NEURO UNIT 2
EXPLAINED ANSWERS TO PRACTICE QUESTIONS

TABLE OF CONTENTS

UHLRICH

Vision: Gross Structure of the Eye

1. Which of the following statements about the organization of the eye is **TRUE**?
A. FALSE light rays have to pass through the cornea and the anterior chamber (filled with aqueous humor) before reaching the lens
B. FALSE the pupil lies in front of the lens
C. FALSE the posterior chamber is the space between the back of the iris and the lens; filled with aqueous humor
D. TRUE
E. FALSE the shape of the lens is under neural control

2. Which of the following statements about fluids in the eye is **TRUE**?
A. FALSE the cells of the retina are not in contact with the aqueous humor but are in contact with the vitreous humor
B. FALSE The vitreous is a transparent, colorless mass of soft, gelatinous material
C. TRUE the ciliary body is a vascular structure of the eye that secretes the transparent aqueous humor and contains the ciliary muscle, responsible for changing the lens shape
D. FALSE just the opposite
E. FALSE the posterior chamber is filled with aqueous and lies between the iris and the lens

Vision Image Formation: Optics, Lens and Accommodation

1. Which of the following pairs is **INCORRECT**?
A. TRUE if a distant object is in focus on the retina when the ciliary muscle is relaxed, then the power of the optical system matches, or is appropriate for, its length. This condition is termed emmetropia.
B. TRUE and the image is focused in front of the retina. The power of the eye is too great for the length.
C. FALSE presbyopia=stiffening of the lens with age, leading to inability focus **near** objects
D. TRUE and the image is focused behind the retina. The power of the relaxed eye is too low for the length of the eyeball.
E. Huh?

2. Which of the following statements related to the lens is **TRUE**?
A. FALSE primary innervation is parasympathetic
B. FALSE most of the bending of the light rays is done by the cornea
C. FALSE when the ciliary muscle contracts, tension is taken off of the zonule fibers and the lens is able to round up (which it wants to do!).. The capsule around the lens is elastic.
D. TRUE as it rounds up (as tension is taken off the capsule) its curvature increases and the light rays are deflected more
E. FALSE see D

3. What type of lens would you prescribe for a hyperopic patient?
A. TRUE in hyperopia the power of the relaxed eye is too low for the length of the eyeball and the image is focused behind the fovea. A convex lens will converge the light rays to focus the image
B. FALSE see A
C. FALSE
D. FALSE
E. FALSE

Vision Image Formation: The Iris and Pupil

1. Which of the following is **NOT** an advantage of having a constricted pupil?
A. TRUE depth of field is the distance an object can be moved and still be in focus. It deals with the range of acceptable object distances that can be classed as "in focus" when the eye is accomodated to focus on a particular spot. Closing down the pupil decreases the diameter of the spot of light rays falling on the fovea and thus two different points (one further away than the other) are still sharp enough to decipher.
B. FALSE you need the pupil to be wider in dark conditions, not smaller
C. TRUE a smaller pupil=less spherical aberration=sharper image.
D. TRUE
E. See B

2. Both pupils of Mitsy and the dog Bitsy are dilated, even in daylight. Mitsy and Bitsy claim that they were simply drawn that way. Which of the following is also possible?
A. FALSE when you accommodate, the pupils constrict
B. FALSE the parasympathetic system constricts the pupil; sympathetic=dilates
C. FALSE descending autonomics ("etc" of ALS, etc)=sympathetic; lesion=constricted pupils
D. TRUE noradrenerci (norepinephrine) agonist=sympathetics increased=dilated pupils
E. FALSE Only D

3. Which of the following will result in the *complete* loss of pupillary constriction in the <u>right</u> eye when light is directed in the <u>left</u> eye?
A. FALSE lesion of **left** EW=**left** eye is dilated and will not constrict to light presented in either eye
B. FALSE lesion of **right** optic nerve=light cannot get in from **right** eye. Lesion left optic tract=no affect on pupillary light reflex since fibers to EW are not interrupted**.**
C. TRUE lesion of **right** oculomotor nerve=no way right eye will constrict to light shone into either eye
D. lesion of PC=interrupt each pretectal input to contra. EW. Information from each eye has access to both EWs. Draw it!!!
E. FALSE Only C

4. Let's try another one. After which of the following lesions will you still observe <u>bilateral</u> constriction of the pupils when light is shone in the <u>right</u> eye?
A. TRUE a lesion of the right OT=shine light into the right eye and the light stimulus can still reach the left PT and from there both EWs.
B. FALSE lesion of PC and left PT=light into right eye can only reach right PT and right EW. Light into left eye can only reach right PT and right EW
C. FALSE lesion of left ciliary ganglion=no constriction of left eye
D. TRUE like a lesion of the OT=normal
E. TRUE see A and D

5. Let's put the lens and pupil together. Which of the following results from activation of the parasympathetic innervation of the eye?
A. FALSE close objects will come into sharp focus
B. FALSE when they contract they take the tension off of the zonule fibers and let the lens round up
C. FALSE para=constrict; sym=dilate
D. FALSE constrictor (sphincter) pupillae contracts
E. TRUE miosis=constriction; mydriasis=dilation Both classic…….

Retinal Structure and Function

1. Matching:
A/5 Muller cell bodies sit in the inner nuclear layer. They are the principal glial cell of the retina. They form architectural support structures stretching radially across the thickness of the retina and forming the limits of the retina at the outer and inner limiting membrane respectively.
B/4 Ganglion cells make the innermost (toward the vitreous) cell body layer of the retina
C/7 The stacks of discs containing visual pigment molecules in the outer segments of the photoreceptors are constantly renewed. New discs are added at the base of the outer segment. At the same time old discs are displaced up the outer segment and are pinched off at the tips and engulfed by the apical processes of the retinal pigment epithelium. These discarded, spent discs become known as phagosomes in the pigment epithelial cells. They are then broken down by lysis.
D/3 .The photoreceptors, rods and cones, are located in the outermost (next to the retinal pigmented epithelium versus the vitreous) layer of the retina.
E/8 The optic disk (or optic nerve head, papilla) is the entrance of blood vessels and optic nerves from the brain to the retina. The absence of the receptor in this area results in the so-called blind spot in human vision. The inner part of eye's posterior portion, including the optic disk, the fovea, the retina and the distributing blood vessels is called the fundus.
F/2 horizontal cells are found in the inner nuclear layer (layer of bipolar cells). They accumulate information from a wide field of cones. They can influence bipolar cells either directly or by feeding back information to the cones, probably both.
G/6 the ganglion cells take their input via synapses in the inner plexiform layer (IPL). Ganglion cell dendrites join there with axons from bipolar cells. The bipolar cells are neurons whose cell bodies comprise the inner nuclear layer (INL). Integrator neurons (the horizontal and amacrine cells) also have their bodies in the inner nuclear layer. The horizontal cells have been mentioned above (**F/2**). Amacrine cells are so named because they are nerve cells thought to lack an axon. They lie in the inner nuclear layer but are synaptically active in the inner plexiform layer (IPL); they serve to integrate and modulate the visual message presented to the ganglion cell.
H/1 ganglion cell axons convey the neural output of the retina

2. TRUE or FALSE:
A. FALSE the choroid is the middle layer of the eyeball. It is the tissue layer in between the sclera and retina and has several layers of blood vessels of varying sizes. It is also heavily pigmented so as to prevent light from reaching the retina. The choroid, along with the iris and ciliary body are also referred to as the uvea. Inflammation in any of these structures is called uveitis.
B. TRUE
C. TRUE
D. TRUE
E. FALSE the ganglion cell axons pass through the multiple fenestrations of the lamina cribrosa, which is formed by connective tissue continuous with the surrounding sclera and distal dura mater of the optic nerve

3. The reason that ganglion cell axons are not myelinated within the eye is:
A. FALSE myelinated fibers are faster conducting than unmyelinated fibers
B. FALSE (JKH note: There is spatial and temporal summation in the retina. Spatial summation is the process by which neural signals from neighboring retinal areas are combined, thereby increasing sensitivity. In contrast, temporal summation is the process by which signals from a neuron or neurons are accumulated over time, thereby increasing sensitivity. **This is beyond what you need to know. The bottom line is that these two phenomena do not depend on ganglion cell axons being unmyelinated**.)
C. FALSE photoreceptors have graded responses; gradual increases in light intensity have gradual effects on neurotransmitter release. **Again, The bottom line is that this has nothing to do with ganglion cell axons being unmyelinated.**
D. TRUE
E. Like B and C?

4. Match each characteristic to either RODS or CONES:
A. RODS
B. CONES
C. RODS
D. CONES
E. RODS
F. RODS
G. CONES
H. CONES
I. CONES
J. CONES
K. RODS 120 million rods to 6 million cones

5. The **FOVEA** is associated with which of the following characteristics (more than one answer is correct):
A. FALSE only cones in the fovea
B. FALSE area of sharpest vision does not need to be cluttered with blood vessels
C. TRUE lots of cones
D. TRUE fovea means “pit” in Latin. It is about 1 mm in diameter and 0.2 mm thick.
E. TRUE
F. FALSE in the normal eye, the intraocular pressure (IOP) is maintained by the exact balance between the continuous production of aqueous humour (by the ciliary body) and its drainage via the trabecular meshwork and underlying canal of Schlemn.
G. FALSE a stimulus in the periphery would not fall on the fovea but on more peripheral retina.

6. Name the site of acquisition of myelin by axons in the visual path:
A. FALSE myelin at this level would not maintain the transparency needed
B. FALSE myelin at this level would not maintain the transparency needed
C. FALSE the macula lutea (yellow spot; the yellow pigment comes from the carotenoids lutein and zeaxanthin) contains the fovea in its center. Myelin here would not maintain the transparency needed.
D. TRUE
E. FALSE see C
F. FALSE

7. A patient has lost all the rods in her retina. Which of the following statements regarding her condition is **TRUE**?

A. FALSE three classes of cones confer humans with color vision
B. FALSE rods are most numerous in the parafovea
C. TRUE 120 million rods versus 6 million cones
D. FALSE rods=scotopic (night time); cones=photopic
E. FALSE Only C

8. Which of the following statements is **TRUE**?

A. TRUE (JKH note you might want you to read this verbatim paragraph from the www. "Light at various wavelengths is capable of very damaging effects on biological machinery. The retina, besides being an extremely sophisticated transducer and image processor, is clearly designed to withstand the toxic and heating effects of light. The eye is well equipped to protect the retina against radiation we normally encounter in everyday life. Besides the almost complete exclusion of ultraviolet radiation by the cornea and the lens together, the retina itself is endowed with a number of additional mechanisms to protect against such damage: The retinal pigment epithelium produces substances which combat the damaging chemical by-products of light radiation. The retinal pigment epithelium plays an essential part sustaining the photoreceptors. This includes recycling and metabolizing their products, thereby renewing them in the face of continual wear from light bombardment. The central retina is permeated with xanthophyll pigment which filters and absorbs short-wavelength visible light. The photoreceptors thus need to be in intimate contact with the retinal pigment epithelium, which is opaque. The retinal pigment epithelium, in turn, needs to be in intimate contact with the choroid (also opaque) both to satisfy its nutritional requirements and to prevent (by means of the heat sink effect of its massive blood flow) overheating of the retina from focused light. If the human retina were 'wired' the other way around (the verted configuration), as evolutionists such as Dawkins propose, these two opaque layers would have to be interposed in the path of light to the photoreceptors which would leave them in darkness! Thus I suggest that the need for protection against light-induced damage, which a verted retina in our natural environment could not provide to the same degree, is a major, if not *the* major reason for the existence of the inverted configuration of the retina. Paul Gurney, "Is our 'inverted retina' really 'bad design'?

B. FALSE the optic disc lies in the nasal retina and temporal visual field
C. FALSE there are no receptors at the optic disc, only exiting ganglion cell axons
D. FALSE the foveal pit should not be confused with the optic disc
E. FALSE

9. Let's try another one on rods and cones. Which of the following statements is **FALSE**?

A. TRUE 120 million rods to 6 million cones
B. FALSE there are no receptors at the optic disc
C. TRUE **c**ones=**c**olor
D. TRUE
E. TRUE rods=convergence

Vision -Central Visual Pathways

1. Which of the following statements about visual fields is **FALSE**?
A. TRUE Let's take it an eye at a time! The part of the right retina that "looks" at the binocular part of the left visual field is the temporal retina and this retina looks at the nasal visual field. Keep in mind that the nasal visual field of the right eye is actually to left of the nose!! So, the first part of response A is correct. Now, the part of the left retina that "looks" at the binocular part of the left visual field is the nasal retina and this retina looks at the temporal visual field. . Keep in mind that the temporal visual field of the left eye is to the right of the nose!! Therefore, the second part of response A is also correct. It may be easier to understand if you look at the module's visual field diagrams.
B. TRUE
C. TRUE the temporal retina of the left eye looks at much of the visual field that lies to the right of the nose. This same region is also looked at by the nasal retina of the right eye=binocular field
D. FALSE lets go back to C for an example. The temporal retina of the left eye looks at much of the visual field that lies to the right of the nose. This same region is also looked at by the nasal retina of the right eye=binocular field. The most peripheral part of this right visual field is looked at only by the right nasal retina=monocular zone. You know that the nasal retina looks at the **temporal visual field**. Again, look at the diagrams.
E. TRUE It doesn't have the nose to get in the way!

2. Identify the following:
A. striate cortex: same as area 17 or primary visual cortex. Lies in the occipital lobe. It is so named because of the myelinated stripe in layer IV.
B. retinotopic organization of LGB and visual cortex: the preservation in central visual structures of the topographical organization found in the retina wherein adjacent cells "see" adjacent points in visual space
C. calcarine sulcus: the medial surface of the occipital lobe is characterized by the deep calcarine sulcus or fissure which begins at the occipital pole and turns forward towards the corpus callosum. The small group of gyri superior to the calcarine sulcus are collectively called the **cuneus** gyrus and the large triangular gyrus inferior to the calcarine fissure is called the **lingual** gyrus. The cortex immediately superior (above) and inferior (below) to the calcarine sulcus forms the primary visual cortex **(**striate cortex; Brodmann's area 17) on the medial bank of occipital cortex. The lower visual field is represented in the cuneus and upper in the lingual (target of Myer's loop). The cuneus and lingual are also referred to the "upper" and "lower" banks of the calcarine s respectively.
D. scotoma: a "hole" or blind spot in the visual field.
E. diplopia: double vision
F. homonymous hemianopsia: hemi-visual field defects in the temporal field of one eye and the nasal field of the other (e.g., deficit in the left visual fields of both eyes).
G. LGB: the site in the thalamus where retinal axons synapse on thalamic relay neurons that project to primary visual cortex. A laminated structure, LGB "looks" at the contralateral visual hemi-field and the nucleus as a whole receives input from both eyes, but individual neurons have monocular receptive fields.
H. Meyer's Loop: formed by the fibers of the optic radiations that dip down into the temporal lobe before swinging back kup towards visual cortex. Lesions in this region of the temporal lobe produce upper quadrant hemianopsia. The loop terminates in the lower (lingual) bank of the calcarine.
I. Optic nerve=the bundle of retinal ganglion cell axons from the eye to the optic chiasm, contains axons from only one eye. **Optic tract**=retinal ganglion cell axons running from the optic chiasm to the LGB, contains axons from both eyes

3. What visual field defects result from lesions at the following sites?
A. right optic tract—**left homonymous hemianopsia**
B. right LGB—**left homonymous hemianopsia**
C. left optic nerve—**blindness in left eye**
D. fibers crossing at the optic chiasm—**bitemporal hemianopsia**
E. Meyer's loop in left temporal cortex—**right upper quadrant hemianopsia**

4. Which of the following statements about the central visual pathways is **TRUE**?
A. FALSE "central" means toward the LGB and visual cortex (from the chiasm). The *left* LGB and left area 17 look at the *right* half of the binocular visual field (they also can see the right monocular segment)
B. FALSE the LGB is thought to project directly to only area 17
C. TRUE you do not get a scotoma from such lesions
D. FALSE all visual structures exhibit retinotopic organization
E. FALSE Only C
5. Which of the following lesions and visual field deficits are paired **INCORRECTLY**?
A. TRUE
B. TRUE
C. TRUE classic National Board!
D. FALSE lesion of crossing fibers=bilateral loss of information from nasal retinae=bilateral loss of **temporal** visual fields
E. TRUE

6. Which of the following statements about the central visual pathways is/are **TRUE**?
A. FALSE the opposite: axons from temporal retinas=uncrossed, nasal retinas=crossed
B. TRUE axons arising from cells in the LGB and heading for area 17 of the cerebral cortex travel in the retrolenticular limb of the internal capsule.
C. FALSE the LGB as a whole receives input from both eyes (is binocular). However, cells in each of he six layers receive input from only **ONE** eye (layers and cells are monocular). Classic you know what!
D. FALSE all of the circuitry necessary for the pupillary light reflex is intact with an area 17 lesion! There is a scotoma but a normal pupillary light reflex. The cortex does not perceive light in the area of the scotoma but the light information from the area not perceived by cortex still reaches all of the necessary structures for the reflex; the reflex is kind of dumb!
E. FALSE neurons in the lateral geniculate nucleus send their axons the *ipsilateral* occipital cortex

HEATLEY

Vision–Function Testing

1. Which of the following statements is **TRUE?**
A. TRUE
B. FALSE the size of the smallest letter clearly seen by the patient with normal visual acuity would be 10 times *smaller* than……
C. FALSE the patient with 20/200 vision would need to *2 feet* from the eye chart to see the smallest letter on the eye chart seen clearly by a patient with 20/20 vision standing 20 feet from the eye chart
D. TRUE
E. TRUE see A and D

2. Which of the following statements is **TRUE?**
A. FALSE just the opposite is true. Central retina exhibits greater sensitivity
B. TRUE nasal retina sees temporal visual field
C. FALSE they exit nasal to the fovea
D. FALSE there will be a hole reflecting the damaged area
E. FALSE there will be a diffuse affect involving the entire hill of vision

3. Which of the following statements is **TRUE?**
A. FALSE it lies at the top of the hill of vision
B. FALSE one eye at a time
C. TRUE the top of the hill represents the sensitivity of the fovea/central vision
D. FALSE the Goldman visual field test does not use computerized stimuli and is thus not the most accurate method
E. FALSE his/her vision is 20/4

4. Which of the following statements is **TRUE?**
A. TRUE
B. FALSE light reaching left eye reaches both PTs and each PT projects to both EWs
C. FALSE light reaching right eye reaches both PTs and each PT projects to both EWs
D. FALSE there are no direct retinal projections to the EW; need to go through the PTs!
E. FALSE there are no direct retinal projections to the EW; need to go through the PTs!

5. Which of the following statements is **TRUE** regarding the effects of a lesion of the right optic nerve? The nerve is completely degenerated.
A. FALSE the pupils will be the same size. Light from the left eye is reaching both PTs and both EWs are fine. The two EWs are receiving the same strength of signals from the PT(s). The efferents of the circuit (EW on out) need to be damaged for pupil asymmetry.
B. FALSE see A
C. FALSE you start out with the pen light in front of the left eye=both eyes constricted. Swing light to the right eye and no light will get into the system=both pupils will dilate
D. FALSE see A
E. TRUE you start out with the pen light in front of the left eye=both eyes constricted. Swing light to the right eye and no light will get into the system=both pupils will dilate (change)

6. Which of the following statements is **TRUE** regarding the Relative Afferent Pupillary Defect?
A. TRUE let's say there is a lesion of the right optic nerve. You start out with the pen light in front of the left eye=both eyes constricted. Swing light to the right eye and no light will get into the system=**BOTH** pupils will dilate. You start out in front of the right eye and both pupils are dilated. You swing the pen light to the left eye and **BOTH** pupils constrict
B. FALSE to have the RAP there needs to be a change as you go back and forth between the two eyes
C. FALSE let's say there is a lesion of the right CNIII. The right pupil will be dilated to begin with and will not change when the light is swung between the two eyes. Just as important, the left eye will stay the same size as the light swings between the two eyes.
D. FALSE these are the exact places where lesions will result in a RAPD. The lesion in the retina needs to involve more than 50%.
E. FALSE a pen light?

Vision-Visual Disease States

1. Which of the following statements is **TRUE** regarding retinal detachment?
A. FALSE is more common in long/myopic eyes. Elongation l/t weakness and increased risk.
B. TRUE don't confuse this with glare while driving at night which is related to cataract
C. FALSE
D. FALSE retinal detachments involve the sensory retina dissecting from the underlying pigment epithelial layer by subretinal fluid
E. FALSE "alleviates **ANY** shading." You are Pros at answering questions like this!

2. Which of the following statements is **TRUE** regarding the effects of retinal detachment upon the pupillary light reflex?
A. FALSE it does not reduce the amount of light coming into the eye, just the amount of signal about the light that reaches the PTs
B. FALSE needs to be more than 50% for a RAPD
C. FALSE needs to be more than 50% for a RAPD
D. FALSE they will have a RAPD.
E. TRUE what we are trying top say is that just the absence of an observable RAPD does not mean there is no potential for a problem, but if you do have one there is a problem for sure.

3. Which of the following statements is **TRUE** regarding optic nerve avulsion (**major** damage)?
A. FALSE such an association is very likely
B. TRUE
C. FALSE impaired vision is less likely to be missed computer testing
D. FALSE if >50% of the fibers in the optic nerve are damaged there will be a RAPD
E. FALSE

4. Which of the following statements is **TRUE?**
A. FALSE it is *not* common (1:100,000) but does result from aneurysms and tumors
B. FALSE protrusion of the eye can be a presenting sign of fast growing tumors
C. TRUE death of ganglion cells in both *nasal* retina
D. FALSE there are lots of receptors in the fovea and many need to die in order to see a defect
E. FALSE acuity tests test the fovea where lots of cells need to die in order to see a defect

5. Which of the following statements is **TRUE** about compression of the fibers in the optic chiasm by a pituitary tumor?
A. FALSE the crossing fibers in the chiasm arise from the nasal retinas
B. FALSE the crossing fibers in the chiasm arise from the nasal retinas and the nasal retinas look at the temporal visual fields
C. FALSE is the same amount of information coming in from the two eyes? If you swing the pen light between the two eyes, would the pupils remain the same size? (Of course you could aim the light at the "dead" part of one retina and the "live" part of the other and get a RAPD, but only the total light coming into each eye is what you want to test.
D. FALSE the temporal retinas are fine and "see" a major part of the visual world (all except for the two monocular segments!)
E. TRUE

6. Which of the following statements is **TRUE** about the effects of stroke upon visual function?
A. FALSE all of the circuitry for the light reflex is intact with a cortical stroke
B. FALSE where are the cell bodies of the optic nerve? Are they OK?
C. TRUE a major part of occipital cortex is area 17 and thus lesions in this area=scotoma. Such lesions are **less likely** to cause non-visual symptoms such as would occur following lesions in the parietal and temporal lobes.
D. FALSE there is a wide range of clinical symptoms and areas of damage with stroke
E. FALSE because the blood flow to the two sides of the cortex responsible for the two fields of vision comes from two different vessels (i.e. the right and left posterior cerebral arteries) it is highly unlikely that BOTH sides will be equally affected. The pattern that is seen, therefore, is that one HALF of foveal vision can be lost, and the other side is completely normal. With this normal half of foveal function, patients can do
remarkably well on acuity tests.

7. Which of the following associations is **TRUE**?
A. FALSE the "classic" bitemporal (heteronymous; different sides of the visual field in each eye) defect occurs with lesions of the optic chiasm. Homonymous (same sides of the visual field in each eye) occur with lesions of the optic tract, LGB and visual cortex.
B. FALSE see A
C. TRUE see A
D. FALSE can only happen with loss entire retina and complete lesion of the optic nerve
E. FALSE see A

Vision—Other Visual Disease States

1. Which of the following statements is **FALSE** regarding cataract?
A. TRUE the classic "glare while driving at night"
B. TRUE
C. TRUE
D. FALSE there is loss of acuity
E. FALSE This is ARMD

2. Which of the following statements is **TRUE** regarding cataract?
A. FALSE the entire hill is uniformly decreased
B. FALSE with its diffuse effect, cataracts does not decrease the total amount of light striking the retina enough to generate a RAPD
C. FALSE surgery is very common to correct cataract
D. TRUE classic complaint
E. FALSE you are thinking glaucoma!

3. Which of the following statements is **FALSE** regarding age-related macular degeneration (ARMD)?
A. TRUE
B. FALSE only after the process includes loss of large clumps of rods and cones does the patient experience decreased vision.
C. TRUE
D. TRUE the macula is by far the most metabolically active area and wastes build up more here simply because more wastes are produced here
E. TRUE is more than 50% of the retina damaged?

4. Which of the following statements is **TRUE** regarding glaucoma?
A. FALSE results from an *increase* in intraocular pressure
B. FALSE the amount of fluid being created is constant, and normal, but the meshwork cells function poorly and less fluid gets out
C. TRUE
D. FALSE visual acuity is not decreased in glaucoma, at least not until virtually all of the fibers are atrophied, very late in the course of the disease
E. FALSE the longer ganglion cell axons are more sensitive to the compression caused by the increased pressure and they are associated with the peripheral retina.

5. Which of the following statements is **TRUE**?
A. FALSE fovea-related axons are shorter
B. TRUE
C. FALSE longer axons are more sensitive
D. FALSE there are more ganglion cells per given retinal surface area in the central retina than the peripheral retina
E. FALSE do you think early glaucoma=more than 50% of retina damaged?

Vision—Integrative

1. Which of the following visual problems will result in a relative afferent pupil defect?
A. FALSE all of the circuitry underlying the light reflex is intact
B. TRUE if more than 50%
C. FALSE would a patient with bitemporal hemianopsia have one? NO!
D. FALSE would a lesion of the fovea damage more than 50% of the retina? NO!
E. FALSE Unless it's more than 50%. This does happen in glaucoma, but only very late. Clinically, it is an unhelpful way to detect or follow glaucoma.

2. Which of the following statements is **TRUE** about visual acuity?
A. FALSE ganglion cell axons from the periphery are affected early while the central area (=acuity) is fine.
B. FALSE the effect of ARMD on visual acuity is very minimal early in the disease, where only clumps of pigment and waste product called drusen are present. Remember, there are approximately 6 million cones and most of them are in the fovea.
C. FALSE there is a marked loss of acuity in later stages of cataract but the patient *is* affected by bright light situations
D. TRUE
E. FALSE it can be severe in optic nerve compression as long as the ganglion cell axons associated with the fovea are damaged

3. Which of the following statements is **FALSE** regarding the **MECHANISM(S)** involved in visually related defects?
A. TRUE
B. FALSE increased ocular pressure=glaucoma
C. TRUE
D. TRUE
E. TRUE along with aneurysms

4. Which of the following statements is **FALSE** regarding the **SYMPTOMS** associated with visually related defects?
A. TRUE
B. TRUE
C. FALSE decreased eye motility is seen in optic nerve compression
D. TRUE a cortical stroke will usually result in deficits of cortical function like hemiplegia, difficulties in language (aphasias) etc.
E. TRUE

5. Which of the following statements is **TRUE r**egarding findings in the **PHYSICAL EXAM** associated with visually related defect?
A. FALSE cupping=glaucoma
B. FALSE lens opacities=cataract
C. FALSE chiasm lesions= pituitary tumors and ant. communicating artery aneurysms
D. TRUE
E. algae in gentle wave=retinal detachment

7. Which of the following lesions will result in a retinal afferent pupil defect?
A. FALSE remember, the pretetcum on each side has bilateral projections to the EW. The amount of light reaching the intact PT from each eye is the same.
B. FALSE the amount of light reaching the PT on the side of the intact OT is the same for each eye; the pretectum on each side has bilateral projections to the EW
C. FALSE all of the circuitry necessary for the light reflex, from the retina to the EW, is intact and healthy
D. FALSE all of the circuitry necessary for the light reflex, from the retina to the EW, is intact and healthy
E. FALSE all of the circuitry necessary for the light reflex, from the retina to the EW, is intact and healthy
F. FALSE the same amount of light from both eyes reaches PTs
G. TRUE this and a major retinal problem=RAPD