. Most of these structures degenerate, but the main duct (mesonephric duct) and some of the tubules contribute to the male reproductive system.
- Mesonephric ducts** Collecting ducts for the mesonephric kidney that regress in females, but form the epididymis, ductus deferens, seminal vesicle, and ejaculatory ducts in males
- Metanephros** Definitive kidney formed from metanephric mesoderm (metanephric blastema) in the pelvic region
- Metencephalon** Derived from the cranial portion of the rhombencephalon (hindbrain); forms the cerebellum and pons
- Midgut** Part of the gut tube extending from immediately distal to the liver bud to the proximal two thirds of the transverse colon. It forms part of the duodenum, jejunum, ileum, cecum, appendix, ascending colon, and part of the transverse colon. Early in development, it forms the primary intestinal loop with the superior mesenteric artery as its axis. This loop is involved in gut rotation and

physiological umbilical herniation and is connected to the yolk sac by the vitelline duct.

Monozygotic twins Twins formed from a single oocyte. Splitting may occur at the two-cell stage or after formation of the germ disc, but usually takes place at the time of inner cell mass formation.

Morphogen Molecule secreted at a distance that can induce cells to differentiate. The same morphogen can induce more than one cell type by establishing a concentration gradient.

Müllerian-inhibiting substance Another term for the antimüllerian hormone that is produced by Sertoli cells and causes regression of the müllerian (paramesonephric) ducts in males

Myelencephalon Derived from the caudal portion of the rhombencephalon (hindbrain); forms the medulla oblongata

Myotome Dorsomedial portion of each somite that forms the epimere from which extensor muscles of the back are derived

Nephron Functional unit of the kidney consisting of the proximal and distal convoluted tubules, loop of Henle, Bowman's capsule, and a glomerulus

Neural crest cells Cells of the neuroepithelium that form at the tips ("crest") of the neural folds and then migrate to other regions to form many structures, including spinal ganglia, bones and connective tissue of the face, septa for the outflow tract of the heart, some cranial nerve ganglia, ganglia for the gut tube (enteric ganglia), melanocytes, and so on. These cells are vulnerable to teratogenic insult, explaining why many children with facial clefts also have cardiac defects.

Neurocranium Part of the skull that forms a protective case around the brain (the other part of the skull is the viscerocranium, or face). It consists of two parts, the membranous neurocranium or flat bones of the skull and the cartilaginous neurocranium or chondrocranium forming the base of the skull.

Neuropores Cranial and caudal openings of the developing neural tube, present from the time that the neural folds first make contact until the neural tube is complete, i.e., unclosed portions of the closing neural tube

Neurulation The process of transforming the neural plate into the neural tube. Neurulation begins in the 3rd week and ends at 28 days. Failure of the

neural folds to close the tube results in neural tube defects, including anencephaly and spina bifida.

Notochord An extended column of midline cells lying immediately ventral to the floor plate of the central nervous system and extending from the hypophysis to the end of the spinal cord. It is important for inducing the neural plate, ventral (motor) region of the brain and spinal cord, and the sclerotome portion of the somites to form vertebrae. The major signal molecule for these phenomena is sonic hedgehog (SHH).

Nucleus pulposus Central gelatinous portion of an intervertebral disc derived from proliferation of notochord cells

Omentum Fold of peritoneum passing from the stomach to the liver (lesser omentum) or from the stomach to the transverse colon and beyond (greater omentum).

Outer cell mass Cells that surround the blastocyst cavity and cover the inner cell mass and that will form the trophoblast

Organogenesis Period of development when the organ primordia are established, usually considered to be from the beginning of the 3rd week to the end of the 8th week of gestation. This is the time when organs are most sensitive to insult and induction of most birth defects occurs.

Paramesonephric ducts Ducts that parallel the mesonephric duct and extend from the abdominal cavity to the posterior wall of the urogenital sinus. These ducts regress in the male, but form the uterus, uterine (fallopian) tubes, and upper part of the vagina in females.

Paraxial mesoderm Mesoderm-derived tissue along the axis of the embryo responsible for forming somites and somitomeres

Parenchyma The distinguishing cells of a gland or organ held together by connective tissue called the stroma

Parietal Pertaining to the wall of any cavity

Parturition Birth

Pericardioperitoneal canals Openings from the abdomen to the thorax posterior to the septum transversum that are closed by the pleuroperitoneal membranes during formation of the diaphragm

Pharyngeal arches Bars of mesenchyme derived from mesoderm and neural crest cells that form in five pairs

around the pharynx, somewhat like the gills (branchia) of a fish. They are covered by ectoderm externally and endoderm internally. Clefts are present externally between pairs of arches; pouches are present between arches internally. However, there is no communication between clefts and pouches.

Pharyngeal cleft Ectoderm-lined indentation between pharyngeal arches on their external surface

Pharyngeal pouch Endoderm-lined indentation between pharyngeal arches on their internal surfaces

Phenotype The physical characteristics of an individual

Placode A thickened region of ectoderm that forms sensory organs and ganglia. Examples include the nasal, otic, lens, and epibranchial placodes.

Pleuropericardial folds Extensions of mesoderm from the lateral body wall that meet in the midline to separate the pleural and pericardial cavities. The folds carry the phrenic nerve with them and contribute to the parietal pericardium and form the fibrous pericardium.

Pleuroperitoneal folds Extensions of mesoderm that extend from the body wall to meet the septum transversum and mesentery of the esophagus, thereby closing the pericardioperitoneal canals during formation of the diaphragm.

Prechordal plate Collection of mesoderm cells lying between the bucco-pharyngeal membrane and the cranial end of the notochord. These cells represent some of the first to pass through the primitive streak and are important for forebrain induction using sonic hedgehog as a signal molecule.

Primary intestinal loop Loop formed around the superior mesenteric artery by the midgut. It rotates and lengthens as it herniates into the umbilicus in the 6th week. It then continues its growth and rotation as it re-enters the abdominal cavity beginning in the 10th week.

Primary palate Formed by the medial nasal prominences as part of the intermaxillary segment. It fuses with the secondary palate.

Primitive node Elevated region around the cranial end of the primitive streak that is known as the "organizer" because it regulates important processes such as laterality and formation of the notochord

Primitive pit Depression in the primitive node

- Primitive streak** Groove formed in the epiblast at the caudal end of the bilaminar germ disc stage embryo through which epiblast cells migrate to form endoderm and mesoderm during gastrulation
- Processus vaginalis** Outpocketing of peritoneum that precedes the testis through the inguinal canal. Once it reaches the scrotum, it pinches off from the abdominal cavity and forms the tunica vaginalis of the testis. If it fails to pinch off, it can serve as a path for herniation of bowel through the canal into the scrotum forming an inguinal (indirect) hernia.
- Pronephros** Primitive kidney that forms a few nonfunctional vestigial tubules in the cervical region
- Prosencephalon** One of three primary brain vesicles that forms the telencephalon and diencephalon
- Rathke's pouch** Outpocketing of ectoderm from the roof of the oral cavity that forms the anterior portion (adenohypophysis) of the pituitary
- Rectouterine pouch (Douglas' pouch)** Depression between the vagina and rectum. This site is the most common place for an ectopic pregnancy within the peritoneal cavity. (The most common site for ectopic pregnancies in general is in the ampullary region of the uterine tube).
- Renal corpuscle** Combination of Bowman's capsule and a glomerulus
- Retroperitoneal** Posterior to the peritoneum
- Rhombencephalon** One of three primary brain vesicles that forms the metencephalon and myelencephalon
- Rhombomere** One of eight segments that form in the rhombencephalon that contribute to development of cranial nerve nuclei and give rise to neural crest cells that migrate to the pharyngeal arches
- Secondary palate** Derived from the maxillary processes of the first arch; includes the soft and hard palates. Fuses with the primary palate anteriorly.
- Sclerotome** Ventromedial part of each somite that forms the vertebrae
- Septum primum** The first septum to grow down from the roof of the common atrium and contribute to the interatrial septum. Prior to contact with the atrioventricular endocardial cushions, programmed cell death creates a new opening in this septum to maintain communication between the atrial chambers. This septum forms the valve of the foramen ovale.
- Septum secundum** The second septum to grow down from the roof of the common atrium toward the atrioventricular endocardial cushions. It never makes contact with the cushions; consequently, an oblique opening, the foramen ovale, is created between the septum secundum and septum primum that allows shunting of blood from the right atrium to the left during fetal development. At birth, this opening is closed when the septum primum is pressed against the septum secundum and the adult pattern of blood flow is established.
- Septum transversum** Mesoderm tissue originally lying cranial to the heart, but repositioned between the heart and connecting stalk by cranial folding of the embryo. It gives rise to the central tendon of the diaphragm, connective tissue for the liver, and ventral mesentery.
- Situs inversus** Complete reversal of left- and right-sidedness of the organs in the thorax and abdomen
- Somites** Epithelial balls of cells formed in segmental pairs along the neural tube from paraxial mesoderm. Somites differentiate into vertebrae, muscles of the back and body wall, and dermis of the skin.
- Somitomeres** Loosely organized segmented collections of paraxial mesoderm in the cranial region. Somitomeres form muscles and bone of the face and skull.
- Sonic hedgehog** Secreted protein that acts as a morphogen in several embryonic sites, including the limbs, somites, gut formation, and establishment of the midline in the central nervous system
- Spina bifida** Neural tube defect that involves incomplete development of the vertebral arches, with or without defects of the underlying neural tube. If only the vertebrae are involved the defect is called spina bifida occulta, because it usually is skin-covered and not visible from the surface. If the underlying neural tube is affected, then the defect is called spina bifida cystica. Seventy percent of these defects can be prevented by daily maternal use of 400 μg of folic acid beginning 2 to 3 months prior to conception and continuing throughout pregnancy.
- Spinal nerve** Nerve formed by the junction of dorsal and ventral roots at each intervertebral foramen
- Splanchnic nerves** Preganglionic sympathetic and parasympathetic fibers in the thorax (greater [T5–9], lesser [T10 and 11], and least [T12] splanchnic nerves; sympathetic); lumbar region (lumbar splanchnics [L1 and 2]; sympathetic); and pelvic splanchnics (S2–4; parasympathetic).
- Stenosis** A narrowing of a canal or orifice
- Stroma** Connective tissue of glands
- Surfactant** Phospholipid made by alveolar type II cells that reduces surface tension in alveoli, a step that is essential for respiration. Production does not begin until the end of the 6th month, making it difficult for premature infants born before this time to survive.
- Sympathetic trunks** Paired collections of sympathetic ganglia lying on the posterior body wall lateral to the vertebral bodies; sometimes called sympathetic chain ganglia
- Syncytiotrophoblast** Outer multinucleated layer of the trophoblast that serves to invade the endometrium of the uterus
- Syndrome** A group of abnormalities occurring together that have a known cause, e.g., Down syndrome, fetal alcohol syndrome
- Telencephalon** Derived from the most cranial portion of the prosencephalon (forebrain); forms the cerebral hemispheres.
- Teratogen** A factor that causes a birth defect, such as a drug or environmental toxicant
- Teratology** Science that studies the origin, causes, and prevention of birth defects
- Teratoma** Tumor containing derivatives from all three germ layers. They may arise from remnants of the primitive streak or from germ cells that do not migrate successfully to the gonadal ridges. The most common ones are caudal teratomas arising in the buttock region.
- Thyroglossal duct** Duct formed along the path of thyroid migration extending in the midline from the foramen cecum in the tongue to the neck
- Transcription factors** Proteins with DNA binding sites that regulate expression of downstream genes
- Trophoblast** Outer cell layer surrounding the blastocyst from which placental tissues are derived
- Urachus** Vestigial remnant of the allantois from the ventral surface of the urogenital sinus to the umbilicus that

normally regresses to a fibrous cord forming the median umbilical ligament. Sometimes it may remain patent to form an urachal fistula or cyst.

Urogenital ridge Bilateral epithelial-covered elevation of intermediate mesoderm that lies in the lower thoracic and lumbar regions and that forms the mesonephric kidneys and the gonads

Urorectal septum Wedge of mesoderm that grows down between the hindgut and primitive urogenital sinus, partially separating these two structures. The caudal end of the septum forms the perineal body.

Uterovesical pouch Depression between the vagina and the bladder

Ventral mesentery Double layer of peritoneum derived from the septum transversum and extending from the

liver to the ventral body wall (the falciform ligament) and from the liver to the stomach and duodenum (lesser omentum).

Ventral primary ramus Ventral branch of a spinal nerve that innervates muscles derived from the hypomere and skin over the anterior body wall and limbs

Ventral root Motor fibers passing from ventral horn cells in the spinal cord to a spinal nerve

Visceral Relating to the organs of the body

Viscerocranium Part of the skull that comprises the bones of the face. (The other part of the skull is the neurocranium.)

Vitelline duct Connection between the yolk sac and the primary intestinal loop of the midgut through the connecting stalk. Failure of this duct to degenerate results in fistulas and diverticula (e.g., Meckel's diverticulum)

from the small intestine to the umbilicus.

White rami communicantes

Connections carrying preganglionic sympathetic fibers from spinal nerves to the sympathetic trunks. White rami exist only at levels T1–L2.

Yolk sac Structure located ventral to the bilaminar germ disc derived from the hypoblast. It is the site of origin of the first blood cells and the germ cells and remains attached to the midgut via the vitelline (yolk sac) duct until late in development.

Zone of polarizing activity (ZPA)

Population of mesoderm cells at the posterior border of the limb next to the apical ectodermal ridge that regulates anterior–posterior patterning of the limb