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# **Anatomy:**

## **PreTest<sup>®</sup> Self-Assessment and Review**

Second Edition

500 board-type, multiple-choice questions with  
answers, explanations, and current references

# Anatomy:

## PreTest<sup>®</sup> Self-Assessment and Review

Second Edition

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# Introduction

*Anatomy: PreTest Self-Assessment and Review* has been designed to provide medical students, as well as physicians, with a comprehensive and convenient instrument for self-assessment and review within the field of anatomy. The 500 questions provided have been designed to parallel the format and degree of difficulty of the questions contained in Part I of the National Board of Medical Examiners examinations, the Federation Licensing Examination (FLEX), the Visa Qualifying Examination, and the ECFMG examination.

Each question in the book is accompanied by an answer, a paragraph explanation, and a specific page reference to either a current journal article, a textbook, or both. A one page bibliography, listing all the sources used in the book, follows the last chapter.

Perhaps the most effective way to use this book is to allow yourself one minute to answer each question in a given chapter; as you proceed, indicate your answer beside each question. By following this suggestion, you will be approximating the time limits imposed by the board examinations previously mentioned.

When you finish answering the questions in a chapter, you should then spend as much time as you need verifying your answers and carefully reading the explanations. Although you should pay special attention to the explanations for the questions you answered incorrectly, you should read **every** explanation. The author of this book has designed the explanations to reinforce and supplement the information tested by the questions. If, after reading the explanations for a given chapter, you feel you need still more information about the material covered, you should consult and study the references indicated.

This book meets the criteria established by the AMA's Department of Continuing Medical Education for up to 22 hours of credit in category 5D for the Physician's Recognition Award. It should provide an experience that is instructive as well as evaluative; we also hope that you enjoy it. We would be very happy to receive your comments.

# Contents

Introduction	
Gross Anatomy	
Head and Neck	
Questions	1
Answers, Explanations, and References	13
Gross Anatomy	
Thorax	
Questions	28
Answers, Explanations, and References	42
Gross Anatomy	
Abdomen	
Questions	54
Answers, Explanations, and References	68
Gross Anatomy	
Pelvis	
Questions	83
Answers, Explanations, and References	90
Gross Anatomy	
Extremities	
Questions	100
Answers, Explanations, and References	112
Embryology	
Questions	127
Answers, Explanations, and References	137
Histology	
Questions	152
Answers, Explanations, and References	188
Neuroanatomy	
Questions	215
Answers, Explanations, and References	231
Bibliography	250

# Gross Anatomy

## Head and Neck

**DIRECTIONS:** Each question below contains five suggested answers. Choose the one best response to each question.

1. A man who has a deep laceration of the scalp with profuse bleeding is seen in the emergency room. His epicranial aponeurosis (*galea aponeurotica*) is penetrated, resulting in severe gaping of the wound. The structure underlying the epicranial aponeurosis is
  - (A) the tendon of the epicranial muscles (occipitofrontalis)
  - (B) a layer containing blood vessels
  - (C) a layer of loose connective tissue
  - (D) the periosteum (pericranium)
  - (E) the dura mater
2. A tumor originating within the maxillary sinus may result in specific signs that depend upon the direction of spread. Spread through the medial wall of the maxillary sinus most likely will result in
  - (A) epiphora (tearing)
  - (B) diplopia (double vision)
  - (C) swelling of the face
  - (D) swelling and ulceration of the palate
  - (E) pain referred to the maxillary molar teeth
3. A spasm or excessive contraction in which of the following muscles will contribute to dislocation of the jaw by drawing the articular disk beyond the articular tubercle of the temporomandibular joint?
  - (A) Temporalis
  - (B) Buccinator
  - (C) Medial pterygoid
  - (D) Lateral pterygoid
  - (E) Masseter
4. Infection may spread from the nasal cavity to the meninges along the olfactory nerves (CN I). Olfactory fibers pass from the mucosa of the nasal cavity to the olfactory bulb via the
  - (A) semilunar hiatus
  - (B) cribriform plate of the ethmoid bone
  - (C) anterior and posterior ethmoidal foramina
  - (D) sphenopalatine foramen
  - (E) nasociliary nerve



## Questions 5-20

A six-year-old boy is brought into the emergency room because of a high temperature and aberrant right eye function with diplopia. He complains of nausea, severe headache (particularly on the right side), severe right earache, and severe sore throat with difficulty swallowing. The boy has a history of earaches and tonsillitis. Examination of the oral cavity reveals bilateral acute tonsillitis; there is especially severe abscess involvement within the crypts of the right tonsil. The preliminary diagnosis is underlying bacterial infection with septicemia (blood poisoning) arising from the right tonsil, and a probable site of secondary infection elsewhere in the head.

5. The examining physician asks the patient to follow with his eyes as the physician raises and lowers his finger, then moves it from side to side, in front of the boy. Pure elevation of the eyes, with neither secondary abduction or adduction, nor intorsion (internal rotation) or extorsion (lateral rotation), is accomplished by synergistic action of which of the following muscle pairs?

- (A) Superior rectus and inferior oblique
- (B) Superior rectus and superior oblique
- (C) Inferior rectus and superior oblique
- (D) Inferior rectus and inferior oblique
- (E) Medial rectus and lateral rectus

6. All voluntary movements of the boy's right eye are absent. Paralysis of the extraocular muscles of the right eye in this case may be best explained by a localized infection secondary to the primary involvement of the tonsillar crypts. The extraocular signs observed could be the result of an infection arising most probably in the

- (A) eyeball
- (B) optic canal
- (C) pterygopalatine fossa
- (D) cavernous sinus
- (E) facial canal

7. Vision in the patient's right eye is found to be somewhat impaired. Fundoscopic examination of the same eye shows dilatation and engorgement of the retinal veins and some edema of the optic nerve. These findings may best be explained by

- (A) secondary infection within the optic canal with resultant occlusion of the ophthalmic vein
- (B) septic thrombosis within the cavernous sinus
- (C) side effects of trigeminal neuralgia
- (D) eyelid dysfunction due to paralysis of the levator palpebrae superioris muscle
- (E) decreased blood flow in the internal carotid artery

8. A corneal blink reflex cannot be elicited by stimulation of the conjunctiva of the right eye, but bilateral blinking occurs when the left conjunctiva is stimulated. Loss of the blink reflex on the right side in this patient is best attributable to

- (A) atrophy of the orbicularis oculi muscle on the right
- (B) Horner's syndrome (sympathetic paralysis) on the right side
- (C) functional loss of the oculomotor nerve (III) with paralysis of the levator palpebrae superioris
- (D) functional loss of the ophthalmic division of the trigeminal nerve (CN V<sub>1</sub>)
- (E) functional loss of the facial nerve (CN VII) on the right

9. Dilatation of the right pupil is noted. Light directed into either eye of the patient fails to constrict the pupil on the right side. This indicates malfunction of the autonomic fibers in which of the following cranial nerves?

- (A) Optic
- (B) Oculomotor
- (C) Trochlear
- (D) Ophthalmic
- (E) Abducens

10. The patient exhibits the following normal reflexes; bilateral consensual blink reflex elicited from the left (normal) side; sneeze reflex on the right side; jaw-jerk reflex; and a strong gag reflex elicited on the right at the root of the tongue. These reflexes test the integrity of all the following nerves EXCEPT the

- (A) maxillary (CN V<sub>2</sub>)
- (B) mandibular (CN V<sub>3</sub>)
- (C) facial (CN VII)
- (D) glossopharyngeal (CN IX)
- (E) vagus (CN X)

11. As a further check of cranial nerve function, the examining physician placed his fingers over the eyelids of the boy and asked him to try to keep his eyes closed while the physician attempted to open the lids. This would test the functional integrity of which of the following?

- (A) Oculomotor nerve
- (B) Motor root of the trigeminal nerve
- (C) Ophthalmic division of the trigeminal nerve
- (D) Facial nerve
- (E) None of the above



12. The signs thus far discussed in this patient result from secondary infection in one specific location. The most likely route for hematogenous spread of infection from the right tonsil to the site of secondary infection is via

- (A) emissary veins from the orbital region of the face
- (B) emissary veins from the maxillary region of the face
- (C) the pterygoid plexus of veins lateral to the pharyngeal musculature
- (D) the internal carotid artery which also lies in the cavernous sinus
- (E) none of the above

13. The patient exhibits rigidity of the neck muscles, indicating meningeal inflammation. This development may best be explained by spread of infection to the meninges via

- (A) the cribriform plate of the ethmoid bone
- (B) retrograde flow in meningeal veins draining into the cavernous sinus
- (C) the emissary veins from the face
- (D) the pterygopalatine fossa
- (E) the foramen magnum

14. Although both tympanic membranes appear normal, fluid is observed in both middle ears. The right ear also suffers a moderate hearing loss. Ear involvement in this case may best be explained by spread of infection from the tonsils via the

- (A) facial canal
- (B) foramen ovale
- (C) pharyngotympanic tube
- (D) external auditory meatus
- (E) internal auditory meatus

15. If the boy's disease process had progressed further, the otitis media (middle ear infection) could have led to all the following complications EXCEPT

- (A) loss of parotid gland function on the right
- (B) loss of salivation from the submandibular and sublingual glands
- (C) loss of lacrimation in the right eye
- (D) loss of taste from the right anterior tongue
- (E) complete facial paralysis on the right

16. The patient immediately received intensive intravenous antibiotic therapy. Once his septicemia subsided and ocular function returned to normal, he was scheduled for tonsillectomy and adenoidectomy. The palatine tonsil lies between which of the following pairs of muscles?

- (A) Styloglossus and stylopharyngeus
- (B) Levator palati and tensor palati
- (C) Palatopharyngeus and salpingopharyngeus
- (D) Palatoglossus and palatopharyngeus
- (E) Styloglossus and palatoglossus

17. Upon removal of the left tonsil, pulsating hemorrhage occurs from the tonsillar fossa. This situation may arise as a consequence of severed branches of all the following arteries EXCEPT the

- (A) lingual
- (B) facial
- (C) maxillary
- (D) ascending pharyngeal
- (E) posterior auricular

18. The adenoid (nasopharyngeal tonsil) also was removed at surgery. This structure is located

- (A) in the midline hanging from the free edge of the velum (soft palate)
- (B) in the tubal elevation around the opening of the auditory tube on each side
- (C) in the midline on the posterior superior wall of the pharynx
- (D) between the palatopharyngeus and stylopharyngeus muscles
- (E) at the base of the tongue just caudal to the row of vallate taste buds

19. The surgery was successful and the recovery uneventful. If the boy's surgery could have been postponed indefinitely, involution of the palatine tonsil would probably commence at what year of age?

- (A) 7
- (B) 13
- (C) 21
- (D) 35
- (E) 55

20. During a follow-up examination some months after the surgery, it was discovered that taste in the posterior two-thirds of the tongue on the right was absent. A branch of which of the following nerves was most likely inadvertently severed during the tonsillectomy?

- (A) Chorda tympani
- (B) Lingual (CN V<sub>3</sub>)
- (C) Facial (VII)
- (D) Glossopharyngeal (CN IX)
- (E) Vagus (CN X)

**DIRECTIONS:** Each question below contains four suggested answers of which one or more is correct. Choose the answer:

- |   |    |                |             |
|---|----|----------------|-------------|
| A | if | 1, 2, and 3    | are correct |
| B | if | 1 and 3        | are correct |
| C | if | 2 and 4        | are correct |
| D | if | 4              | is correct  |
| E | if | 1, 2, 3, and 4 | are correct |

21. The anterior fontanelle of the newborn is covered by a membrane and decreases in size postnatally to become the bregma in the adult. The bregma is formed by the juncture of the

- (1) sagittal suture
- (2) occipital bone
- (3) coronal suture
- (4) parietal bones

22. Although the ciliary action of the mucosa facilitates drainage of the paranasal sinuses, body position is paramount. Which of the paranasal sinuses listed below do NOT drain by gravity with the body in the erect position?

- (1) Frontal
- (2) Sphenoidal
- (3) Ethmoidal
- (4) Maxillary

23. During anesthesia-induced muscle relaxation, obstruction of the respiratory passage is prevented by forward traction on the mandible. Normally, the tongue is prevented from falling backward and obstructing respiration by which of the following muscles?

- (1) Styloglossus
- (2) Hyoglossus
- (3) Palatoglossus
- (4) Genioglossus

24. In the course of administering a local anesthetic, a needle that is placed too far into the greater palatine canal may paralyze an autonomic ganglion. Loss of function at this ganglion would result in

- (1) dry eye from loss of lacrimal gland secretion
- (2) dry mouth from loss of parotid gland secretion
- (3) dry nasal mucosa from loss of nasal gland secretion
- (4) dry mouth from loss of submandibular and sublingual gland secretions

25. The relatively high incidence of lingual carcinoma makes the lymphatic drainage of the tongue a matter of importance. The lymphatic drainage zones of the mucosa of the tongue are arranged so that the

- (1) tip of the tongue drains in part to the submental and in part to the submandibular nodes
- (2) anterior part of the tongue in part drains unilaterally to nodes far down the cervical chain
- (3) central portion of the tongue drains bilaterally
- (4) posterior one-third of the tongue drains bilaterally

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**SUMMARY OF DIRECTIONS**


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A	B	C	D	E
1, 2, 3 only	1, 3 only	2, 4 only	4 only	All are correct

---

26. Structures that accompany the sublingual gland above (deep to) the mylohyoid muscle include the

- (1) lingual artery and nerve
- (2) submandibular duct
- (3) genioglossus muscle
- (4) digastric muscle

27. Injury to the motor root of the mandibular division of the trigeminal nerve (CN V<sub>3</sub>) would incur paralysis of the

- (1) tensor tympani muscle
- (2) buccinator muscle
- (3) tensor veli palatini muscle
- (4) posterior belly of the digastric muscle

28. During surgery of the neck, the carotid sheath and its contents may safely be retracted as a unit. Structures normally found within the carotid sheath include the

- (1) internal jugular vein
- (2) vagus nerve
- (3) common carotid artery
- (4) sympathetic chain

29. The external carotid artery supplies most of the scalp, most of the face, and most of the upper portion of the neck. Branches of the external carotid artery include the

- (1) ophthalmic artery
- (2) occipital artery
- (3) inferior thyroid artery
- (4) ascending pharyngeal artery

30. The internal carotid arteries have significant anastomotic connections with tributaries of which of the following arteries?

- (1) Internal maxillary
- (2) Facial
- (3) Superficial temporal
- (4) Vertebral

31. Fracture of the cranium in the vicinity of the jugular foramen may result in specific neurologic signs. In addition to the internal jugular vein, the jugular foramen contains which of the following cranial nerves?

- (1) Glossopharyngeal (CN IX)
- (2) Vagus (CN X)
- (3) Spinal accessory (CN XI)
- (4) Hypoglossal (CN XII)

32. The strap (ribbon) muscles of the neck, which stabilize the hyoid bone during deglutition, are innervated by the

- (1) superior root of the ansa cervicalis (descendens hypoglossi) from C1-C2
- (2) spinal accessory nerve (CN XI)
- (3) inferior root of the ansa cervicalis (descendens cervicalis) from C2-C3
- (4) hypoglossal nerve (CN XII)

33. Cricothyrotomy is performed at the lower border of the thyroid cartilage, which lies at the level of the sixth cervical vertebra. The site of this procedure

- (1) is inferior to the level of the false vocal folds
- (2) corresponds to the level of the thyrohyoid membrane
- (3) is inferior to the level of the true vocal folds
- (4) corresponds to the level of the thyroid isthmus

34. Irritation of the vagus nerve can produce coughing. This is a result of the fact that the superior laryngeal branch of the vagus nerve provides sensory innervation to the mucosa of the

- (1) larynx inferior to the vocal folds
- (2) larynx superior to the vocal folds
- (3) trachea
- (4) epiglottis

35. A frequent indication of thyroid tumor is hoarseness due to involvement of the recurrent laryngeal nerve. This nerve supplies motor innervation to the

- (1) lateral cricoarytenoid muscle
- (2) vocalis muscle
- (3) posterior cricoarytenoid muscle
- (4) cricothyroid muscle

36. Like all endocrine glands, the thyroid is very vascular. The thyroid gland receives its major blood supply from one or more branches of the

- (1) subclavian artery
- (2) common carotid artery
- (3) external carotid artery
- (4) internal carotid artery

37. The thyroid gland develops from a median diverticulum of the anterior wall of the oropharynx and descends anterior to the trachea. Functional ectopic thyroid tissue may persist along the thyroid diverticulum. Remnants of the thyroid primordium include the

- (1) thyroglossal duct
- (2) foramen cecum
- (3) pyramidal lobe of the thyroid gland
- (4) thyrohyoid ligament

## SUMMARY OF DIRECTIONS

A	B	C	D	E
1, 2, 3 only	1, 3 only	2, 4 only	4 only	All are correct

38. Since the parathyroid glands are essential for calcium regulation and metabolism, in the event of a thyroidectomy one or two of them must either be preserved or reimplanted elsewhere. Which of the following statements about these small (4 to 6 mm) glands are true?

- (1) They are found lying on the dorsal surface of the thyroid gland
- (2) They are derived from the dorsal diverticulum of the third branchial pouch
- (3) They frequently are located ectopically between hyoid bone and anterior mediastinum
- (4) They are derived from the dorsal diverticulum of the fourth branchial pouch

39. Reflexes that protect the inner ear from excessive noise involve the contraction of the tensor tympani and stapedius muscles. Which of the following statements about the tensor tympani muscle are true?

- (1) It inserts onto the malleus
- (2) It is innervated by the chorda tympani nerve
- (3) It lies parallel to the auditory tube
- (4) It represents a second branchial arch derivative



**DIRECTIONS:** The groups of questions below consist of lettered choices followed by several numbered items. For each numbered item select the **one** lettered choice with which it is most closely associated. Each lettered choice may be used once, more than once, or not at all.

#### Questions 40-43

A patient is suspected of having a basal skull fracture. During examination of the oropharynx, she is asked to stick out her tongue and say "ah." Indirect laryngoscopy is then performed by inserting a mirror into the oropharynx. For each physical finding described below, select the nerve with whose injury such a finding is most likely to be associated.

- (A) Left lingual nerve
  - (B) Right glossopharyngeal nerve
  - (C) Left glossopharyngeal nerve
  - (D) Right vagus nerve
  - (E) Right hypoglossal nerve
40. Deviation of the tongue to the right side
41. Deviation of the uvula to the left side
42. Loss of the gag reflex on the right side
43. Adduction of the true vocal fold on the right side

#### Questions 44-47

Certain neurons supplying the head and neck region have their cell bodies located in ganglia. For each of the neurons described, select the ganglion with which its cell bodies are associated.

- (A) Geniculate ganglion
  - (B) Pterygopalatine ganglion
  - (C) Otic ganglion
  - (D) Superior cervical ganglion
  - (E) None of the above
44. Postganglionic fibers of the autonomic nervous system that bring about constriction of the pupil
45. Postganglionic parasympathetic secretomotor fibers that regulate lacrimal gland secretion
46. Parasympathetic secretomotor fibers that supply the parotid gland
47. Sensory fibers that convey taste from the anterior two-thirds of the tongue

## Questions 48-50

A patient was brought into the emergency room with an attack of paroxysmal tachycardia. The heart was restored to normal sinus rhythm by the resident physician as a result of simple massage of the region superficial to the carotid sinus.

For each cardiac reflex described, select the nerves that are most closely involved.

- (A) Cardiac nerves arising from the cervical sympathetic chain
- (B) Glossopharyngeal nerves
- (C) Vagus nerves
- (D) Hypoglossal nerves
- (E) Inferior roots of the ansa cervicalis

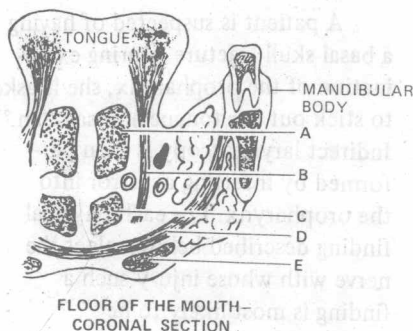
48. The nerve that primarily contains the afferent component of the cardiac reflex responsible for slowing the heart

49. The nerve a branch of which constitutes the efferent component of the cardiac reflex that slows the heart

50. The nerve excessive activity of which may contribute to tachycardia

## Questions 51-55

For each nerve-muscle-action that follows, from the diagram below choose the lettered anatomic structure with which it is most closely associated.



- 51. The muscle that is innervated by the motor root of the trigeminal nerve and elevates the tongue
- 52. The muscle that is innervated by the motor root of the trigeminal nerve and assists in lowering the jaw
- 53. The muscle that is innervated by the hypoglossal nerve and protrudes the tongue
- 54. The muscle that is innervated by the hypoglossal nerve and depresses the tongue
- 55. The muscle that is innervated by the superior ramus of the ansa cervicalis (C1-C2) and assists in lowering the jaw