

The Effectiveness of Low Vision Rehabilitation – Improving Daily Living and Quality of Life



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Disclosure Slide

- I have no financial relationship with any commercial interest related to the content of this lecture.

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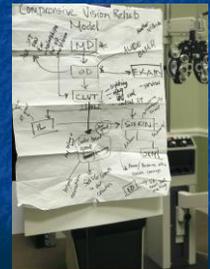
Goals for the Presentation

- Learn what a comprehensive, multi-disciplinary low vision network consists of
- Review elements of a low vision exam and the clinical tests to assess functional vision in a low vision patient
- Explore case studies that demonstrate how a comprehensive, multi-disciplinary low vision care plan can improve patient outcomes

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Low Vision Network Services

- Evolution of multi-agency, disciplinary team
 - Southeast Vision Rehabilitation
 - Siskin Hospital for Physical Rehabilitation Low Vision Program
 - Signal Centers Assistive Technology Services / Vision Services



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Southeast Vision Rehabilitation

- Private practice referral center
 - Low Vision
 - Neuro-optometric rehabilitation
- Co-founder of Chattanooga area Low Vision Network Services



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Why it is personal for me...



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What is our process?

- Patients are typically, but not always, referred into the network to Dr. McBryar
- Initial exam, device prescription, and dispensing
- Possible follow up visits
- Referral to internal network partners
Siskin, Signal Centers
- Referral to external healthcare providers and entities
 - Home health, Vocational rehabilitation, "older blind" program
- Co-management with referring physician who provides ongoing medical management

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What is our goal?

- Comprehensive services
 - Studies show much better outcomes when patients have comprehensive versus single provider services
- Increased consumer, community, and provider awareness
- Improve communication with referring providers



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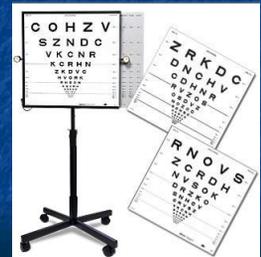
Low Vision Exam Elements



- Extensive patient history and education
- Visual Acuity
- Trial Frame
- Refraction
- Contrast Sensitivity
- Visual Field Testing
- Scotoma mapping

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Visual Acuity – Feinbloom and ETDRS



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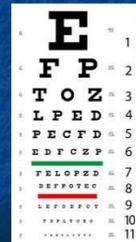
Visual Acuity

- Snellen acuity often understates actual functional acuity
- Example: Referral may say patient is CF, but VA is measured at 20/400 equivalent with Feinbloom
 - Patient may be a good candidate for magnification at this functional acuity level

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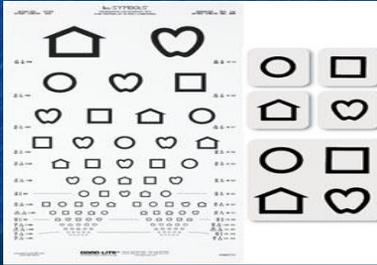
Visual Acuity Tests: In Decreasing Order of Cognitive Difficulty

- Snellen Letters
- Snellen Numbers
- Tumbling E
- Picture tests: LEA symbols



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Consider Utilizing Matching for Patients with Aphasia



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The Broken Wheel Test

Valid and reliable in children 2 to 5 years – can work for older patients with cognitive deficits

Familiar symbol (car) is presented in a forced choice response

Critical feature is recognition of the gap in the Landolt C

No directional orientation is necessary

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Trial Frame Refraction



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Why Trial Frame?

- Much better for patients who need to eccentrically view the chart
- Free space viewing allows patient to appreciate improvement in detail discrimination of faces and objects
- Can observe patient's posture and balance with potential prescription

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Contrast Sensitivity – Pelli Robson Chart

- Letters of the same size with decreasing contrast
- The faintest triplet out of which 2 letters are correctly identified is stopping point



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Contrast Sensitivity – Pelli Robson Chart

- Lowest read determines a log contrast sensitivity score
- Score below 1.5 suggests sensitivity impairment

PELLI-ROBSON				
0.00	H S Z	D S N	0.15	
0.30	C K R	Z V R	0.45	
0.60	N D C	O S K	0.75	
0.90	O Z K	V H Z	1.05	
1.20	N H O	N R D	1.35	
1.50	V R C	O V H	1.65	
1.80	C D S	N D C	1.95	
2.10	K V Z	O H R	2.25	

Right Eye

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Continuous Text CS Chart



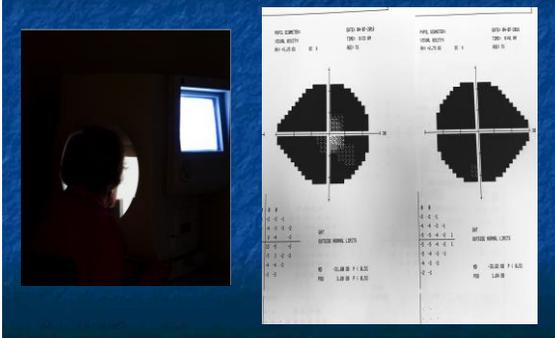
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Level of Impairment

CONTRAST SENSIVITY		
Percentage	Level of Impairment	log CSF
Unable	Profound	0.00
25%	Severe	0.52 - 0.96
10%	Moderate	1.00 - 1.40
5%	Early	1.44 - 1.56
2.50%	Adult Normal	1.60 - 1.76
1.25%	Child Normal	1.80 - 1.92

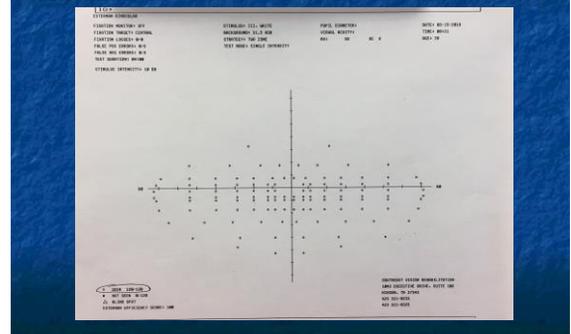
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Humphrey Visual Field Test



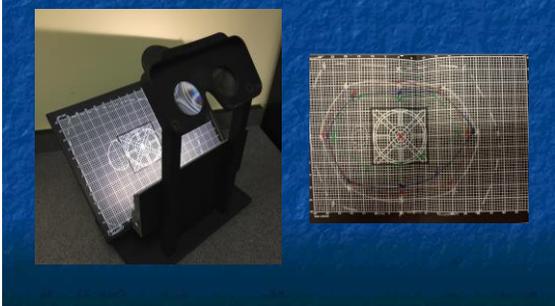
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Esterman Binocular Field Test



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Functional / Color Field Charter



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The California Central Visual Field Test

- May be administered monocular or binocular
 - Binocular provides functional field used by the patient for ADL's
- Several levels of brightness and laser dot size can be used
 - More sensitivity in plotting relative scotomas that are not dense but clinically significant

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The California Central Visual Field Test



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Indications for Using:

- Suspected central field defects – absolute versus relative scotoma
- Dry AMD (geographic atrophy)
- Wet AMD – distance VA does not match functional reading
- Diabetic retinopathy
- Optic neuropathies – including glaucoma

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Indications for Using:

- Word or letter misidentification in spite of adequate magnification
- Losing place, skipping lines, rereading text
- Slow reading that may be caused by a scotoma
- Educating patient in location of scotomas and compensatory eye movements to avoid scotomas

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Applications:

- If scotoma is relative – adequate lighting and contrast can mitigate effect
- If scotoma is absolute – may consider translucent nasal occlusion or Bangerter foil if fellow eye significantly better

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SK Reading Test



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SK Reading Test

- Helpful in determining when there is a right or left scotoma that does not appear on visual field testing
- Measures the patient's reading speed and number of errors at various sized print
- I am looking for discrepancies in isolated letter NVA and continuous text NVA

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Applications

- Helpful in determining most effective level of magnification
- Helpful for monitoring functional vision for changes

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Optical Device Trials



- Near
 - Glasses
 - Hand held magnifier
 - Stand magnifier
- Bar / brightfield magnifier
- Distance
 - Telescope
 - Bioptics
 - Spectacle binoculars or "TV glasses"

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Determining Level of Magnification Needed

- "The current technology regarding low vision aids is simple, and the options open to the clinician often are restricted"

Understanding Low Vision, Copyrighted 1983

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Start with an estimate of magnification:

- Is it assumed that 20/40 will suffice for most tasks, although this is only a starting point
- A patient with 20/200 best-corrected acuity with a goal of 20/40
 - $200/40 = 5X$ (level of mag needed)

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How many times have you heard this question???



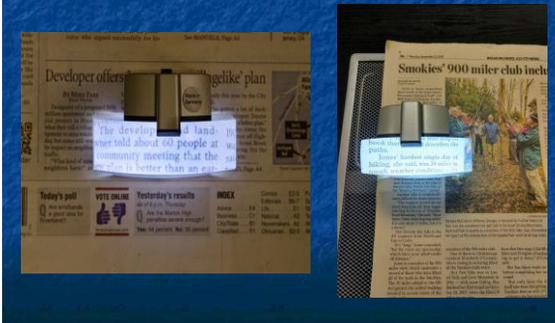
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Can you just give me stronger glasses?



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Near Magnification



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Near Magnification



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Case Study "E. K" 78 y/o female

- Referred by OT who received patient as referral from primary eye care provider
- Dry AMD
- BCVA: 20/50 OD, 20/60 OS
- Contrast sensitivity: moderate loss

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Case Study "E. K" Treatment / Recommendations

- 2.2x TV Specs
- +5/7 prism readers with yellow reading guide for continuous text such as church bulletin
- 3.5x illuminated handheld magnifier for spot checking medications, etc.

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Case Study "K.A." 21 y/o female

- Referred by Vocational Rehabilitation
- In the process of applying to nursing school at the time of initial evaluation
- Ocular albinism and nystagmus
- Glare sensitivity
- Ready to pursue driving if she is deemed to be a candidate

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Case Study "K.A." 21 y/o female

- Manifest Rx with BCVA:
 - +5.00 -5.50 X006, 20/100
 - +5.75 -5.75 X170, 20/80
 - 3X bioptic: 20/40 OD, 20/30 OS
- Referred to another OD for scleral CL evaluation and fit

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Case Study "K.A." 3x Binocular Bioptic with Polarized Gray Fitover



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Case Study "K.A."



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Case Study "D.T." 65 y/o female

- Histoplasmosis
- Has been seeing her OD for years but never a referral for LV services
 - Pt stated she was told "in order to get it to the size your eye could see, it would be so large it wouldn't work."

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Case Study "D.T." 65 y/o female

- Referred by retina specialist - "he felt certain you could help me somehow"
- Max TV glasses: pt loved these with trial lenses of MRx combined
- Manifest Rx with BCVA:
 - -10.25 -3.00 x 022, 20/200
 - -9.50 -2.50 x 150, 20/80
 - 2.2X bioptic: 20/50 OS

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Case Study "D.T." 65 y/o female

- Referred for scleral CL evaluation – can this be an option for this her?
 - Would not need combined rx in Max TV GL's
 - Could have plano carrier lens in bioptics
- Went for scleral eval, went back to primary OD who said he did not feel comfortable with her proceeding with contacts so pt decided not to pursue

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Case Study "D.T." 2.2x Monocular Bioptic



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Case Study "D.T." 2.2x Max TV Glasses with Rx Modification



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Case Study "D.T."



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Non-optical Device Trials

- Electronic / technology
 - CCTV
 - Portable
 - Desktop
 - Wearable
 - Computer adaptations
 - Smartphones / tablets / apps



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Glare assessment – 2 Types

- **Discomfort**
 - How light makes their eyes feel – shielding eyes – hands above
 - Photophobia
- **Disability**
 - Going through tunnel in darkness - emerge into bright light and are blinded

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Absorptive Filters



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Absorptive Filters

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Lighting Assessment Format - Contained



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Lighting Assessment: Position



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Lighting Assessment: Intensity



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Lighting Assessment: Temperature



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Advances in Technology?



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So many changes in the last 5 years alone!



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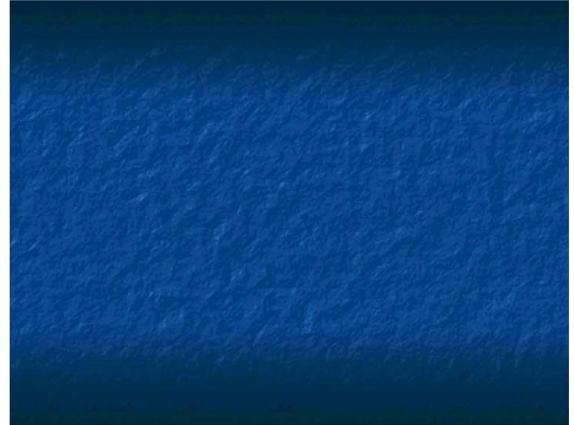
New options for students...



Prodigi Connect 12

- Android tablet
- Optional distance camera
- OCR and magnification app
- Preloaded with educational apps (Dropbox, Google docs, etc.)
- Optional bluetooth keyboard

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MagniLink TAB

- Surface Pro
- Magnification and OCR
- Toggle between USB and Tablet cameras
- Pair with Bluetooth keyboard
- Operates as a fully functioning Windows computer

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But the biggest question is...



Wearables
are we there yet???



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Virtual Reality "Goggles"

- Off the shelf products
- Oculus VR headset
- Samsung smart phone
- App
- Iris Vision
- Patriot ViewPoint
- CyberEyez

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AI Smart Glasses

- OrCam MyEye 2
- CyberEyez

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eSight 3

NuEyes Review

SEE BOOST

Digital wearables

- digital magnification
- features similar to CCTV
- direct video feed
- OCR / object recognition
- difficult to use for those with large central scotomas / acuities less than 20/400

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Empowering blind and low-vision users of Apple products and related applications

"A community-powered website for blind and low-vision users of Apple's range of Mac computers, the iPhone, iPad, iPod touch, Apple TV, and Apple Watch. AppleVis strives to empower the community by offering multiple pathways to access and share relevant and useful information. As a community, we seek to encourage and support people in exploring the many ways in which Apple products and related applications can offer opportunities to the vision-impaired for personal enrichment, independence and empowerment. AppleVis also offers resources and mechanisms for raising awareness of the accessibility of Apple products and related applications, and for promoting further advancement in accessibility."

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Partial/Sector Occlusion for Distance or Near



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Case Study "E.S."

79 y/o female

- Referred by retina specialist
- Glaucoma OU
- Wet AMD OU
- 20/400 OD, 20/50 OS
 - Bothered by peripheral motion OD
 - Complained of "missing spots" in vision OS and needing to "look just off center"
- Contrast sensitivity: severe loss

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What options to try?

- Spectacle magnification – 4/6 prism readers no better than current SRx, 5/7 prism readers or higher made text look more distorted
- Clip-on magnification – 1.7X was the best but still not adequate for near tasks that patient wanted to perform, higher mag too much and caused distortion

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What options to try?

- Makrolux – helped pt keep her place, but still missing letters and/or words in the middle of sentences
- HH/Stand magnification – unable to find a power that provided adequate magnification to help with “missing areas”

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What options to try?

- Digital magnification
 - Visolux XL
 - Desktop CCTV
- Same story, different device....
- The patient began to say “maybe there just isn’t anything that can help.”

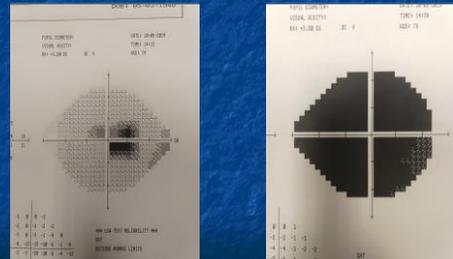
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Case Study “E.S.” Treatments / Recommendations

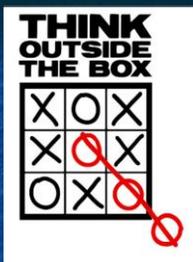
- Gave options to contained and direct task lighting – daughter would help her order online
- Discussed referral to OT for PRL training and to work on sewing adaptations

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Let me take one more look...



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4 prism diopters base-in OS

She was able to read 20/32
continuous text without difficulty

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The Case That Started It All



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Case Study "C.A." 68 y/o female

- Artist
- Car accident with neck injury 1987
- History of type 1 diabetes
- Proliferative diabetic retinopathy with multiple surgeries OU
- Vitreous collapse OD

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Case Study "C.A." Symptoms

- Blur at distance and near
- Bumping into things on left side
- Cannot see fine detail to paint
- Severe glare
- Poor contrast sensitivity

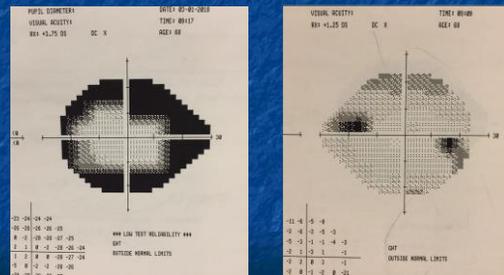
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Case Study "C.A." Clinical Findings

- VA (best corrected): 20/25 OD, 20/60 OS
- Refraction: -1.50 -1.00 X070 OD
+0.75 -0.75 X080 OS
- Contrast Sensitivity: Moderate loss

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Case Study "C.A." Visual Fields



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Case Study "C.A." Treatments/Recommendations

- Sector Prism OS to assist with driving and safe ambulation
- 5x Eschenbach Mirage Binocular telescopes for distance
- 4D clip on loupe for near detail work

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Case Study "C.A." Telescopes and Sector Prism



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Case Study "C.A." Treatments/Recommendations

- UV absorptive filters for glare control
 - Medium gray
- Stella Floor lamp for enhancing contrast
- Head lamp for remote painting workshops
- Referral: to peer group for participation in activities such as "Art in the Dark" at the museum

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Case Study "M.B." 56 y/o male

- Theology student
- Behcet's disease with secondary optic nerve atrophy
 - Diagnosed 35 years ago
- Blur at distance and near
 - Trouble reading and using computer
- Difficulty with glare and contrast

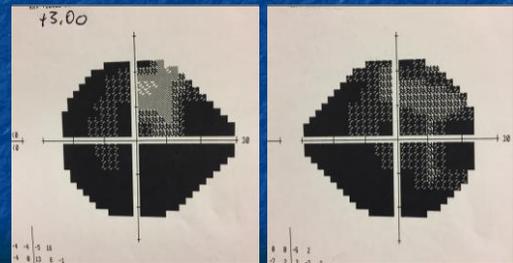
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Case Study "M.B." Clinical Findings

- Distance Visual Acuity: 20/400 OD, OS
- No improvement with trial frame refraction
- Near Visual Acuity: 20/80 at 6-8 cm
 - Wearing +20 lenticular readers
- Contrast sensitivity: Profound loss

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Case Study "M.B." Visual Fields



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Case Study "M.B." Treatments/Recommendations

- +24D Eschenbach Clear Image glasses OU to replace the lenticular glasses
 - Typically this strength would need to be monocular or have prism for binocular work.
 - Patient uses these monocularly – switching between eyes as one fatigues – he switches to the other

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Case Study "M.B." Treatments/Recommendations

- +10D Noves OU by Eschenbach – for intermediate tasks such as computer
- IRIS vision VR electronic wearable magnification
 - For distance viewing and reading at normal working distance
- HumanWare Connect 12 electronic magnifier with OCR
- Recommended JAWS training

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Case Study "A.O." 15 y/o male

- Optic Nerve Hypoplasia
- Nystagmus
- Constant Right Exotropia
- VA OD HM; OS 20/100
- Severe contrast loss
- Severe glare
- Migraines
- Severe anxiety

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Case Study "A.O." Symptoms

- Difficulty seeing distance content on smart board at school
- Told he will never be able to drive
- Told he needed to consider applying for disability payments because of vision impairment

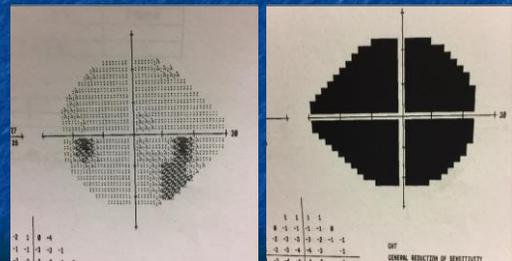
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Case Study "A.O." Clinical Findings

- Distance VA: OD HM, OS 20/100
- Refraction OS: +0.75 -1.25 X180
 - No improvement in distance acuity
- Cover test: Constant right exotropia
- Contrast sensitivity: Severe loss

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Case Study "A.O." Visual Fields



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Case Study "A.O." Treatments/Recommendations

- Monocular 2.2X bioptic – able to achieve 20/40 DVA on ETDRS chart
 - To be used in the classroom
- CCTV as needed for small print
- PAVE program – provided other magnification to be used in classroom
- Referral to Signal Centers for "transitional services"

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Case Study "A.O." Referral

- 3 week summer camp for blind and VI individuals ages 14-18
 - Prevocational skills
 - Transition services
 - Technology exposure
 - Community mobility training
 - Mentoring



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Case Study "S.W." 42 y/o female

- Employment history as a nurse
- Referred by primary OD
- Retinitis pigmentosa
- Fluctuating IOP
- Cystoid Macular edema
- Vitreomacular traction Syndrome
- Multiple Sclerosis

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Case Study "S.W." Symptoms

- Double vision
- Severe glare / photophobia
- Severe contrast sensitivity loss
- Blur
- Severely restricted visual field
- Vertigo
- Fall risk
- Fatigue

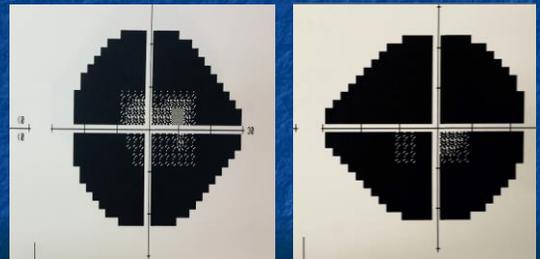
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Case Study "S.W." Clinical Findings

- Visual Acuity (Unaided):
 - 20/30-1 OD, 20/50 OS, 20/30-1 OU
- Refraction: plano OU with +2.75 Add
- Contrast Sensitivity: Moderate loss
- Maddox Rod:
 - Vertical 2-3 Hyper OD
 - Horizontal 6 BI OS

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Case Study "S.W." Visual Fields



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Case Study "S.W." Treatments/Recommendations

- Prism to fuse vertical diplopia
 - 1BD OD / 1 BU OS
- UV absorptive filters glare control
 - Dark grey shield for outdoors
 - Red/orange for indoors
- Makrolux 2.2x magnifier
- Monocular used as a minifier

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Case Study "S.W."

- Portable electronic magnifier for contrast and low level magnification – reduced fatigue and motion induced vertigo



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Case Study "S.W." Referrals

- Low Vision Occupational Therapy
 - In home and Home safety
 - ADLs
- Blind Rehabilitation program
 - Assistive technology training
 - JAWS screen reader software training
 - iPhone accessibility features / apps training
 - Orientation and Mobility
 - White cane training
 - Guide dog referral
 - Vocational Rehabilitation
 - Job training and job placement
- Online Braille Courses

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Case Study "S.W." Outcomes

- Retained job as school nurse
 - Used filters and minifier to assist
- Certification in medical transcription
 - Using JAWS and electronic mag
- Completed 3 Braille courses



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"The difference between an average healthcare professional and an excellent one is that the excellent one knows when to get others involved."
-Eric Singman, MD, PhD



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THANK YOU!!!!!!

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