



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.

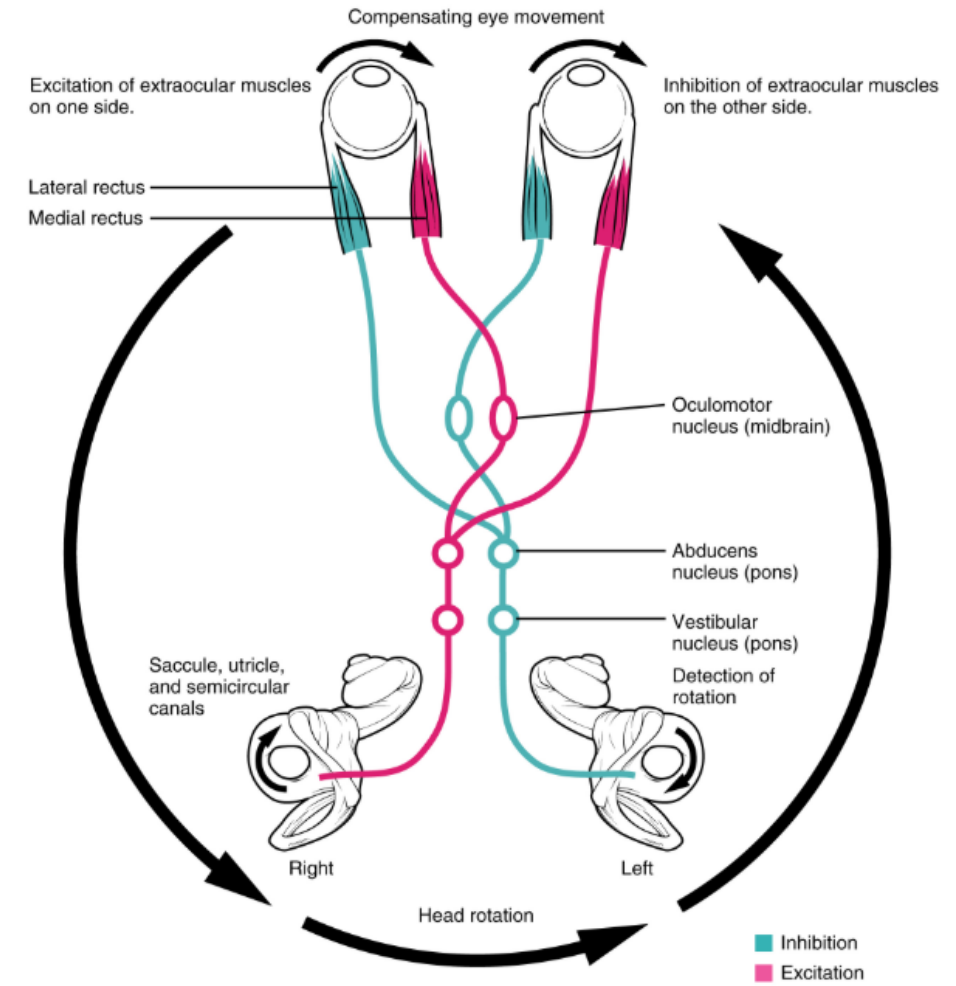
Objectives

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

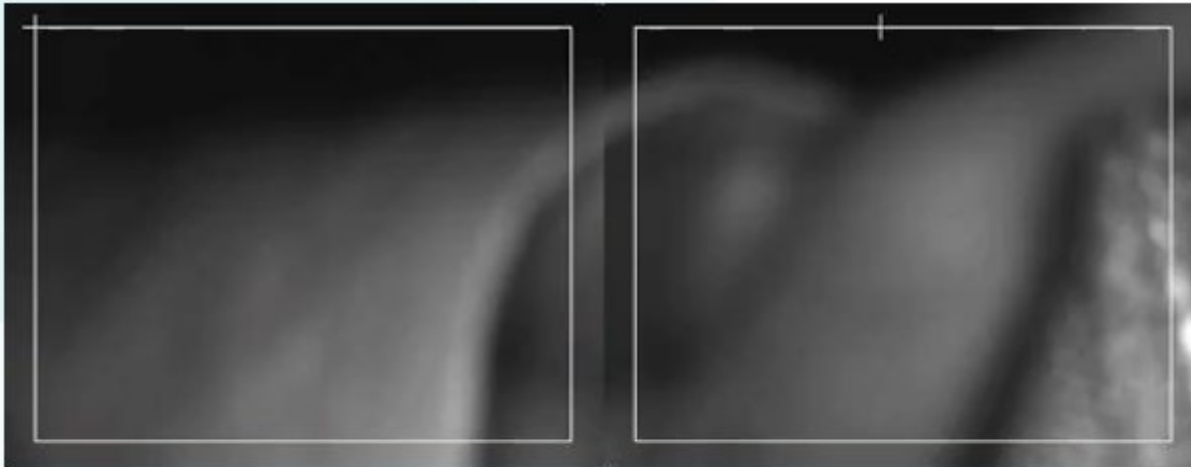
Nystagmus

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

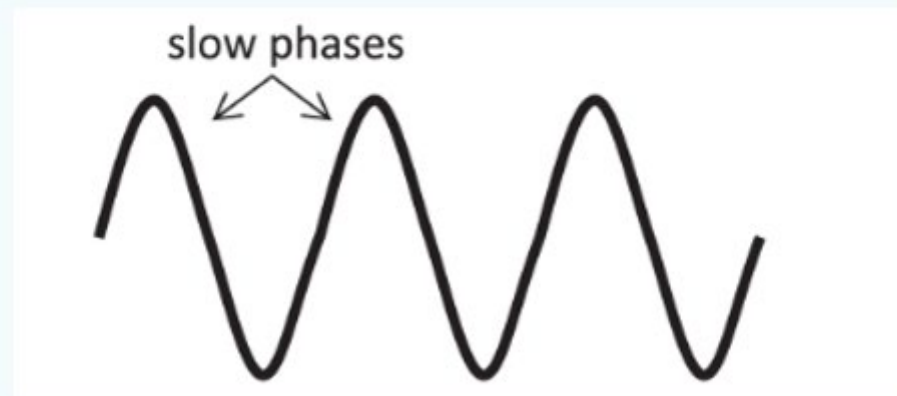
1. **Pendular:** eyes drift back and forth in a steady, pendulum-like motion.
2. **Jerk:** characterized by a slow component in the opposite direction of the head movement and a fast component that brings the eye back to center.



Pendular nystagmus

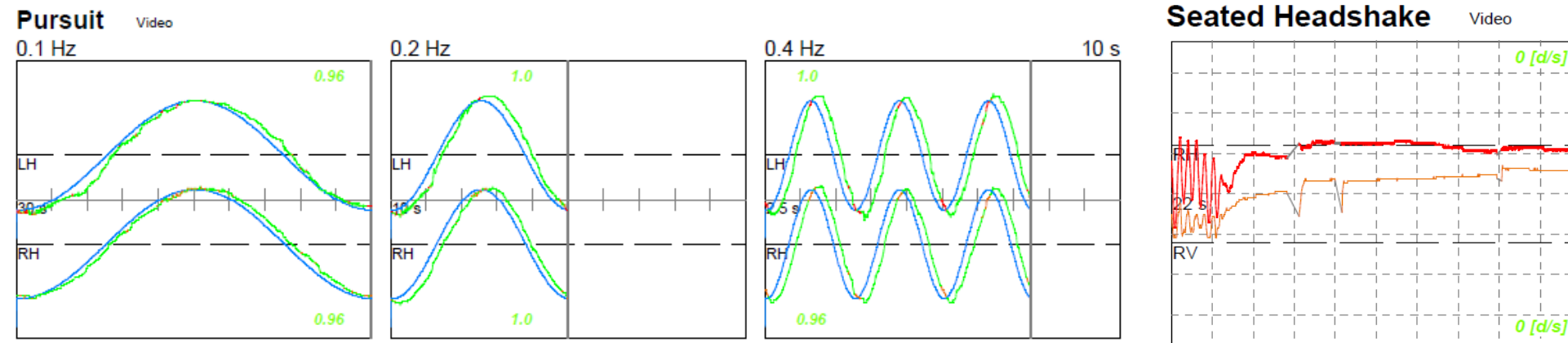


- Can indicate a normal functioning VOR if it exists in the right circumstance.
- Can indicate a central pathology if it exists spontaneously.

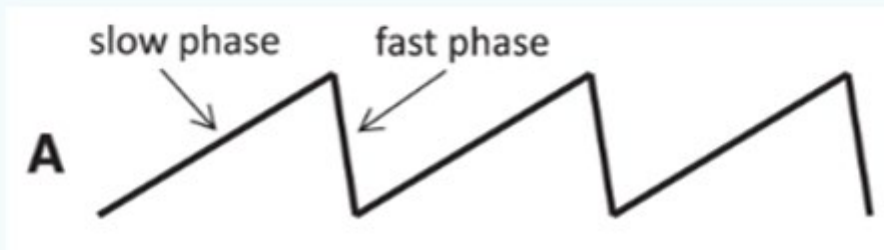
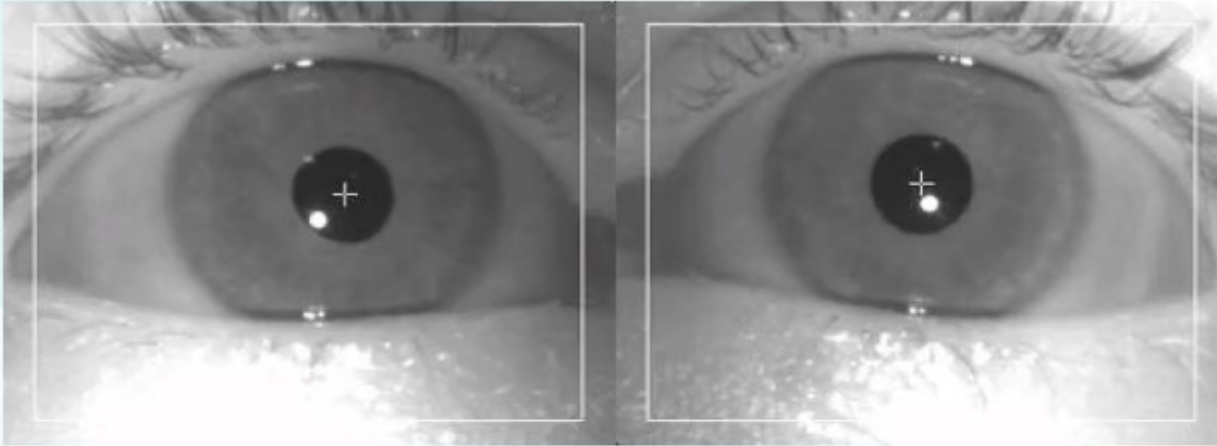


Pendular nystagmus

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



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:

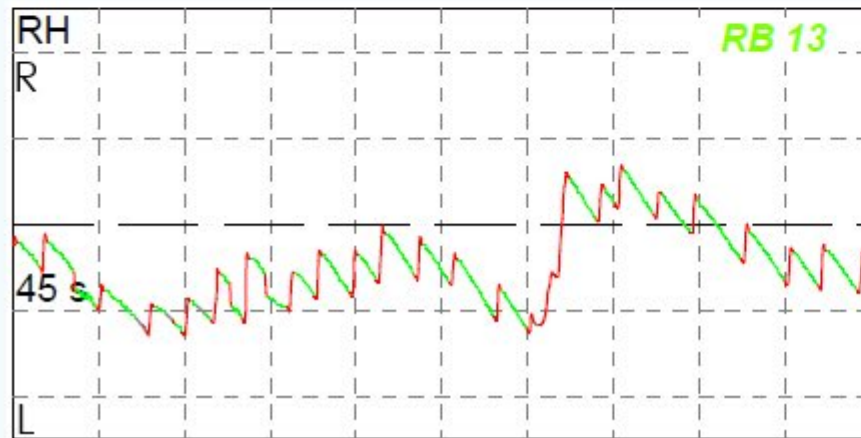
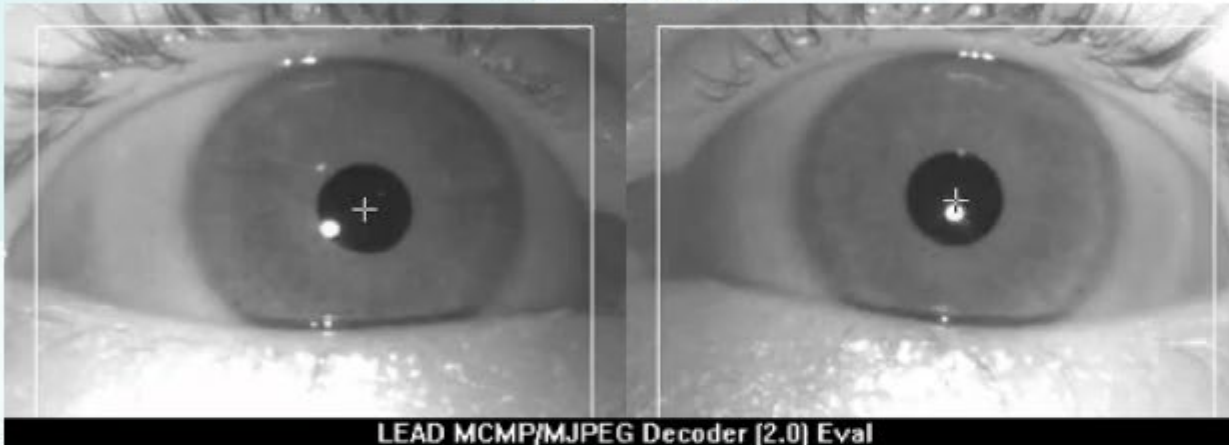
- Horizontal – left beating, right beating
- Vertical – up beating, down beating
- Torsional

Velocity (degrees/second):

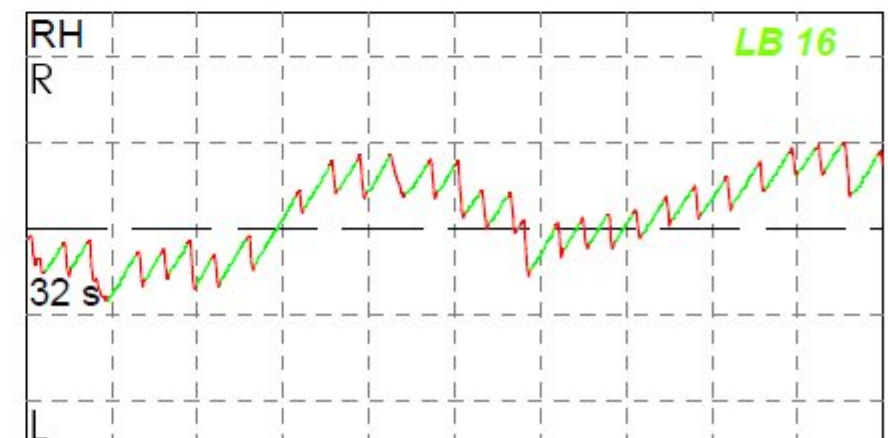
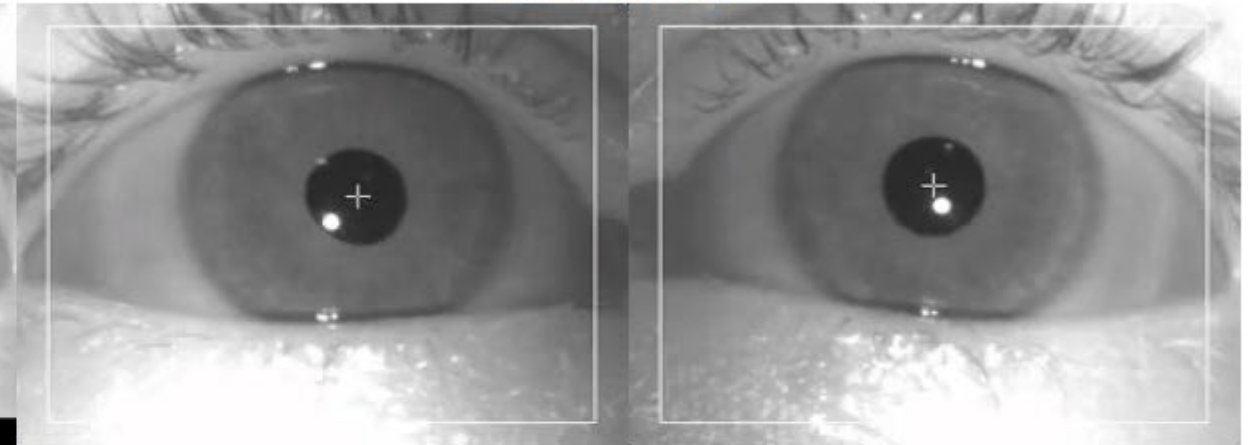
- Strong response i.e., 25 d/s
- Weak response i.e, 3 d/s

Horizontal Nystagmus

Right beating



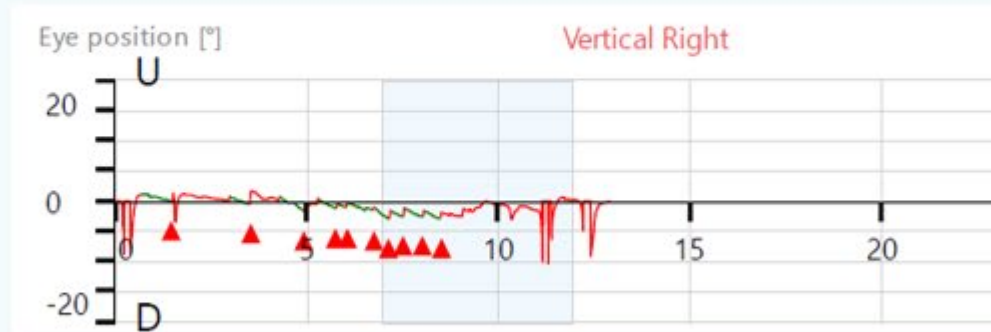
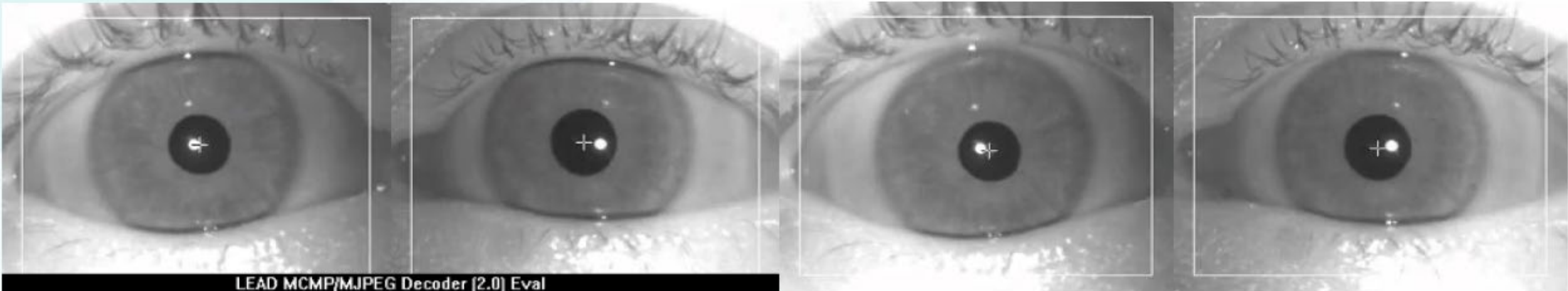
Left beating



Vertical Nystagmus

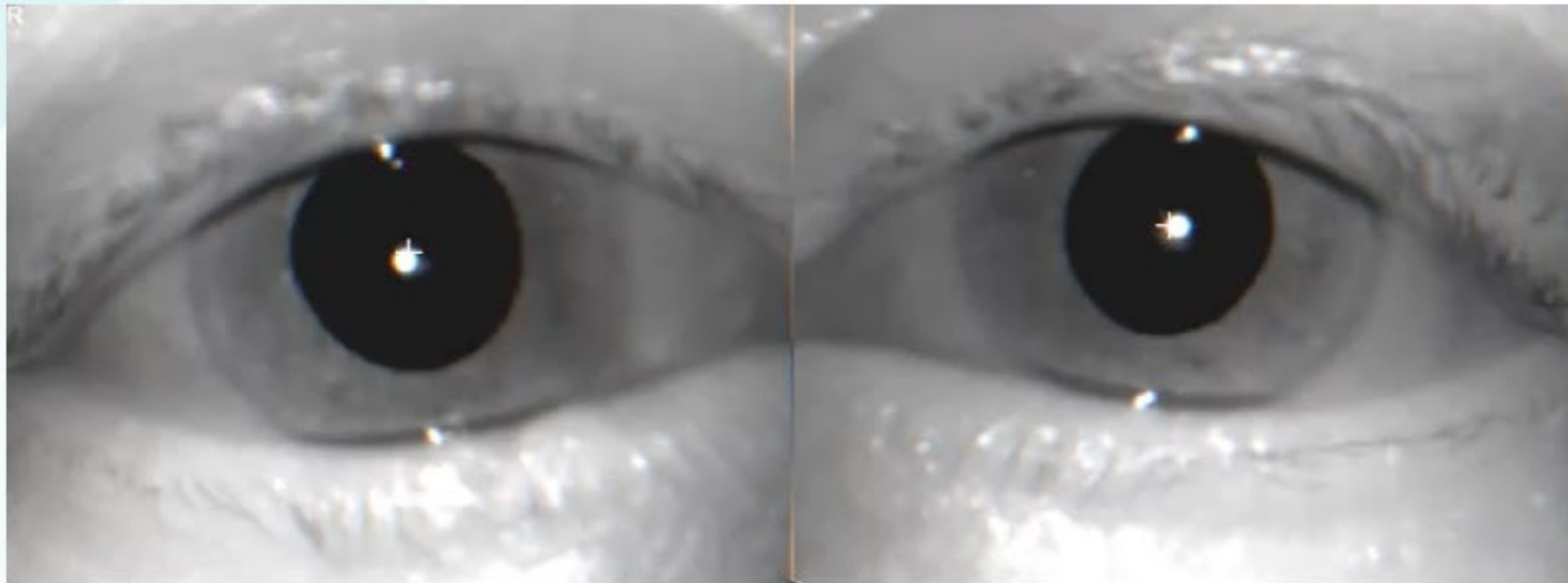
Up beating

Down beating

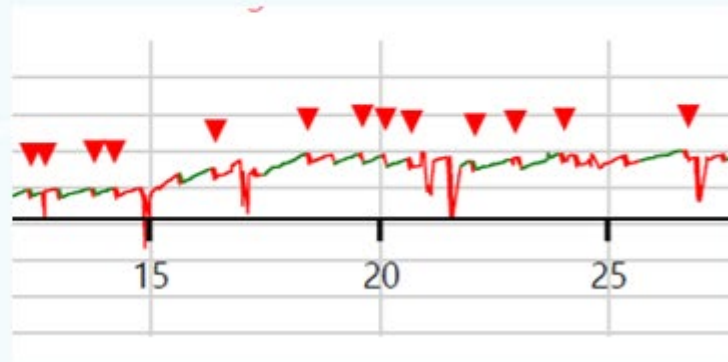


Square Wave Jerks (SWJ) / Ocular flutter

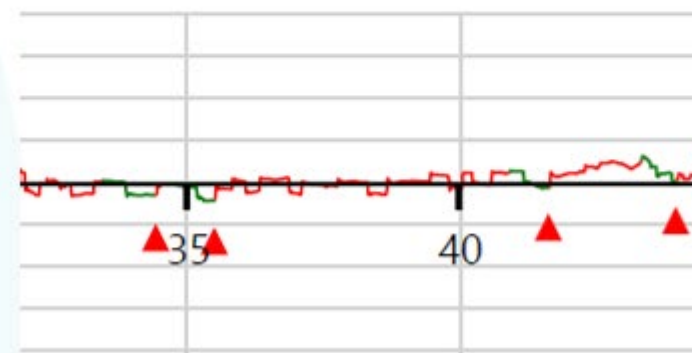
Gaze center (vision denied)



3 d/s LBN

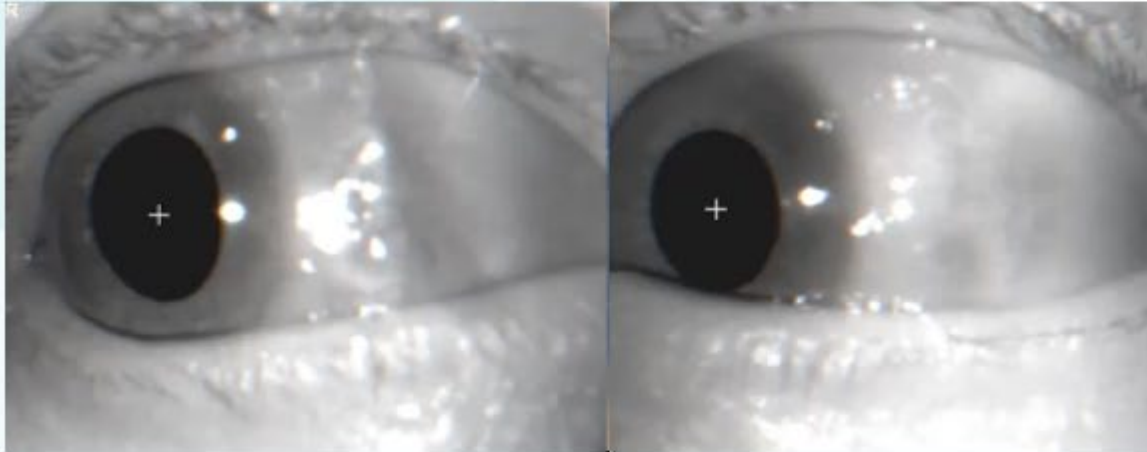


SWJ

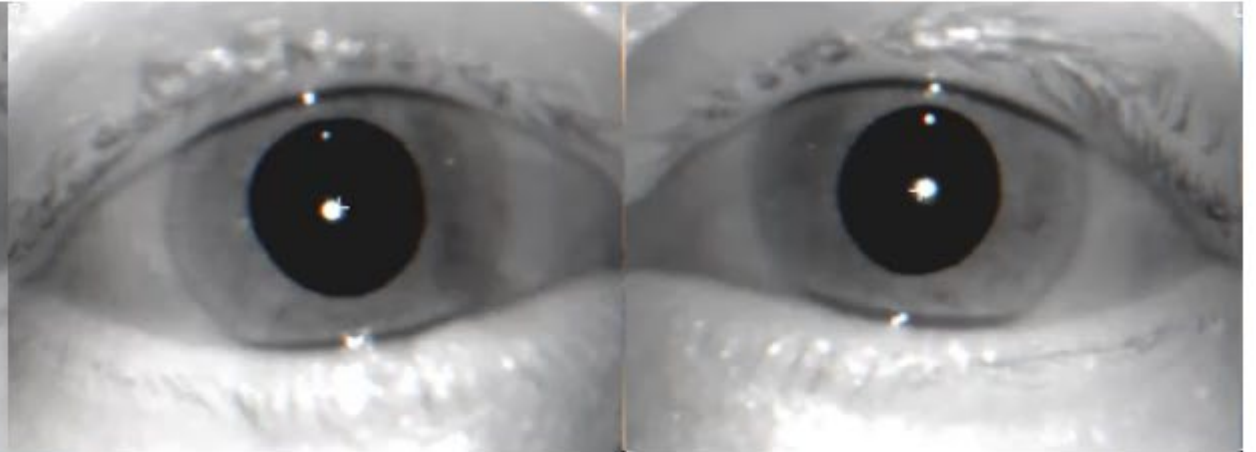


End-point Nystagmus

Right gaze (vision denied)



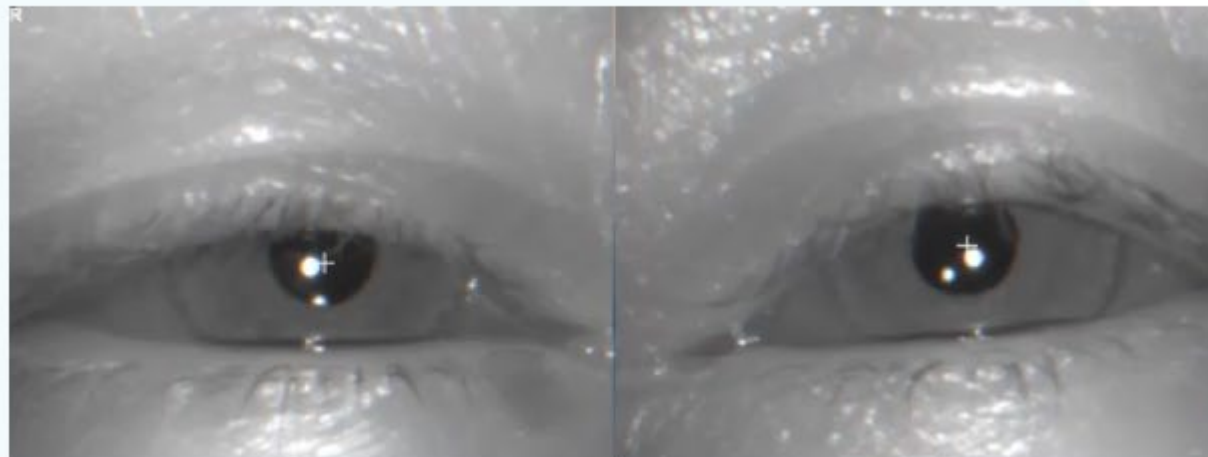
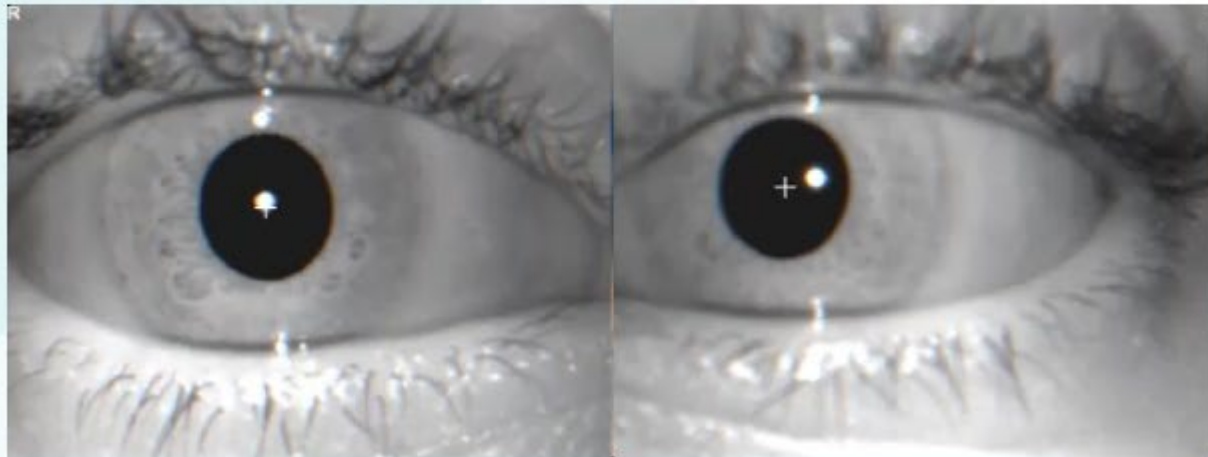
Left gaze (vision denied)



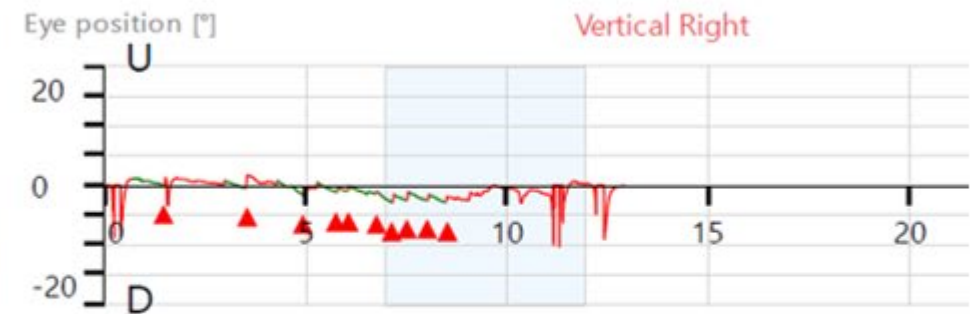
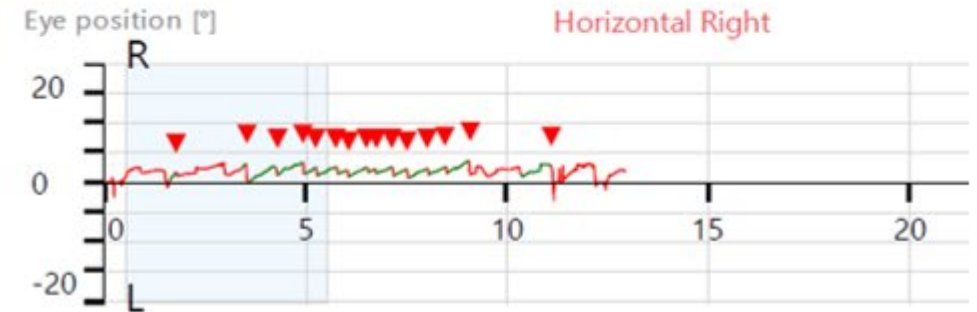
Other Terminology

- 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 delayed latency
 - Nystagmus post head shake or in Dix Hallpike may use this as a descriptor
- Torsional vs non-torsional
 - (next slide)

Torsional vs Non-Torsional



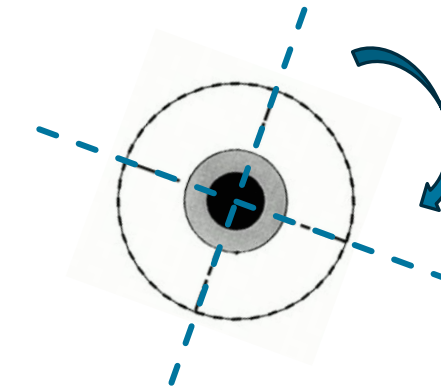
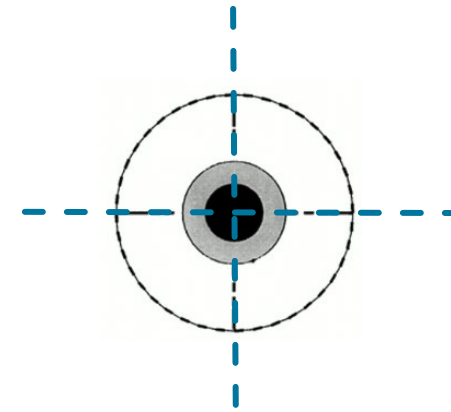
Torsional



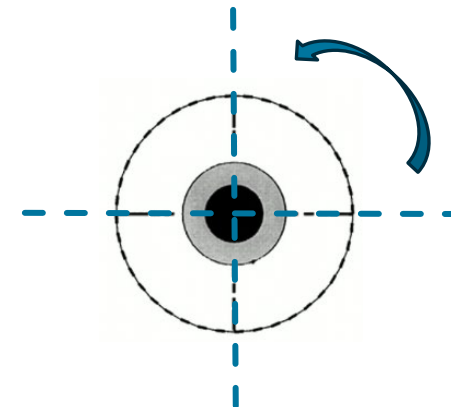
Non-Torsional

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



Slow phase (CW)



Fast phase* (CCW)

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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

Professional Staff

Emergency

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

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

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.
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- *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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