COURSE SYLLABUS

THE SUNCOAST SEMINAR

PRESENTED BY THE PINELLAS OPTOMETRIC ASSOCIATION

Saturday April 25

7:45 am - 8:15 am	**Registration**
	Exhibit Hall Open
	Continental breakfast - *sponsored by St. Luke's Cataract and Laser Institute*
8:15 am - 9:55 am	**Advances in Cornea, Cataract, Refractive and Glaucoma Surgery (2, TQ, COPE: 103831-GO)** Neel R. Desai, M.D. and Priti Panchal, O.D.
9:55 am - 10:40 am	**Break**
	Exhibit Hall Open
10:40 am - 12:20 pm	**Amblyopia Management for Primary Care O.D.s (1, COPE: 103274-FV)** **Acquired Brain Injury: What the O.D. Needs to Know (1, COPE: 103273-FV)** Richard Sorkin, O.D.
12:20 pm - 1:10 pm	**Lunch** - *sponsored by Retina Vitreous Associates of Florida*
	Exhibit Hall Open
1:10 pm - 1:20 pm	**Lighthouse of Pinellas Update**
1:20 pm - 1:30 pm	**FOA Update**
1:30 pm - 3:10 pm	**Pharmaceutical Update - Innovations and Insights for Eye Care (2, TQ, COPE: 103324-PH)** Greg Caldwell, O.D.
3:10 pm - 3:30 pm	**Break**
3:30 pm - 5:10 pm	**Latest Advances in Eye Care Technology - Innovations in Early Detection and Management (2, TQ, COPE:103700-GO)** Greg Caldwell, O.D.

Sunday April 26

7:30 am - 8:00 am	**Registration**
	Continental breakfast - *sponsored by the POA*
8:00 am - 9:40 am	**Grand Rounds - Improving Eye Care and Outcomes for Patients (2, TQ, COPE: 103866-TD)** Greg Caldwell, O.D.
9:40 am - 10:00 am	**Break**
10:00 am - 11:40 am	**Prevention of Medical Errors (2, COPE: 102834-EJ)** Alice Sterling, O.D.
11:40 am - 12:00 pm	**Lunch** - *sponsored by LENZ Therapeutics*
12:00 pm - 1:40 pm	**Florida Jurisprudence (2, COPE: 101024-EJ)** Alice Sterling, O.D

SUNCOAST SEMINAR HANDOUT

Modern Innovations in Cataract, Refractive, Corneal, and Glaucoma Care

Guide for optometrists: referral pearls, patient selection, co-management, and what is available now versus what is emerging next.

Learning Objectives

- Distinguish historical, current, and emerging treatment paradigms in cataract, refractive, corneal, and glaucoma care.
- Recognize the referral triggers that should prompt earlier subspecialty evaluation for keratoconus, dysfunctional lens syndrome, high ametropia, and ocular hypertension/open-angle glaucoma.
- Understand how modern technology choices change patient counseling, postoperative expectations, and long-term OD/MD co-management responsibilities.
- Connect the lecture content directly to the Suncoast Seminar post-test domains.

Neel R. Desai, MD

Eye Institute of West Florida

Audience: Optometrists involved in screening, referral, postoperative care, and refractive/cataract co-management.

March 2026

1. Cataract Surgery Innovations: From “remove the cataract” to “engineer postoperative vision”

Historically, cataract surgery was judged largely by safety, wound integrity, and whether the patient could function with glasses afterward. Today, cataract surgery is a refractive procedure. Preoperative planning is increasingly dominated by ocular surface optimization, biometry precision, astigmatism management, and lens selection based on lifestyle, visual demands, and tolerance for optical trade-offs. For the referring optometrist, that means the preoperative exam matters more than ever: tear film quality, irregular astigmatism, epithelial basement membrane disease, Salzmann nodular degeneration, Fuchs endothelial compromise, prior refractive surgery, macular status, pupil behavior, and patient personality all influence the best IOL pathway.

Historical to current cataract paradigm

Era	Primary goal	Typical lens strategy	Main OD contribution today
Legacy cataract care	Remove opacity safely	Monofocal, distance target	Detect cataract and monitor
Modern refractive cataract care	Optimize quality of vision and reduce spectacle dependence	Customized premium, toric, EDOF, or full-range options	Pre-op surface optimization, expectation setting, and postoperative co-management
Emerging precision cataract care	Match optics to phenotype and tolerance profile	Highly segmented lens portfolios plus gentler extraction platforms	Identify phenotype early and guide the right patient to the right procedure

PanOptix Pro

PanOptix Pro represents an evolution of trifocal technology rather than a complete departure from it. The practical message for co-managing ODs is that this is designed for the patient who truly wants a broad range of spectacle independence and is willing to accept the refractive cataract mindset that comes with multifocal optics. Compared with earlier-generation trifocal experiences, the current positioning emphasizes enhanced intermediate clarity, improved image contrast, and higher light utilization. It remains most attractive for motivated patients with healthy maculae, low irregularity, regular astigmatism that can be corrected, and realistic counseling about dysphotopsias.

enVista Envy

enVista Envy is notable because its ActivSync approach is marketed around intelligent energy distribution across lighting conditions rather than a simplistic “distance versus near” framing. In practical terms, this expands the conversation beyond pure acuity charts

and into image quality, contrast, and functional performance in real world lighting. For optometrists, that means paying close attention to mesopic complaints, night driving concerns, and patients who want range but are less tolerant of scatter and reduced quality of vision.

ClearView 3

ClearView 3 is important historically because it broadened the U.S. premium IOL conversation beyond concentric diffractive rings. Its rotationally asymmetric, segmented refractive design gives surgeons another option for patients who want presbyopia correction but may prefer a lens discussion centered on low-light contrast and reduced halo/glare burden compared with classic ring-based multifocals. It is especially useful to understand when counseling patients who say they want range of vision but are anxious about "rings," "halos," or the night-driving reputation of older multifocal platforms.

TECNIS PureSee and the emerging refractive EDOF category

PureSee highlights where the field is going: toward extended depth-of-focus optics that try to preserve contrast closer to monofocal-like performance while still extending functional range, especially for distance and intermediate tasks. This is strategically important because many patients do not need tiny print freedom at all costs; they want cleaner quality of vision, more tolerance, and fewer optical side effects. As this category matures, the OD should think in phenotypes: the "full range seeker," the "quality-first patient," and the "compromise-intolerant night driver."

Practical IOL phenotype matching

Lens/design	Optical concept	Best fit	Watch-outs
PanOptix Pro	Trifocal with enhanced light utilization	Motivated spectacle-independence seekers wanting near/intermediate/distance range	Need healthy ocular surface/macula and counseling on halos/glare
enVista Envy	Full-range/energy-distribution strategy	Patients seeking range with emphasis on image quality and lighting adaptability	Residual refractive error and surface disease still matter
ClearView 3	Segmented refractive multifocal	Patients interested in range but wary of ring-based optics	Still a premium optic—precise selection remains essential
PureSee	Purely refractive EDOF	Quality-first patient prioritizing distance/intermediate with lower contrast concerns	Near expectations must be framed honestly

MICOR 700: Why ultrasound-free extraction matters

The significance of MICOR is easiest to appreciate in historical context. Conventional phacoemulsification transformed cataract surgery and remains highly effective, but it still relies on ultrasonic energy. The promise of MICOR is not that phaco suddenly became "bad," but that the field may finally have a meaningful alternative for lens extraction with less intraocular energy burden. That matters most when you are trying to protect endothelium, reduce thermal concerns, and potentially create a gentler environment in already compromised corneas. The referral pearl is simple: when the patient has cataract plus Fuchs endothelial dystrophy, borderline endothelial reserve, prior corneal compromise, or a high-value premium refractive target where every bit of corneal clarity matters, the extraction platform itself becomes part of the refractive plan.

What is available now at EIWF versus what is emerging next

- Current real-world cataract planning already includes personalized premium IOL selection, toric management, refractive lens counseling, and surface-first optimization before surgery.
- The field is moving toward more phenotype-specific premium optics and lower-energy extraction strategies, with MICOR representing one of the most important potential shifts away from ultrasound dependence.
- For ODs, the highest-yield action is not memorizing every lens spec—it is recognizing which patients are premium candidates, which are quality-of-vision candidates, and which should be steered away from premium optics because of ocular surface, corneal, retinal, or personality factors.

2. Refractive Innovations: refractive lens exchange and EVO ICL

Modern refractive care is no longer a simple LASIK-versus-PRK decision tree. The real-world refractive clinic increasingly triages among corneal laser vision correction, lens-based correction, and phakic IOL technology based on age, refraction, biomechanics, dry eye

profile, chamber anatomy, retinal risk, and the patient's presbyopic stage. This is where ODs are particularly valuable because many patients present first to the primary eye-care office asking, "What am I a candidate for?"

Refractive Lens Exchange (RLE/CLE)

Historically, clear lens extraction was viewed cautiously because removing a clear crystalline lens meant giving up accommodation and exposing a non-cataract patient to intraocular surgery. Today, RLE is best understood as a strategic option for the presbyopic hyperope, the dysfunctional lens syndrome patient, and selected older refractive patients whose complaints are increasingly lens-driven rather than cornea-driven. In the right patient, RLE solves several problems at once: refractive error, presbyopia, progressive lens dysfunction, and future cataract development. The most common classic phenotype is the hyperope over 45 who wants freedom from glasses and is already beginning to "fight the lens."

When to think RLE early

Think about RLE earlier when the patient has hyperopia with presbyopia, inconsistent quality of vision that exceeds what the slit lamp "cataract grade" suggests, narrow-ish anatomy, or repeated dissatisfaction with glasses/contact options. Think more cautiously in high axial myopes, especially when retinal detachment risk meaningfully changes the counseling equation. OD counseling should frame RLE not as "doing cataract surgery early," but as a lens-based refractive procedure chosen because the natural lens has become the limiting structure for visual function and spectacle independence.

EVO ICL

EVO ICL has become one of the most important refractive innovations for younger and middle-aged patients who want premium refractive outcomes without removing the crystalline lens. Its central-port posterior chamber phakic lens design is clinically meaningful because it preserves the natural lens and therefore avoids early presbyopia induction, while also improving physiologic aqueous flow and eliminating the historical routine need for peripheral iridotomy. For the OD, EVO ICL should immediately come to mind in the high myope, thin-cornea patient, dry-eye patient, or large-correction patient who is not an ideal laser candidate but still wants refractive freedom.

RLE versus EVO ICL: referral framework

Question	RLE/CLE	EVO ICL
Who is the classic patient?	Hyperopic presbyope or dysfunctional lens syndrome patient, often >45	Younger or middle-aged phakic myope/astigmat seeking correction while preserving accommodation
Why choose it?	Solves refractive error plus presbyopia/lens dysfunction and prevents future cataract	Maintains natural lens, treats larger refractive errors, and can be attractive in dry eye or thin cornea
What are key cautions?	Retinal detachment risk in high myopes; intraocular lens trade-offs	Anterior chamber depth, sizing, vaulting, angle anatomy, and long-term follow-up
What should the OD emphasize?	Lens-based strategy and expectation setting around premium optics	Preservation of the natural lens, central-port design, and candidacy beyond corneal laser limits

Sizing, safety, and why the OD still matters after surgery

The maturing EVO ICL workflow increasingly incorporates better sizing tools, including ultrasound biomicroscopy-based anatomic assessment and more sophisticated nomograms. That does not make postoperative co-management less important; it makes it more structured. ODs play a critical role in postoperative vault surveillance, IOP monitoring, lens clarity tracking, refraction, and long-term retinal vigilance in highly myopic eyes. The broader lesson is that refractive innovation does not remove the need for primary eye care—it creates more nuanced, longitudinal co-management opportunities.

High-yield refractive referral pearls

- Young high myope with thin corneas or dry eye? Think EVO ICL before assuming laser is best.
- Hyperope over 45 who wants presbyopia correction and is already bothered by lens dysfunction? Think RLE/CLE.
- Do not let a "mild cataract" label distract from the fact that the lens may already be the limiting optical structure in a symptomatic presbyope.
- In the modern era, the best refractive answer is the procedure that matches the patient's age, anatomy, lens status, and tolerance for trade-offs—not the one they happened to ask about by name.

3. Corneal Innovations: Epioxa and CAIRS in the new keratoconus era

Keratoconus is one of the best examples of how the field has shifted from passive observation to proactive intervention. The old paradigm often amounted to "watch until it is obviously worse, then escalate." That approach is increasingly outdated. Keratoconus is a progressive biomechanical corneal disorder, and the most meaningful treatment decisions are often made before dramatic slit-lamp changes or overt refractive collapse have occurred. For the OD, this means the referral threshold should be lower, not higher, particularly when tomography, epithelial thickness mapping, retinoscopy, or clinical pattern recognition suggests early ectasia.

Early detection: what matters in the exam lane

The most important concept for ODs is that early keratoconus may announce itself through subtle clues long before dramatic anterior bowing is obvious. Posterior elevation change, asymmetry on Scheimpflug tomography, epithelial compensation patterns, increased higher-order aberration, asymmetric cylinder progression, or the classic scissoring reflex on retinoscopy can all be early flags. By the time Fleischer ring and Munson sign are prominent, the disease has usually declared itself more fully. Lowering the referral threshold protects the patient from late recognition and lost opportunity.

Historical crosslinking versus Epioxa

The Dresden epi-off paradigm was revolutionary because it changed the disease course rather than merely correcting the optics. But epi-off treatment came with a real burden: epithelial removal, pain, delayed healing, infection risk, and a recovery experience that can be intimidating for patients and parents. Epioxa is important because it represents the first FDA-approved epithelium-on, oxygen-enriched cross-linking pathway in the United States. Conceptually, that matters because it targets the same disease-modifying goal—halting progression—while trying to reduce the procedural burden associated with epithelial debridement. In practical referral terms, it may help close the gap between the patient who needs treatment and the patient who hesitates because of fear of pain or recovery.

Why epi-on may change OD behavior

If the treatment journey becomes less invasive and more acceptable to patients, then the OD should feel even more empowered to refer earlier rather than waiting for repeated proof of progression. That is particularly true in pediatric and young-adult keratoconus, where delay can be costly. Epioxa does not eliminate the need for careful diagnosis, counseling, or longitudinal monitoring, but it may change the patient acceptance curve in a clinically meaningful way.

CAIRS: where keratoconus rehabilitation is going

CAIRS—corneal allogenic intrastromal ring segments—matters because it reframes corneal shape rehabilitation using biologic donor tissue rather than synthetic ring segments. Historically, INTACS provided a way to flatten and regularize selected ectatic corneas, but extrusion risk, biomechanical mismatch, and the limitations of synthetic segments tempered enthusiasm in some cases. CAIRS uses donor corneal tissue segments implanted into stromal channels, creating a more biologic interface that may reduce extrusion risk while still reshaping the cornea and improving contact lens tolerance and optical regularity. It is especially compelling in the moderate keratoconus patient with contact lens intolerance, reduced quality of vision, and a still-clear central cornea.

Keratoconus treatment progression

Problem stage	Historical approach	Current/available direction	Emerging direction
Early/occult disease	Observe until obvious progression	Earlier tomography-driven referral and earlier crosslinking consideration	Broader acceptance of epi-on treatment and potentially even earlier intervention
Progressive ectasia	Epi-off crosslinking as dominant paradigm	Epi-off plus new epi-on option (Epioxa) based on phenotype and counseling	Adjunctive pharmacologic biomechanical strategies such as LOX-pathway activation under investigation
Irregular/protruding cornea with contact lens intolerance	Rigid lenses, INTACS, or eventual transplant	CAIRS plus scleral lens rehabilitation in selected eyes	More refined biologic remodeling strategies paired with staged biomechanical stabilization

The OD after CAIRS and crosslinking

Long-term OD involvement remains essential. After stabilization and reshaping procedures, many patients still need visual rehabilitation—often with scleral lenses, specialty soft lenses, or selective spectacle strategies. The most effective modern sequence is often: detect early, stabilize the biomechanics, improve the shape if indicated, then optimize the optics. ODs are central to every step except the surgery itself.

Corneal referral pearls

- Keratoconus usually begins in adolescence but may first present subtly in adulthood—do not let age falsely reassure you.
- Posterior elevation changes, irregular astigmatism, and scissoring reflexes matter even when the slit lamp is unimpressive.
- Crosslinking is about halting progression, not reversing presbyopia or "curing" irregular optics.
- After CAIRS, the patient often still comes back to the OD for the finishing work: scleral lens fitting, surface management, and long-term surveillance.

4. Glaucoma Innovations: DSLT and the laser-first paradigm

Few shifts in glaucoma have been as important as the move away from assuming topical drops must always be first-line therapy. The LiGHT trial helped legitimize selective laser trabeculoplasty as a clinically effective and cost-effective first-line option in ocular hypertension and open-angle glaucoma, and longer-term follow-up has only strengthened the relevance of that message. The practical consequence is major for ODs: when a patient is newly diagnosed and the anatomy is appropriate, "drop first" is no longer the only modern answer.

Why SLT changed the treatment conversation

Traditional glaucoma drops are effective, but they carry familiar problems: adherence, ocular surface toxicity, cost, complexity, and the reality that many patients do not use them as prescribed. SLT reframed the discussion by offering an intervention that lowers IOP without requiring perfect long-term medication behavior from day one. DSLT goes one step further by reimagining how laser trabeculoplasty is delivered.

What makes DSLT different

DSLT is automated and non-contact, delivering treatment without the gonioscopic contact-lens workflow required for traditional manual SLT. That matters because it reduces operator dependence, can improve efficiency, and may make treatment more reproducible and scalable. For the patient, it can feel less intimidating; for the practice, it may create a more efficient pathway; and for the OD, it opens the door to earlier procedural referral in patients who would benefit from a medication-sparing strategy.

Where DSLT fits in OD referral patterns

The highest-yield OD role is identifying the right phenotype: newly diagnosed ocular hypertension or mild primary open-angle glaucoma, reasonable angle anatomy, patients likely to struggle with chronic adherence, patients with ocular surface disease made worse by drops, and patients motivated by a procedure-first approach. It is equally important to recognize who still needs subspecialty nuance—advanced disease, secondary glaucomas, complex angle pathology, and patients whose pressure targets are so low that laser alone may not realistically suffice.

Medical therapy, SLT, and DSLT

Feature	Drops	Manual SLT	DSLT
How it works	Chronic patient-administered IOP lowering	Office-based laser trabeculoplasty with contact gonio lens	Automated non-contact direct selective laser trabeculoplasty
Advantages	Flexible and familiar	Evidence-based first-line option; medication-sparing	Potentially faster, more standardized, and easier patient experience
Limitations	Adherence, cost, toxicity, complexity	Operator technique and contact-lens workflow	Technology adoption, patient selection, and evolving real-world integration
OD message to patient	Drops work, but they require long-term consistency	Laser-first is an established evidence-based choice	A modern laser-first pathway may further simplify care in selected patients

Glaucoma co-management pearls

- Think beyond pressure alone: adherence burden, ocular surface health, access, and patient behavior matter.
- The laser-first paradigm is now evidence-based, not fringe.
- DSLT does not replace judgment; it creates a simpler front-end laser option for appropriate patients.
- ODs remain essential for diagnosis, trend interpretation, imaging, fields, adherence assessment, and deciding when escalation beyond laser is needed.

5. Practical OD takeaways, available-now pathways, and emerging horizons

Across all four domains, the unifying principle is earlier identification paired with more nuanced procedure selection. The cataract patient is now a refractive planning patient. The keratoconus patient should be referred before deterioration becomes dramatic. The high myope should not be forced into a corneal-laser-only mindset when EVO ICL may be a better physiologic option. The newly diagnosed glaucoma patient should not be counseled as though lifelong drops are the only logical entry point. These shifts increase, rather than decrease, the value of comprehensive optometric care.

Available now, available in selected centers, and emerging next

Domain	Established current tools	What may be selectively available/expanding	What is emerging
Cataract	Premium IOL customization, toric correction, refractive counseling, ocular surface optimization	Segmented premium lens adoption, phenotype-driven IOL matching, lower-energy extraction pathways including MICOR integration	Further refinement of quality-preserving full-range optics and gentler extraction platforms
Refractive	RLE/CLE, EVO ICL, corneal laser options	More refined lens-based candidacy algorithms and broader phakic-lens adoption	Increasingly anatomy-specific and age-specific refractive triage
Cornea	Tomography-based early diagnosis, epi-off CXL, specialty contact lens rehab	Epioxa epi-on crosslinking, CAIRS reshaping and biologic rehabilitation	Topical biomechanical therapies and more staged shape/stability combinations
Glaucoma	Medical therapy and evidence-based SLT-first strategies	DSLT implementation and medication-sparing workflows	More automated, access-friendly procedural glaucoma front-end care

How to use this handout during and after the lecture

Use the content as a referral map rather than a memorization exercise. Ask yourself: is this patient primarily a cataract/IOL phenotype question, a corneal biomechanics question, a lens-based refractive question, or a procedural glaucoma question? That framing will almost always help you decide whether and when to refer. The Suncoast Seminar post-test is built around these exact distinctions: what each innovation is, why it matters, which patient fits it best, and what role the OD continues to play after the procedure.

Bottom-line seminar pearls

- Lower the referral threshold for early keratoconus and progressive irregular astigmatism.
- Do not treat premium IOLs as interchangeable; each design expresses a different optical philosophy.
- Consider the extraction platform itself—especially in eyes with endothelial vulnerability or high-value refractive goals.
- Remember that RLE and EVO ICL solve different problems for different ages and lens states.
- Embrace the laser-first glaucoma conversation; it is evidence-based and increasingly practical.
- The modern OD is not “sending the patient away.” The modern OD is initiating the right procedure and then co-managing the long arc of care.

Amblyopia Management for Primary Care ODs

Richard Sorkin, OD, FCOVD
St. Petersburg, FL

Work History

- Graduated from NSU in 1997
- Completed a Pediatrics/Binocular Vision Residency
- Instructor and Assistant Professor at NSU
- Interim Chief of Pediatrics Clinic at NSU
- Private Practice (20+ years) in St. Petersburg, Florida

Speaker Disclosure

- Dr. Sorkin has no financial interest in any product discussed in the presentation.

Amblyopia

- Etymology: ambluōpia (Greek Word)
- Breakdown of the word:
- *amblus*=dull, dim, or blunt
- *Ōps*=eye

Ancient History of Amblyopia Treatment

- Thabit Ibn Qurrah of Mesopotamia (about 900 A.D.) wrote that lazy eye due to strabismus should be treated by eye patching.
- "You should not release the normal eye until the vision in the strabismic eye has completely returned to normal."
- Qurrah also said such patients must be purged, should bathe every second day and be made to sneeze by putting the juice of olive leaves into the nose!
- Count de Buffon (1743) was later given credit for the use of eye patching to treat amblyopia.

How common is it?

- **Amblyopia is the most common cause of monocular vision loss in children**
- In Europe, it accounts for 90% of pediatric visits to the Ophthalmologist[1]
- Studies show about 2-3% of the general population have amblyopia[2]
- 1-5% of military recruits were estimated to have amblyopia[3]

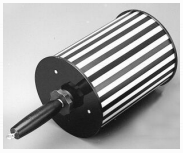
[1]Attebo, et al. 1998; Moseley, et al. 1997; Sjöstrand and Abrahamsson 1997
[2]Bruce Moore Eye Care for infants and Young Children
[3]Helveston EM. The incidence of amblyopia ex anopsia in young adult males in Minnesota

Development of Visual Acuity

- Chavasse's Acuity Levels (1939):
- 4 months 20/2500
- 6 months 20/1000
- 9 months 20/240
- 1 year 20/166
- 2 years 20/40
- 3 years 20/30
- 5 years 20/20 or better

Development of Visual Acuity

- Testing using OKN:
  - Rapid increase in visual acuity from birth
  - 20/20 by age 3-5
- Testing using VEP:
  - Rapid increase in acuity during the first 6 months
  - 20/150 @ 2 months
  - **20/20 at 6 months!**



Developmental Periods in Amblyopia

- **Critical Period (Birth-6 months)**
  - Aggressive Treatment Required
  - Lack of Treatment leads to blindness/nystagmus
- **Sensitive Period (6 months to 8 years)**
  - Upper Age Limit for *onset* of Amblyopia
  - Aggressive Treatment Required
  - Lack of Treatment results in visual impairment

Developmental Periods in Amblyopia

- **Susceptible Period (8 y.o. to 18 y.o.)**

Amblyopia generally does not develop after age 8 (visual cortex already established neural wiring)[1]

  - Aggressive Treatment if patient is compliant
  - *If amblyogenic factor still present, amblyopia can recur*
- **Residual Plasticity Period (> 18 y.o.)**
  - Treatment can be successful if patient is compliant and prognosis is optimal
  - Amblyopia not likely to recur even if amblyogenic factor still present

Levi, D Rethinking amblyopia 2020 Vision Res Nov:176:118-129. doi: 10.1016/j.visres.2020.07.014. Epub 2020 Aug 28

Developmental Periods in Amblyopia

- Von Noorden stated that the critical period ends at the age of 6 to 7 years[1]
- **All children with amblyopia should be offered an attempt at treatment regardless of age[2]**

[1]Von Noorden GK, Crawford ML. The sensitive period. Trans Ophthalmol Soc UK. 1979;99:442–6

[2]Amblyopia Summary Benchmark-2013 AAO Pediatric Ophthalmology/Strabismus PPP Panel, Hoskins Center for Quality Eye Care

Importance of the Critical and Sensitive Periods

- The periods (before age 8) relate to the *development of Amblyopia*
- They do not limit the treatment or resolution of Amblyopia

Therefore: **While you can treat amblyopia at any age, you do not have to be concerned with amblyopia developing or worsening after age 8**

Early Definitions of Amblyopia

- Feldman and Taylor (1942)
  - Maximum attainable vision < 20/50
- Schapero (1961)
  - Maximum attainable vision < 20/30

Previous Definitions of Amblyopia

(All assuming an absence of underlying structural or pathological anomalies):

- An absolute reduction in Snellen acuity in either eye.
- A difference in best corrected visual acuity between the two eyes of two lines or more of Snellen acuity.

Previous Definitions of Amblyopia

- A condition of low or reduced visual acuity not correctable by refractive means and not attributable to ophthalmoscopically apparent structural or pathological anomalies or proven afferent pathways disorders.

Improved Definition of Amblyopia

- VA worse than 20/20 in the absence of underlying structural or pathological anomalies, ***but with at least one of its causes occurring before the age of 6 years old.***

Current Definition of Amblyopia

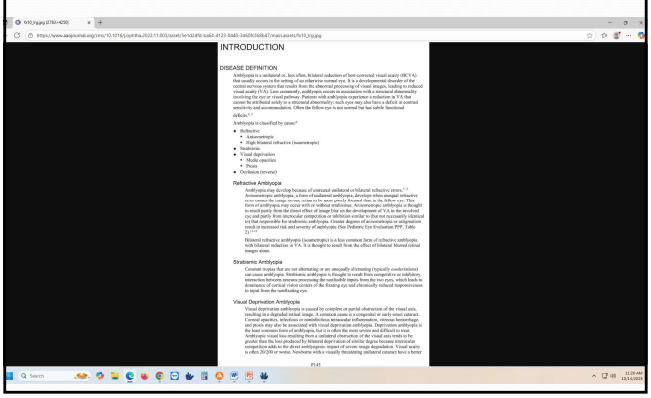
AOA clinical guideline definition

- **Amblyopia is a unilateral or infrequently bilateral condition in which the best corrected visual acuity is poorer than 20/20 in the absence of any obvious structural anomalies or ocular disease**

American Optometric Association

OPTOMETRIC CLINICAL PRACTICE GUIDELINE
Last Reviewed 2004

AAO Definition of Amblyopia



AAO Preferred Practice Pattern Pediatric Ophthalmology/Strabismus Panel

- Now includes the potential for successful treatment is greatest in young, though treatment in older children can improve VA
- Amblyopic children have reduced eye-hand coordination, slower reading speed and reduced motor skills, *even in the absence of strabismus*
- Insufficient evidence that untreated amblyopia is an impediment to education or career performance

Amblyopia PPP 2022 - Updated 2024
AAO PPP Pediatric Ophthalmology/Strabismus Panel, Hoskins Center for Quality Eye Care

AAO Preferred Practice Pattern Pediatric Ophthalmology/Strabismus Panel

- The guidelines now include **digital therapeutics and binocular (dichoptic) therapy** as suitable treatment options, in addition to traditional modalities like optical correction, patching, pharmacological treatment (atropine), optical treatment, and Bangerter filters

Amblyopia PPP 2022 - Updated 2024
AAO PPP Pediatric Ophthalmology/Strabismus Panel, Hoskins Center for Quality Eye Care

Current Definition of Amblyopia

AOA clinical guideline definition

- Amblyopia represents a syndrome of compromising deficits, rather than simply reduced visual acuity, including:
  - Increased sensitivity to *contour interaction* effects
  - Abnormal *spatial dist*ortions and uncertainty
  - Unsteady and inaccurate monocular *fixation*
  - Poor *eye tracking* ability
  - Reduced *contrast sensitivity*
  - Inaccurate *accommodative* response

Current Research Based Definition

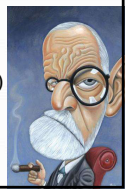
- *Amblyopia is a relative reduction in visual acuity of greater than one line between the two eyes, or an absolute reduction below 20/25 with either eye,* ***with associated decrements in visual processing, spatial perception, accommodation, ocular motility, and spatial projection****.*

Classification of Amblyopia

- "Hysterical/Psychogenic"
- Form Deprivation
- Strabismic
- Refractive
  - Isometropic (bilateral blur)
  - Anisometropic (unilateral blur)

"Hysterical/Psychogenic Amblyopia"

- Vision loss occurs from emotional/ psychological issues rather than physiological origin (no amblyogenic factor)
- Symptoms are not under voluntary control as it is with malingering.
- Streff's Non-Malingering Syndrome
  - Usually females (age 8-14)
  - Bilateral reduced VA (20/70 – 20/200)
  - Minimal Refractive Error (close to emmetropia)
  - Reduced visual fields, color vision, stereo



Form Deprivation Amblyopia

- Cornea
  - Opacified
  - Hyphema
  - **Prolonged Occlusion/Atropinization**
- Lids
  - Congenital Ptosis
- Lens
  - Congenital/Traumatic Cataract

Obstruction must take place before age 8 to develop Amblyopia

Strabismic Amblyopia

- Strabismus is the misalignment of the visual axes
- The "conflicting information" fed to the visual cortex leads to suppression and amblyopia
- Age of onset, Constancy, Laterality, Directionality, Magnitude, Correspondence and Comitancy all determine the prognosis

Strabismic Amblyopia

- **Age of Onset**: Congenital/Infantile occurs within the first 6 months
- 85% of infantile strabismus is esotropia
- **Intermittent (including accommodative esotropia) has better prognosis than constant**
- Alternating Strabismus: **usually not associated with Amblyopia**
- In Exotropia ≤ 25 PD, *visual therapy is the treatment of choice!*

Refractive Amblyopia

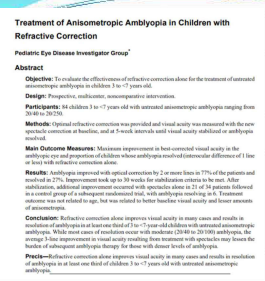
- **Isometropia**: Bilateral Blur
- Myopia-Above 5 D OU
  - Rx recommendation: Full Prescription, *consider bifocal if near point problems!*
- Hyperopia-Above 2 D OU
  - Rx recommendation: Full Prescription, tempered by age, amount and phoria
- Astigmatism-Above 1.25 D OU
  - Rx recommendation: Full prescription, oblique cyl is more amblyogenic!
    - EB Ciner Refractive error in young children: evaluation and prescription. Pract Optom 1992;3:182-190

Refractive Amblyopia

- **Anisometropia:** (suppression amblyopia)
- Myopia-Above 4 D
  - Full Prescription (with CL if possible) and can keep more myopic eye under-corrected for near
- Hyperopia- **Above 1 D**
  - Full Prescription with spectacle lens, or CL if aniso is > 4.0 D
- Astigmatism- Above 1 D
  - Full Prescription. If cylinder is cut, try to preserve the spherical equivalent

Pediatric Eye Disease Investigator Group (PEDIG)

- Began investigating Amblyopia Treatment in 1999 (ATS)
- Considers Mild to Moderate amblyopia as 20/80 or better, severe is 20/100-20/400
- Important Findings:
  - In Children (age 3-7), 6 hours of patching was equal to full time patching
  - In Children (age 3-7), 2 hours of patching was equal to 6 hours of patching



Treatment of Anisometropic Amblyopia in Children with Refractive Correction

Pediatric Eye Disease Investigator Group*

Abstract

Objective: To evaluate the effectiveness of refractive correction alone for the treatment of untreated anisometropic amblyopia in children 3 to <7 years old.

Design: Prospective, multicenter, noncomparative intervention.

Participants: 84 children 3 to <7 years old with untreated anisometropic amblyopia ranging from 20/40 to 20/250.

Methods: Optimal refractive correction was provided and visual acuity was measured with the new spectacle correction at baseline, and at 5-week intervals until visual acuity stabilized or amblyopia resolved.

Main Outcome Measures: Maximum improvement in best-corrected visual acuity in the amblyopic eye and proportion of children whose amblyopia resolved (interocular difference of 1 line or less) with refractive correction alone.

Results: Amblyopia improved with optical correction by 2 or more lines in 77% of the patients and resolved in 27%. Improvement took up to 30 weeks for stabilization criteria to be met. After stabilization, additional improvement occurred with spectacles alone in 21 of 34 patients followed in a control group of a subsequent randomized trial, with amblyopia resolving in 6. Treatment outcome was not related to age, but was related to better baseline visual acuity and lesser amounts of anisometropia.

Conclusion: Refractive correction alone improves visual acuity in many cases and results in resolution of amblyopia in at least one third of 3 to <7-year-old children with untreated anisometropic amblyopia. While most cases of resolution occur with moderate (20/40 to 20/100) amblyopia, the average 3-line improvement in visual acuity resulting from treatment with spectacles may loosen the burden of subsequent amblyopia therapy for those with denser levels of amblyopia.

Precis:—Refractive correction alone improves visual acuity in many cases and results in resolution of amblyopia in at least one third of children 3 to <7 years old with untreated anisometropic amblyopia.

- Refractive correction alone improves VA in many cases and results in resolution in at least 1/3 of children age 3 to <7 with untreated aniso amblyopia

Amblyopia Treatment Studies (ATS)

- 25% recurrence after cessation of patching, but lower recurrence if tapered to 2 hours first
- In patients aged 7-12, little recurrence one year after cessation of patching
- Patients that were prescribed near activities while patching had better compliance and improvement
- Weekend atropine provides improvement in VA similar to daily atropine in treating moderate amblyopia in children 3 to 7 years

ATS-Refractive Treatments

- Treatment of bilateral refractive amblyopia with spectacle correction improves binocular VA in children 3 to <10 years, with most improving to 20/25 or better within one year
- **In children ages 3-8, 2 hours of patching leads to "ROBUST IMPROVEMENT" in visual acuity**

ATS-Patching for Exotropia

Recent study: **A Randomized Trial Comparing Part-time Patching with Observation for Intermittent Exotropia in Children 12 to 35 Months of Age**

- The treatment group was patched for 3 hours daily for 5 months
- **Did not recommend** part-time patching for the treatment of Intermittent XT in children in this age group

Amblyopia Treatment

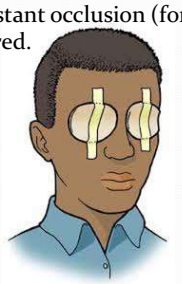
- Traditional approach to Amblyopia Treatment has not changed in over 200 years!
  - 1. **Optimal Optical Prescription**
  - 2. Occlusion Therapy
  - 3. Visual Therapy

Amblyopia Occlusion Treatment

- Direct occlusion – patch non-amblyopic eye (NAE)
- Allows stimulation of amblyopic eye and reduces competition/inhibition from NAE.

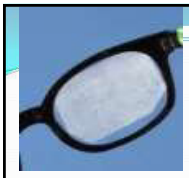
Amblyopia Occlusion Treatment

- Alternating occlusion – alternate direct and indirect for young patients when there is concern of occlusion amblyopia, yet constant occlusion (for constant strabismus) is desired.

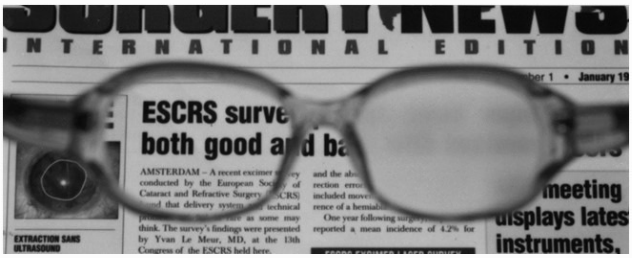


Types of Occlusion

- Adhesive bandage-type (Opticlude, Coverlet)
- LP occlusion foil (Bangerter foils)
- Tie-on or elastic band "pirate" patch
- Clip on
- Translucent tape
- Frosted lens
- Opaque contact lens



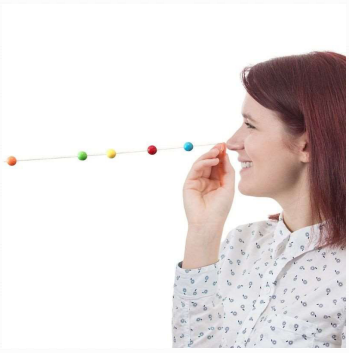
Bangerter Foils



Active Visual Training

- Active VT is used as a stand-alone treatment or in conjunction with spectacles/patching
- VT addresses the following issues:
  - Accommodation
  - Eye-Hand Coordination
  - Ocular Motility/Fixation
  - Binocular Therapy

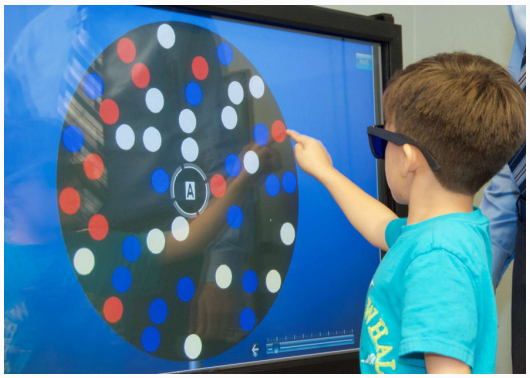
Therapy Activities



Therapy Activities

Therapy Activities

Therapy Activities



New Technology

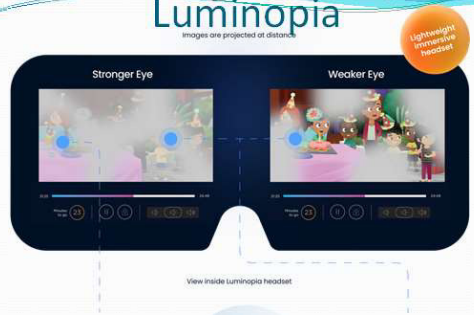
- Several new devices have "hit the market"
- Allow for Home Therapy
- Can be prescribed by ODs!

Dichoptic Treatment

- Binocular therapy for unilateral amblyopia
- Binocular therapy that presents different visual stimuli to each eye simultaneously with the goal of reducing suppression and improving binocular integration
- Dominant eye gets reduced contrast/blur
- Amblyopic eye gets full contrast

Luminopia

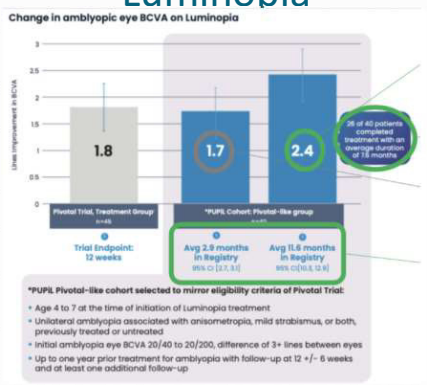
Luminopia



Reducing contrast to the stronger eye overcomes suppression of the amblyopic eye

Dichoptic masking blocks complementary parts of the image for each eye to encourage the brain to combine the videos into one complete image

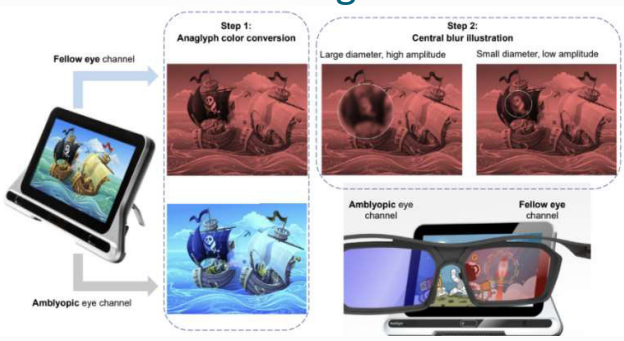
Luminopia



CureSight

- FDA cleared in 2023 for improvement in visual acuity and stereoacuity in amblyopia patients, aged 4-9 years, associated with anisometropia and/or with mild strabismus (<5 PD)
- Uses central blur to the non-amblyopic eye
- Anaglyph glasses with Eye Gaze tracking (central blur instead of global contrast reduction)

CureSight



EyeHero (Amblyoplay)

- Amblyoplay was launched in 2019
- EyeHero (US version) released in 2024
- AmblyoPlay® is a vision therapy tool for individuals with lazy eye, mild strabismus, convergence insufficiency and other binocular vision disorders
- NOT considered a medical device
- A "tool that helps with training visual skills"

EyeHero (Amblyoplay)

- recommended 30 mins/day, 5 days a week x 6 months

RevitalVision

- The only FDA-cleared product for ADULT AMBLYOPIA over age 9
- Utilizes an interactive computerized program
- They state that "the average improvement is more than 2 lines on the eye chart, and 100% in contrast sensitivity"
- Improves Stereo Acuity & Binocular Functions

RevitalVision

- Patients must have a best corrected vision between 20/30 and 20/200, there is no limitation on refraction
- Uses the Gabor patch, which **"effectively activates and matches the geometry of the receptive field in the visual cortex."**
- **Also have treatments for:**
  - Low Vision/Eye Diseases (keratoconus,
  - nystagmus, corneal, retinal disease)
  - Post Cataract Surgery
  - Post-LASIK low myopia
  - Early Presbyopia
  - Sports Vision

Discussion

- Amblyopia is the end result (effect) of a binocular problem (cause)
- The cause (binocular problem) results in a suppression to avoid diplopia
- The resultant amblyopia and increased hyperopia is a way to reduce stress on the system

Discussion

- MEM (near retinoscopy) will show a higher lag in the amblyopic eye
- Amblyopia is much easier to diagnose with a Retinoscope!

Take Home Points

- Treatment for amblyopia can be successful at any age (dependent on patient motivation)
- Remember that amblyopia includes a decrement in accommodation, ocular motor function and visual processing

Take Home Points

- Think of amblyopia as a symptom of a binocular problem
- Anisometropic Amblyopia and Strabismic Amblyopia result from a ***breakdown in binocularity***

Questions????

Acquired Brain Injury: What the OD needs to know

Richard Sorkin, OD, FCOVD

Financial Disclosure

No financial relationships!

- including consulting, employment, stock ownership, or research funding with any companies discussed in this lecture

What will we learn today?

1. Understand how common Acquired Brain Injury and Traumatic Brain Injuries are in society
2. Identify all of the acute and lingering symptoms of ABI/TBI
3. Gain awareness of the types of visual deficits that are expected in patients with acquired brain injury
4. Review the most important optometric findings when examining patients with a history of neurologic compromise
5. Have a better understanding of what a comprehensive multi-disciplinary neuro-rehabilitation care plan entails

What is ABI and TBI?

- Acquired Brain Injury (ABI) includes any acquired brain injury such as CVA, infection, brain tumor or trauma
- Traumatic Brain Injury (TBI) is a brain injury caused by an external force (bump, blow or jolt)
  - Can be Penetrating or Non-Penetrating
  - Primary (damage is immediate) or Secondary (damage happens gradually)
  - **May include loss of consciousness (LOC)**

Commonalities of ABI and TBI

- Sudden nature of onset
- Damage to central nervous system (CNS)
- Resulting neurological dysfunctions
- Both are served by the same medical care system (Emergency Department, neurology etc.)

ABI/TBI Incidence

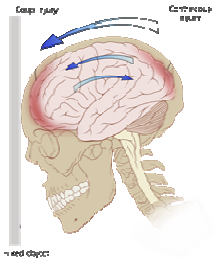
- Acquired Brain Injury (ABI) and/or Traumatic Brain Injury (TBI) occurs every 15 seconds in the US
- 2/3 of all head injuries are patients under 30 years old
- Young men are more likely to suffer from head injuries

ABI/TBI Incidence

- >200,000 TBIs reported in ER annually
  - 75% include concussions
- Estimated 3.8 million concussions in the USA per year (with 50% unreported)
- 85% of TBI are considered mild (mTBI)
  - Head injury followed by altered mental state or brief LOC (<20 minutes of duration)

Signs/Symptoms of Neurological Insult

- Headaches 71%
- Difficulty concentrating 57%
- Feeling slowed down 58%
- Dizziness 55%
- "Fogginess" 53%
- Fatigue 50%
- Blurred/double vision 49%
- Light sensitivity 47%
- Memory dysfunction 43%
- Balance dysfunction 43%



Signs/Symptoms of Neurological Insult

- Poor depth perception
- Unable to work on a computer
- Loss of visual field
- Nausea with eye movement
- Distracted by peripheral visual stimuli
- Overwhelmed in busy or crowded environments
- Aching eyes

mTBI patients often report vision problems despite having normal visual acuity and fundus

Signs/Symptoms of Post Concussion Syndrome (PCS)

Lingering Symptoms:

- Headache
- Dizziness
- Malaise
- Fatigue
- Noise intolerance
- Loss of concentration

Signs/Symptoms of Post Concussion Syndrome (PCS)

lingering symptoms:

- Memory and intellectual difficulties
- Insomnia
- Affective disorders
  - irritability, depression, anxiety, and affect lability.

Visual Sequelae of ABI

- Visual field loss
- Eye movement dysfunctions
- Ocular muscle dysfunctions
- Binocular dysfunction (BVD)
- Accommodative dysfunctions
- Perceptual dysfunctions
- Visual involved vestibular dysfunctions

Affective Challenges after ABI

- Emotional reactions-Depression, Anxiety
- Accepting changes in self-the "new" person, mourn the loss of their abilities
- Alterations in behavioral control-impulsive, risk taking, unpredictable
- Use of accommodations

Appropriate Optometric Testing for ABI/TBI

Accommodation Skills in ABI/TBI

- Commonly affected in TBI, usually is associated with convergence issues
- Can be mild to severe
- Can have dramatic effect on ADLs, preventing them from returning to work

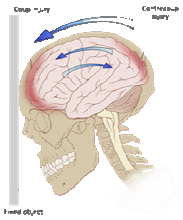
Accommodation Skills in ABI/TBI

- Study of 161 head injuries showed 36% how one or more acquired accommodative problems[1]
- Many do not improve spontaneously
- Treated with Lens application and/or Visual Therapy

[1]Kowal L. Ophthalmic manifestations of head injury. Aust NZ J Ophthalmol 1992; 20:35-40

Oculomotor Skills in ABI/TBI

- ABI results in injuries to broad areas of the brain
- Oculomotor neurology includes frontal, parietal and cerebellum
- 70% of concussed patients have at least one OMD



Oculomotor Changes in ABI/TBI

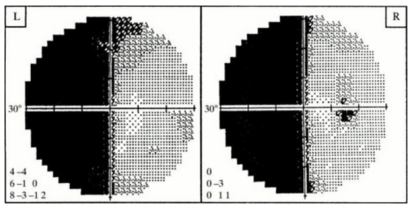
- Downbeat nystagmus
- Reduced saccades, pursuits and fixation maintenance
- Acute vertigo with head movement
- Reduced vergence ranges (with or without CI)
- Nerve palsies (Multiple)
- 4th nerve palsy (blunt frontal area injury)
- Strabismus
- Internuclear ophthalmoplegia

Prognosis for BV disorders

Better prognosis for:
- Intermittent deviations
- Exodeviations
- Comitant
- Normal Correspondence
- Presence of Stereopsis
- **Patient motivation**
- **Physical/Mental stamina to participate in treatment**

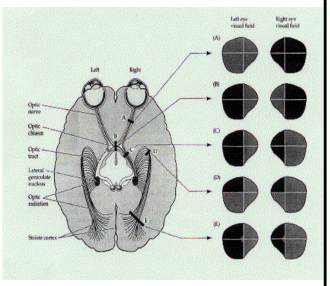
Visual Field Loss

- Assessment of fields with any CNS injury is important
- Hemianopia is common



Common Field Deficits in ABI and TBI

- Unilateral
- Bitemporal
- Hemianopsia
- Quadrantanopsia
- Pie in the Sky (temporal lobe)
- Other Superior field loss (AION)
- Scattered islands



Visual Neglect

- Complete unawareness of the field loss
- Sometimes referred to as Hemianopic field defects
- Can occur without visual field loss
- A continuum from complete awareness to complete unawareness
- Unawareness can lead to bodily harm

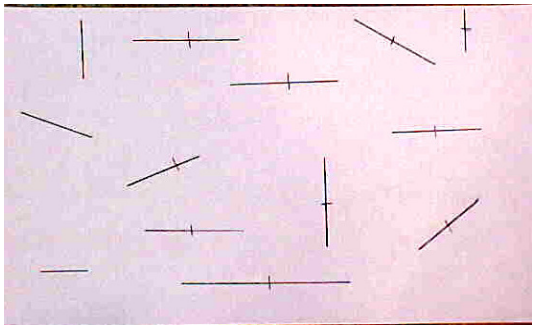
Visual Midline Shift Syndrome (VMSS) / Abnormal Egocentric Localization (AEL)

- Mismatch between the perceived egocentric visual midline and the actual physical midline
  - ➢Altered perception of "straight ahead"
  - ➢Spatial mismatch
  - ➢Can be up to 15˚

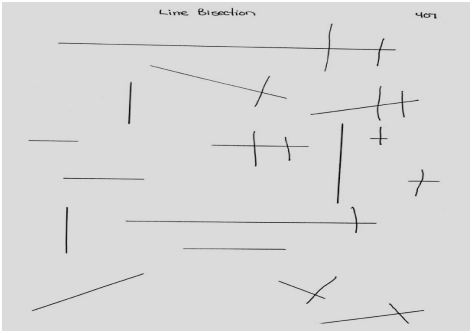
Visual Midline Shift

- Causes an expansion on one side
- Causes a contraction on the opposite side
- Have symptoms such as unsteady, not grounded, "out of sync with the world"

Unilateral Spatial Inattention Testing - Line Bisection



Line Bisection
Left Inattention (stroke)



Vision and the Vestibular System

- Vestibular system (i.e. inner ear) communicates with CNS
- Integrated information with head movements and EOMs
- CN VIII (vestibulocochlear Nerve)

Vestibular Control

- Vestibulocerebellar pathway- balance, posture, and eye movements by coordinating head movements with the eyes
- VOR (vestibulo-ocular reflex)-controls foveal fixation during head movement
- Postural control (both static and dynamic conditions)

AOA description of Optometry

- Doctors of optometry (O.D.s/optometrists), America's primary eye health care providers, are the frontline of eye and vision care
- Prescribe medications, low vision rehabilitation, vision therapy, spectacle lenses, contact lenses and perform certain surgical procedures.

AOA Definition of Optometric Vision Therapy

- The use of lenses, prisms, filters, occluders, specialized instruments, and computer programs is an integral part of optometric vision therapy
- Research has shown VT to be an effective treatment for the visual sequela of acquired brain injury

Yoked prism in Visual Neglect

- Prescribing Yoked Prism (Base Up, Base Down, Base Right and Base Left) can aid in realigning the visual midline
- Corrects posture
- Improves balance, gait
- Functional movement making the patient feel more centered

Yoked Prism for Visual Midline Shift

- Determine the appropriate prism correction for prescribing or therapy by observing the patient's posture, gait, spatial orientation, and mobility skills
- Shift the perceived midline images to the real midline
- Low amounts of prism can make a difference
- Visual motor activities to re-establish the midline

Visual Field Loss/Neglect

- Prescribe sector prism to allow for expansion and/or awareness of missing visual field

Fresnel Prism

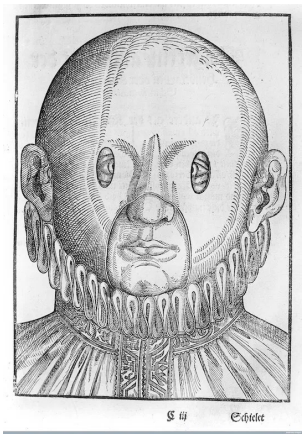
Peli Lens™

Diplopia and use of Occluders

- Allows for immediate improvement
- Partial patching – central spot patch
- Selective occlusion – most often nasal or temporal sector
- Consider this as a temporary solution until further treatment can be pursued
- Translucent occlusion is preferred to opaque

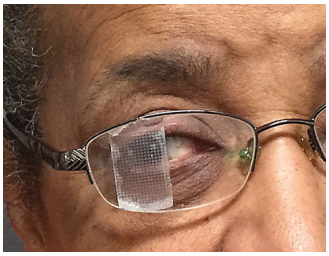
Bi-Nasal Occlusion

- Reduces visual stress
- Helps correct eye alignment (Esotropia)
- Reduces visual confusion
- Improves balance



Georg Bartisch, *Ophthalmodouleia: Das ist, Augendienst*, **1583**

Other types of Occlusion



Alden Optical® Enhancement Tints

Absorptive Filters

Corning Photochromic Filters

- CPF 450 (indoor use)
- CPF 511 (cataracts, AMD)
- CPF 527 (cataracts, AMD)
- CPF 550
- CPF 527X (better cosmetics)
- CPF Glare Cutter

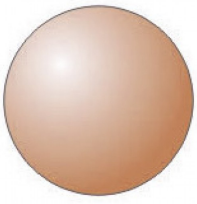
Corning Photochromic Filters

FL-41

- Color is described as “boysenberry”
- FL is abbreviation for fluorescent
- Blocks blue-green light
- Doesn’t completely block 480 nm unless extremely dark

Good PA, Taylor RH, Mortimer MJ. The use of tinted glasses in childhood migraine. *Headache.* 1991;31:533–6.

FL-41



BPI® FL-41™
BPI# 37616

Components of the Neuro-Visual Rehabilitation Care Plan

- Counseling and education of patient and/or family members
- Corrective or Therapeutic Lenses
  - Refractive error
  - Prisms
    - Compensatory
    - Therapeutic

Components of the Neuro-Visual Rehabilitation Care Plan

- Absorptive Filters
- Occlusion
- Treatment or co-management of ocular disease / injury

Rehabilitation Team

- Physiatrist-Rehab of Disabled Individuals
- Physical Therapist (Physio/PT)-exercise, increase range of motion, mobility and motor skills, vestibular
- Occupational Therapist (OT)-orientation and mobility, functional tasks and activities of daily living (ADLs)
- Speech and Language Pathologist (ST)-effective speech (articulation), language disorders

Rehabilitation Team

- Rehabilitation Psychologist
- Social Workers
- Dieticians
- Vocational Rehabilitation Counselors

Neuropsychological Evaluation

- Typically performed by Licensed Psychologist
- Use of Standardized Test Batteries
- Assess the following:
  - Intellectual functioning
  - Attention
  - Information processing speed
  - Memory function
  - Executive functioning
  - Communication impairments

CONCUSS Randomized Clinical Trial of Vergence/Accommodative Therapy

- Study involved immediate OBVAM vs. delayed treatment (6 weeks)
  - **~88% improved or recovered** in the immediate therapy group after 6 weeks
  - Only **~8% improved** during the "wait and see" period without therapy
- Conclusion: **OBVAM therapy is effective in improving the NPC, PFV and symptoms in CONC-CI**

Alvarez TL, Scheiman M, et. Al. CONCUSS randomized clinical trial of vergence/accommodative therapy for concussion-related symptomatic convergence insufficiency
Br J Sports Med. 2025 Oct 1:bjsports-2025-109807. doi: 10.1136/bjsports-2025-109807

Prescribing Tips For ABI

- Lens Designs: avoid progressives
  - Single Vision- consider separate pair for distance and near
- Additional Considerations:
  - AR coating
  - Binasal occlusion
  - Low base in prism

Lens Prescribing Tips

- Many of the young TBI patients need reading glasses for near work due to accommodative problems
- Yoked prisms help many patients with balance, navigation and gait problems