

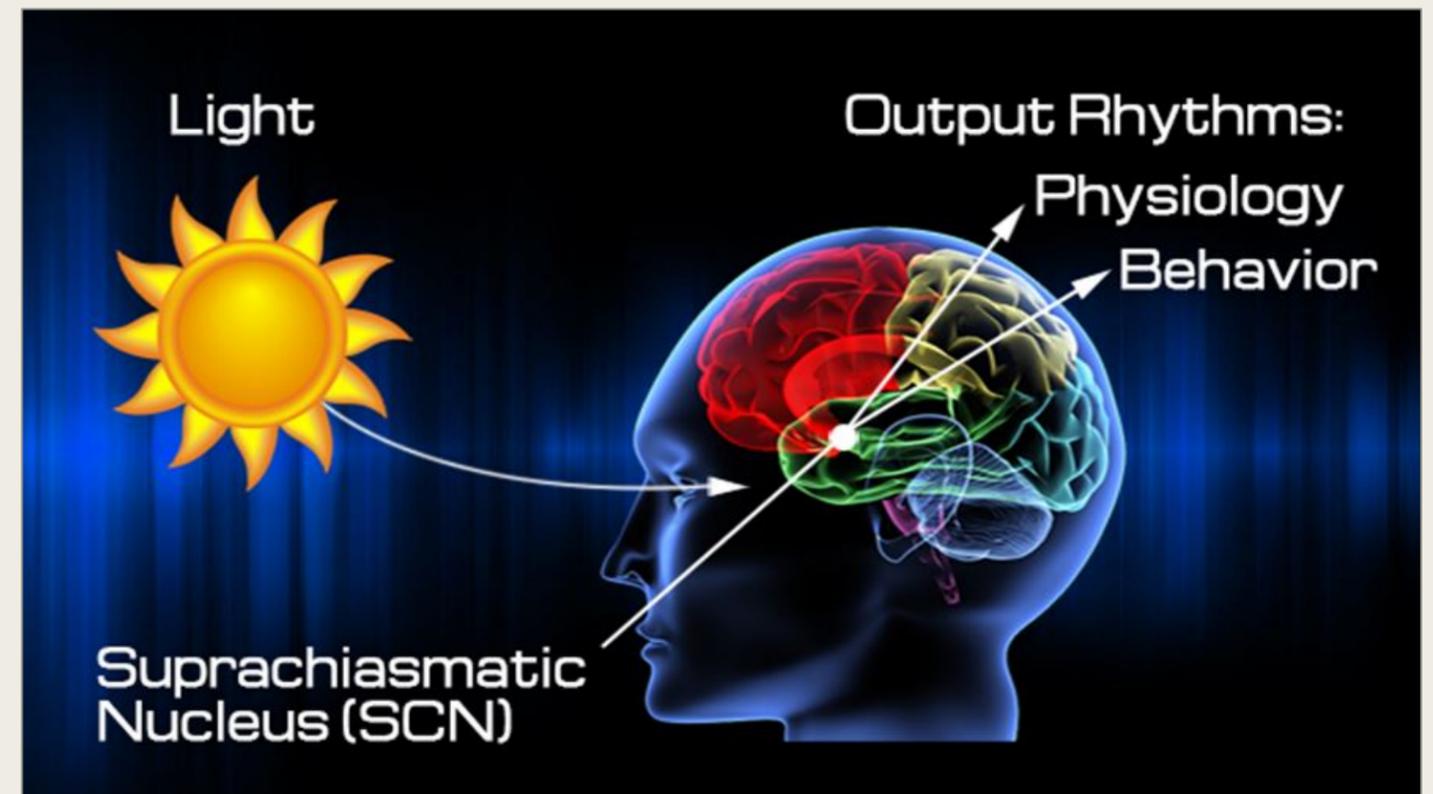
EVALUATION OF SLEEP IN INDIVIDUALS WITH GLAUCOMA

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Sleep

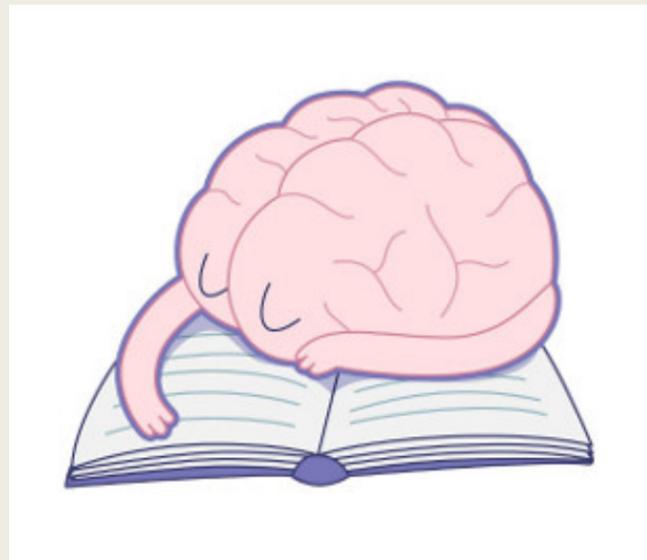
- Sleep is controlled by a circadian rhythm which is influenced by light, temperature and social cues.
- The eye produces melatonin as well as sends signals to the brain to release melatonin
- In non-visually impaired individuals, melatonin is correlated with sleep quality
- When administered orally melatonin can:
 - Can increase sleep time
 - Reduce night awakening
 - Synchronize sleep-wake cycles



- In a study by Tabandeh, H. *et al.*, 50 blind subjects **76%** complained of sleep-wake disorder and **36%** complained of symptoms that interfered with their occupation
- Blindness affects the absorption of light due to degenerative photoreceptors
- Sleep is regulated through homeostasis and disturbance to this cycle can lead to cognitive, emotional and mood imbalance

Memory

- Sleep is important for the formation of long-term memory and adapting to environmental changes with vision loss
- In order for rehabilitation services to be as effective as possible, techniques and instructional information on how to use visual aids must be reinforced to obtain a client's goals and to avoid device abandonment



Ophthalmic Disorders

- Circadian misalignment is the mismatch between the sleep-wake cycle
- Age-related macular degeneration, cataracts, and diabetic retinopathy can diminish light input in the eye
- Melatonin is one of the main contributors in coordinating cellular functions with the environment and is responsible for communicating with the brain stimulated by light input
- The retina contains intrinsically photosensitive retinal ganglion cells (iPRGCs) that produce melanopsin and are able to communicate with a center in the brain through photic input and signal transduction
- Glaucoma results in the loss of the iPRGCs



Hypothesis

Loss of the iPRGCs in the retina can affect sleep patterns depending on the degree of glaucoma and the severity of the disease

Materials and Methods

Inclusion

- VI participants diagnosed with any form of Glaucoma
- Speak English w/out a translator

Exclusion

Medically diagnosed with:

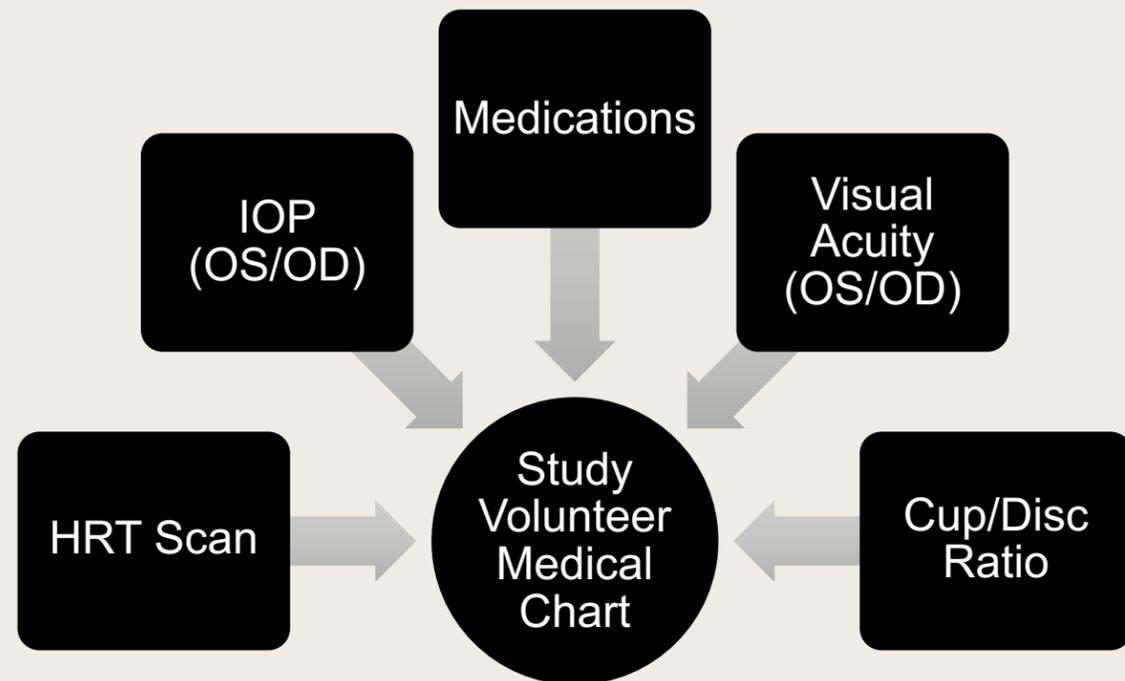
- Sleep apnea
- Any cognitive impairment, hearing deficits
- Neurological visual comorbidities

Sample

42 Participants from
Toronto Eye Specialists and Surgeons
Toronto, Ontario



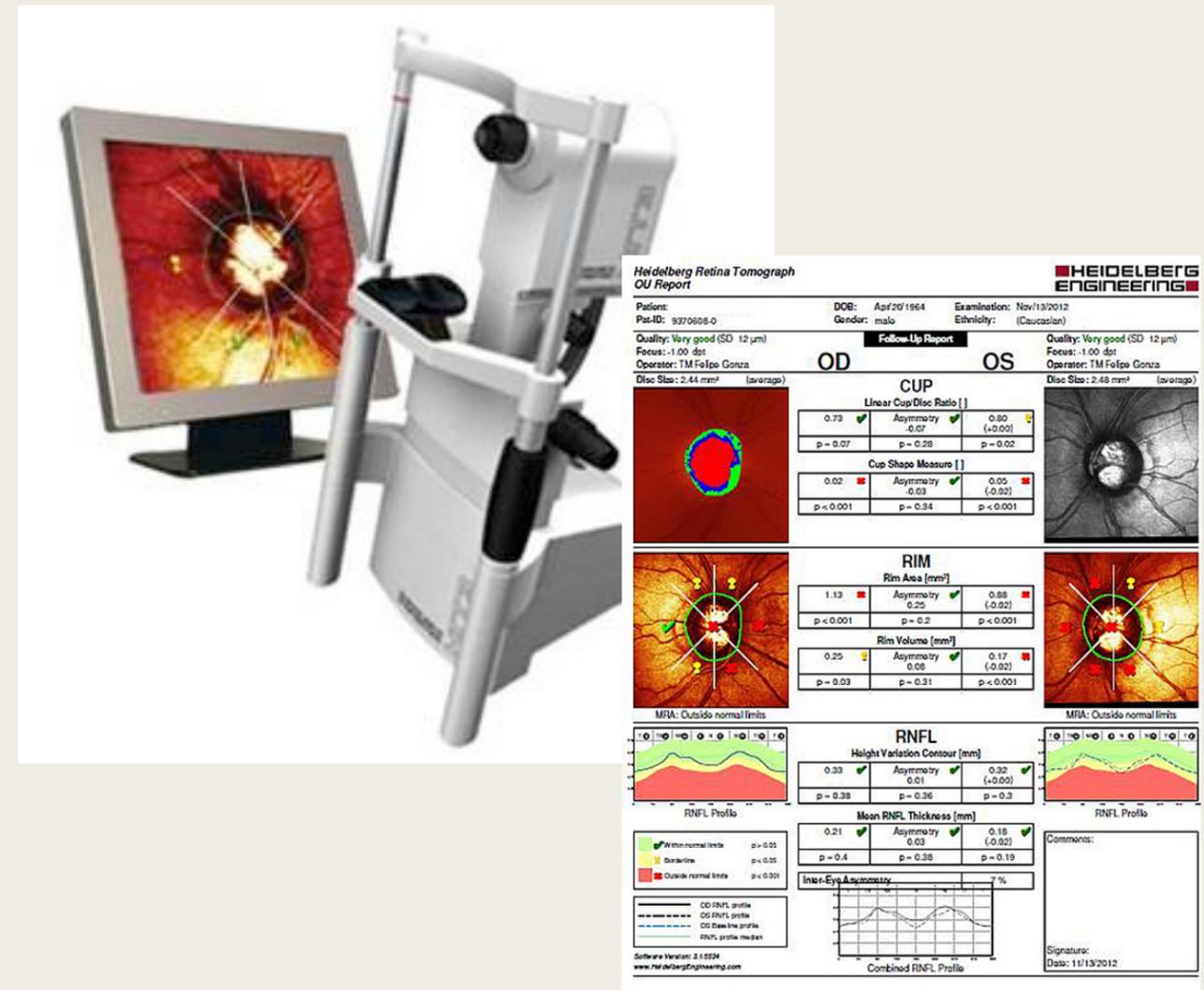
Demographic Questionnaire



Factors that can influence sleep

- 1) Do you drink coffee or caffeine? If so, during what time of the day?
- 2) Do you eat chocolate more than 3-times a week?
- 3) Do you work a day-shift or night-shift?
- 4) Do you take your glaucoma medication as instructed by the doctor?
- 5) Do you take anti-depressants, sleep medication or anything that may affect your natural sleep?

Heidelberg Retinal Tomography



Produces a 3-D image of the optic nerve to determine progression of glaucoma. This device is used to measure the cup disc ratio.

Image: http://www.drbrendancronin.com.au/images/Diagnostic_tests/HRT_machine.jpg

• https://www.researchgate.net/profile/Mohammad_Pakravan/publication/233977900/figure/fig4/AS:300114712252420@1448564331714/Figure-4-Heidelberg-retinal-tomography.png

Preliminary Data

N = 31

Mean Age: 63

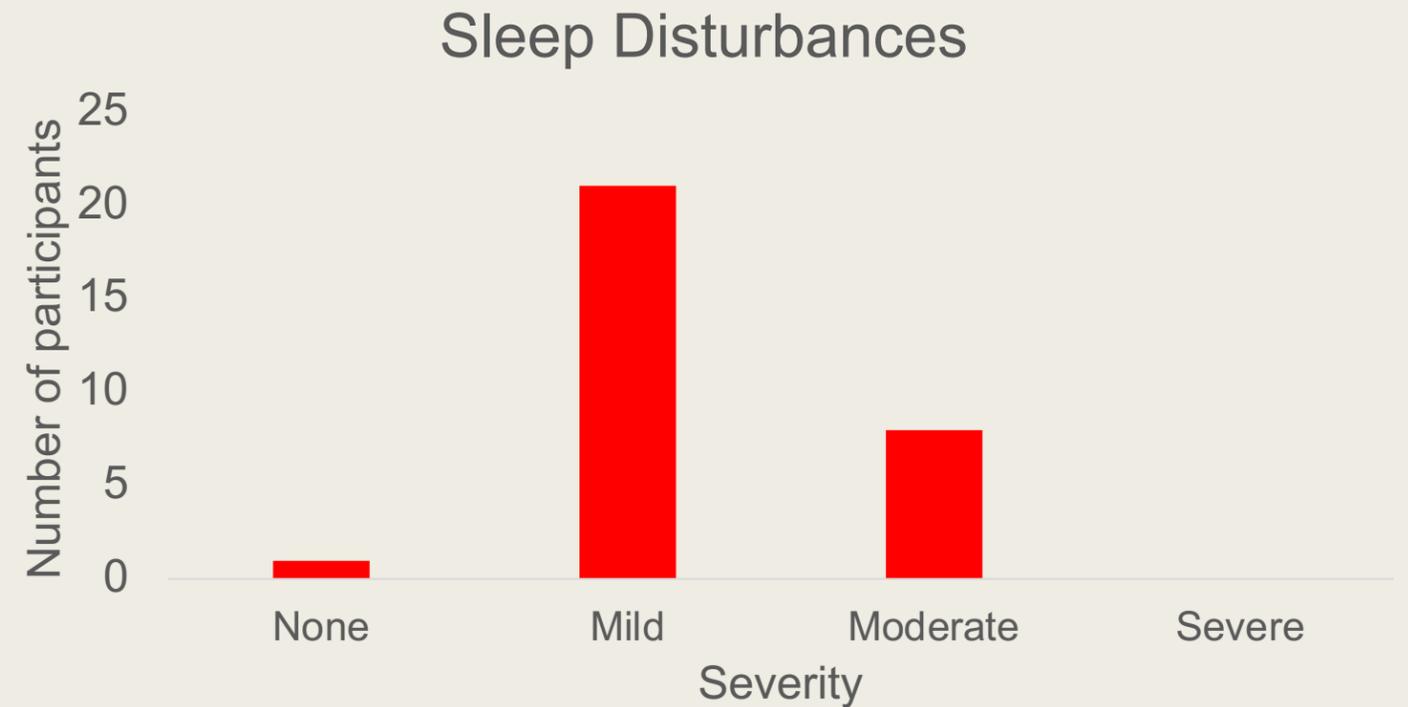
20 Female, 11 Male

PSQI Global Score (No.[%])

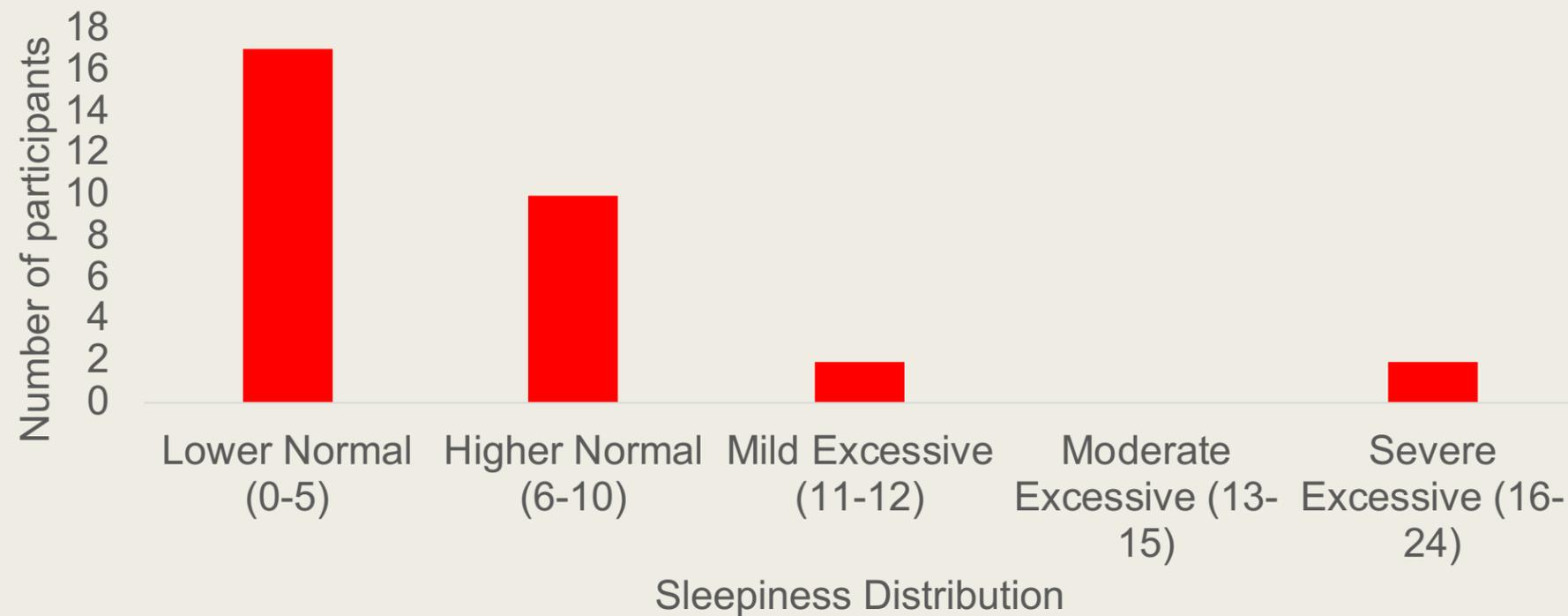
Score <5 – Good Sleep Quality	Score ≥ 5 – Poor Sleep Quality
(12) [38.7%]	(19) [61.2%]

Global PSQI Score Distributed according to Tabandeh *et al.* (No.[%])

None ≤ 5	Mild (6-8)	Moderate (9-12)	Severe ≥ 12
(13) [41.9%]	(9) [29%]	(5) [16.1%]	(4) [12.9%]



Epworth Sleepiness Scale



Further Research:

- Compare the 7 categories of PSQI with cup disc ratio
- Compare data to normative data and other retinal disorders
- Potential continuing research:
 - To quantify the loss of the iPRGCs in the optic nerve
 - Provide information on how to effectively intervene in rehabilitation

Acknowledgements:

- Dr. Olga Overbury, Ph.D., University of Montreal
- Caitlin Murphy, M.Sc.
- Dr. Edward Margolin, MD, Toronto Eye Specialists and Surgeons

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- Image on slide 2: https://www.nigms.nih.gov/education/PublishingImages/circadian_rhythm_labeled1.jpg
- Image on slide 3: <http://www.the-scientist.com/images/News/June2016/310brainsleep2.jpg>
- Image on slide 4: http://retinagallery.com/albums/userpics/10001/normal_glaucoma_midi01.png
- Image on slide 5: <https://ajsmithactionresearch.files.wordpress.com/2014/08/participants.jpg>