



## QUIZ INSTRUCTIONS

Read the article

Complete the quiz – Select the option that **best** answers the question

Number of questions – 20

Passing grade –70%

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## QUIZ

### Pupil Testing in the Optometric Practice

1. Which of the following statements is FALSE?
  - a) Pupillary evaluations are one of the few objective reflexes that detect and quantify neural abnormalities.
  - b) Pupil abnormalities do little to help aid in the diagnosis and management of many ophthalmic conditions.
  - c) Pupil abnormalities can reveal serious neuro-ophthalmic disease and help aid in the diagnosis and management of many ophthalmic conditions.
  - d) Pupillary dysfunction can help detect abnormalities of the retina, optic nerve, optic chiasm, optic tract, midbrain, and/or peripheral nerves.





2. Which of the following statements is FALSE?
  - a) The pupil is a hole in the center of the iris.
  - b) The iris contains two groups of smooth muscle.
  - c) The pupil improves vision by decreasing irregular refraction from the peripheral cornea and allows passage of aqueous humor from the posterior to anterior chamber.
  - d) The pupil consciously and voluntarily controls how much light enters the eye.
  
3. Which of the following statements is TRUE?
  - a) The sphincter pupillae is a radially oriented muscle at the pupillary margin which constricts the pupil.
  - b) The dilator pupillae is a circularly oriented muscle which causes dilation of the pupil when it is constricted.
  - c) When illumination is dim, the radial dilator pupillae muscle constricts and pulls the pupil open (mydriasis) while the sphincter pupillae relaxes.
  - d) When illumination is bright, the radial sphincter pupillae muscle constricts and the pupil becomes smaller (mydriasis) while the dilator pupillae relaxes.
  
4. Which of the following is TRUE?
  - a) The amount of light entering the eye is the main source of input which balances the sympathetic and parasympathetic innervation of the iris muscles.
  - b) Pupil size is not influenced by accommodation, viewing distance, the patient's mood, alertness, cognitive load, and any drug use.
  - c) The pupillary response summates the light intensity received by the entire retina equally.
  - d) The average pupil size in normal illumination is about 6mm





5. Which of the following is FALSE?
- a) A pupil smaller than 2.0mm is considered miotic (small).
  - b) A pupil larger than 7.0mm is considered mydriatic (large).
  - c) The autonomic nervous system supplies innervation to smooth muscles and glands and unconsciously regulates body function and the internal organs.
  - d) Senile mydriasis is the gradual decrease in pupil size with age due to a higher rate of atrophy of the dilator pupillae vs. sphincter pupillae muscles.
6. Which of the following is FALSE?
- a) The iris dilator has more powerful and active control of pupil size than the iris sphincter.
  - b) The parasympathetic system is responsible for stimulation of the 'feed, breed, rest, and digest' responses such as stimulating saliva flow, slowing heart rate, constricting bronchi, stimulating bile release, bladder constriction, and pupil constriction.
  - c) The sympathetic nervous system stimulates the 'fight or flight' responses such as accelerating the heartbeat, dilating bronchi, inhibiting gastrointestinal peristalsis, converting glycogen to glucose, secreting adrenaline, inhibiting bladder constriction, and pupil dilation.
  - d) The iris sphincter has more powerful and active control of pupil size than the iris dilator.
7. Which of the following is FALSE?
- a) The parasympathetic pupillary pathway has an afferent component (moving from the eye to the brain).
  - b) The sympathetic pupillary pathway has an afferent component (moving from the eye to the brain).
  - c) The parasympathetic pupillary pathway has an efferent component (moving from the brain back to the eye).
  - d) The sympathetic pupillary pathway has an efferent component (moving from the brain back to the eye).





8. Which of the following is FALSE?
- a. When the retina is stimulated by the light, it transduces the light image into electrical pulses via the retinal rods and cones in the retina.
  - b. The electrical signal from the rods and cones moves forward in the retina to the ganglion cells.
  - c. The ganglion cell axons move the information into the optic nerve, bifurcate at the chiasm, and then move towards the brain.
  - d. From the optic nerve, fibers travel straight to synapse in the visual cortex in the occipital lobe.
9. Which of the following is TRUE?
- a. At the optic chiasm, the parasympathetic nerve fibers bifurcate allowing the nasal fibers from the right eye to move into the left optic tract and the nasal fibers from the left eye to move into the right optic tract.
  - b. At the optic chiasm, the sympathetic nerve fibers bifurcate allowing the nasal fibers from the right eye to move into the left optic tract and the nasal fibers from the left eye to move into the right optic tract.
  - c. From the optic tract, visual ganglion cell fibers break off to synapse primarily at lateral geniculate nucleus in the thalamus and then move to the pretectum in the midbrain for pupillary control.
  - d. Once the parasympathetic pupillary fibers synapse at the pretectal nuclei, they move to synapse at the Edinger-Westphal (EW) nuclei of the oculomotor nerve (cranial nerve three) without bifurcation.



10. Which of the following is TRUE?

- a. After synapsing at the Edinger-Westphal nuclei, the efferent parasympathetic fibers bifurcate a second time and travel back towards the orbit and synapse at the ciliary ganglion.
- b. From the ciliary ganglion, the efferent parasympathetic fibers run with the short ciliary nerves. 3% of the fibers go on to innervate the ciliary body to stimulate accommodation and 97% of the fibers go on to innervate the iris sphincter pupillae muscles to stimulate pupil constriction.
- c. From the ciliary ganglion, the efferent parasympathetic fibers run with the short ciliary nerves. 97% of the fibers go on to innervate the ciliary body to stimulate accommodation and 3% of the fibers go on to innervate the iris sphincter pupillae muscles to stimulate pupil constriction.
- d. If the pupil responds normally to light, the pupillary near response may still be abnormal.

11. Which of the following is FALSE?

- a. The iris sphincter has more powerful control of the pupil size than the dilator muscles.
- b. When illumination increases or the near reflex is stimulated, the parasympathetics cause a constriction of the iris constrictor and miosis of pupils size.
- c. Once a light or near stimulus is dampened or removed, the parasympathetic signal dampens and the sympathetics become activated causing an increase in pupil size.
- d. The iris sphincter and the dilator muscles have equal control of pupil size

12. Which of the following is TRUE?

- a. The sympathetic pupillary pathway is an efferent only pathway and 1 bifurcation.
- b. The sympathetic pupillary pathway is an efferent only pathway and has no bifurcation.
- c. The sympathetics dampen during situations such as intense concentration, fright, and arousal.
- d. The sympathetic pupillary pathway starts at the retina.



13. Which of the following is FALSE?

- a. From the hypothalamus, the 1st order sympathetic neurons descend through the brainstem on the right and left side with no bifurcation and synapse at the ciliospinal center at the level of spinal cords C8-T1.
- b. The 2nd order neurons exit the spinal cord and passes over the apex of the lung and go up to synapse at the superior cervical ganglion.
- c. Inside the cavernous sinus, the fibers meet with the ophthalmic division of the 3rd cranial nerve (CN 3) and the ophthalmic artery.
- d. After synapsing at the superior cervical ganglion, the 3rd order neurons form a plexus mesh around the internal carotid artery and run along the internal carotid artery into the cavernous sinus.

14. Which of the following is FALSE?

- a. Physiologic anisocoria is a normal difference in pupil diameter in 20% of the population where the difference in pupil size does not exceed 1.0mm and is the same in all illumination.
- b. Interruption of the ocular sympathetic pathway results in contralateral miosis, ptosis, and facial anhidrosis.
- c. Interruption of the ocular sympathetic pathway results in ipsilateral miosis, ptosis, and facial anhidrosis.
- d. Non-physiologic anisocoria is usually the result of an iris innervation or efferent pathway problem but can also be due to previous trauma or surgery, ocular inflammation, or iris synechia.





15. Which of the following is TRUE?

- a. If the anisocoria appears to worsen in bright illumination and improves in dim illumination, that suggests an impairment of the oculo-sympathetic nervous system and the smaller pupil is the irregular one.
- b. If the anisocoria appears to worsen in dim illumination and improves in bright illumination, that suggests an impairment of the oculo-sympathetic nervous system and the smaller pupil is the irregular one.
- c. If anisocoria appear to worsen in bright illumination and improves in dim illumination, that implies that the iris sphincter is not functioning and the smaller pupil is the irregular one.
- d. If the anisocoria appears to worsen in dim illumination and improves in bright illumination, that suggests an impairment of the iris dilator and the larger pupil is the irregular one.

16. Which of the following is FALSE?

- a. The most common causes of an anisocoria worse in bright illumination is pharmacologic agents, Argyll-Robertson pupil, and Horner's syndrome.
- b. The most common causes of anisocoria worse in bright illumination is pharmacologic agents, injury to the sphincter muscle, Adie's tonic pupil, and cranial nerve 3 palsy.
- c. Apraclonidine can help identify if a patient has Horner's syndrome. One drop of 0.5% or 1% will have no effect on a normal pupil's size but will dilate a Horner's syndrome pupil by 1.0mm or more.
- d. If the Horner's syndrome persists, a daily 1.0-2.5% phenylephrine drop can be used to cosmetically resolve the anisocoria by slightly dilating the pupil.

17. Which of the following is TRUE?

- a. In an oculomotor nerve palsy, the patient will exhibit small ptosis and an eye that appears to be positioned down and out.
- b. Since the efferent CN 3 fibers bifurcate, a CN 3 palsy results in contralateral ptosis, hypotropia and exotropia, and an inability of the pupil to constrict with poor accommodation.
- c. A recent onset oculomotor nerve palsy with a dilated pupil should be monitored in a few months in conjunction with a neurologist.
- d. The 3rd cranial nerve innervates the levator palpebrae superioris muscle in the upper eyelid and 4 of the 6 extraocular muscles.





18. Which of the following is FALSE?

- a. An afferent pupillary defect will not cause anisocoria in normal illumination.
- b. A light shone into the right eye will produce an equal direct constriction in the right eye and an equal consensual constriction in the left eye in a normal patient.
- c. Pupillary testing involves evaluation of pupil size in light and dim illumination, pupil shape, location, and the strength of the direct pupillary light response compared to the strength of the consensual pupillary light response in the same eye.
- d. A light shone into the right eye will produce a greater constriction in the right eye than the left eye in a normal patient.

19. Which of the following is TRUE?

- a. Pupil size should not be measured using a millimeter ruler.
- b. Previous surgery or trauma, ocular inflammation, iris atrophy, ocular ischemia, posterior synechiae, or congenital iris disorders do not produce non-round pupillary shape.
- c. If a ruler is being used to measure pupil size, the provider should have the patient take off their glasses and look straight ahead. The provider should stand to the side and present the ruler at the center of the pupil to measure pupil size.
- d. If a ruler is being used, the provider should have the patient take off their glasses and look straight ahead. The provider should stand to the side and present the ruler either on the temporal side or underneath the iris the patient's visual axis to measure the pupil size.







20. Which of the following is FALSE?

- a. To perform a swinging flashlight test, hold a light on eye A for 2 seconds and then quickly move the light to eye B. Move the light in a slight downward 'U' motion to avoid stimulating accommodation by moving directly across the visual axis. Hold the light on eye B for 2 seconds while still observing eye A. Move the light back to eye A and observe eye A. Repeat this 2-3 times and look for a constant and equal amount of pupillary constriction in eye A during direct and consensual responses. Repeat for eye B.
- b. If there is only one functioning (due to trauma, surgery, or pharmacologic effect) or only one visible (corneal edema or scar) pupil, a RAPD / Marcus Gunn evaluation cannot be performed.
- c. During APD testing, you are comparing the strength of the direct pupillary light response to the strength of the consensual pupillary light response in the *same eye*.
- d. APD testing performs a relative comparison between the direct and consensual responses and is looking for damage at or before the midbrain.

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