What Is the Vestibular System?

Worksheet

The vestibular system uses semicircular canals to detect rotational head movement and otolith organs to detect linear acceleration and gravity, sending signals via the vestibular nerve to coordinate balance, posture, and eye movement.

Questions

1. Which structures detect rotational head movement?

A) Otolith organs
B) Semicircular canals
C) Cochlea
D) Eustachian tube

2. The vestibulo-ocular reflex (VOR) helps by

A) Amplifying sound
B) Stabilizing gaze during head movement
C) Equalizing ear pressure
D) Producing earwax

3. Which cranial nerve transmits vestibular signals to the brain?

A) CN II
B) CN VII
C) CN VIII
D) CN X

4. The utricle and saccule mainly detect

A) Rotational movement
B) Linear acceleration and gravity
C) Sound frequency
D) Air pressure changes

5. A person spins around quickly, then stops. They feel dizzy and see the room 'spinning' for a moment. Why?

6. While walking, a person's eyes stay fixed on a sign even though their head bobs up and down. Which reflex explains this?

7. A patient with inner ear damage reports constant unsteadiness and vertigo, worse in the dark. What system is most likely impaired?

8. Define: What does the vestibular system detect?

9. Define: What are the two main vestibular organs?

10. Define: What is the vestibulo-ocular reflex (VOR)?

Answer Key

1. B) Semicircular canals - The three semicircular canals sense angular/rotational acceleration.

2. B) Stabilizing gaze during head movement - VOR moves the eyes opposite to head motion so the image stays steady.

3. C) CN VIII - CN VIII, the vestibulocochlear nerve, carries both hearing and balance signals.

4. B) Linear acceleration and gravity - These otolith organs sense linear head movement and the pull of gravity.

5. Spinning moves endolymph fluid inside the semicircular canals Hair cells signal 'rotating' to the brain during the spin When the person stops, fluid keeps moving briefly due to inertia Hair cells still signal rotation, causing a mismatch that produces dizziness and visual spinning (post-rotational nystagmus)

6. Head movement is detected by the vestibular system The vestibulo-ocular reflex (VOR) activates Eye muscles move in the opposite direction of head movement This keeps the image of the sign stable on the retina despite head motion

7. The vestibular system provides balance information independent of vision Damage reduces reliable inner-ear balance signals In daylight, vision partly compensates for the deficit In the dark, without visual compensation, unsteadiness and vertigo worsen

8. Head position, rotation, and linear acceleration - the sense of balance.

9. The semicircular canals (rotation) and the otolith organs - utricle and saccule (linear movement/gravity).

10. A reflex that moves the eyes opposite to head movement to keep vision stable.