SCRUBS

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 5 - Pharyngeal Arches, Pharyngeal Pouches, Tongue, and Thyroid

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Quiz Level

What germ layer gives rise to muscles derived from pharyngeal arches and muscles of the tongue, excluding palatoglossus?

A) Ectoderm
B) Neuroectoderm
C) Mesoderm (paraxial)
D) Endoderm
E) Lateral plate mesoderm

2. Which pharyngeal pouch forms the parafollicular cells of thyroid?

A) 3rd dorsal portion
B) 3rd ventral portion
C) 4th dorsal portion
D) 4th ventral portion
E) 5th

3. What is true regarding the tympanic membrane?

A) It is derived only from the ectoderm
B) It is formed from pharyngeal grooves
C) It is derived from all three germ layers
D) It is formed from the first pharyngeal pouch
E) It develops from the second pharyngeal membrane

4. In the development of the tongue, the second arch develops an anterior midline swelling known as?

A) Copula
B) Hypopharyngeal eminence
C) Terminal sulcus
D) Foramen cecum
E) Median sulcus

5. What marks the intersection of the median sulcus with the terminal sulcus?

A) Copula
B) hypopharyngeal eminence
C) Terminal sulcus
D) Foramen cecum
E) Median sulcus

Test Level

6. Choose the correct derivatives of the 4th/6th pharyngeal arch mesoderm.

1. Levator veli palatini
2. Stylohyoid
3. Posterior digastric
4. Pharyngeal muscles
5. Tensor veli palatini
6. Cricopharyngeus
7. Stylopharyngeus

A) 1, 2, 4
B) 3, 6, 7
C) 1, 4, 6
D) 1, 5, 7
E) 2, 3, 5

7. A 6-month-old infant is brought to the pediatrician by his parents due to concerns about recurrent infections and slow weight gain. Upon examination, the pediatrician notes a distinct facial appearance characterized by wide-set eyes, a prominent nose, and a small mouth. Further investigations reveal absent thymus and parathyroid glands, confirmed by imaging studies and blood tests showing hypocalcemia. Based on the clinical findings described, what syndrome is most likely affecting this infant?

A) Treacher Collins syndrome
B) Pierre Robin syndrome
C) Down syndrome
D) Turner syndrome
E) DiGeorge syndrome

8. A 30-year-old female presents to the otolaryngology clinic with a painless swelling in her neck that has gradually increased in size over the past few months. She reports no associated symptoms such as pain, dysphagia, or difficulty breathing. On physical examination, a palpable, soft, non-tender mass is noted along the anterior border of her left sternocleidomastoid muscle. What is the likely embryological origin of the swelling described in this patient?

A) Persistent thymic tissue
B) Thyroglossal duct cyst
C) Cervical (branchial) cyst
D) Laryngeal cyst
E) Branchial vestiges

9. A 1-week-old newborn is brought to the pediatrician by concerned parents due to difficulty with breastfeeding. The parents report that the infant seems to have trouble latching onto the breast and becomes fussy during feeding attempts. Upon examination, the pediatrician observes that the infant's tongue movement appears restricted, and upon further inspection, a short frenulum is noted extending to the tip of the tongue. What anatomical feature is likely responsible for the breastfeeding difficulty described in this infant?

A) Ankyloglossia
B) Enlarged palatine tonsils
C) Macroglossia
D) Microglossia
E) Glossochisis

10. A 6-month-old infant is brought to the pediatrician by concerned parents due to facial abnormalities noticed since birth. On examination, the infant presents with micrognathia (small jaw), a cleft palate, and widely spaced eyes. The ears are noted to be low-set with malformed pinnae. Based on these clinical findings, what is the likely embryological origin of the abnormalities affecting this infant?

A) First pharyngeal arch
B) Second pharyngeal arch
C) Third pharyngeal arch
D) Fourth pharyngeal arch
E) Fifth pharyngeal arch

Answers

1. The correct answer is C.
Muscles derived from the pharyngeal arches and muscles of the tongue (except the palatoglossus) originate from the paraxial mesoderm. The paraxial mesoderm forms somites, which differentiate into sclerotomes, myotomes, and dermatomes. The myotomes give rise to the skeletal muscles, including those from the pharyngeal arches and most of the tongue muscles. The lateral plate mesoderm forms the visceral and parietal layers of the serous membranes and contributes to limb development.

2. The correct answer is D.
The parafollicular cells (also known as C cells) of the thyroid gland are derived from the 4th ventral portion of the pharyngeal pouch. During embryological development, the 4th pharyngeal pouch gives rise to the ultimobranchial body, which later becomes incorporated into the thyroid gland. The 4th dorsal portion gives rise to the superior parathyroid.

3. The correct answer is C.
The tympanic membrane, or eardrum, is derived from all three germ layers: ectoderm, mesoderm, and endoderm. The outer layer of the tympanic membrane is derived from ectoderm, the inner layer from endoderm, and the middle layer from mesoderm. It is derived from the first pharyngeal membrane; remember that only one pair of pharyngeal membranes actually contribute to adult structures.

4. The correct answer is A.
The copula is a midline structure that develops from the second pharyngeal arch during embryological development. It plays a role in the formation of the tongue. As the tongue develops, the copula is eventually overgrown by the hypopharyngeal eminence (derived from the third and fourth pharyngeal arches), and it does not contribute to the adult tongue structure.

5. The correct answer is D.
The foramen cecum is a small depression on the dorsum of the tongue that marks the intersection of the median sulcus and the terminal sulcus. It is a remnant of the thyroglossal duct, which is an embryological structure that contributes to the development of the thyroid gland.

6. The correct answer is C.
The pharyngeal muscles, cricopharyngeus, and levator veli palatini are all derived from the 4th/6th pharyngeal arch mesoderm. The other muscles listed, such as the stylohyoid and posterior digastric, are derived from the second pharyngeal arch, and the stylopharyngeus is derived from the third pharyngeal arch. Tensor veli palatini is derived from the first pharyngeal arch.

7. The correct answer is E.
DiGeorge syndrome, also known as 22q11.2 deletion syndrome, results from the abnormal development or absence of the third and fourth pharyngeal pouches during embryonic development. This syndrome is associated with a constellation of features including absent or hypoplastic thymus and parathyroid glands, facial dysmorphism including malformed external ears, and immune deficiency.

8. The correct answer is C.
Cervical (branchial) cysts are congenital anomalies resulting from entrapped epithelial remnants of the pharyngeal grooves during embryonic development. They typically present as painless, soft masses along the anterior border of the sternocleidomastoid muscle, commonly in young adults but can present at any age.

9. The correct answer is A.
Ankyloglossia, or tongue-tie, refers to a condition where the frenulum of the tongue is abnormally short or extends to the tip of the tongue, limiting its range of motion. This anatomical anomaly can interfere with the infant's ability to properly latch onto the breast during breastfeeding, leading to feeding difficulties and maternal nipple pain.

10. The correct answer is A.
The first pharyngeal arch plays a critical role during embryonic development in forming structures such as the jaw, middle ear bones (malleus and incus), and certain ligaments. Insufficient migration of neural crest cells into the first arch during early development can lead to a spectrum of craniofacial abnormalities known as first arch syndromes, such as Treacher Collins or Pierre Robin).