MUSC Health
Medical University of South Carolina

Crash Course on Nystagmus

Vestibular Update 2025 – Charleston SC

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Disclosures

No financial disclosures or conflicts of interest.

No relevant non-financial relationship to disclose.

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Objectives

1. Identify types of nystagmus.
2. Identify key terms for interpretation.
3. Identify "normal" vs "abnormal" nystagmus in relation to the vestibular test battery.

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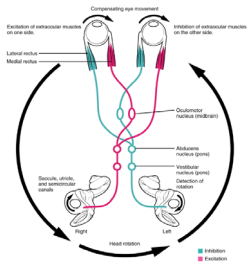
Nystagmus

Nystagmus: Involuntary eye movements resulting from neural connections between the vestibular and ocular systems

1. **Pendular:** eyes drift back and forth in a steady, pendulum-like motion.
2. **Jerk:** characterized by a slow component in the opposite direction of the head movement and a fast component that brings the eye back to center.



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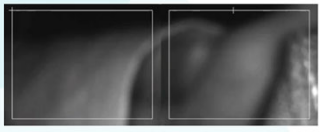
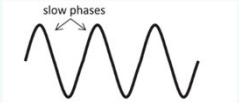
Pendular nystagmus





- Can indicate a normal functioning VOR if it exists in the right circumstance.
- Can indicate a central pathology if it exists spontaneously.

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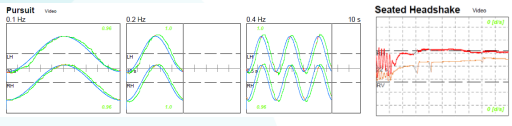
Pendular nystagmus

- Can indicate a normal functioning VOR if it exists in the right circumstance



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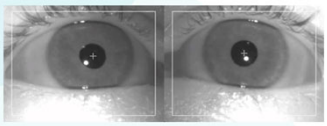
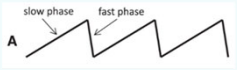
Jerk nystagmus





- Can indicate a normal functioning VOR if it exists in the right circumstance.
- Can indicate a peripheral or central pathology depending on the direction, velocity, and conditions in which it is observed.

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Characterizing Jerk Nystagmus

Direction:

- Horizontal – left beating, right beating
- Vertical – up beating, down beating
- Torsional

Velocity (degrees/second):

- Strong response i.e., 25 d/s
- Weak response i.e, 3 d/s

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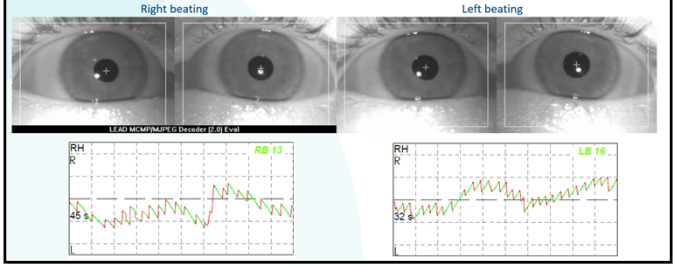
Horizontal Nystagmus

Right beating

Left beating



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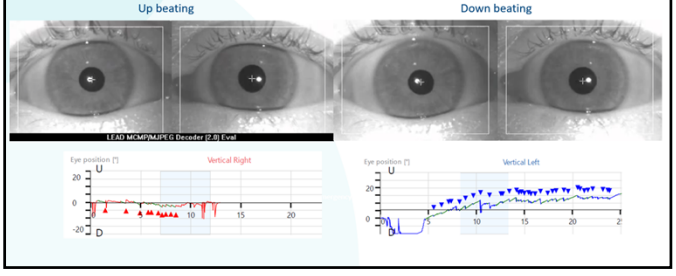
Vertical Nystagmus

Up beating

Down beating



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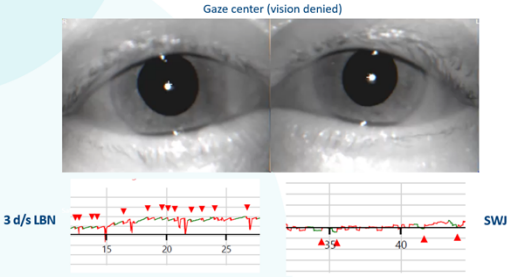
Square Wave Jerks (SWJ) / Ocular flutter

Gaze center (vision denied)



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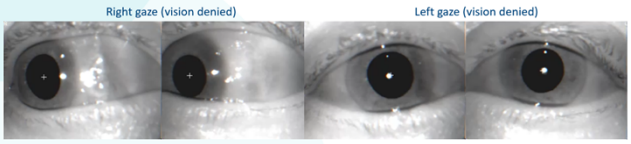
End-point Nystagmus



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Other Terminology

- Direction fixed vs direction changing
  - Direction fixed nystagmus: beating the same direction, typically peripheral
  - Direction changing nystagmus: more than one direction seen throughout a VNG or in one condition, typically central
- Geotropic vs ageotropic (apogeotropic)
  - Can identify the direction of the nystagmus in relation to the head position
  - Geo = towards the earth
  - Ageo (apogeo) = away from the earth
- Immediate vs delated latency
  - Nystagmus post head shake or in Dix Hallpike may use this as a descriptor
- Torsional vs non-torsional
  - (next slide)

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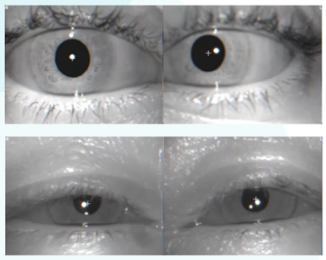
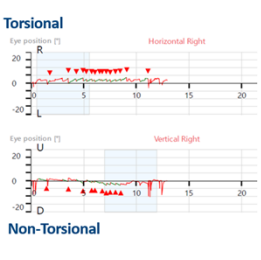
Torsional vs Non-Torsional





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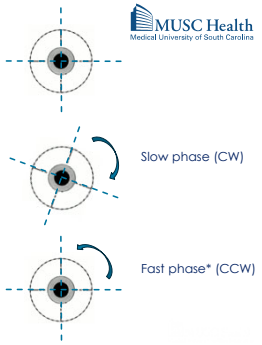
Torsional vs Non-Torsional

- Measuring the torsional component
- Jerk nystagmus is recorded in the torsional channel
- Clockwise (CW) vs Counter clockwise (CCW)
  - From the clinician's view
- Direction of the nystagmus is defined by the fast phase



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"Normal" vs "Abnormal" nystagmus

- If you are stimulating the vestibular system, there should be nystagmus indicating an intact and functioning VOR
  - Rotary chair testing
  - Caloric testing
  - *Dynamic* positioning movements
- If you are NOT stimulating the vestibular system, there should NOT be nystagmus
  - *Static* head or body positions
  - Spontaneous gaze

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Interpretation

- How can we use our horizontal nystagmus to determine the side of lesion?
  - Nystagmus will beat **towards the side with more neural activity**
  - Nystagmus will beat AWAY from the ear with a hypofunction
- Examples of pathologies that can follow this rule:
  - Vestibular neuronitis
  - Vestibular labyrinthitis
  - Meniere's Disease that results in a hypofunction

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HOWEVER...

- Nystagmus will beat **towards the side with more neural activity**
  - Nystagmus may beat towards the side of lesion, if the lesion is causing an increase in spontaneous neural activity
  - *Irritative* lesion
- Examples of pathologies that can follow this rule:
  - Vestibular schwannoma
  - Meniere's Disease

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Impressions Summary

- Gaze (vision denied or allowed)
- *Static* head and body positions

  - We use these tests to measure the spontaneous neural activity from the balance system.
  - *Nystagmus will beat towards the side with more peripheral neural activity.*

- Rotary Chair
- Caloric testing

  - We use these tests to measure the response to a stimulus.
  - We can record and measure nystagmus in these test to see how well that structure is functioning.

- *Dynamic* positioning movements – we can observe the eye movement, but this is not what we are. analyzing . i.e. **during the movement** of a Dix Hallpike or headshake.

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References

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