

STUDENT COLLABORATIVE RESOURCES FOR UNDERSTANDING AND BRODY SUCCESS

**SCRUBS** is a student driven initiative that aims to develop supplemental resources for current and future cohorts that will pass through Brody. Members of **SCRUBS** participate in a variety of sub-committees working to create resources for students, by students. These resources aim to offer unique perspectives from students who have walked in the same shoes and can develop resources that we wish we had been exposed to during our time in the course.

The hope is this organization will become a staple of the Brody student body, exemplifying the unique collaborative community that Brody offers. If this is a mission that aligns with your goals and you have the desire to help those that will come behind you, as well as a goal to leave your mark on Brody as a whole, we invite you to join the team!

#### **Disclaimer:**

The resources that are included in this document are made by students and not the faculty. As such, there is the possibility for errors in our development, although this is mitigated via a team approach to development with multiple stages of vetting. If there is a contradiction with the coursework presented within your course, please go by the course documents. Additionally, **SCRUBS** aims to supply **supplemental resources**, however these are in no way replacements to the instruction of the Brody faculty. Use these resources as a supplement, but not as your primary source for course material.

# Coursepack Practice Questions Embryology Chapter 8 - Respiratory System Wendy Wang - BSOM Class of 2027

#### <u>Quiz Level</u>

1. What germ layer gives rise to the laryngotracheal groove?

- A) Endoderm
- B) Mesoderm (splanchnic)
- C) Mesoderm (lateral)
- D) Neuroectoderm
- E) Ectoderm

2.Select the correct order of development:

A) Laryngotracheal groove, lung bud, laryngotracheal diverticulum, bronchial buds, primary bronchi, bronchopulmonary segment
B) Laryngotracheal groove, bronchial buds, lung bud, laryngotracheal diverticulum, primary bronchi, bronchopulmonary segment

C) Laryngotracheal groove, bronchial buds, laryngotracheal diverticulum, lung bud, primary bronchi, bronchopulmonary segment

D) Laryngotracheal groove, laryngotracheal diverticulum, lung bud, bronchial buds, primary bronchi, bronchopulmonary segment

E) Laryngotracheal groove, laryngotracheal diverticulum, bronchial buds, lung bud, primary bronchi, bronchopulmonary segment

3. What germ layer gives rise to the laryngeal cartilages?

- A) Endoderm
- B) Mesoderm (splanchnic)
- C) Mesoderm (lateral)
- D) Neuroectoderm
- E) Ectoderm

4. Which condition is associated with the incomplete separation of the esophagus and trachea?

- A) Congenital diaphragmatic hernia
- B) Gastroschisis
- C) Omphalocele
- D) Tracheoesophageal fistula
- E) Esophageal atresia

5. Which condition is associated with excess amniotic fluid during pregnancy?

- A) Oligohydramnios
  B) Gestational diabetes
  C) Placental abruption
  D) Polyhydramnios
  E) Ectopic pregnancy

# <u>Test Level</u>

6. A 32-week pregnant woman undergoes a routine ultrasound and is found to have an unusually high amount of amniotic fluid. She is also experiencing difficulty with fetal swallowing. After delivery, the newborn is diagnosed with a condition where there is an abnormal connection between the esophagus and trachea. This condition is commonly associated with all of the following symptoms **except**:

- A) Excessive salivation
- B) Regurgitation after feeding
- C) Abdominal distention after crying
- D) Inflammation of the lungs
- E) Oligohydramnios

7. A 30-week pregnant woman undergoes an ultrasound and is diagnosed with polyhydramnios. After delivery, the newborn presents with excessive salivation, regurgitation after feeding, and abdominal distention. Further examination reveals an abnormal connection between the esophagus and trachea. This condition is commonly associated with which of the following developmental issues?

- A) Incomplete separation of the esophagus and trachea
- B) Excessive growth of bronchial buds
- C) Abnormal division of the lung bud into secondary bronchi
- D) Failure of the lung bud to form the laryngeal cartilage
- E) Disruption in the development of the bronchopulmonary segments

8. A 22-week pregnant woman has an ultrasound showing normal amniotic fluid levels. After delivery, the newborn has difficulty with breathing and shows symptoms of respiratory distress. Upon examination, it is found that the right bronchial bud is larger and more vertical compared to the left. What is the most likely explanation for this observation?

- A) Abnormal fusion of the pleuroperitoneal membranes
- B) Failure of the laryngotracheal diverticulum to elongate
- C) Normal anatomical variation in the bronchial buds
- D) Incomplete development of the laryngeal cartilages
- E) Defective formation of the bronchopulmonary segments

9. A 26-week pregnant woman is found to have a normal amount of amniotic fluid during her ultrasound. After delivery, the newborn shows signs of difficulty with airway passages. The examination reveals that the cartilages of the larynx have developed from specific pharyngeal arches. Which pharyngeal arches are responsible for the development of these cartilages?

- A) First and second pharyngeal arches
- B) Third and fourth pharyngeal arches
- C) Fourth and sixth pharyngeal arches
- D) Fifth and sixth pharyngeal arches
- E) First and third pharyngeal arches

10. During an early prenatal checkup, a 20-week pregnant woman has an ultrasound that shows normal fetal development. After delivery, the newborn exhibits difficulty breathing and is diagnosed with a condition where there is an abnormal connection between the bronchial buds and the surrounding mesoderm. What is the most likely developmental issue related to this condition?

- A) Incomplete formation of the laryngotracheal groove
- B) Failure of the bronchial buds to develop properly into bronchopulmonary segments
- C) Abnormal division of the lung bud into primary bronchi
- D) Defective elongation of the laryngotracheal diverticulum
- E) Improper fusion of the pleuroperitoneal folds with the septum transversum



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# <u>Answers</u>

# 1. The correct answer is A.

The laryngotracheal groove arises from the endoderm. This groove arises from endoderm on the anterior wall of the foregut and is inferior to the fourth pharyngeal arches, eventually giving rise to the larynx, trachea, and the lungs.

# 2. The correct answer is D.

The correct sequence of development from the laryngotracheal groove to the bronchopulmonary segment begins with the laryngotracheal groove, an endodermal outgrowth. This groove develops into the laryngotracheal diverticulum, which eventually gives rise to the lung bud. The lung bud then forms the bronchial buds. These bronchial buds branch off to become the primary bronchi. As the primary bronchi continue to subdivide, they eventually form the bronchopulmonary segments within the lungs.

# 3. The correct answer is D.

The laryngeal cartilages are derived from the neuroectoderm (neural crest). The cartilage, connective tissue, and smooth muscle of the trachea and bronchi are derived from the mesoderm (splanchnic).

# 4. The correct answer is E.

Esophageal atresia occurs when there is an incomplete separation of the esophagus and trachea during embryonic development. This defect results in the esophagus ending in a blind pouch rather than connecting to the stomach, often accompanied by a tracheoesophageal fistula, which is an abnormal connection between the esophagus and trachea.

# 5. The correct answer is D.

Polyhydramnios refers to an excessive amount of amniotic fluid during pregnancy. This condition can be associated with various fetal or maternal complications, including fetal anomalies or maternal diabetes.

# 6. The correct answer is E.

The condition described, tracheoesophageal fistula, is commonly associated with symptoms such as excessive salivation, regurgitation after feeding, abdominal distention due to air entering the stomach, and potential lung inflammation (aspiration pneumonia). Oligohydramnios, which is a deficiency of amniotic fluid, is not associated with this condition; rather, it is typically associated with other conditions like fetal kidney issues or premature rupture of membranes.

#### 7. The correct answer is A.

The symptoms described—polyhydramnios, excessive salivation, regurgitation after feeding, and abdominal distention—are commonly associated with tracheoesophageal fistula, which results from incomplete separation of the esophagus and trachea during embryonic development. This abnormal connection leads to the described clinical manifestations and is a significant developmental issue in the formation of the lower respiratory system.

#### 8. The correct answer is C.

The difference in size and orientation of the bronchial buds is a normal anatomical variation. The right bronchial bud is typically larger and more vertically oriented than the left, and this characteristic persists throughout life without being a sign of abnormal development.

#### 9. The correct answer is C.

The cartilages of the larynx develop from the fourth and sixth pharyngeal arches. This developmental process is crucial for the formation of the laryngeal structures necessary for proper airway function.

#### 10. The correct answer is B.

The condition described involves an abnormal connection between the bronchial buds and surrounding mesoderm, which indicates a failure in the proper development of the bronchial buds into the bronchopulmonary segments, leading to respiratory difficulties.