LOST IN TRANSITION:

Leveraging the VOMS as a Throughline from Assessment to Clearance

Julie MacDonald **M.Sc, CAT(C), R.Kin, RMT**
Certified Athletic Therapist
Registered Kinesiologist
Registered Massage Therapist

Recovery from Concussion:

Symptoms

No Symptoms!

(Collins, 2014)

Cervical

Visual Ocular

Hormone/ Endocrine

Vestibular

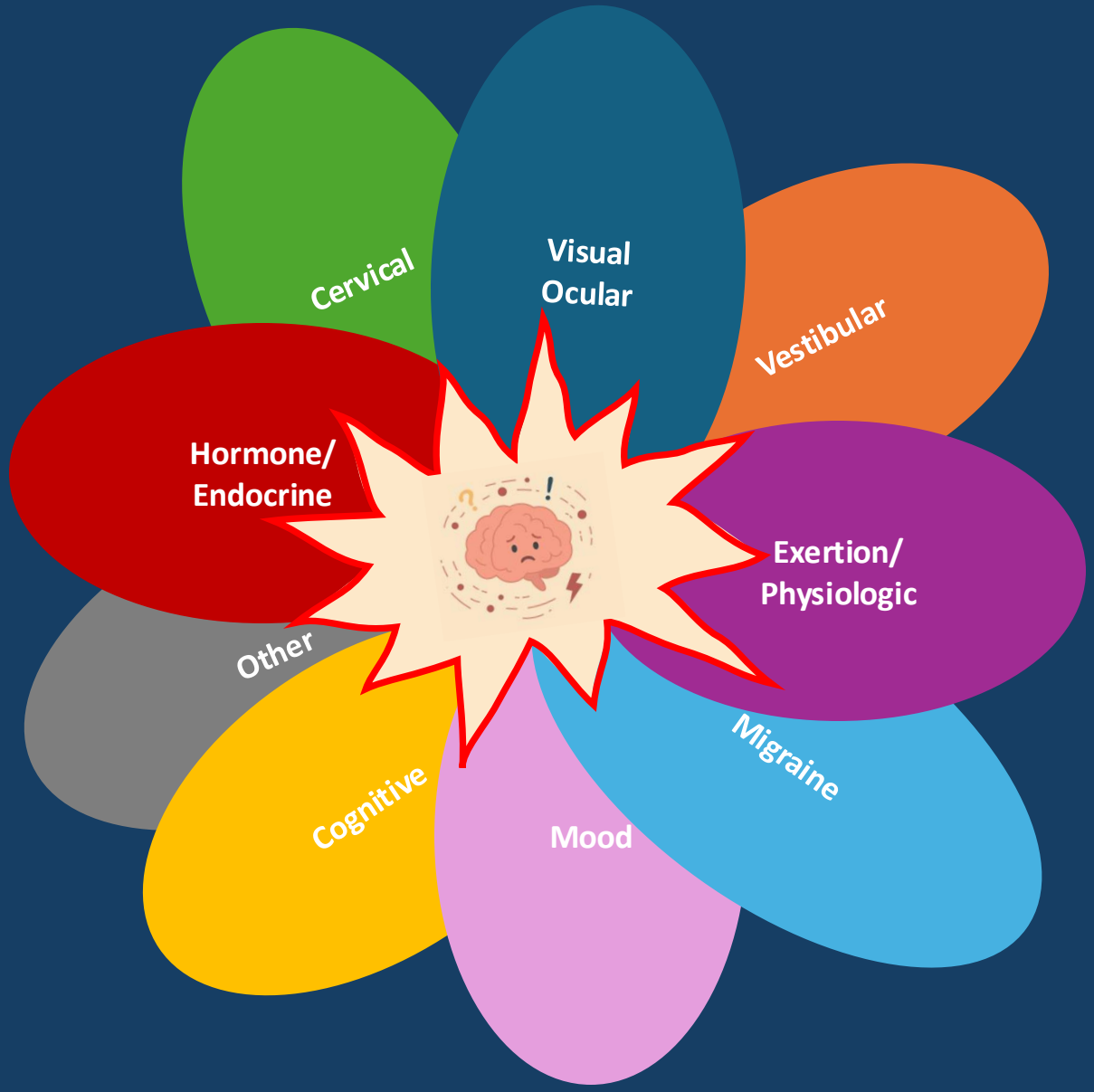
Other

Exertion/ Physiologic

Cognitive

Migraine

Mood


Cervical
Visual
Ocular
Vestibular
Hormone/
Endocrine
Exertion/
Physiologic
Other
Migraine
Cognitive
Mood

When you say “VOMs”…

SCAT6

Step 4: Coordination & Ocular/Motor Screen

Coordination: Is finger-to-nose normal for both hands with eyes open and closed?	Y	N
Ocular/Motor: Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	Y	N
Are observed extraocular eye movements normal? If not, describe:	Y	N

VOMs

Mucha et al. 2014

ImPACT APPLICATIONS, INC.

Vestibular/Ocular-Motor Screening (VOMS) for Concussion

	Not Tested	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Comments
Baseline Symptoms	N/A					
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						

Mucha A, Collins MW, Elbin RJ, Furman JM, Troutman-Enseki C, DeWolf RM, Marchetti G, Kontos AP. A brief vestibular and ocular motor screening (VOMS) assessment to evaluate preliminary concussion: Preliminary findings. Am J Sports Med. 2014.

ConcussionManagement.com

SCOAT6

Modified Vestibular/Ocular-Motor Screening (mVOMS) for Concussion

For detailed instructions please see the Supplement.

mVOMS	Not Tested	Headache	Dizziness	Nausea	Fogginess
Baseline symptoms	N/A				
Smooth pursuits (2 horizontal and 2 vertical, 2 seconds to go full distance right-left and back; up-down and back)					
Saccades – Horizontal (10 times each direction)					
VOR – Horizontal (10 repetitions) (metronome set at 180 beats per minute – change direction at each beep, wait 10 secs to ask symptoms)					
VMS (x 5, 80° rotation side to side) (at 50 bpm, change direction each beep, wait 10 secs to ask symptoms)					

Child SCOAT6

Visio-Vestibular Examination

Smooth Pursuits

Patient-reported Symptom Provocation:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Or Physical Signs:

Jerky or Jumpy Eye Movements: Yes ☐ No ☐ >3 Beats of Nystagmus: Yes ☐ No ☐

Fast Saccades

Horizontal Saccades:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Vertical Saccades:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Gaze Stability Testing (The Angular Vestibular-Ocular Reflex)

Vertical Gaze Stability:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Horizontal Gaze Stability:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Near Point of Convergence Testing

Distance: _____ cm

Left and Right Monocular Accommodation

Left Eye Distance: _____ cm Right Eye Distance: _____ cm

Complex Tandem Gait (if not tested in Balance)

Complex Tandem Gait Score: _____

Step 4: Coordination & Ocular/Motor Screen

Coordination: Is finger-to-nose normal for both hands with eyes open and closed?	**Y**	**N**
Ocular/Motor: Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	**Y**	**N**
Are observed extraocular eye movements normal? If not, describe:	**Y**	**N**

ImPACT APPLICATIONS, INC.

Vestibular/Ocular-Motor Screening (VOMS) for Concussion

	Not Tested	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Comments
Baseline Symptoms	**N/A**					
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						

Mucha A, Collins MW, Elbin RJ, Furman JM, Troutman-Enseki C, DeWolf RM, Marchetti G, Kontos AP. A brief vestibular and ocular motor screening (VOMS) assessment to evaluate preliminary concussion: Preliminary findings. Am J Sports Med; 2014.

Modified Vestibular/Ocular-Motor Screening (mVOMS) for Concussion

For detailed instructions please see the Supplement.

mVOMS	Not Tested	Headache	Dizziness	Nausea	Fogginess
Baseline symptoms	**N/A**				
Smooth pursuits (2 horizontal and 2 vertical, 2 seconds to go full distance right-left and back; up-down and back)					
Saccades – Horizontal (10 times each direction)					
VOR – Horizontal (10 repetitions) (metronome set at 180 beats per minute – change direction at each beep, wait 10 secs to ask symptoms)					
VMS (x 5, 80º rotation side to side) (at 50 bpm, change direction each beep, wait 10 secs to ask symptoms)					

Visio-Vestibular Examination

Smooth Pursuits

Patient-reported Symptom Provocation:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Or Physical Signs:

Jerky or Jumpy Eye Movements: Yes ☐ No ☐ >3 Beats of Nystagmus: Yes ☐ No ☐

Fast Saccades

Horizontal Saccades:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Vertical Saccades:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Gaze Stability Testing (The Angular Vestibular-Ocular Reflex)

Vertical Gaze Stability:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Horizontal Gaze Stability:

Worsening Headache: Yes ☐ No ☐ Dizziness: Yes ☐ No ☐

Eye Fatigue: Yes ☐ No ☐ Eye Pain: Yes ☐ No ☐ Nausea: Yes ☐ No ☐

Near Point of Convergence Testing

Distance: _____ cm

Left and Right Monocular Accommodation

Left Eye Distance: _____ cm Right Eye Distance: _____ cm

Complex Tandem Gait (if not tested in Balance)

Complex Tandem Gait Score: _____

SCOAT6

mVOMS

Baseline symptoms

Smooth pursuits
(2 horizontal and 2 vertical, 2 seconds to go full distance right-left and back; up-down and back)

Saccades – Horizontal (10 times each direction)

VOR – Horizontal
(10 repetitions)
(metronome set at 180 beats per minute – change direction at each beep, wait 10 secs to ask symptoms)

VMS (x 5, 80º rotation side to side)
(at 50 bpm, change direction each beep, wait 10 secs to ask symptoms)

VOMs
Mucha et al. 2014

Vestibular/Ocular Motor Test:

BASELINE SYMPTOMS:

Smooth Pursuits

Saccades – Horizontal

Saccades – Vertical

Convergence (Near Point in cm):
Measure 1:
Measure 2:
Measure 3:

VOR – Horizontal

VOR – Vertical

Visual Motion Sensitivity Test

Visio-Vestibular Examination

Smooth Pursuits

Jerky or Jumpy Eye Movements:

Fast Saccades

Horizontal Saccades:

Vertical Saccades:

Gaze Stability Testing

Vertical Gaze Stability:

Horizontal Gaze Stability:

Near Point of Convergence Testing

Distance: cm

Left and Right Monocular Accommodation

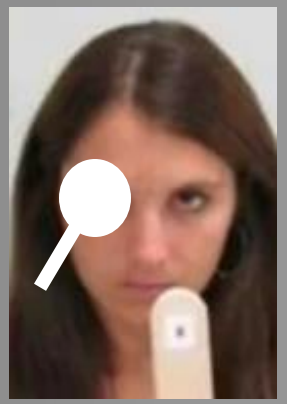
Left Eye Distance: cm Right Eye Distance:

Child SCOAT6

- Smooth Pursuits
- Saccades (H+V)
- Convergence (NPC)
- VOR (H+V)
- Visual Motion Sensitivity*
- Accommodation

Smooth Pursuits

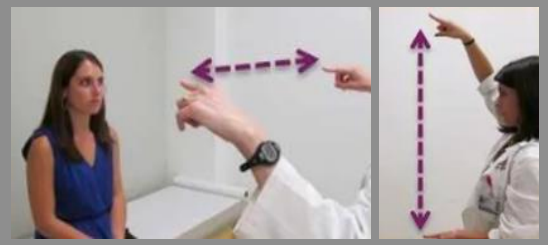
Accommodation



Convergence (NPC)

Saccades

Horizontal + Vertical



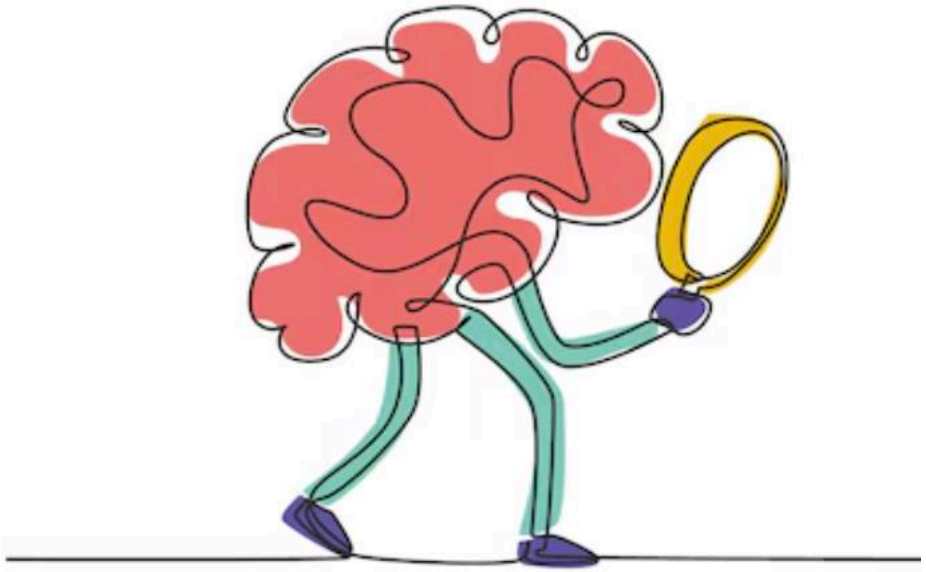
Visual Motion Sensitivity

Vestibulo-Ocular Reflex

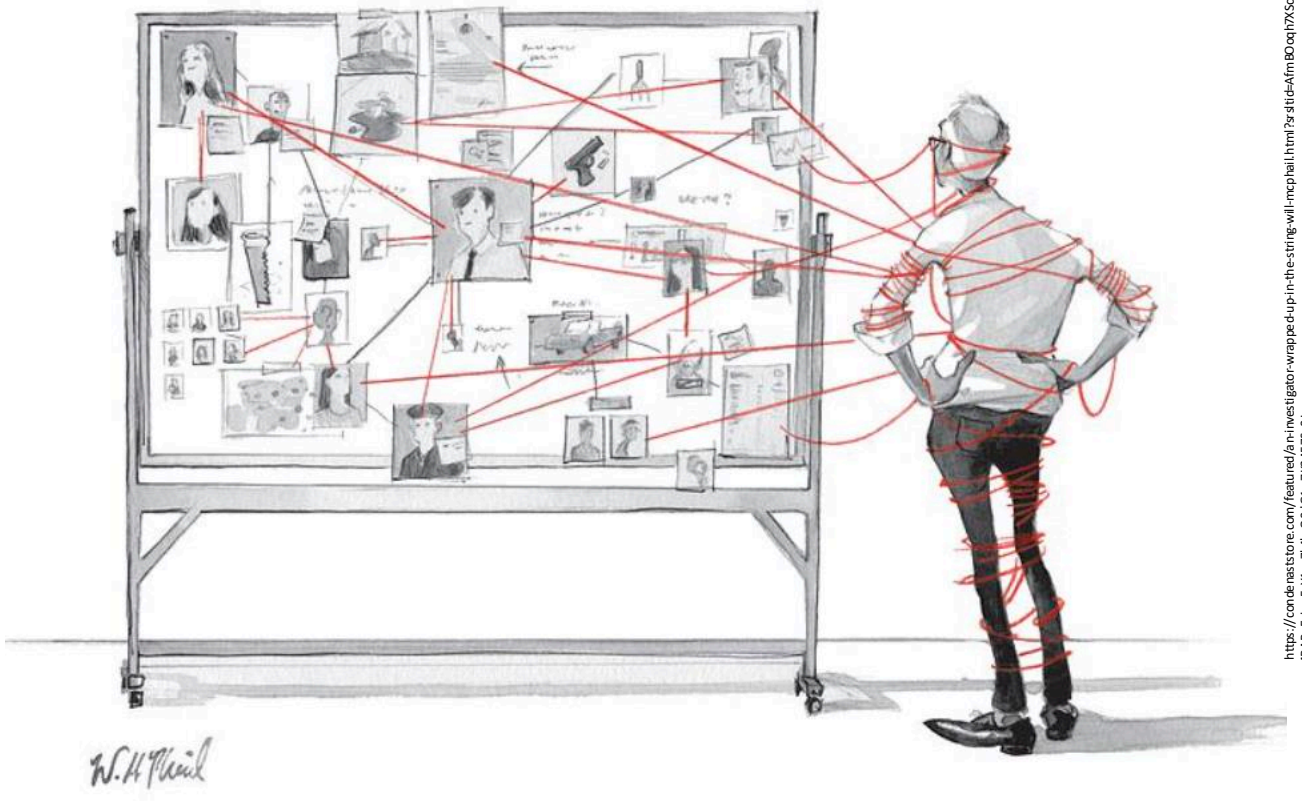
Horizontal + Vertical

Images adapted from UPMC Physician Resources:
https://www.upmcphysicianresources.com/cme-courses/active-management-of-ocular-problems-following-concussion

Observing Symptoms



Explaining Symptoms



https://condenaststore.com/featured/an-investigator-wrapped-up-in-the-string-will-mcphail.html?sr-stid=AfmBOoqh7XScOVNHtz-4BABeEyinw5rY1ogZk4hsO0dGim7K2A5ZS_0J

QUANTITY > QUALITY

IDENTIFY > ASSESS

QUALITY > QUANTITY

ASSESS IN CONTEXT

TREAT THROUGH (RE)INTEGRATION

QUALITY > QUANTITY:

ASSESS IN CONTEXT

- WHERE are they seeing from?
- WHAT can they see?
- HOW are they seeing?

TREAT THROUGH (RE)INTEGRATION

How do they need to FUNCTION in their environment?

MONITOR | REHABILITATE | (RE)INTEGRATE

Sensorimotor Recalibration

Peripheral-Spatial Integration

Eye:Head Coordination

Saccade variations

Gaze Stability + VOR variations

Disorientation-Reorientation

Multi-system Integration

*** Monitoring:** *NPC | Accommodation | VMS*





IMPERIA

MAF




EXIT


379

CUP
BAUER


Thank you.

@juliepmacd

juliemacdonaldwellness@gmail.com

References

Collins MW, Kontos AP, Reynolds E, Murawski CD, Fu FH. A comprehensive, targeted approach to the clinical care of athletes following sport-related concussion. *Knee Surg Sports Traumatol Arthrosc*. 2014;22 2:235–246.

Davis GA. Introducing the Child Sport Concussion Office Assessment Tool 6 (Child SCOAT6). *Br J Sports Med*. 2023;57(11):668

Kaae C, Cadigan K, Lai K, Theis, J. (2022). Vestibulo-ocular dysfunction in mTBI: utility of the VOMS for evaluation and management - a review. *NeuroRehabilitaiton*. 2023;50:279-296.

Kontos AP, Monti K, Eagle S, et al. Test-retest reliability of the vestibular ocular motor screening (VOMS) tool and modified Balance Error Scoring System (mBESS) in US military personnel. *Journal of Science and Medicine in Sport*. 2021;24:264-268.

Mucha, A. (2019, July 19). Active Management of Ocular Problems Following Concussion. [Webinar]. UPMC Physician Resources, https://www.upmcphysicianresources.com/cme-courses/active-management-of-ocular-problems-following-concussion.

Mucha A, Collins MW, Elbin RJ, et al. A Brief Vestibular/Ocular Motor Screening (VOMS) assessment to evaluate concussions: preliminary findings. *Am J Sports Med*. 2014;42(10):2479-2486.

Patricios JS, Schneider KJ, Dvorak J., et al. Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport–Amsterdam, October 2022. *British Journal of Sports Medicine*. 2023;57(11), 695–711.

Patricios JS. Introducing the Sport Concussion Office Assessment Tool 6 (SCOAT6). *Br J Sports Med*. 2023;57(11):651.