

**STRUCTURAL BASIS OF MEDICAL PRACTICE**  
**EXAMINATION VII**

October 21, 2004

Embryology Exam

Circle the correct answer. All, some, or none may apply. (100 pts)

**Respiratory Development**

1. **The diaphragm:**
  - a. is innervated by nerves from cervical somites
  - b. ascends to its definitive position through the epiploic foramen
  - c. develops, in part, from the pleuroperitoneal membranes
  - d. develops, in part, from septum secundum
  
2. **Which of the following occur during the development of the respiratory system:**
  - a. the developing airway undergoes dichotomous branching
  - b. surfactant is produced by the epithelial cells
  - c. the air spaces enlarge
  - d. the visceral pleura forms the blood-air barrier
  
3. **The respiratory diverticulum (lung bud):**
  - a. appears in the embryo at approximately 4 weeks
  - b. arises as an outgrowth of the ventral wall of the foregut
  - c. is associated with the third pharyngeal pouch
  - d. forms the trachea and the bronchial buds
  
4. **With respect to maturation of the lungs:**
  - a. the alveolar period occurs 8 months to childhood
  - b. the pseudoglandular period involves the presence of alveoli
  - c. the terminal sac period occurs from 26 weeks to birth

- d. during the canalicular period each terminal bronchiole divides into 2 or more respiratory bronchioles

### **Limb and Muscle Development**

- 5. Which of the following statements with respect to the muscular system is(are) true:**
- a. With the exception of some smooth muscle, the muscular system develops from the mesodermal germ layer.
  - b. Head and neck musculature is derived from somitomeres 1-4.
  - c. Smooth muscle differentiates from splanchnic mesoderm surround the gut and its derivatives and from ectoderm (pupillary, mammary gland, and sweat gland muscles).
  - d. Cardiac muscle is derived from splanchnic mesoderm.
- 6. Which of the following statements with respect to the skeletal system is(are) true:**
- a. The skeletal system develops from paraxial and lateral plate (somatic layer) mesoderm and from neural crest.
  - b. Paraxial mesoderm forms somitomeres.
  - c. Somites differentiate into a ventromedial part, the dermomyotome, and a dorsolateral part, the sclerotome.
  - d. Mesenchymal cells may become fibroblasts, chondroblasts, or osteoblasts.
- 7. Which of the following statements with respect to the integument system: is(are) true:**
- a. The epidermis is derived from ectoderm.
  - b. The dermis is derived from mesenchyme.
  - c. The mammary line/mammary ridge begins to develop in the embryonic period.
  - d. Melanocytes are derived from endoderm.
- 8. With respect to muscular development:**
- a. The first indication of limb musculature is observed in week 17 as a condensation of mesenchyme near the base of the limb buds.
  - b. Myoblasts of the epimeres form the extensor muscles of the vertebral column

- c. Epimeres of the hypomeres give rise to the muscles of the limbs and body wall
  - d. The dorsal primary ramus serves for the innervation of muscles constituting the hypomere.
- 9. In rotation of the upper and lower limbs:**
- a. the upper limb rotates about  $90^{\circ}$  laterally
  - b. the upper limb rotates so that the extensor muscles lie on the on the anterior surface
  - c. during the 7th week of gestation the limbs rotate in opposite directions
  - d. the lower limb rotates approximately  $90^{\circ}$  medially

### **Heart and Great Vessel Development**

- 10. Which of these statements is/are correct?**
- a. The cardiac loop is completed by day 28
  - b. The bulbus cordis forms the trabeculated part of the right ventricle
  - c. The conus cordis forms the roots and proximal portion of the aorta and pulmonary artery
  - d. The sinus venosus forms the conus arteriosus.
- 11. Which of the following statements about the development of the venous system is/are correct?**
- a. The vitelline system develops into the portal vein
  - b. The umbilical veins form the caval system
  - c. The vitelline vein forms the ligamentum teres
  - d. The subcardinal veins form the superior vena cava
- 12. At birth, which change(s) occur(s) to establish circulation:**
- a. the ductus arteriosus closes
  - b. the foramen ovale closes
  - c. the umbilical vein closes

d. the umbilical arteries form the medial umbilical ligaments

**13. The 5th aortic arch:**

- a. forms the pulmonary artery
- b. forms the dorsal aorta
- c. forms the carotid artery
- d. forms the subclavian arteries

**14. With respect to septum formation in the ventricle:**

- a. formed, in part, by the inferior endocardial atrioventricular cushion
- b. formed, in part, by the septum secundum
- c. formed, in part, by the right conus swelling
- d. formed, in part, by the left conus swelling

**Nervous System Development**

**15. The spinal cord is characterized by:**

- a. the basal plate containing sensory neurons
- b. the alar plate containing motor neurons
- c. a mantle layer that forms the gray matter of the spinal cord
- d. the roof and floor plates do not contain neuroblasts

**16. With respect to the formation of the central nervous system:**

- a. the metencephalon forms the pons
- b. the metencephalon forms the cerebellum
- c. the cervical flexure is formed at the juncture of the hindbrain and the spinal cord
- d. the telencephalon forms the cerebral hemispheres

**17. With regard to the origin of the cranial nerves:**

- a. the olfactory nerve (I) is related to the telencephalon

- b. the trigeminal nerve (V) is related to the metencephalon
- c. nuclei for all 12 cranial nerves are present by the fourth week of development
- d. cranial nerve sensory ganglia originate from ectodermal placodes and neural crest cells

**18. Neural crest cells form:**

- a. sympathetic neuroblasts
- b. Schwann cells
- c. dorsal root neurons
- d. sensory ganglia (dorsal root ganglia)

**Urogenital Development**

**19. With regard to the urinary system:**

- a. develops from intermediate ectoderm
- b. develops along the ventral wall of the abdominal cavity
- c. consists of three slightly overlapping kidney systems that form in a cranial to caudal sequence
- d. begins formation in the 10th week.

**20. In urinary system development:**

- a. the pronephros forms the permanent kidney
- b. the mesonephros disappears at the end of week 4
- c. collecting ducts of the permanent kidney develop from the ureteric bud
- d. the ureteric bud gives rise to the renal pelvis and the major and minor calyces

**21. With respect to the bladder and urethra:**

- a. during the fourth to seventh weeks of development the cloaca divides into the urogenital sinus anteriorly and the anal canal posteriorly
- b. the urinary bladder develops from the upper end of the urogenital sinus
- c. the allantois degenerates and forms the median umbilical ligament in the adult

d. the prostatic and membranous parts of the urethra in the male arise from the urogenital sinus

**22. In genital system development:**

- a. germ cells do not appear in the genital ridges until the sixth week of development
- b. initially both male and female embryos have two pairs of genital ducts: mesonephric (wolffian) ducts and paramesonephric (mullerian) ducts
- c. the genital swellings form the scrotal swellings in the male and the labia majora in the female
- d. the cloacal folds form the genital tubercle, urethral folds, and anal folds

**Head and Neck Development**

**23. With respect to head and neck development:**

- a. pharyngeal arches contain mesoderm and neural crest cells
- b. pharyngeal grooves are evaginations of the endoderm of the foregut
- c. pharyngeal/branchial arches appear in the 8th week of development
- d. the dorsal part of the first pharyngeal cleft gives rise to the external auditory meatus

**24. With regard to head and neck development:**

- a. the nerve supply to the muscles of the first pharyngeal arch is the trigeminal nerve
- b. the nerve supply to the muscles of the second arch is the facial nerve
- c. muscles of mastication are related to the third pharyngeal arch
- d. there are five pair of pharyngeal pouches, although the fifth one is often considered as part of the fourth

**25. Components of the pharyngeal apparatus may include:**

- a. muscles
- b. cranial nerve
- c. artery

d. neural crest cells

**26. Muscle of facial expression is(are) derived from which of the following:**

a. 3<sup>rd</sup> pharyngeal arch

b. 4<sup>th</sup> pharyngeal groove

c. 2<sup>nd</sup> pharyngeal arch

d. 1<sup>st</sup> pharyngeal membrane

**27. With respect to head and neck development:**

a. the primary palate develops from the intermaxillary segment of the maxilla

b. fusion of the palatal shelves creates the hard (secondary) and soft palate

c. the thyroid gland originates from an epithelial proliferation in the floor of the tongue

d. the thymus gland is derived from pharyngeal pouch 3

**Clinical Correlate: Critical Periods of Development**

**28. Withdrawal symptoms (including discontinuation syndrome) in the newborn infant can occur if, during pregnancy, the mother has used:**

a. tetracycline

b. ethanol

c. warfarin

d. vitamin A

**29. Exposure to thalidomide causes:**

a. bladder malformations

b. phocomelia

c. inner ear abnormalities

d. gastrointestinal abnormalities

**30. Exposure to a teratogen during the first 6 weeks of embryonic life may cause fetal abnormalities in which organ systems:**

a. limbs (upper or lower)

- b. heart
- c. neural tube
- d. eye

**31. Fetal alcohol syndrome includes:**

- a. limb defects
- b. bladder defects
- c. cardiac malformations
- d. microcephaly

**Clinical Correlate: Heart and Great Vessel Development**

**32. Characteristics of the Tetralogy of Fallot include:**

- a. a narrow right ventricular outflow region
- b. defect of the interventricular septum
- c. hypertrophy of the right ventricular wall
- d. an overriding aorta

**33. A patent ductus arteriosus:**

- a. is associated with prematurity
- b. causes left to right shunt
- c. cured by surgical ligation
- d. is associated with pulmonic stenosis

**34. Cyanosis is NOT present at arterial oxygen saturation(s) of:**

- a. 98%
- b. 88%
- c. 80%
- d. 70%



**35. With respect to congenital heart and vascular disease:**

- a. accounts for 1% of malformations among live-born infants
- b. rubella virus is an example of a cardiovascular teratogen
- c. thalidomide is an example of a cardiovascular teratogen
- d. includes infants with a failure of development of the septum secundum

**Clinical Correlate: Limb and Muscle Development**

**36. Patients with myotonic dystrophy has(have):**

- a. cataracts in lens of the eye
- b. delayed relaxation of clinched muscles
- c. transverse smile
- d. increased incidence of endocrine abnormalities

**37. A child with Duchenne muscular dystrophy may demonstrate**

- a. pseudohypertrophy of the calf muscles
- b. need for special education help in school
- c. need for wheelchair for longer distances by age 12
- d. elevated levels of creatine phosphkinase in the serum.

**38. Children who get up from a prone position by pushing on their thighs with the arms ("walking up their legs") are demonstrating:**

- a. weakness of the pelvic girdle muscles
- b. vagal reflex
- c. Gower maneuver
- d. dizziness from decreased blood flow to the brain

**Clinical Correlate: UG/GI/Respiratory Development**

**39. With respect to Meckel's diverticulum:**

- a. vitelline duct remnant

- b. located near the rectosigmoid junction
  - c. may contain pancreatic mucosa
  - d. may contain gastric mucosa
- 40. The following abdominal masses can be seen and/or palpated on physical exam in newborns:**
- a. renal stone
  - b. omphalocele
  - c. adrenal tumor
  - d. appendicitis
- 41. With tracheoesophageal fistula of the C type (upper esophagus ends in a blind pouch, and the lower esophagus connects to the trachea) the following is(are) true:**
- a. infant develops symptoms in the newborn period
  - b. infant shows inability to swallow milk (breast or formula)
  - c. symptoms develop after 2 years of age
  - d. the condition is always fatal
- 42. An open bladder with the interior of the organ visible in newborn occurs with:**
- a. hypospadias
  - b. duplication of the ureters
  - c. extrophy of the bladder
  - d. duplication of the testes

**Clinical Correlate: Head and Neck Development**

- 43. The follow are risks to the infant with cystic hygroma:**
- a. hemorrhage within the structure
  - b. obstruction of the trachea
  - c. hearing deficit

- d. malignant change
- 44. A thyroglossal duct cyst may appear:**
  - a. at the base of the tongue
  - b. near the sternocleidomastoid muscle
  - c. under an ear lobe
  - d. suprasternal notch
- 45. In regard to cleft lip/palate:**
  - a. increased risk in subsequent sibling
  - b. may be unilateral or bilateral
  - c. may be associated with other syndromes
  - d. teeth eruption may be affected
- 46. Branchial fistulas may be seen as a defect in the formation of the following structure(s):**
  - a. 2nd pharyngeal pouch
  - b. 1st pharyngeal pouch
  - c. 3rd pharyngeal pouch
  - d. external pinna

**Clinical Aspects - Nervous System Development**

- 47. The incidence of neural tube defects can be decreased by:**
  - a. use of folic acid by the pregnant woman
  - b. prenatal exercise
  - c. avoiding insecticides
  - d. use of multivitamins(without folic acid) by the pregnant woman
- 48. Hydrocephalus is caused by:**
  - a. lack of prenatal vitamins

- b. failure of reabsorption of cerebral spinal fluid
- c. obstruction to the flow of cerebral spinal fluid
- d. vitamin C deficiency

**49. Agnesis of the corpus callosum is associated with:**

- a. mental retardation
- b. increased head circumference
- c. seizure disorder
- d. folic acid deficiency in the mother

**50. Myelomeningocele is associated with:**

- a. decreased movement in muscles below the lesion
- b. maternal infection during pregnancy
- c. hydrocephalus
- d. open spine with visible nerve structure at the site of the lesion