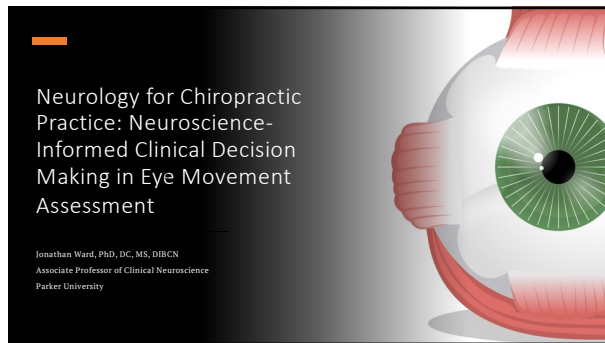
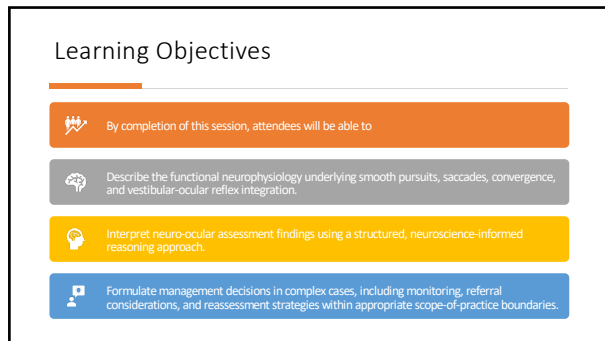




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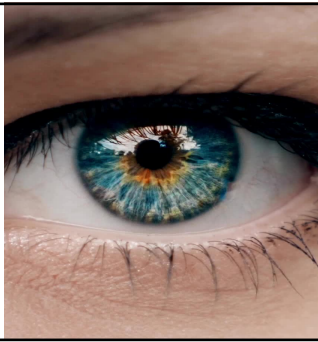


2



3

Why Eye
Movements?



4

Clinical Case



5

How Would
You Evaluate
This Patient?

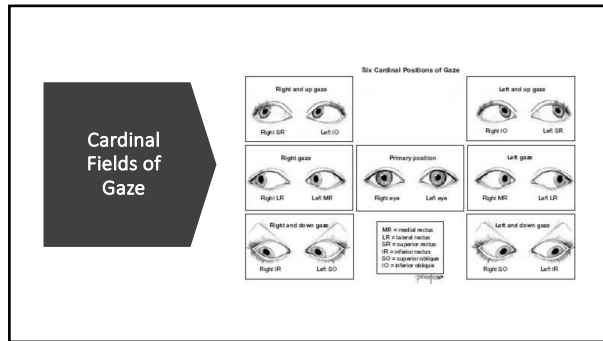
Cranial Nerves

Cervical Range of Motion

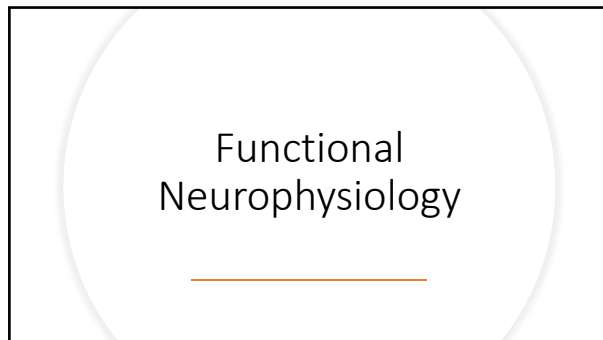
Full Neurological Evaluation

Eye Movements?

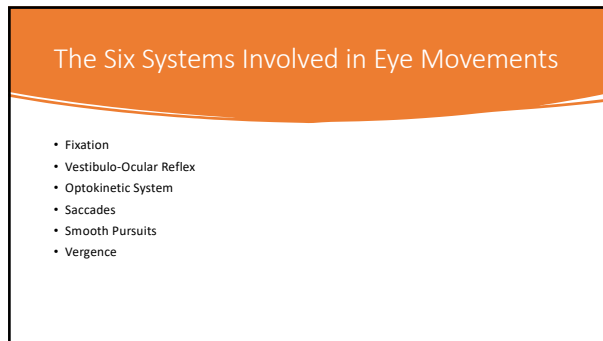
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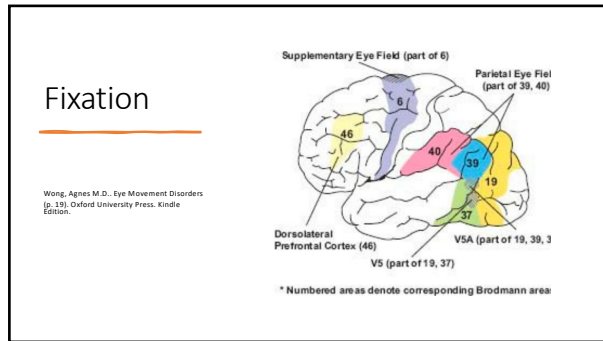
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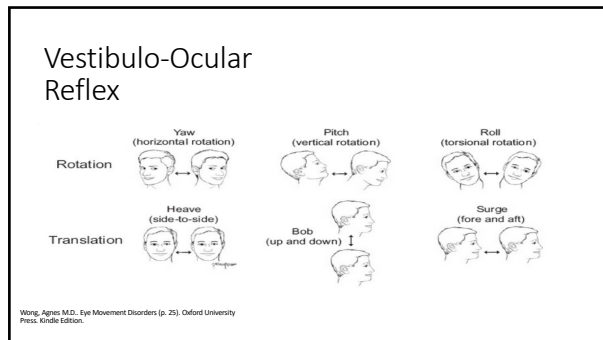
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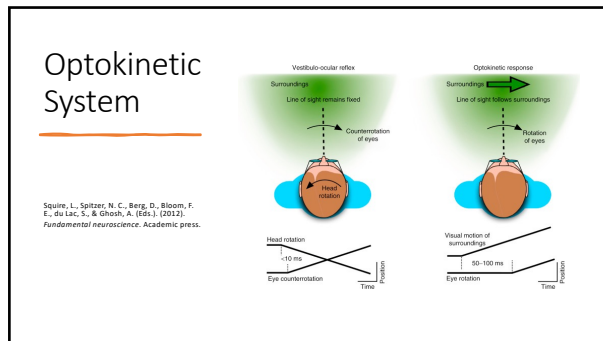
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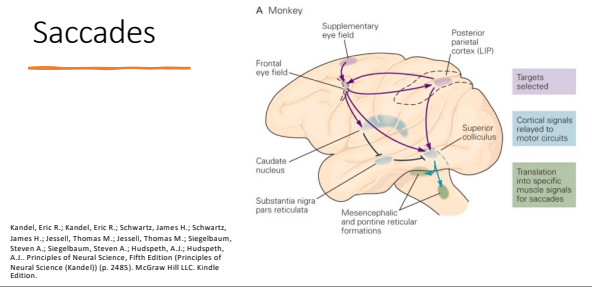


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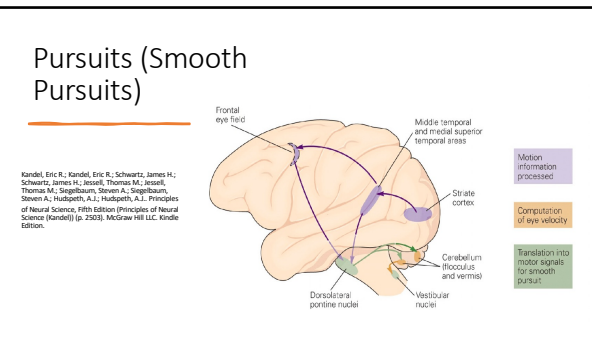
12

Saccades



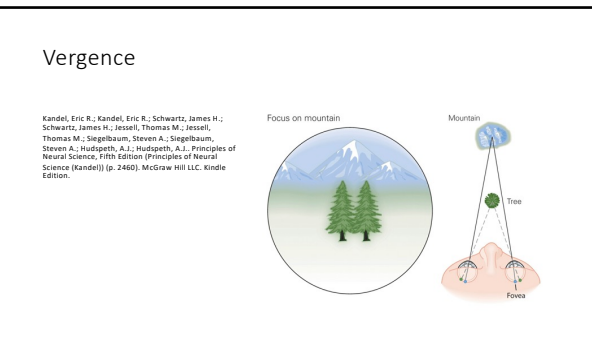
13

Pursuits (Smooth Pursuits)

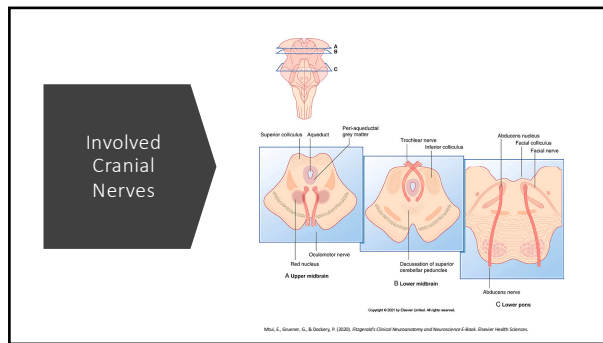


14

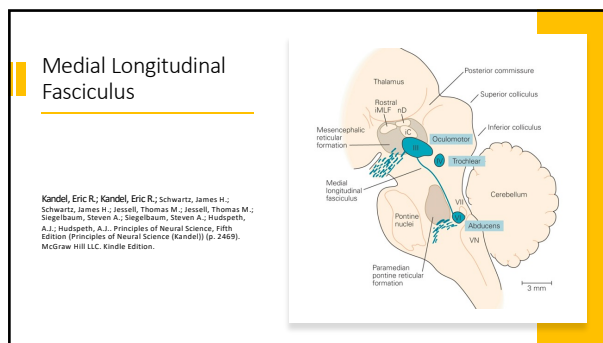
Vergence



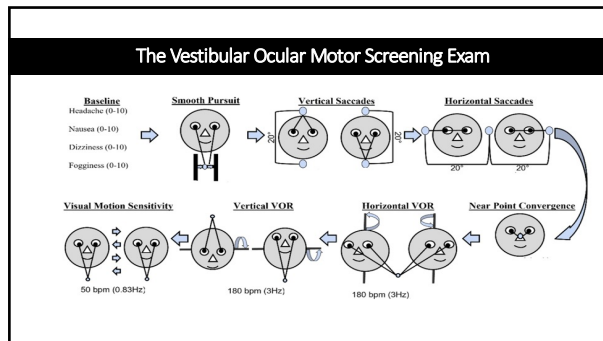
15



16



17



18

Vestibular Ocular Motor Screening Exam									
Interpretation									
Test	N/T	Headache	Dizziness	Nausea	Fixation	Pre-Test Score	Post-Test Total	Raw Change (Post - Pre)	Total Change Score
Baseline Symptoms (Pre-VOMS)		6/10	6/10	3/10	7/10	24	24	0	0
Horizontal Smooth Pursuits		7/10	6/10	1/10	7/10	24	21	-3	0
Vertical Smooth Pursuits		7/10	6/10	1/10	7/10	24	21	-3	0
Horizontal Saccades		9/10	7/10	3/10	7/10	24	26	+2	2
Vertical Saccades		9/10	7/10	3/10	7/10	24	26	+2	2
Convergence	#1: 1.5 cm #2: 2 cm	9/10	7/10	3/10	7/10	24	26	+2	2
Horizontal VOR (180 bpm)		9/10	8/10	5/10	7/10	24	27	+3	3
Vertical VOR (180 bpm)		9/10	8/10	3/10	7/10	24	27	+3	3
Visual Motion Sensitivity (50 bpm)		9/10	8/10	3/10	7/10	24	27	+3	3
Total Change Score									15

19

Group Activity

Pair up and Practice the VOMS

20

Clinical Case



21

How Would You Evaluate This Patient?

Mini Mental Status Exam

Montreal Cognitive Assessment

Eye Movements?

22

Functional
Neurophysiology

23

Antisaccades

Hanuška, J., Rusz, J., Bezdíček, O., Ulmanová, O., Bonnet, C., Dušek, P., ... & Růžička, E. (2019). Eye movements in idiopathic rapid eye movement sleep behaviour disorder: high antisaccade error rate reflects prefrontal cortex dysfunction. *Journal of sleep research*, 28(5), e12742.

24

The Bedside Antisaccade Task administration

- What you need:** your hands, two chairs, and a pre-printed trial sequence and score sheet.
- Setup**
 - Sit facing the patient, knees roughly an arm's length apart, eyes at the same level.
 - Hold both hands up at eye level, about shoulder-width apart, roughly equal distance to the left and right of your face.
 - The patient keeps their head still and looks at your nose between trials.
- Instructions**
 - Say: "When one of my fingers moves, look at my other hand as quickly as you can. Then come back to my nose."
 - Run a few practice trials until the patient clearly understands.
- Each trial**
 - The patient fixates your nose.
 - Briefly wiggle the index finger on one hand.
 - The patient should look to the **opposite** hand.
 - Watch the patient's **first** eye movement and mark it.
- Keep it unpredictable**
 - Follow the pre-printed pseudorandom left/right sequence with roughly equal numbers each side.
 - Vary the pause before each finger movement, so the patient can't anticipate.
- Trials:** 40, in two blocks of 20 with a short rest between.

25

Bedside Antisaccade Task Interpretation

- Correct:** the first eye movement goes away from the moving finger.
- Error:** the first eye movement goes toward the moving finger, even if the patient then corrects.
- Score = number correct out of 40.** Note corrected versus uncorrected errors separately if you like.
- What it reflects**
 - Inhibitory control and executive function: overriding the reflex to look at something that moves.
- Rule out confounders first: the patient didn't understand, fatigue, inattention, vision problems, sedating medications, or inconsistent examiner technique.
- Expect some decline with normal aging.
- A clearly poor score or worsening score over time – referral for cognitive evaluation.

26

Group Activity

Pair up and Practice the BAS

27

Management & Referral Considerations

28

Monitor

Establish a baseline and repeat it with the same test, setup, and scoring.

Track change over time rather than relying on a single result.

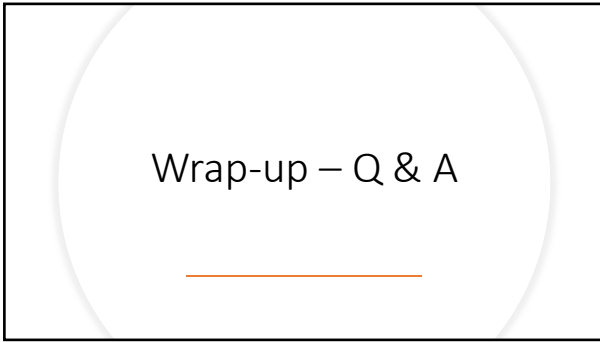
29

Refer

Urgent: red flags such as new double vision, spontaneous or vertical nystagmus, unequal pupils, sudden neurological change, or rapidly worsening cognition.

Routine: neuro-optometry, vestibular rehabilitation, primary care, neurology, or neuropsychology, depending on the finding.

30



31



32

Vestibular-Ocular Motor Screening (VOMS)

Assessment for Concussion

Patient's full name:						
Date assessed:						
Scoring						
	Tested or not tested	Headache (0-10)	Dizziness (0-10)	Nausea (0-10)	Fogginess (0-10)	Comments
Baseline symptoms	Mandatory					
Smooth pursuits	☐					
Saccades-horizontal	☐					
Saccades-vertical	☐					
Convergence (near point)	☐					(Near point in cm): Measure 1: _____ Measure 2: _____ Measure 3: _____
VOR - horizontal	☐					
VOR - vertical	☐					
Visual motion sensitivity test	☐					
Examiner's full name:						
Signature:						

Instructions

Interpretation: This test is designed for use with subjects ages 9-40. When used with patients outside this age range, interpretation may vary. Abnormal findings or provocation of symptoms with any test may indicate dysfunction – and should trigger a referral to the appropriate healthcare professional for more detailed assessment and management.

Equipment: Tape measure (cm); Metronome; Target w/ 14 point font print.

Baseline symptoms: Record: Headache, Dizziness, Nausea & Foggiess on 0-10 scale prior to beginning screening

Smooth pursuits: Test the ability to follow a slowly moving target. The patient and the examiner are seated. The examiner holds a fingertip at a distance of 3 ft. from the patient. The patient is instructed to maintain focus on the target as the examiner moves the target smoothly in the horizontal direction 1.5 ft. to the right and 1.5 ft. to the left of midline. One repetition is complete when the target moves back and forth to the starting position, and 2 repetitions are performed. The target should be moved at a rate requiring approximately 2 seconds to go fully from left to right and 2 seconds to go fully from right to left. The test is repeated with the examiner moving the target smoothly and slowly in the vertical direction 1.5 ft. above and 1.5 ft. below midline for 2 complete repetitions up and down. Again, the target should be moved at a rate requiring approximately 2 seconds to move the eyes fully upward and 2 seconds to move fully downward. Record: Headache, Dizziness, Nausea & Foggiess ratings after the test. (Figure 1)

Saccades: Test the ability of the eyes to move quickly between targets. The patient and the examiner are seated.

- **Horizontal Saccades:** The examiner holds two single points (fingertips) horizontally at a distance of 3 ft. from the patient, and 1.5 ft. to the right and 1.5 ft. to the left of midline so that the patient must gaze 30 degrees to left and 30 degrees to the right. Instruct the patient to move their eyes as quickly as possible from point to point. One repetition is complete when the eyes move back and forth to the starting position, and 10 repetitions are performed. Record: Headache, Dizziness, Nausea & Foggiess ratings after the test.
- **Vertical Saccades:** Repeat the test with 2 points held vertically at a distance of 3 ft. from the patient, and 1.5 feet above and 1.5 feet below midline so that the patient must gaze 30 degrees upward and 30 degrees downward. Instruct the patient to move their eyes as quickly as possible from point to point. One repetition is complete when the eyes move up and down to the starting position, and 10 repetitions are performed. Record: Headache, Dizziness, Nausea & Foggiess ratings after the test.

Convergence: Measure the ability to view a near target without double vision. The patient is seated and wearing corrective lenses (if needed). The examiner is seated front of the patient and observes their eye movement during this test. The patient focuses on a small target (approximately 14 point font size) at arm's length and slowly brings it toward the tip of their nose. The patient is instructed to stop moving the target when they see two distinct images or when the examiner observes an outward deviation of one eye. Blurring of the image is ignored. The distance in cm. between target and the tip of nose is measured and recorded. This is repeated a total of 3 times with measures recorded each time. Record: Headache, Dizziness, Nausea & Foggiess ratings after the test. Abnormal: Near Point of convergence ≥ 6 cm from the tip of the nose.

Vestibular-Ocular Reflex (VOR) Test: Assess the ability to stabilize vision as the head moves. The patient and the examiner are seated. The examiner holds a target of approximately 14 point font size in front of the patient in midline at a distance of 3 ft.

- **Horizontal VOR Test:** The patient is asked to rotate their head horizontally while maintaining focus on the target. The head is moved at an amplitude of 20 degrees to each side and a metronome is used to ensure the speed of rotation is maintained at 180 beats/minute (one beat in each direction). One repetition is complete when the head moves back and forth to the starting position, and 10 repetitions are performed. Record: Headache, Dizziness, Nausea and Foggiess ratings 10 sec after the test is completed.

- **Vertical VOR Test:** The test is repeated with the patient moving their head vertically. The head is moved in an amplitude of 20 degrees up and 20 degrees down and a metronome is used to ensure the speed of movement is maintained at 180 beats/minute (one beat in each direction). One repetition is complete when the head moves up and down to the starting position, and 10 repetitions are performed. Record: Headache, Dizziness, Nausea and Foggiess ratings after the test.

Visual Motion Sensitivity (VMS) Test: Test visual motion sensitivity and the ability to inhibit vestibular-induced eye movements using vision. The patient stands with feet shoulder width apart, facing a busy area of the clinic. The examiner stands next to and slightly behind the patient, so that the patient is guarded but the movement can be performed freely. The patient holds arm outstretched and focuses on their thumb. Maintaining focus on their thumb, the patient rotates, together as a unit, their head, eyes and trunk at an amplitude of 80 degrees to the right and 80 degrees to the left. A metronome is used to ensure the speed of rotation is maintained at 50 beats/min (one beat in each direction). One repetition is complete when the trunk rotates back and forth to the starting position, and 5 repetitions are performed. Record: Headache, Dizziness, Nausea & Foggiess ratings after the test.

Mucha, A., Collins, M. W., Elbin, R. J., Furman, J. M., Troutman-Enseki, C., DeWolf, R. M., Marchetti, G., & Kontos, A. P. (2014). A brief Vestibular/Ocular Motor Screening (VOMS) Assessment to evaluate concussions: Preliminary findings. *The American Journal of Sports Medicine*, 42(10), 2479–2486. <https://doi.org/10.1177/0363546514543775>

Bedside Antisaccade (BAS) Scoring Worksheet

Session details and setup

Field	Entry
Patient / partner name	
Age	
Examiner name	
Date	
Baseline test or re-test?	
Glasses worn? Vision concerns?	

Setup

- Sit facing the patient, about an arm's length apart, eyes at the same level.
- Hold both hands up at eye level, shoulder-width apart, the same distance to each side of your face.
- The patient keeps the head still and looks at your nose between trials.

Instructions to the patient: "When one of my fingers moves, look at my *other* hand as quickly as you can. Then come back to my nose."

Each trial: wait a varied 1–3 seconds, briefly wiggle the index finger on the side listed, and watch the patient's **first** eye movement.

Trial record

Mark each trial: ✓ = first look went away from the finger (correct); E = first look went toward the finger and stayed (error); CE = first look went toward the finger, then corrected (still an error). Follow the sequence exactly; it is randomized and balanced (20 left, 20 right).

Practice (not scored): repeat until the patient clearly understands.

Practice	Finger moves	Correct look	Result
P1	Left	Right	
P2	Right	Left	
P3	Right	Left	
P4	Left	Right	

Block 1

Trial	Finger moves	Correct look	✓ / E / CE
1	Left	Right	
2	Right	Left	
3	Right	Left	
4	Left	Right	
5	Right	Left	
6	Left	Right	
7	Left	Right	
8	Right	Left	
9	Left	Right	
10	Right	Left	
11	Right	Left	
12	Left	Right	
13	Left	Right	
14	Right	Left	
15	Left	Right	
16	Right	Left	
17	Right	Left	
18	Left	Right	
19	Right	Left	
20	Left	Right	

Short rest (about 30 seconds).

Block 2

Trial	Finger moves	Correct look	✓ / E / CE
21	Right	Left	
22	Left	Right	
23	Right	Left	

Trial	Finger moves	Correct look	✓ / E / CE
24	Right	Left	
25	Left	Right	
26	Left	Right	
27	Right	Left	
28	Left	Right	
29	Right	Left	
30	Right	Left	
31	Left	Right	
32	Right	Left	
33	Left	Right	
34	Left	Right	
35	Right	Left	
36	Left	Right	
37	Right	Left	
38	Left	Right	
39	Left	Right	
40	Right	Left	

Score and interpretation

Score = number of ✓ out of 40. Higher is better.

Measure	Block 1 (of 20)	Block 2 (of 20)	Total (of 40)
Correct (✓)			
Errors, uncorrected (E)			
Errors, corrected (CE)			

Comparison	Entry
Previous score and date (if any)	

Comparison	Entry
Change from baseline	

What the score reflects: inhibitory control and executive function, meaning the ability to override the reflex to look at something that moves. Uncorrected errors may reflect losing track of the task goal; quickly corrected errors may reflect a reflexive glance that was caught.

Reference: Hellmuth J, et al. Multicenter validation of a bedside antisaccade task as a measure of executive function. *Neurology*. 2012;78(23):1824–1831.