

University of British Columbia
Department of Ophthalmology & Visual Sciences

Eye Movements: Neurology, Abnormalities, and Testing

Dr. Miriam Spering, Assistant Professor

Session objectives and agenda

1. General Objectives

This 2-hour session on eye movements builds on students' existing knowledge on the neurology of eye movements and eye movement abnormalities and aims at introducing students to using eye movements as indicators of disease.

The acquired knowledge and skills directly relate to the general objectives for the Ophthalmology rotation. The student shall be able to:

- a) Identify different types of eye movements and differentiate between normal and abnormal eye movement findings. [General Objectives, c)]
- b) Perform an eye movement exam. [Essential Objectives, Skills, d)]
- c) Describe the nature of strabismus and amblyopia and be able to explain these to a patient or parent of a patient. [Essential Objectives, Knowledge, j)]

More specifically, the student shall:

- d) Know the characteristic features of saccades, pursuit, vergence, fixational eye movements, VOR and OKN.
- e) Be able to name the extraocular muscles and their primary and secondary functions.
- f) Know the basic brainstem mechanisms driving saccadic eye movements.
- g) Know the unilateral or alternating cover test, its general principles, and be able to perform it on a patient.
- h) Be able to identify different types of ocular deviation (tropias and phorias), possible perceptual consequences and clinical management.
- i) Be able to explain the difference between strabismus and amblyopia and explain the symptoms and perceptual consequences as well as clinical management using technical terms and lay language.
- j) Know how to conduct basic vision testing (e.g., stereovision, color vision, visual acuity).

2. Agenda

The human eye movement repertoire

- a) Saccades
- b) Pursuit
- c) Vergence
- d) Fixation
- e) Vestibulo-ocular reflex (VOR)
- f) Optokinetic reflex (OKR)

Neurology of eye movements

- a) Saccades
- b) Pursuit / OKR

Common eye movement abnormalities

- a) Disorders of saccades resulting from brainstem and cerebellar lesions, e.g., disorders of speed, accuracy and initiation
- b) Disorders of fixation / gaze holding, e.g. flutter, opsoclonus, square-wave jerks
- c) Disorder of pursuit following cerebral and basal ganglia lesions, e.g. in Parkinson's disease
- d) Abnormal nystagmus, downbeat, upbeat, torsional; congenital nystagmus

Ocular deviations with a focus on strabismus and amblyopia

- a) Definition
- b) Clinical management
- c) Perceptual consequences

The eye movement exam

- a) Review: visual acuity (e.g., ETDRS letter chart), stereovision (e.g., stereo fly or Randot C), color vision (e.g., Ishihara), confrontation visual field test
- b) Principles (following Appendix 1 in Leigh & Zee)
- c) Unilateral / alternate cover test

Contact information

Please contact me if you have any questions:

Dr. Miriam Spering

Phone: (604) 675-8871

mspering@mail.ubc.ca

<http://visualcognition.ca/spering.html>

Relevant literature

Harper, Richard A. *Basic ophthalmology*, 9th ed. San Francisco, CA: American Academy of Ophthalmology, 2010. (Chapter on Neuro-Ophthalmology)

Optional

Leigh, R. John and Zee, David S. *The neurology of eye movements*, 3rd ed. San Francisco: American Academy of Ophthalmology, 2006. (Available in Woodward, UBC Library, or ask me for a pdf)

Wong, Agnes M. F. *Eye movement disorders*. Oxford, UK: Oxford University Press, 2008. (Available in Woodward)

E-textbook of *Eye Movements* by the Canadian Neuro-Ophthalmology group (Jason Barton):
<http://www.neuroophthalmology.ca/textbook/NOeyemovt.html> (an excellent source, highly recommended)