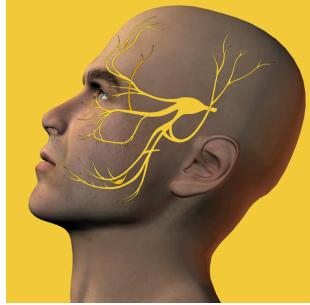


Optometry Meets Neurology: Linking Headaches and Dry Eye Symptomology



Paul M. Karpecki, OD, FAAO
Kentucky Eye Institute
KEPLR Vision
KYCO University of Pikeville

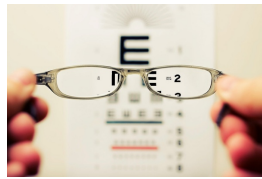
Paul M. Karpecki, OD, FAAO Financial Disclosures:

Aerie Pharmaceuticals
Akorn
Alcon Labs
Aldeyra
Allergan/Abbvie
Allysta
Amaros Medical
Aurinia
Avellino Labs
Azura Pharmaceuticals
Bausch Healthcare
BioTissue
BlephEx
Bruder Healthcare
Bruno Pharmaceuticals
Cambium Pharma
DGH Technology
Dompe
Enchroma
Eyedotec
Eyegate
Eyevance

Healthe
Hubble
Hue.AI
iCare USA
Imprimis
Ivantis
Johnson/Web MD
Johnson & Johnson
Vision
Kala pharmaceuticals
Keplr Vision
Konan Medical
LeGrande
LenTechs
Maculogix
Mallinckrodt
Mati Therapeutics
NeuroLens
Novaliq
Novartis
Oasis Medial
Ocuphire

Ocular Sciences
Oculus
OcuMedic
Orasis
Oyster Point
Percept
RegenerEyes
Reichert
Rendia
RxSight
Science Based Health
Sentiss Pharmaceuticals
Sight Sciences
Silk Technologies
Sun Pharmaceuticals
Surface Pharmaceuticals
Tarsus Medical
TearClear
TrueVision Systems
Visant Medical
Vital Tears

Based on 6 months data ending
March 1, 2020 from 15,024
Independent ECPs, the national
average for prescriptions that
contain prism correction is?



- a) 3%
- b) 6%
- c) 9%
- d) 12%
- e) Are you kidding,
prism is voodoo!

	SPH	CYL	AX	PRISM	ADD
O.D.	+0.75	-1.00	120	1.0 BO	
O.S.	PL	-0.50	110	2.0 BU	
PD				63	/

Polling Question



- Patient History: 35 yo female
- Mild Headaches
- 8+ hours using computers or digital devices, current computer glasses okay, not great (+.75)
- Unremarkable HPI, healthy, average BMI
 - Cover test: EXOp near and far
 - Phorias: 4 EXOp distance, 8 EXO near, no vertical issue
 - Normal versions OU with comments of slight neck stiffness
 - Fixation disparity test?
- What prism would you prescribe?



What Prism would you consider to Prescribe?

- A. NO prism, as symptoms and measurements are minimal
- B. 2 BI
- C. 3 BI
- D. 4 BI
- E. 3 BO



65%

of Americans experiencing symptoms of Digital Eye Strain

10%

report these symptoms to their OD

A big problem with many names



Documented in 1800s	Documented in 1855	Documented in 1900	Popularized in 2000s	Popularized in 2010s	
Asthenopia	Convergence Insufficiency	Fixation Disparity	Computer Vision Syndrome	Digital Vision Syndrome	Trigeminal Dysphoria
Fatigue	Eyestrain	Eyestrain	Eye Strain	Eye Strain	Headaches
Eye Pain	Headaches	Headaches	Headaches	Headaches	Neck Pain/ Stiffness
Blurred Vision	Difficulty reading	Difficulty reading	Headaches	Headaches	Tired Eyes
Double Vision	Double vision	Double vision	Blurred Vision	Blurred Vision	Discomfort at Computer
Headaches	Difficulty concentrating	Difficulty concentrating	Dry Eyes	Dry Eyes	Dry Eyes
Burning	Squinting or closing one eye	Squinting or closing one eye	Neck and Shoulder pain	Neck and Shoulder pain	Light Sensitivity
Watery Eyes					
Dry Eyes					
Sore Neck					
Photophobia					

Lifestyle Index

This questionnaire is meant to help you & your doctor understand what you're experiencing on a regular basis—whether it's identifying your eye problems, stressors, etc. Your responses will help us better understand the best way to help you.

How often do you experience any of these symptoms? Fill in applicable circle. For example: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Headaches

1 You get headaches of any severity each week (even just a dull ache) more than 4 times a week or more often than you would like.

2 You get headaches of any severity each week (even just a dull ache) 3-4 times a week.

3 You get headaches of any severity each week (even just a dull ache) 1-2 times a week.

4 You get headaches of any severity each week (even just a dull ache) less than 1 time a week.

5 You rarely or never get headaches.

Neck Pain/Stiffness

1 Your neck gets stiff, hurts, or gets tired easily when you work at a computer or read for long hours.

2 Your neck gets stiff, hurts, or gets tired easily when you work at a computer or read for long hours.

3 Your neck gets stiff, hurts, or gets tired easily when you work at a computer or read for long hours.

4 Your neck gets stiff, hurts, or gets tired easily when you work at a computer or read for long hours.

5 Your neck gets stiff, hurts, or gets tired easily when you work at a computer or read for long hours.

Tired Eyes

1 Your eyes feel increasingly fatigued by the end of the day.

2 Your eyes feel increasingly fatigued by the end of the day.

3 Your eyes feel increasingly fatigued by the end of the day.

4 Your eyes feel increasingly fatigued by the end of the day.

5 Your eyes feel increasingly fatigued by the end of the day.

Very Dry Sensation

1 Your eyes progressively feel more dry/irritated while working at the computer or reading.

2 Your eyes progressively feel more dry/irritated while working at the computer or reading.

3 Your eyes progressively feel more dry/irritated while working at the computer or reading.

4 Your eyes progressively feel more dry/irritated while working at the computer or reading.

5 Your eyes progressively feel more dry/irritated while working at the computer or reading.

Light Sensitivity

1 Bright or strong lights bother your eyesight. You wear sunglasses or shades when you work.

2 Bright or strong lights bother your eyesight. You wear sunglasses or shades when you work.

3 Bright or strong lights bother your eyesight. You wear sunglasses or shades when you work.

4 Bright or strong lights bother your eyesight. You wear sunglasses or shades when you work.

5 Bright or strong lights bother your eyesight. You wear sunglasses or shades when you work.

Blurred Vision

1 You experience blurry vision, motion sickness, or dizziness.

2 You experience blurry vision, motion sickness, or dizziness.

3 You experience blurry vision, motion sickness, or dizziness.

4 You experience blurry vision, motion sickness, or dizziness.

5 You experience blurry vision, motion sickness, or dizziness.

Additional Notes

Please additional notes you'd like to add.

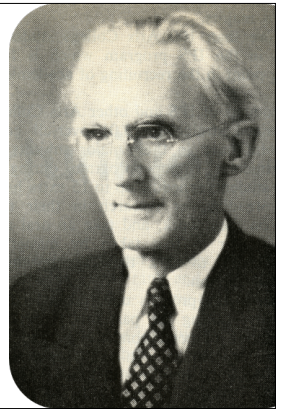
The Lifestyle Index

Review of Criteria, Testing and Treatment plans

- Percival's Rule: described a comfortable zone of fusion reserves and phorias- Early 1900s
 - Formula review: Prism needed=1/3(greater limit of BI or BO range)-2/3(lesser limiting of BI or BO range)
 - Eg: pt has 6 ex and BO ranges of 6/10/8 and BI range of 21/26/22, prism needed= 1/3 (21)-2/3(6)= 3 BI

Sheard's criterion

- Prism needed = 2/3 (phoria) - 1/3 (compensating fusional vergence)
- eg: pt has 6 XP and BO to blur is 6, the prism needed is 2/3 (6) - 1/3 (6) = 2 BI



A. M Skeffington



- Skeffington's describing visual processing
 - A Modern Concept of Vision A. M. Skeffington, OD
 - Originally published in Practical Applied Optometry, 1991
 - Reviews the behavioral functional theory of vision care, and then the details of lens/prism application for the prevention of certain visual problems, the development of visual performance, and enhancement of vision achievement.
 - "Vision" played a much larger part in individuals' lives than simply being able to read a letter chart

Prism Prescribing Guidelines

- Morgan's Criterion : Based on Morgan's Normative Values
- Clinical Wisdom : 1/3rd of measured angle of deviation
- Sheard's Criteria : 2/3(Phoria) - 1/3(Fusional vergence) - eso look BI ; exo look BO
- eg : 6 prism exo, BO to blur 6 prism Amount of prism will be 2 prism BI (1 prism each eye)
- Percival Criteria : 1/3(greater limit of BI or BO range) - 2/3(lesser limit of BI or BO range)

Calculating
Prism,
dusting off
your text
book

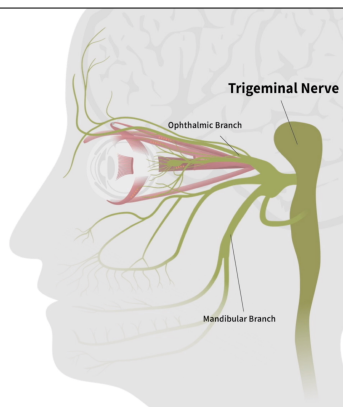
The Trigeminal Nerve

Relief is in Sight

- Proprioceptive signals are transmitted through the ophthalmic branch of the trigeminal nerve, which is responsible for detecting sensation and reporting pain.

- It appears that these signals play a large role in the stimulation of the trigeminal nerve, resulting in symptoms associated with **Trigeminal Dysphoria**.

- Nerves
- Extraocular muscles
- Proprioceptive fibers



Headache Types



Migraine without Aura:

- Unilateral
- Throbbing
- Nausea/vomiting
- Light and sound sensitive
- Worse with activity
- Severe
- Last 6-8 hours untreated

Migraine with Aura:

- Reversible neurologic symptoms that are fully reversible
- Usually last 20-30 minutes
- Can be visual, unilateral numbness, unilateral weakness or dysphasia

Tension Type Headache:

- Bilateral squeezing headache
- Rare nausea/vomiting
- No light or sound sensitivity
- Better or no change with activity
- Mild to moderate

Medication overuse headache:

- Diffuse dull ache, pressure or discomfort
- Non throbbing
- No nausea/vomiting
- No light or sound sensitivity
- No change with activity
- Mild

Trigeminal Dysphoria:

- Bilateral occipital and neck pain that radiates to the retro-orbital regions
- Constant pressure or ache
- Dry eye sensation
- Fatigue
- Light sensitive
- Worse with reading and working on the computer

Measurement Device



Real-life measurement of Binocular Vision, taking into account:

- Heterophoria
- Vergence conditioning
- Binocular peripheral fusion
- Fixation disparity
- Accommodative convergence response
- Alternating monocular central

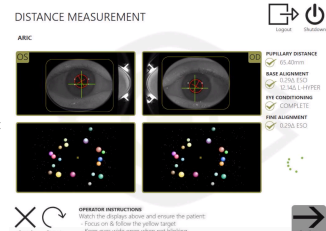
Peripheral and central vision measure in **objective, repeatable, environment** at both near (50 centimeters) and far (6 meters, simulating optical infinity).



How it works



- Patients focus on a single point while a dynamic display of rotating planets and stars activate peripheral and central vision to measure distance and near eye alignment.
- The measurement device isolates peripheral and central vision to provide a comprehensive assessment of the patient's eye alignment and synchronization.
- Unique single measurement of total misalignment at distance and near, providing a prescriptive range for contoured prism RX.



How is it different?



Objective – 100% objective. No patient or operator interaction. Sophisticated eye-tracking

Accurate – measurements are calculated to one-hundredth of a prism diopter

Efficient – testing performed in less than 3 minutes by a technician

Standardization – consistent, reproducible measurement (standard deviation is < 0.8 prism diopter)



What does this mean?

100,000+ measurements to date

We are gathering over 10 million data points a week from our current sites

All of this data goes into our **Contoured Prism Lenses**

What is Contoured Prism?

- A proprietary lens technology integrating a contoured prism design in conjunction with the patient's refractive prescription.
- Contoured prism technology enables practitioners to relieve binocular misalignment detected at distance, intermediate, and near in a single lens.
- Research indicates that over 90% of patients experience a larger misalignment when fusing at near than at distance.¹**

Chronic Headache Study

179 Participants

Inclusion Criteria = refractory, end-of-the line, chronic headache

82%
positive response to treatment at 90 days

54%
reported headache symptoms as 'reduced substantially' or 'basically gone'

Patient Reported Symptom Relief - 90 day

How have your symptoms responded?

n=179

- Basically gone
- Decreased substantially
- Decreased slightly
- No change
- Increased

Digital Vision Syndrome Study

Patient Reported Symptom Relief – 90 Day

- 22 participants – inclusion criteria = Qualified as DVS sufferer by validated questionnaire¹
- 100% positive response to treatment at 90 days
- 86%** reported DVS symptoms as "Reduced Substantially" or "Basically Gone"

How have your symptoms responded?

n=22

- Basically Gone
- Decreased Substantially
- Decreased Slightly
- No Change
- Increased

Patient Case Study #1

15 year old female
Complains of headaches, and dizziness. Convergence insufficient intermittent exotropia. Has worn glasses since age 11, which have helped, but still complains of headaches, and dizziness.

Lifestyle Index:

Headaches	4
Neck Stiffness	3
Computer Discomfort	2
Tired Eyes	4
Dry Eye	1
Light Sensitivity	2
Dizziness	4

Rx (Single Vision):

+0.50-1.00x096
+1.00-1.25x090
1.6 BI NeuroLens

neurolens Measurement Device:

3.1 EXO Distance – 10.2 EXO Near

neurolens Value: 1.6 BI

Case History #1

Lifestyle Index:

Headaches	4
Neck Stiffness	3
Computer Discomfort	2
Tired Eyes	4
Dry Eye	1
Light Sensitivity	2
Dizziness	4

Patient #1

Patient reports his glasses are MUCH clearer than before despite the exact same RX. She is making fewer mistakes when taking tests where answers are reports being able to read longer. Headaches have lessened significantly and she no longer experiences dizziness.

Patient Case Study 2



42 year old female
Headaches, light
sensitivity, tired eyes,
eyes never quite feel right,
and vision has always
seemed off. Never found
glasses to fix the problem.

neurolens Rx (Progressive):
Plano with 1.50 Add OU
1.5 BI

Lifestyle Index:

Headaches	4
Neck Stiffness	2
Computer Discomfort	3
Tired Eyes	4
Dry Eye	1
Light Sensitivity	4
Dizziness	3

neurolens Measurement Device:
3.40 EXO Distance – 9.48 EXO Near

Patient Case Study 2

Follow up report:

Patient reported back, relieved and thrilled with new correction. Reported only 1 headache in 14 days(previously Headaches almost daily). Vision seems “natural” and has more energy and concentration. Needs fewer breaks. Feels like a weight lifted off her shoulders, “finally someone that listened and understood my problems”.

Thank You!



- “Only a **small amount** of **Base-In prism** will produce a **noticeable change** in the relation of fusional demand and reserve so that the average patient may require very limited amounts to restore comfort.”

Irving Borish

Questions?