Optometry
COT
JCAHPO Certified Ophthalmic Technician (COT)

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Question: 1

All of the following are symptoms of systemic toxicity except:

A. Flushing red
B. Dry mouth
C. Rapid pulse
D. Eye redness

Answer: D

Explanation:
Systemic toxicity refers to symptoms that affect the entire body, typically resulting from exposure to toxic substances, medications, or certain medical conditions. These symptoms are indicators that the body's normal functioning is compromised by a toxic agent that is impacting multiple systems or organs. Common symptoms of systemic toxicity include flushing or reddening of the skin, dry mouth, irregular or rapid pulse, hallucinations, difficulty speaking, and loss of coordination. Each of these symptoms can indicate that the toxic agent has affected various systems such as the cardiovascular, nervous, or integumentary systems.
Flushing or reddening of the skin occurs when blood vessels dilate, often due to an inflammatory response or direct effect of a toxin on the vascular system. Dry mouth happens when there is decreased saliva production, which may be influenced by systemic agents affecting glandular function or signaling pathways that control fluid secretion. An irregular or rapid pulse can result from toxins affecting heart function or signaling pathways that regulate cardiac rhythm. Hallucinations and difficulty speaking suggest that the central nervous system is compromised, either through direct neurotoxic effects or through secondary effects like poor oxygenation or altered neurotransmitter levels. Loss of coordination also points to neurotoxic impacts, affecting the brain's ability to control body movements.
However, eye redness, although a common symptom in various conditions, does not typically indicate systemic toxicity. Eye redness is usually localized, often resulting from irritation, infection, or allergies affecting the eye itself. Conditions like conjunctivitis, dry eyes, or mechanical irritation are common causes of eye redness and do not necessarily relate to systemic toxicity. Therefore, in the context of identifying symptoms that are exclusively indicative of systemic effects, eye redness does not fit the profile and is considered an exception.
It is crucial for healthcare providers to recognize these symptoms early, especially in vulnerable populations such as patients with Down Syndrome and children, who may have different thresholds for exposure and response to toxic substances. Being vigilant about these symptoms can help in timely intervention and management of potential toxic exposures, thereby preventing further complications or severe systemic effects.

Question: 2

Which best describes binocular vision?

A. The ability to use both eyes to correctly perceive an object
B. The coordinated use of the two eyes to produce individual mental images
C. The ability to use both eyes simultaneously to focus on and fuse two images into a single image for a correct interpretation
D. The visual alignment of both eyes so that the image appears simultaneously in the center of each fovea

Answer: C

Explanation:
Binocular vision is the ability to use both eyes simultaneously to focus on and fuse two images into a single image for a correct interpretation. This capability is a key aspect of human vision that provides several advantages over monocular (single-eye) vision.
In binocular vision, each eye captures its own slightly different image due to the horizontal separation of the eyes on the face. This difference in perspective between the two images is known as binocular disparity. The brain processes these two images, merging them into one cohesive visual scene. This process, known as stereopsis, enables depth perception or the ability to perceive the three-dimensional structure of objects and the spatial relationship between them.
The coordination between the eyes is achieved through a complex system of muscles that control eye movements and positioning. This allows both eyes to focus on the same point in space, aligning the images projected onto the retinas of each eye. When this alignment is not perfect, it can lead to issues such as double vision or binocular confusion, where the brain struggles to merge the two images into a single coherent one.
Furthermore, binocular vision enhances the field of view and improves visual acuity. The overlapped field of view provides a wider angle of perception, and the brain's ability to combine images increases the detail and sharpness of the perceived image.
In summary, binocular vision is not merely about using two eyes; it's about the sophisticated coordination and processing that allows for depth perception, enhanced field of view, and improved clarity. This ability plays a crucial role in tasks that require precise depth judgments, such as driving, sports, and various forms of manual operations.

Question: 3

Having the patient look down when you instill topical anesthetics might be advantageous because

A. the drop will sting less
B. the drop will be distributed over the cornea
C. the drop will stay on the eye longer
D. the tears will not dilute the solution

Answer: B

Explanation:
When administering topical anesthetics or other eye medications, the position in which the patient holds their eyes can significantly affect the distribution and effectiveness of the drop. One

recommended technique is to have the patient look down at the time of instillation. This approach has several advantages related to the mechanics of how the eye responds and how the medication covers the eye surface.
Firstly, when the patient looks downward, the natural anatomy of the eye facilitates the upward rolling of the eyeball during blinking. This automatic movement occurs because, as the upper eyelid closes, it pushes the eyeball slightly upward and back into its socket. As a result, when the drop lands on the sclera (the white part of the eye) or the inner side of the lower eyelid with the patient looking down, the subsequent blink helps spread the drop more uniformly across the surface of the cornea. The cornea is the clear, dome-shaped surface that covers the front of the eye and plays a crucial role in focusing vision. Even coverage of the cornea is essential for the effectiveness of the medication, ensuring that the entire area receives the therapeutic effect.
Moreover, by targeting the drop placement away from the cornea initially, the discomfort or stinging sensation that might accompany the drop's contact can be minimized. Many patients reflexively blink or squeeze their eyes shut when they anticipate discomfort, potentially expelling the medication from the eye before it can begin to work. By reducing initial discomfort through strategic drop placement, it's more likely that the patient will keep their eyes closed gently, allowing the medication to be absorbed effectively.
In addition to improving comfort and distribution, this method may also help in reducing the dilution of the medication by tears. When a drop is applied directly onto the cornea or into the tear pool while looking up, tears can immediately start diluting the medication before it has a chance to act. With the patient looking down, the medication is less exposed to the full volume of the tear film initially, potentially increasing its efficacy.
This technique is not only beneficial for anesthetics but also for other topical treatments, including dyes and antibiotics, where thorough and even coverage of the cornea is necessary for diagnostic or therapeutic purposes. While having patients look up during the drop application might be easier or more intuitive, the advantages of them looking down, as described, make it a superior method for effective eye treatment.

Question: 4

The peripheral vision of a normal person is

A. 60 degrees temporal, 60 degrees inferior, 75 degrees nasal and 95 degrees superior
B. 75 degrees temporal, 60 degrees inferior, 95 degrees nasal and 60 degrees superior
C. 95 degrees temporal, 60 degrees inferior, 75 degrees nasal and 60 degrees superior
D. 95 degrees temporal, 75 degrees inferior, 60 degrees nasal and 60 degrees superior

Answer: D

Explanation:
The question pertains to the extent of peripheral vision in a normal person. Peripheral vision refers to the area of visual field that lies outside the central area of focus. This ability allows humans to perceive and detect stimuli that are not directly in front of them, enhancing spatial awareness and the ability to monitor the environment effectively. It's important for daily activities, particularly those requiring quick reactions to surroundings, such as driving, sports, and navigating through crowded spaces.
The normal visual field for a human eye extends approximately 95 degrees temporally (toward the temple), 75 degrees inferiorly (downward), 60 degrees nasally (toward the nose), and 60 degrees

superiorly (upward). This distribution varies slightly between individuals but remains largely consistent across healthy human populations.
The greatest extent of the visual field is temporally; this broader lateral vision plays a crucial role in detecting potential threats and opportunities on the side toward which the face is not turned. The inferior field, although not as wide as the temporal, is also quite extensive and helps in navigating terrain and detecting objects below eye level.
Conversely, the nasal (toward the nose) and superior (upward) fields are narrower. The nasal field is limited due to the obstruction caused by the nose itself, while the superior field is generally less extensive possibly due to the overhanging brow and forehead, which provide physical protection for the eyes.
Understanding the extents of these visual fields is crucial in fields such as optometry and ophthalmology, as deviations from these norms can indicate the presence of ocular or neurological conditions. Monitoring changes in peripheral vision can help in early diagnosis and management of such diseases.

Question: 5

If a patient is unable to count fingers at 6 inches, the next option is to

A. record blind on the patient's record
B. do a glare test
C. do a contrast sensitivity test
D. see if he or she can detect hand movement

Answer: D

Explanation:
When assessing visual acuity in a clinical setting, a systematic approach is followed to determine the extent of a patient's vision capabilities. If a patient is unable to count fingers at a standard distance of 6 inches, the next step in this hierarchical assessment is to check for the ability to perceive hand movements.
The inability to count fingers at close proximity indicates a significant loss of visual acuity. This could be due to various ocular conditions such as severe refractive errors, advanced stages of cataracts, retinal diseases, or optic nerve damage. Given this level of visual impairment, it is essential to further assess the residual visual function to understand the extent of vision loss and to guide further medical or rehabilitative management.
The test for detecting hand movements involves the examiner moving their hand in different quadrants of the patient's visual field to see if the patient can perceive the motion. This test is crucial because the ability to detect motion can indicate the presence of functional vision, albeit severely impaired, which could be important for the patient's orientation and mobility.
If the patient fails to detect hand movements, the next step would typically be to assess light perception. This involves determining whether the patient can distinguish between light and dark or the presence of a light source. Losing light perception is usually indicative of very profound vision loss or blindness.
These assessments help in understanding the level of visual impairment and are essential for planning further interventions, whether they be medical treatments, visual aids, or adaptations for daily living activities to improve the patient's quality of life. Visual acuity tests are not just about diagnosing the

level of vision but are instrumental in guiding the overall management strategy for patients with significant visual impairment.

Question: 6

The examiner is using a trial lens with a patient to measure the degree of hyperopi
a. She uses a working lens of +1.50 for a working distance of 66 cm. She adds plus lenses until there is no reflexive movement and refractive error is neutralized. What must be done next to get the correct measurement for the hyperopia?
A. Nothing, she already has the correct measurement.
B. Add +1.50 to the measurement
C. Subtract +1.50 to allow for the working distance
D. Add a +2.00 lens to allow for working distance

Answer: C

Explanation:
To determine the correct measurement for hyperopia when using a retinoscope and trial lenses, it is essential to understand the effect of the working distance on the measurement. The examiner used a +1.50 diopter (D) lens for a working distance of 66 cm. This step is crucial as it compensates for the examiner's distance from the patient's eye, ensuring that the retinoscope's light is focused correctly on the retina.
When using a working lens, the power of this lens must be considered in the final prescription calculation. In this case, the working lens is +1.50 D. As the examiner adds plus lenses to neutralize the reflex seen through the retinoscope (meaning when there is no apparent movement of the reflex in response to the movement of the retinoscope), the total lens power required to achieve this neutral point represents the combined effect of the patient's refractive error and the working lens.
To isolate the patient's true refractive error, the power of the working lens must be subtracted from the total power of the lenses used to neutralize the reflex. This subtraction is necessary because the +1.50 D lens artificially introduces an additional focusing power at the working distance (66 cm), which does not represent the patient's natural focusing ability.
Therefore, the correct procedure after achieving a neutral reflex is to subtract +1.50 D from the total power of the lenses used during the examination. This adjustment gives a more accurate representation of the patient's hyperopia under normal viewing conditions (i.e., without the artificial influence of the working lens).
In summary, after neutralizing the reflex in the retinoscope with additional plus lenses, the examiner must subtract +1.50 D from the total lens power used. This calculation adjusts for the initially added power due to the working distance, thereby providing the true measure of the patient's hyperopia. This step is critical to ensure that the prescribed corrective lenses will effectively compensate for the patient's refractive error in everyday activities, not just at the specific testing distance.

Question: 7

A surgical schedule would describe the procedure to correct the drooping of the upper eyelid as

A. ptosis correction

B. chalazion removal
C. scleral buckling
D. trabeculectomy

Answer: A

Explanation:
Ptosis correction is the surgical procedure aimed at correcting the drooping of the upper eyelid, a condition known as ptosis. Ptosis can occur due to various reasons, including congenital issues (present at birth), age-related muscle weakening, trauma, or neurological disorders. The drooping can range from mild, where it barely affects the eye, to severe, where it can cover the pupil entirely and impede vision. *The surgical intervention for ptosis is primarily performed to improve the field of vision and cosmetic appearance. Depending on the severity and the underlying cause of ptosis, different surgical techniques may be employed. The most common method involves tightening the levator muscle, which is responsible for lifting the eyelid. In cases where the levator muscle is weak, a sling operation may be necessary, where the eyelid is connected to forehead muscles to allow more effective lifting. *Other procedures mentioned such as chalazion removal, scleral buckling, and trabeculectomy are not directly related to the correction of ptosis. Chalazion removal involves the treatment of a blocked oil gland in the eyelid. Scleral buckling is a procedure used to treat retinal detachment, involving the placement of a supportive band around the eye. Trabeculectomy is performed to relieve intraocular pressure in patients with glaucoma. None of these address the drooping of the eyelids directly like ptosis correction does. Therefore, in a surgical schedule focused on addressing the issue of a drooping eyelid, the correct term and procedure would be ptosis correction.

Question: 8

When setting the ocular of the fundus camera system, you should

A. remove one's own correction
B. turn the ocular to the maximum plus position, then rotate down
C. turn the ocular to the maximum plus position, then rotate up
D. turn the ocular to the maximum minus position, then rotate up

Answer: B

Explanation:
When setting the ocular of a fundus camera system, it's important to adjust it properly to ensure the clearest possible view of the patient's retina. This process is crucial for capturing accurate and effective retinal images, which are essential for diagnosing and monitoring various eye conditions.
The correct method to adjust the ocular involves initially setting the ocular to the maximum plus position. The "plus" setting in optical terms refers to more convergent power, which compensates for farsightedness. By setting the ocular to maximum plus, you essentially start with the ocular lens at its highest convergent power.
Once the ocular is set to the maximum plus position, the next step is to look through the eyepiece and slowly rotate the adjustment towards the minus direction. The "minus" setting refers to more divergent

power, which compensates for nearsightedness. This gradual adjustment from plus to minus helps in fine-tuning the focus to match the examiner's own visual acuity.
As you rotate the ocular adjustment toward the minus, you should carefully observe the clarity of the image. The goal is to stop adjusting as soon as the image of the fundus (the interior surface of the eye, including the retina, optic disc, macula, and posterior pole) becomes sharp and clear. This point of optimal clarity varies from one individual to another based on their unique visual needs and corrections. This method ensures that the ocular is set to provide the best personal visual acuity, allowing for detailed and accurate examination of the fundus. It's crucial that the ocular adjustment is made each time a different operator uses the fundus camera, as each person's eyesight and required corrections differ. Proper adjustment not only aids in better diagnosis through clearer images but also ensures a more comfortable and efficient examination process for both the operator and the patient.

Question: 9

A disadvantage of eye drops is that

A. they are expensive
B. they do not have prolonged contact with the eye
C. they must be refrigerated
D. they penetrate too deeply into the eye’s structures

Answer: B

Explanation:
One of the primary disadvantages of using eye drops is that they do not maintain prolonged contact with the eye. This limitation significantly impacts the effectiveness of the treatment for various eye conditions. When eye drops are administered, they are intended to deliver medication directly to the eye's surface. However, due to the eye's anatomy and natural protective mechanisms, such as blinking and tear production, the medication does not remain on the surface for long.
The lacrimal system, which includes the lacrimal glands and drainage ducts, plays a crucial role in tear production and drainage. When eye drops are applied, a significant portion of the medication can be quickly washed away or drained out through the lacrimal system before it has a chance to be absorbed. This rapid drainage reduces the amount of time the active ingredients in the drops can act on the eye, thereby diminishing their therapeutic effect.
While other factors such as cost and the need for refrigeration might also be considered disadvantages, these do not universally apply to all eye drops and are often secondary to the issue of contact time. Similarly, concerns about eye drops penetrating too deeply into the eye's structures are not as common and depend heavily on the specific formulation and intended use of the eye drops.
Therefore, the lack of prolonged contact with the eye remains one of the most significant limitations of eye drops, affecting their overall efficacy in treating eye conditions. This challenge has led to the development of alternative drug delivery systems intended to increase contact time, such as gel formulations, ocular inserts, or slow-release systems, aiming to improve the therapeutic outcomes of ocular medications.

Question: 10

Changes in refractive status would be expected with all but which of the following conditions?

A. Pregnancy
B. Diabetes
C. Conjunctivitis
D. Cataracts

Answer: C

Explanation:
Changes in the refractive status of the eye involve alterations in how the eye focuses light, primarily due to changes in the shape or functionality of the lens and/or the cornea. Several conditions can lead to such changes, impacting vision. However, not all eye-related conditions affect refractive status. Among the options provided—pregnancy, conjunctivitis, diabetes, and cataracts—conjunctivitis is the condition least likely to cause changes in refractive status.
Conjunctivitis, commonly known as pink eye, is an inflammation or infection of the conjunctiva, the transparent membrane that lines the eyelid and covers the white part of the eyeball. Symptoms typically include redness, itching, and discharge that can cause the eyelids to stick together. It is a surface condition that primarily affects the conjunctiva and does not usually involve the cornea or the internal optics of the eye, such as the lens. Therefore, while conjunctivitis can cause discomfort and temporary blurring of vision due to discharge, it does not inherently change the refractive status of the eye.
On the other hand, conditions like pregnancy, diabetes, and cataracts are known to affect the eye's refractive status. During pregnancy, hormonal changes can lead to alterations in the thickness and curvature of the cornea, potentially causing temporary changes in vision. Diabetes can cause fluctuations in blood sugar levels that lead to changes in the lens's shape, affecting its ability to focus, a condition known as diabetic refractopathy. Cataracts involve the clouding of the lens, which can change the way light is refracted inside the eye, leading to refractive changes.
In summary, while conjunctivitis affects the eye, it does not typically result in changes to the refractive status, unlike the other conditions listed. Understanding the distinction between surface inflammations like conjunctivitis and conditions that affect the internal optics of the eye is crucial for diagnosing and managing changes in vision and refractive errors effectively.

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