Incorporating Low Vision into Your Primary Care Practice

October 27, 2012

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Documents:

- Intro to Low Vision Rehabilitation
- Low Vision Testing
- ABCs of Telescopes
- Near Options for the Low Vision Patient
- CCTV's
- Basic Low Vision Starter Kit
Intro to Low Vision Rehabilitation

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Intro to Low Vision Rehabilitation Outline

I. What is Low Vision
II. Statistics
III. Low Vision Rehabilitation & the Dream Team
IV. Community Resources

What is Low Vision?

– Impairment of visual function that cannot be corrected with standard refractive correction (Glasses, CLs), medical treatment, or surgery

– Definitions of Low Vision varies depending on source
  • All loosely based on VA and VF

  WHO (1993):
  – BCVA worse than 20/60 or VF ≤20 degrees

Some Low Vision Terms

Visual function VS Functional Vision

• Visual function: VA, VF, Stereo, Binocular system, Contrast, Light sensitivity, Color

• Functional Vision: Person’s ability to use their vision to effectively accomplish a task

What is Low Vision?

• Broad spectrum of patients with a continuum of vision loss

• Onset:
  – Congenital or Acquired
  – Gradual or Sudden Onset

• Location:
  – Any part of the eye
  – Pathway
  – Brain
  – Systemic condition

• Visual problems:
  – Central vision issues
  – Peripheral vision issues
  – Overall vision reduction
  – Contrast issues
  – glare/Light sensitivity
  – Color vision defects
  – Visual perceptual issues
Some Low Vision Terms

Visual Disorder/Impairment/Disability/Handicap

- Visual Disorder: Anatomical changes to eye/visual system
- Visual Impairment: Functional loss that results from visual disorder
- Visual Disability: When a patient is unable to perform a task because of their visual impairment
- Visually Handicap: When visual disability impacts patient’s quality of life

What is Low Vision?

- So, any patient with impaired functional vision is considered a low vision patient.
- However, to determine who will be eligible to receive services and disability benefits, – specific guidelines had to be set in place

Put these terms to perspective

<table>
<thead>
<tr>
<th>Visual Disorder</th>
<th>Visual Impairment</th>
<th>Visual Disability</th>
<th>Visual Handicap</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARMD</td>
<td>Decreased VA (eg. 20/100)</td>
<td>Pt. is 55 year old accountant cannot read his documents at work</td>
<td>Loss of work</td>
</tr>
<tr>
<td>Cataracts</td>
<td>Decreased VA (eg. 20/60)</td>
<td>Pt. is 70 yr old, retired reports no problems at home (does not read or drive)</td>
<td>Pt. is NOT visually handicapped</td>
</tr>
<tr>
<td>Retinitis Pigmentosa</td>
<td>Decreased VF (eg. 15 degrees)</td>
<td>Pt. is 35 yr old, mobility issues, can’t travel independently</td>
<td>Can’t drive to grocery store, can’t enjoy running anymore</td>
</tr>
</tbody>
</table>

Legal blindness

- Based on Visual Acuity OR Visual Field of the better seeing eye
- VA: Distance BCVA 20/200 or worse
- VF: 20 degrees or less

Legal Blindness

ICD-9 Visual Impairment Codes

<table>
<thead>
<tr>
<th>Level of Impairment</th>
<th>BCVA</th>
<th>VF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Impairment</td>
<td>20/200</td>
<td>N/A</td>
</tr>
<tr>
<td>Moderate VI</td>
<td>20/70-20/160</td>
<td>N/A</td>
</tr>
<tr>
<td>Severe VI</td>
<td>20/200-20/400</td>
<td>≤20 degrees</td>
</tr>
<tr>
<td>Profound VI</td>
<td>20/500-20/1000</td>
<td>≤10 degrees</td>
</tr>
<tr>
<td>Near total VI</td>
<td>Worse than 20/100</td>
<td>≤5 degrees</td>
</tr>
<tr>
<td>Total VI</td>
<td>NLP</td>
<td>NLP</td>
</tr>
</tbody>
</table>

Visual Impairment Level

- Near Normal Visual Impairment (VI)
- Moderate VI
- Severe VI
- Profound VI
- Near total VI
- Total VI

Legal blindness

- Based on Visual Acuity OR Visual Field of the better seeing eye
- VA: Distance BCVA 20/200 or worse
- VF: 20 degrees or less
For visual acuity testing

- Accepted tests/equipments:
  1) Snellen VA chart
     - Most Snellen charts do not have lines between 20/100 and 20/200

2) Other LV VA chart (accepted 2006)
   - These charts do have lines between 20/100 and 20/200
   - Will base on whether you can read the 20/100 line
     - Eg. 20/160
     - Eg. 20/125
     - Eg. 20/100-1

For visual field testing

- Accepted tests/equipments:
  1) Automated static perimetry (HVF 30-2 and 24-2)
     - Target: a 10dB stimulus is equivalent to a 4e stimulus
  2) Kinetic perimetry Eg. Humphrey "SSA Test Kinetic"
     - Target: a white III4e stimulus projected on a white 31.5 apostilb (10 cd/m2) background
  3) Goldmann perimetry
     - Target: III4e

- 284 million worldwide affected (updated 04/11)
  - 90% from developing countries

GLOBAL FACTS

- Leading causes of blindness: (Survey from WHO 2002)
  #1 Cataracts
  #2 Glaucoma
  #3 Age-related macular degeneration
  #4 Other eg. Corneal opacities, Trachoma, DR
National Facts (from Prevent Blindness America)

• Aging population
  – Census 2000: 119 million ≥ age 40
  • Cataract
  • AMD
  • Glaucoma

• Lifestyle (CDC)
  • Diabetic retinopathy (DR)

  • Aging population and lifestyle → VI conditions

Leading causes of Blindness

• Cataracts
  – Leading cause of blindness in preventable blindness

• ARMD
  – Leading cause of blindness in Caucasians in developed countries

• Glaucoma
  – Leading cause of blindness in African Americans

• Diabetic Retinopathy

Need for LVR

• Prevent Blindness America totaled costs
  • Cataracts, Diabetic Retinopathy, Glaucoma, and ARMD

  • Global cost of vision loss (2010) – 3 trillion USD worldwide

OD in private practice

<table>
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<tr>
<th>Reason</th>
<th>2002</th>
<th>2010</th>
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<tbody>
<tr>
<td>Direct Medical Cost</td>
<td>40.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>Other Direct Costs</td>
<td>15.0%</td>
<td>16.0%</td>
</tr>
<tr>
<td>Lost Productivity</td>
<td>10.0%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Medical Expenditures</td>
<td>3.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Non-Medical Expenditures</td>
<td>3.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Total Cost</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Loss of Vision

can interfere with the all aspects of a person’s life:

• Learning
• Vocational
• Hobbies/Leisure
• Social interaction
• Activities of daily living

Low Vision Rehabilitation (LVR)
Loss of Vision

- Specific problems include, but are not limited to:
  - Difficulty/inability in:
    - reading book, newspaper
    - driving
    - performing work/school related tasks
    - watching TV
    - recognizing faces
    - matching colors for their clothes, socks
    - shaving, putting on makeup
    - identifying money (paper bills)
    - grocery shopping
    - Cooking, reading recipes
    - Reading bills and writing checks
    - Etc etc...

What can LVR do for patients?

- Patients are given the right "tools":
  - Maximize use their remaining vision
  - Maintain independence
  - Build confidence
  - Enhance quality of life

- What are these tools?
  - Aids
  - Training
  - Education/Counseling

- No required VA or VF criteria to be referred to LVR

Low Vision Rehabilitation

Low Vision Evaluation
Rehabilitation Teaching/Training (ADL)
Mobility training (cane, guide dog, sighted guide)
Counseling (psychological, vocational, medical)
Vocational rehabilitation (computer, job seeking, training, placement)

Low Vision Rehabilitation Team

- Low Vision Rehabilitation Team
  - LV Doctor’s Role
    - Low Vision Evaluation
      - Evaluate current functional status of eyes & visual system.
      - Provide optometric LV intervention to improve pt’s visual functioning.
      - Our Special...
Magnification Devices

- Types of magnification
  - Relative size magnification
  - Relative distance magnification
  - Angular magnification

- Magnification Aids
  - Microscopes (MS)
  - Hand Held Magnifiers (HHM)
  - Stand Magnifiers (SM)
  - Telemicroscopes and Telescopes

Magnification Devices: Telescopes and Telemicroscopes

Magnification Device: Microscopes

Magnification Device: Hand-held magnifiers

Magnification Device: Stand Magnifiers
Electronic Magnification Devices

Non-Optical Aids

- Absorptive lenses/ Filters

Technology

- Eg. Iphone
  - Mode
  - "There’s an app for that!"
  - The EyeNote® app
- More on Technology later

Device Selection

- So many choices!
- What device should you select?

- Patient specific, distance specific, and task specific

What is the visual goal?

- Depends on patient and task
- Usual goal is about 20/40 to 20/50
- Examples:

Basic formulas

1) Distance Magnification

\[
\text{Current VA} - \text{Mag (K)} = \text{Goal VA}
\]

2) Near Magnification

\[
\text{Current VA} = \text{Goal VA}
\]

\[
\text{Current working distance} = \text{New working distance}
\]

\[
\text{Current size print read} = \text{Goal size print}
\]
Power vs Magnification

• Equivalent power
  – If Feq is the same, you can compare any near aid to one another

• Eg. 8D half eyes reading glasses = 8D hand held magnifier

• Eg. 8x hand held magnifier ≠ 8x stand magnifier

Low Vision Rehabilitation Team-LV Doctor’s Role cont..

• Educate pts on their condition, treatment LV management

• Prescribe appropriate devices/aids

• Dispense & Train

• Coordinate care with other LVR professionals for services outside of our expertise

Federal assistance

• Legal Blindness Benefits:
  – Income assistance
    • Social Security Disability Income (SSDI)
    • Supplemental Security Income (SSI)
  – Income tax
  – Telephone directory assistance
  – Transportation benefits
  – Mailing
    • “Free Matter for the Blind or Handicapped” stamp
  – Library services
  – Vocational rehabilitation services

Medicare and Low Vision Coverage

• Medicare
  – Centers for Medicare and Medicaid Services (CMS) recognizes the importance of rehabilitation for achieving medically necessary goals
  – 65 years and older
  – Exams
  – Rehabilitation training
  – They do not cover:
    • Vision assistive equipment

Services for working age individuals

State of TN

Department of Human Services (DHS)

Vocational Rehabilitation Services (VRS)

Organizations

American Foundation for the Blind (AFB)
National Federation of the Blind (NFB)
Alliance for the Blind and Visually Impaired
American Council of the Blind
Lighthouse
Hadley school for the Blind
Building Referrals

- Existing practice
  - Existing referring doctors and patients
  - Pamphlets
  - Large business cards
- Outside sources
  - MDs/OMDs
  - Lion’s club, Rotary club
  - Senior centers
  - Support groups
  - Local blind rehab centers
  - DHS/State agencies

Conclusion

- Vision impacts all aspects of their daily lives
- Just like physical therapy, speech therapy, vision rehabilitation is available after visual impairment
- They may not need ALL vision rehabilitation services
- Through LVR, we can help people maintain independence, improve quality of life

Workshop stations

- Station 1: LV Exam
- Station 2: Near devices
- Station 3: Distance devices
- Station 4: Electronic devices

Case 1

- JW 83 year old Caucasian male
- POHs:
  - OD: Dry ARMD BCDVA: 20/200
  - OS: Wet ARMD BCDVA: 20/350
  - OU: BCDVA: 20/200
- Primary goal: to be able to drive
- Initial distance device evaluation:
  - patient has difficulty viewing through TS
- Recommendation:
  - RTC for eccentric viewing training then continue with device eval

Case 1

- Office therapy: clock dial method for evaluation and training
  - Selected OD as training eye
  - VA: 20/200+ temporal PRL/3 o’clock EV OD
- Home therapy: incorporate EV in daily activities such as watching TV, looking at people’s faces, reading signs at distance

Case 1

- Weekly visits:
  - Office therapy:
    - Clock dial method
    - CCTV
    - Wall saccadic chart
  - Home therapy: 15 min sessions
    - Daily activities
    - Picture chart
    - Hart chart (large letters)
    - CCTV
Case 1

- After 6 weeks of training
  - DVA cc
    OD 20/120-
    OS 20/240
    OU 20/120+ temporal PRL/ 3 o'clock EV

- Distance goal:
  Patient's current VA 20/120
  Patient's goal VA 20/40

- Magnification needed:
  Current VA = Mag (X)
  Goal VA
  \[ \frac{120}{40} = 3x \]

- Patient specific
  - VA OD >> OS

- Distance specific
  - Just for far distance

- Task specific
  - For driving purposes

- Telescopes
  - Design (G or K)?
  - Style
    - Mono or bino?
    - Hands-free or hand-held?
  - Patient needs 3x.
    - Galilean
    - Monocular
    - Hands-free/Bioptic

Case 2

- A 55 year old white male patient
- POHx: h/o severe NPDR OU and CSME OD
- PMHx: type 2 DM x10 yrs, managed by insulin and diet
- Primary goal: he wanted to manage DM independently

- DVA sc OD: 20/400
- OS: 20/160

- Trial frame refraction:
  OD: -1.50 -0.75 x127 20/100
  OS: -1.00 -0.50 x135 20/70+
  ADD +2.00 OU 20/100 (2.0M) @ 40 cm
  ADD +4.00 OU 20/80 (1.6M) @ 25 cm

- Reduced contrast sensitivity
- Anterior segment: (+) pseudophakia OU, (-) NVI OU
- Posterior segment: (+) severe NPDR OU, (+) CSME OD
Case 2

- Distance device evaluation OS:
  \[
  \text{Current VA} = 70 \quad \text{Goal VA} = 40
  \]
  \[
  \text{2X needed}
  \]
  \[
  \text{Goal VA} = 40
  \]

- Near device:
  \[
  \text{Current VA} \times \text{WD (in D)} = 80 \times 4D = 8D
  \]
  \[
  \text{Goal VA} = 40
  \]

Alternative Calculation: \[
\text{Current M} = \frac{2.5}{2.5} = 1.0
\]

Case 2

- Recommendations
  - SRx in impact resistant material (trivex/polycarbonate)
  - 2.5x Focusable Galileian Monocular HHTS for OS or
    - MaxTV specs
  - HHM 3.5X/10D (yellow filter optional)
  - Lighting/contrast
    - Floor lamp
    - Yellow tinted fit-overs or yellow acetate sheet
  - Health
    - Large print or talking BP/BS monitor
    - Pre-filled insulin syringes
  - Kitchen aids
    - Food measuring scale
    - Bump dots
  - Personal
    - Low Vision watch/Talking watch

Case 2

- A 55 year old white male patient
- POHx: H/O severe NPDR OU and CSME OD
- PMHx: type 2 DM x 15 yrs, managed by insulin and diet
- Primary goal: he wants to manage DM more independently

Case 2

- DVA sc OD: 20/400 OS: 20/160
- Trial frame refraction:
  \[
  \text{OD:} \quad -1.50 -0.75 x 127 \quad \text{20/100}
  \]
  \[
  \text{OS:} \quad -1.00 -0.50 x 135 \quad \text{20/70+}
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Alternative Calculation: \[
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\]
Billing & Payment

<table>
<thead>
<tr>
<th>Service/Device</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Visit (99203/99213)</td>
<td>$90/$60</td>
</tr>
<tr>
<td>Spectacles</td>
<td>$250</td>
</tr>
<tr>
<td>Handheld Telescope</td>
<td>$50</td>
</tr>
<tr>
<td>MaxTV Spectacles</td>
<td>$135</td>
</tr>
<tr>
<td>Illuminated Handheld Magnifier</td>
<td>$60</td>
</tr>
<tr>
<td>Floor Lamp</td>
<td>$150</td>
</tr>
<tr>
<td>Talking BP Monitor</td>
<td>$90</td>
</tr>
<tr>
<td>Talking BG Monitor</td>
<td>$90</td>
</tr>
<tr>
<td>Talking Watch</td>
<td>$60</td>
</tr>
</tbody>
</table>

Office Visit Fee depends on allowable reimbursement in your area. Other items can be purchased from Daily Living Solutions catalog for use in the home.

Case 3

- Demographics: 14 yo Caucasian male patient
- PMHx: none
- POHx: ROP
- Work/Hobbies: High school student
- ADL: mostly independent, parents help. Has an 504c plan at school allowing larger print materials
- Mobility: not an issue
- Psychosocial level: Previous/Current LV aids: 

Case 3

- Entering BCVA:
  - Distance: 20/50 OD 20/50 OS
  - Near: 0.4/1.2M OU
- Pupils: PERRL (-) APD
- EOMS: FROM OU

- Trial frame refraction: No change to SRx
  - OD +1.75 -1.25 x090 20/50
  - OS +2.00 -1.75 x083 20/50

Case 3

- Near device evaluation
  - Electronic devices were shown due to the patient’s age and ability to easily use the technology
  - Compact-mini-Optelec
  - Ruby-Freedom Scientific
  - Pebble-Enhanced Vision

Case 3

- Treatment/Management
  - Distance
  - No prescription issued as there was no noticeable improvement
  - Can drive with restricted license
  - Educated on possible use of bioptic
  - Near
  - Compact-mini
    - Liked for ease of use and the fact that it looks like a cell phone
    - Educated on using an iPad, iPhone and Kindle for
Case 4

- DVA sc OD: 20/400  OS: 20/160
- Trial frame refraction:
  OD: -1.50 - 0.75 x127  20/100
  OS: -1.00 - 0.50 x135  20/70+
  ADD +2.00 20/100
  ADD +4.00 20/80 @25 cm
- Reduced contrast sensitivity
- Anterior segment: (-) cataracts, (-) NVI
- Posterior segment: (+) moderate NPDR OU, CSME OD

Case 4

- Distance device evaluation OS:
  Current VA = 70 = 2X needed
  Goal VA = 40

- Near device:
  Current VA x WD (in D) = 80 x 4D = 8D
  Goal VA = 40

Case 4

- Recommendations
  - SRx in Trivex lens
  - 2.5x Focusable Galilean Monocular HHTS for OS, and Intermediate distance
  - HHM 10D
  - Lighting/contrast
    - Floor lamp
    - Yellow slip-on filter
  - Health
    - Large print BP/BS monitor
    - Pre-filled insulin syringes
  - Kitchen aids
    - Food measuring scale
    - Weight scale
    - High contrast cutting board/measuring spoons/cups

Case 4-Billing

<table>
<thead>
<tr>
<th>Type</th>
<th>Billing</th>
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<tbody>
<tr>
<td>Exam</td>
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<tr>
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<tr>
<td>Yellow acetate slip-on filter</td>
<td></td>
</tr>
<tr>
<td>Health aids</td>
<td></td>
</tr>
<tr>
<td>Kitchen aids</td>
<td></td>
</tr>
<tr>
<td>Low vision watch</td>
<td></td>
</tr>
<tr>
<td>F/U Dispense visit/Training Visit</td>
<td></td>
</tr>
</tbody>
</table>
Incorporating Low Vision into your Primary Care Practice

Low Vision Testing

Anna Schleselman, O.D., M.S.
The Eye Center at Southern College of Optometry
Vision Therapy and Rehabilitation Service

Visual Acuity Testing

• Purpose in low vision:
  – Helps when evaluating performance with devices
  – Evaluates ocular status
    • stable, progressing, or remitting
  – Helps to describe/understand visual capabilities to educate the patient, family, teachers, etc.
  – Eligibility determination: benefits, privileges, services, compensation

Visual Acuity Testing: Distance

• Snellen
  – Problems:
    • Limited sampling with large letters
    • Large steps in size progression with large letters
    • Jumps from 20/100 to 20/200
    • If projected, often poor contrast
    • Hard to use alternate distances

• ETDRS and Bailey Lovie
  – 5 letters in each letter size
  – Logarithmic progression
  – On backlit stand
  – ETDRS
    – Never measure in feet as the foot scale is not valid
    – Works fine at 1 or 2 meters
      • Ex. 2/10 = 20/100
  – Bailey Lovie
    – Can use either feet or meters
      (2 meters or 10 feet)

• Feinbloom Chart
  – Record in feet/letter size
  – Stand at denominations of 20
  – Advantages:
    • Good for measuring very poor vision
    • Easy to hold and change test distance
    • Can boost patient confidence
    • Multiple numbers at most sizes
  – No need for CF

• Lea Acuity charts and HOTV charts are great for pediatric low vision patients
  – Also come on portable backlit stand
Refract.ion in Low Vision

- By definition, low vision means that vision problems remain despite best correction
- This is the easiest way to improve visual function
- Some patients desperately want glasses to fix their problems

Potential Challenges
- High Rx
- Large Rx changes
- Odd optics
- Reduced response consistency (i.e. noisy)
- Patients’ JNDs are usually larger
- Cannot easily predict Rx based on acuity
- No obvious endpoint

Refract.ion in Low Vision

- Prefer trial frame and Janelli clips instead of phoroptor
  - Patients often have had bad previous experiences with the phoroptor
  - Doctor can see eccentric fixation, make large lens changes, control vertex distance, go beyond the range of the phoropter

Refract.ion in Low Vision

- Use a hand held JCC for cylinder
- Tip: When doing an over refraction using Janelli clips, instead of doing the math to combine cyl, put whole system into lensometer

Refract.ion in Low Vision

- Adjusting for viewing distance
  - Not necessary if using Snellen chart at 20 feet
  - If refraction done using Feinbloom or ETDRS chart, remember it is not at optical infinity, so presbyopic patients will take extra plus during refraction

Near Acuity

- Avoid using Reduced Snellen or Jaeger Notation for near acuities
- Reduced Snellen designed such that 20/20 row should require an acuity of 20/20, but this is only true if the chart is held at 40 cm
  - In low vision we often use closer distances
- Jaeger notation is poorly standardized and is not proportional: J4 not twice as big as J2

Near Acuity

- Recommend using M notation
  - 1M = 8 point font
  - Typical newsprint generally considered to have lower case letters = 1.0 M
  - Record: meters/M

Lighthouse single letter acuity
Near Acuity

- Continuous text cards best for checking near acuity
  - Single letters often easier to see than full words, especially with large, central scotomas
- Personal favorite is the MN READ acuity chart
  - Uses sentences and high frequency words at a 3rd grade level

Contrast Sensitivity (CS)

- Although VA and CS are correlated, VA only gives a rough prediction of CS
- Real world targets have low contrast
  - Ex. curbs
- Also, poor viewing conditions are made worse with poor CS
  - Dawn, dusk, rain
- Normal CS: 1.80
- Knowing patients’ CS helps to determine who may benefit from better contrast
  - when reading
    - who may be at a greater risk of falling, and
    - who needs optimal lighting
  - who may benefit from colored filters

Contrast Sensitivity Tests

- Pelli Robson
  - Taken at 1 meter
  - Contrast changes from triplet to triplet logarithmically
  - Stop at 2 misses in a triplet
  - Most often used in clinical trials
  - Good if patient is 20/400 or better
  - Comes with scoring sheet
  - Disadvantages:
    - Large in size
    - Hard to store
    - Hard to keep clean
    - Expensive

- Mars
  - Smaller, more portable
  - Held at 0.5 meter
  - Patient may require a +2.00 add
  - Contrast changes from letter to letter
  - Stop at 2 consecutive misses
  - Comes with scoring sheet

Visual Field Testing

- Amsler Grid
  - Helps to explain to the patient why they are reading slower
  - Necessary to do if patient is considering bioptic training
  - Drawing diagonals may aid foveal fixation
  - Good with very advanced glaucoma, RP, etc.

- Vision Disc
  - Quick test for examining extent of field horizontally
Visual Field Testing

- Goldmann Perimeter
  - More precise than Vision Disc
  - More peripheral than Humphrey
  - Perform without glasses to avoid ring scotomas/expanding field or use contact lenses
  - Use III4e target

Determining Legal Blindness

- In the US, the criteria for legal blindness are:
  - Visual acuity of 20/200 or worse in the better eye with corrective lenses or
  - Visual field restriction to 20 degrees diameter or less in the better eye.

Legal Blindness VA

- Definition works if only using a Projected Snellen chart with no targets between 20/100 and 20/200
- What if a person’s VA is measured with one of the newer charts (ex. ETDRS, Feinbloom)?
  - if they cannot read ANY of the letters on the 20/100 line, they will qualify as legally blind, based on a visual acuity of 20/200 or less.
  - if they are able to read AT LEAST ONE letter on the 20/100 line, that person WILL NOT be classified as legally blind.

Legal Blindness VF

- These tests below are the only VF tests allowed to determine legal blindness:
  - Goldmann perimetry with a III4e target
  - Automated static threshold perimetry (Humphrey 30-2 and 24-2)
    - For Humphrey Field Analyzers, a 10dB stimulus is equivalent to a 4e stimulus.
  - Kinetic perimetry, such as the Humphrey "SSA Test Kinetic"
    - must use a white III4e stimulus projected on a white 31.5 apostilb (10 cd/m2) background.

THANK YOU!
What are telescopes?

- Telescopes are optical devices used to magnify objects at distance.
- Two lenses to a telescope:
  - Objective lens
  - Ocular lens

Different Types
- Galilean
- Keplerian

Different Designs
- Focusable or non-focusable
- Different Styles
  - Many different styles available. In future slides

Markings on a telescope
There are 3 sets of numbers:
- **4X 12, 12.5°**
  - 1st number: represents the magnification (in X)
  - 2nd number: represents the size of the objective lens (in mm)
  - 3rd number: represents the field of view (in degrees)

Views through a telescope

Telescopes
- Advantages and Disadvantages of a Telescope:
  - Advantages:
  - Disadvantages:
Styles of Telescopes

- Monocular (one eye)
  - Hand-held
  - Clip-on
  - Hands-free
  - Spectacle mounted
- Binocular (both eyes)
  - Hand-held
  - Hands-free
  - Spectacle-mounted

Which one do you use?

- Depends on many factors.
  - What is their visual goal? Eg. What do they want to see?
  - What working distance?
  - For how long?
  - Do they want to have mobility?
  - Are there any patient physical/ocular limitations?
  - Availability of Power/Type/Design/Style?
  - Advantages and disadvantages of the telescope?
  - Other visual goals?
  - Cosmesis/Cost

When can we use them?

- Activities distance telescopes can be used for:
  - Watching TV
  - Watching sporting events
  - Seeing/spotting
  - Driving
  - Blackboard at school
  - Hobbies/recreational activities

Monocular hand held telescopes

<table>
<thead>
<tr>
<th>POWER</th>
<th>FIELD</th>
<th>FOCAL RANGE</th>
<th>WEIGHT</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4X12</td>
<td>12.5°</td>
<td>7-3/4&quot;</td>
<td>1.75 oz</td>
<td>2-5/16&quot;</td>
</tr>
<tr>
<td>6X16</td>
<td>9.5°</td>
<td>9-5/6&quot;</td>
<td>2.25 oz</td>
<td>2-7/8&quot;</td>
</tr>
<tr>
<td>8X20</td>
<td>7.0°</td>
<td>10-5/8&quot;</td>
<td>2.50 oz</td>
<td>3-1/4&quot;</td>
</tr>
<tr>
<td>10X20</td>
<td>6.0°</td>
<td>10-1/8&quot;</td>
<td>4.00 oz</td>
<td>4-1/2&quot;</td>
</tr>
<tr>
<td>14X20</td>
<td>5.0°</td>
<td>10-7/8&quot;</td>
<td>4.50 oz</td>
<td>5-3/4&quot;</td>
</tr>
</tbody>
</table>

Clip-on piece

- Can be purchased and added to hand held telescopes (certain styles)
- Allows person to be hands-free
- Clipped to a pair of existing glasses
- Can be flipped up when not in use
- Usually for smaller tube length telescopes

Hands-free binoculars

- Galilean sports binoculars
  - Available from 2.5x to 4.0x
  - Hands-free
  - Adjustable PD
  - Individual adjustable focusing dials
  - Eg. 2.8x focuses from 3 ft to infinity
Hands-free binoculars
- Keplerian sports binoculars
  - AKA Beechers or Butterfly
  - Available in higher powers from 4.0x to 8.0x
  - Hands-free
  - Adjustable PD
  - Individual adjustable focusing dials
  - Bigger and heavier

MaxTV glasses
- Hands-free design
- Approximately 2.0X magnification
- Focuses from soft outward
- Individual adjustable focusing dials
- Lightweight
- Cosmesis

Spectacle Mounted Telescope
- Custom made devices
- Advantages:
  - Use of regular glasses
  - Full refractive error correction
  - Can be one eye or both eyes
  - Better fit to patient’s own eyes/head
  - Able to pick style/design/power
  - May use while walking (certain styles)
  - Less bulky
  - Better cosmesis
- Disadvantages:
  - Cost
  - Fit time/process

Spectacle Mounted Telescopes
- Telescopes can be mounted:
  - ABOVE the patient’s line of sight
  - AT the patient’s line of sight
  - BELOW the patient’s line of sight

Spectacle Mounted Telescope Full Field
- Telescopes are mounted in patient’s glasses at the line of sight
- Can add reading cap for intermediate and near activities

Spectacle Mounted Telescope Bioptics
- Ever heard of a device called Bioptics? Did you know there is a device that visually impaired patients can use for driving?
Bioptic

- Telescope is mounted ABOVE the patient’s line of sight in the glasses
- Bioptic telescope is used as a **spotting tool**
  - Identifies small targets/objects at a distance
- This is utilized by **selected** LV patients

What is a Bioptic?

- Pt will look through the carrier lens for most of activities (95% of the time)
- Only when needed, pt will tilt their head down to look briefly through the telescope (1-2 seconds)

Types of Driver’s Licenses

- Normally sighted individuals:
  - Regular unrestricted driver’s license
- For visually impaired individuals:
  - General restricted driver’s license
  - Bioptic restricted driver’s license

Ocutech Bioptic

- Ocutech YES
- Keplerian optics
- Available in two mag:
  - 4x with 12.5 degrees
  - 6x with 9.5 degrees
- Adjustable working distance:
  - Distance to mid/near range
- Have loaner devices available

Overview of Steps

Complete visual and ocular health exam and selection of Bioptic candidate

1. Bioptic Fitting process
2. Bioptic Vision training
3. Bioptic Driver’s training
4. Road Test/Driver’s license
There are other uses of telescopes than just distance activities:

**Telescopes as Intermediate/Near Magnification Systems**
- You can convert
  - Telescope → Telemicroscope (Distance aid) → (Near aid)
- By adding a reading cap piece
- By twisting the tube if it is a focusable design

**Telescopes as Field Enhancing Systems**
- May use telescopes as field enhancing system
  - Telescope → Reverse telescopes (Distance aid) → (Field enhancing aid)
- These create minification by compress more objects into usable visual field
- Glaucoma, diabetic retinopathy, retinitis pigmentosa
- Simply flip a regular telescope so you look through the objective lens instead of the eyepiece lens

In Low Vision Optometry..
- Different formulas are used to determine the Power or the amount of Magnification a low vision patient needs to see a desired object

For Telescopes:
- Determining the Magnification of a telescope:
  - "What they CAN see" = Mag of TS
  - "What they WANT to see"
For example:

- A person’s corrected distance vision is 20/400
- This person wants to see a sign with letters about 1 inch in height
  - 20/60 letter is approximately 1 inch in height
  - So, \[
  \frac{400}{60} = 6x
  \]
Near Options for the Low Vision Patient

How to Select Low Vision Aids

- Consider the primary goal of patient
- Hands free or not?
- What is working distance of task?
- Determine initial power of device
  - Convert near reading ability from M units to diopters
    - Example: Patient can read 4M (20/200) at 40 cm with +2.50 Add. If patient wants to read 1M (20/50) print, a 4X/16D magnifier is needed when you divide 4M by 1M
    - Patient can read 0.4/4M (units in meters); divide denominator by numerator
    - $4/0.4 = 10$ D
  - Take distance VA, reverse numerator/denominator and divide
    - Example: VA = 20/200; $200/20 = 10$ D
  - Power may be adjusted based on patient’s accommodative ability
    - Allow patient to use half of his accommodation
  - Start a little higher with stand magnifier; 12 D or more
- It must be decided how to correct the vision to meet the patient’s visual goals
  - See device examples below
- Determine focal distance of chosen device based on actual correction
  - Lens-to-print distance = how far magnifier is held from print
  - Power of magnifier (diopters)
    - Example: $100/10 = 10$ cm = 0.10 m
- Teach patient to hold device at proper working distance
- Use reading stand, optimum lighting, etc.
- Allow patient to practice using device
- Make adjustments in power or style of device as needed
- Send patient home 1-2 weeks with device and instructions on use and have him practice using it in everyday activities
- Listen carefully on follow up to patient’s successes and difficulties
- Make adjustments as needed
- Order device that best allows patient to meet his goal

<table>
<thead>
<tr>
<th>Lens Power / Acuity Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near Acuity Tested at 40 cm (0.40 m)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size of Legible Print</th>
<th>Demonstrate Lens Power (Diopters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1M</td>
<td>+2.50</td>
</tr>
<tr>
<td>2M</td>
<td>+5.00</td>
</tr>
<tr>
<td>3M</td>
<td>+7.50</td>
</tr>
<tr>
<td>4M</td>
<td>+10.00</td>
</tr>
<tr>
<td>5M</td>
<td>+12.50</td>
</tr>
<tr>
<td>8M</td>
<td>+20.00</td>
</tr>
<tr>
<td>10M</td>
<td>+25.00</td>
</tr>
</tbody>
</table>

Optical Devices
Near devices

- Stand magnifier
  - Used mainly for reading tasks; rests on flat reading surface at preset (fixed) focus
  - Designed so that divergent light emerges requiring an add or accommodation to view image best
  - Usually requires lap desk or reading stand to position reading material properly in front of reader
    - Illuminated and non-illuminated varieties
    - May select yellow or plum-colored filters to reduce glare or enhance contrast
    - Open or closed base
• Power range: 3X to 15X
  o Examples
   ▪ Scribolux - Illuminated and open base
   ▪ Macrolux – illuminated (2 magnification levels)
   ▪ Powerlux – 3.5X, 5X, 7X; resembles a computer mouse
     ▪ LED illumination in cool blue or warm yellow light
   ▪ Portable CCTV 3.5, 4.3, 5, or 7 inch
• Handheld magnifiers
  o Used mainly for near tasks and spot reading
  o Requires individual to hold device close to eye and bring reading material to magnifier
  o Must be manually focused
  o Designed so that parallel light emerges for use with distance or bifocal correction
  o Illuminated, non-illuminated, and pocket varieties
  o May select yellow filter to reduce glare or enhance contrast
  o Portable CCTV 3.5 or 4.3 inch with extendable handle
    ▪ Power range: 3X to 15X
• Dome/Bar magnifiers
  o Used for extended reading
  o May select illuminated or one with indicator line
    ▪ Power range: 1.7X to 6X
• Near vision glasses
  o Used for extended reading or hobbies
   ▪ Prism half-eyes
     ▪ Power range: +4 (6BI) to +12 (14BI)
   ▪ High-Plus Aspheric glasses
     ▪ Power range: +10D (2.5X) to +48D (12X) OD, OS, or OU
   ▪ Specialty Loupes/Sports Spectacles
     ▪ Fixed focus or adjustable focus
     ▪ Power range: 2X to 4X
   ▪ Magnifying systems with normal reading distances
     ▪ Magnifying glasses or clip-on system – MaxDetail
       ▪ 2X power; adjusts for +/-3D correction; working distance = 35-40 cm
     ▪ 2.5X, 2.8X, 3.5X Binocular spectacles
       ▪ Adjustable for near and distance use
• Other near devices
  o Lighted page magnifier
  o Neck magnifier with or without light

<table>
<thead>
<tr>
<th>Foot (Snellen)</th>
<th>Metric</th>
<th>Height (mm)</th>
<th>Jaeger (Approx)</th>
<th>Metric Units (M)</th>
<th>Point</th>
<th>Usual Type Text Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/500</td>
<td>6/150</td>
<td>15.00</td>
<td>J19</td>
<td>10.00</td>
<td>80</td>
<td>Headlines</td>
</tr>
<tr>
<td>20/250</td>
<td>6/75</td>
<td>7.50</td>
<td>J18</td>
<td>5.00</td>
<td>40</td>
<td>Headlines</td>
</tr>
<tr>
<td>20/200</td>
<td>6/60</td>
<td>6.00</td>
<td>J17</td>
<td>4.0</td>
<td>32</td>
<td>Sub-headlines</td>
</tr>
<tr>
<td>20/100</td>
<td>6/30</td>
<td>3.00</td>
<td>J11</td>
<td>2.0</td>
<td>16</td>
<td>Large Print</td>
</tr>
<tr>
<td>20/80</td>
<td>6/24</td>
<td>2.30</td>
<td>J9</td>
<td>1.60</td>
<td>12</td>
<td>Kid’s Books</td>
</tr>
<tr>
<td>20/60</td>
<td>6/18</td>
<td>1.75</td>
<td>J7</td>
<td>1.20</td>
<td>10</td>
<td>Magazine/Book</td>
</tr>
<tr>
<td>20/50</td>
<td>6/15</td>
<td>1.50</td>
<td>J6</td>
<td>1.00</td>
<td>8</td>
<td>News Print</td>
</tr>
<tr>
<td>20/40</td>
<td>6/12</td>
<td>1.15</td>
<td>J4</td>
<td>0.80</td>
<td>6</td>
<td>Phone book</td>
</tr>
<tr>
<td>20/30</td>
<td>6/9</td>
<td>0.90</td>
<td>J2</td>
<td>0.63</td>
<td>5</td>
<td>Small ads, Bibles</td>
</tr>
<tr>
<td>20/25</td>
<td>6/7.5</td>
<td>0.75</td>
<td>J1</td>
<td>0.50</td>
<td>4</td>
<td>Footnotes</td>
</tr>
<tr>
<td>20/20</td>
<td>6/6</td>
<td>0.58</td>
<td>J1+</td>
<td>0.40</td>
<td>3</td>
<td>Normal Near VA at 40 cm</td>
</tr>
</tbody>
</table>
Contrast Enhancers
Writing devices
- Hinged or simple writing guides
  - Checks, letters, note cards, envelopes, signature (typoscope)
- Raised or bold line paper
- Felt-tipped pin

Lighting options
- Floor lamps
  - Stationary or with casters
- Desk top
  - Clamp arm
  - With magnifiers
- Light Sources
  - Incandescent – good color rendition; burn hot (NO LONGER PRODUCED)
  - Fluorescent – blue wavelength light can be difficult to tolerate
  - Halogen – burn hot due to high temperature of bulb; keep away from flammable items
  - LED – burn cooler; multiple cells combined to yield more light without glare
  - Combination luminaires
    - Incandescent and fluorescent
  - Natural daylight
    - Fluorescent – larger wavelength spectrum; low watt bulbs; burn cooler; reduce glare

Glare Reduction
- Tints and filters
- Mirrors
- Photochromics
  - Transitions
  - Transitions XTRActive/Transitions SOLFX
  - PhotoFusion
- Other Lens Options
  - Antireflective coating
  - Polarization
  - Wrap-around sunglasses
    - Thin-Tech lenses by Ice-Tech
      - Highly curved prescription sunglasses without distortion and bulkiness

Other Resources to Assist with Activities of Daily Living
- Library services
  National Library for Blind and Physically Handicapped
  Library of Congress
  1291 Taylor Street NW
  Washington, DC 20011
  202-707-5100 / 888-657-7323
  202-707-0744 (TTY) / 202-707-0712 (fax)
  nls@loc.gov / www.loc.gov/nls
  Large print books, magazines
  Audio books
  Braille books
  Play back machines

- Telephone services
  - Telecommunications Equipment Distribution Program
    - Must have a disability that is verifiable by a licensed physician
      - www.tedpa.org
  - AT&T National Center for Customers with Disabilities
    - Offers alternative billing formats such as Braille or large print
      - VoiceDial Exemption Program waives monthly fee for voice-enabled services
866-241-6568 (Voice) / 866-241-6567 (TTY)

- Verizon
  Offers alternative billing formats
  800-974-6006 (Voice / TTY)

- Telecommunications Relay service
  Dial 711 – allows hearing and speech disabled to place and receive telephone calls

- Bank services
  Large print, Braille, audio statements
  Contact your local banking institution

- U. S. Postal Service
  Mail can be sent free of charge based on certain standards
  800-275-8777

- Centers for Independent Living
  - U.S. Directory for Centers for Independent Living
    [http://www.virtualcil.net/cils/](http://www.virtualcil.net/cils/)

- Orientation & Mobility
  - Southeastern Guide Dogs, Inc.
    4210 77th Street E
    Palmetto, FL 34221
    800-944-3647 or 941-729-5665
    [www.guidedogs.org](http://www.guidedogs.org)

  - Free White Cane Program
    National Federation of the Blind
    200 E. Wells Street
    Baltimore, MD 21230
    410-659-9314
    [www.nfb.org](http://www.nfb.org)

- News Radio / News Reading Services
  - Newsline
    National Federation of the Blind
    1800 Johnson Street
    Baltimore, MD 21230
    866-504-7300
    [www.nfb.org](http://www.nfb.org)

  - Radio Reading Network
    2901 Liberty Heights Avenue
    Baltimore, MD 21215
    800-455-5605 / 410-462-8580
    [www.radioreadingnetwork.org](http://www.radioreadingnetwork.org)

Most of the ADL and O & M resources are from the Foundation Fighting Blindness Low Vision Resource Guide at [www.fightblindness.org](http://www.fightblindness.org)
CCTV’s
Enhanced Vision

<table>
<thead>
<tr>
<th>Acrobat</th>
<th>Merlin</th>
<th>Merlin Plus</th>
</tr>
</thead>
</table>
| • Auto focus 3-in-1 camera for seeing yourself up close, reading and distance viewing  
  o True mirror image while in self-viewing mode  
  o Memory settings for each camera position  
• Various arms and positioning options provides maximum flexibility  
• Detachable camera for use at multiple workstations  
• 19”, 22” or 24” monitors provide up to 82x adjustable magnification  
• 28 available viewing modes to optimize contrast and brightness  
• Wrap around dual keypad allows easy access to controls  
  o Remote control  
• Computer compatible (Additional hardware required)  
• Optional rolling carrying case for easy transport  
• Left-hand mode  
• Tilt screen  
• Line markers, object locator, remote control and more  | • 7 viewing modes to optimize contrast & brightness  
• 2.7 to 77x adjustable magnification (varies with LCD screen size)  
• Computer compatible with toggle capability (additional hardware required)  
• 28 custom programmable color select options available  
• Auto focus  
• 19”, 22”, or 24” LCD monitor  
• Fully assembled, one-piece unit is ready to use  
• Simple built-in controls move with the screen  
• Fast response, high quality LCD for a clear crisp picture  
• Screen pivots, tilts and swivels in all directions for your comfort  
• Adjustable brightness  
• 3 year warranty  | • Full computer connectivity  
• Split-screen mode  
• Horizontal and vertical line markers and windowing modes  
• Feature Kit and foot pedal control included  
• 7 viewing modes to optimize contrast & brightness  
• 2.7 to 77x adjustable magnification (varies with LCD screen size)  
• Computer compatible with toggle capability (additional hardware required)  
• 28 custom programmable color select options available  
• Auto focus  
• 19” or 22” LCD monitor  
• Fully assembled, one-piece unit is ready to use  
• Simple built-in controls move with the screen  
• Fast response, high quality LCD for a clear crisp picture  
• Screen pivots, tilts and swivels in all directions for your comfort  
• Adjustable brightness  
• 3 year warranty  |
## Onyx

- 17”, 19” or 22” Monitor
  - 17” monitor, magnifies from 1x up to 64x
  - 19” monitor, magnifies from 1.1x up to 71x
  - 22” monitor magnifies from 1.3x up to 96x
- easy-to-carry, self-contained package
- The ONYX offers three distinct views: distance view, document view, and self view.
- Remote control
  - Zoom in and out and adjust brightness without touching or shaking the camera - no need to aim the remote control as with infrared
  - The Find feature puts crosshairs on the screen to assist aiming at distant objects
  - The image can be flipped to provide a mirror image for self viewing, or to provide a right side up view independent of the camera position
  - View images in full color, or select one of four enhanced modes for reading text:
    - Black on white
    - White on black
    - Yellow on blue
    - Yellow on black

## Topaz

- LCD monitor - Adjustable height and tilt for your viewing comfort
- Monitor swivels 180 degrees from side to side)
  - 17” and 19” flat screen monitor models
    - Magnification range - 17” monitor: 2.4x to 63x
    - Magnification range - 19” monitor: 2.7x to 70x
  - 22” wide screen model
    - Magnification range - 22” monitor: 3x to 82x
- Unique Freeze Frame feature
- Magnification dial –
  - Adjust magnification from 3 times up to 82 times the actual size
  - 16 magnification levels
- 28 high contrast text color combos
- Control Panel - Simple, accessible controls for color selection and brightness
- Position Locator Beam - Easily guides you to exact document placement
- Reading Table - Generous size, with fingertip control and wide side-to-side motion
<table>
<thead>
<tr>
<th>Optolec ClearView+</th>
<th>Mattingly TV Mouse</th>
</tr>
</thead>
<tbody>
<tr>
<td>o 18.5”, 19”, 22” Monitor size</td>
<td>o Compatible with any TV/Monitor with a RGB Video Input</td>
</tr>
<tr>
<td>o One-button simplicity control.</td>
<td>o Three (3) Viewing Modes:</td>
</tr>
<tr>
<td>o Average zoom range of 2.7X – 72X.</td>
<td>o Full Color</td>
</tr>
<tr>
<td>o Adjustable monitor arm allows the user to position the monitor for optimal viewing and comfort.</td>
<td>o High-Contrast Positive (Black on White)</td>
</tr>
<tr>
<td>o Adjustable brightness.</td>
<td>o High-Contrast Negative (White on Black)</td>
</tr>
<tr>
<td>o Easy-Glide reading platform with electronic brake.</td>
<td>o Seven (7) Levels of Digital Magnification:</td>
</tr>
<tr>
<td>o High contrast text reading modes.</td>
<td>o 17.5x to 70x Digital Zoom on a 20” TV/Monitor</td>
</tr>
<tr>
<td>o Photo mode for viewing pictures.</td>
<td>o Larger TV/Monitor will Increase Level of Magnification</td>
</tr>
<tr>
<td>o Exceptional brightness/contrast.</td>
<td>o Ability to Freeze and De-Freeze current image</td>
</tr>
<tr>
<td>o Multiple light sources for even illumination while in-use.</td>
<td>o Unique Gliding Wheel Mechanism</td>
</tr>
<tr>
<td>o Free in-home installation.</td>
<td>o Light Weight</td>
</tr>
<tr>
<td>o Fully upgradeable modular design.</td>
<td>o Convenient &amp; Ergonomic (feels like a computer mouse)</td>
</tr>
<tr>
<td>o Hands free magnification.</td>
<td>o Easy to Use - Plug and Play</td>
</tr>
</tbody>
</table>

**Basic Feature Pack**

- o 16 alternative color viewing modes.
- o Position indicator.

**Advanced Feature Pack**

- o 16 alternative color viewing modes.
- o Position indicator.
- o Window/line markers.
- o External PC switch.

**PC Foot Pedal**
# Portable CCTV’s

## Freedom Scientific

<table>
<thead>
<tr>
<th>Ruby</th>
<th>Sapphire</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 4.3-inch high resolution LCD display</td>
<td>• Large, bright, high contrast display (7 inches)</td>
</tr>
<tr>
<td>• Lightweight design - 7.7 oz (218g)</td>
<td>• Slim (1 5/8 inches), and weighs less than 2 pounds</td>
</tr>
<tr>
<td>• 5 viewing modes: full color, black text on a white background, white text on a black background, yellow text on a blue background, or yellow text on a black background</td>
<td>• Full color plus 22 possible text color combinations</td>
</tr>
<tr>
<td>• Freeze Frame and change magnification</td>
<td>• Lies flat on reading material</td>
</tr>
<tr>
<td>• Folding handle</td>
<td>• Freeze Frame</td>
</tr>
<tr>
<td>• 2 hours continuous use</td>
<td>• Built-in writing stand</td>
</tr>
<tr>
<td>• Use rechargeable or disposable batteries</td>
<td>• 4-hour continuous use rechargeable battery</td>
</tr>
</tbody>
</table>

**Magnification Range:**
2x to 14x with handle extended
5x, 7.5x, and 10x flat on the paper

**Dimensions:**
4.94” x 2.94” x 1.35” (.65” thick with handle extended)
125 mm x 75 mm x 34 mm (16.5 mm thick with handle extended)
<table>
<thead>
<tr>
<th>Compact +</th>
<th>Compact Mini</th>
<th>Farview</th>
</tr>
</thead>
</table>
| • 5X, 7.5X and 10X magnification.  
• 4.3"color TFT screen, with Full Color, Black and White, Blue and Yellow, Black and Yellow and Reverse Mode.  
• Freeze frame functionality.  
• Camera positioned at center of screen.  
• Writing capabilities.  
• Additional foreground and background color combinations.  
• Weighs only 10 ounces.  
• Three-hour rechargeable battery.  
• Collapsible carrying case.  
• Collapsible hand grip for optimal reading convenience.  
• Battery life up to 3 hours.  
• Handgrip.  
• Measures 5.3" x 2.9" x 1.2". | • 2 to 11x magnification  
• 3.5-inch full color TFT screen  
• Multiple viewing options  
• Camera is centrally positioned for intuitive reading  
• Rechargeable battery offering up to 3.5 hours continuous use  
• Carrycase and wrist strap  
• Dimensions: 9 x 7 x 1.7 cm / 3.5 x 2.7 x 0.6 inches  
• Weight: 134 grams / 4.7 ounces | • Continuous zoom magnification:  
• Live View: up to 24 times  
• Playback View: enlarge captured images up to 14 times  
• 4.3-inch full colour TFT widescreen display  
• Multiple viewing options:  
• Black text on a white background (positive),  
• White text on a black background (negative), Blue text on a yellow background  
• Yellow text on a black background  
• Yellow text on a blue background  
• Blue text on a yellow background  
• Anti-reflective reading mode  
• Use for reading and writing  
• Camera is centrally positioned for intuitive reading  
• Document and distance view capture - store, enlarge and review images  
• Integrated memory for storing up to 100 images |
| of continuous use | • Playback View: up to 4 hours of continuous use  
|                   | • USB & VGA connections  
|                   | • Weighs only 0.64 pounds.  
|                   | • Measures 6.3" x 3.2" x 1.3". |
Enhanced Vision & Mattingly

<table>
<thead>
<tr>
<th>Pebble from Enhanced Vision</th>
<th>Auchey from Mattlingly</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Adjustable magnification of 2x to 10x</td>
<td>• Color, B/W and Reverse images</td>
</tr>
<tr>
<td>• Lightweight design</td>
<td>• 3.25&quot; Diagonal Wide-screen TFT LCD (2.75” wide x 2” high)</td>
</tr>
<tr>
<td>• 3.5” or 4.3” high resolution LCD</td>
<td>• The camera in the middle of the unit for intuitive use.</td>
</tr>
<tr>
<td>• Large viewing area in a small package</td>
<td>• There are two fixed magnification levels, each of which can “zoom” the magnification when used as a hand-held device (by moving the Aukey closer and further away from the object of regard); the lower magnification level “zooms” from 1.5X to 7X, and the higher level from 5X to 17X.</td>
</tr>
<tr>
<td>• Adjustable brightness</td>
<td>• Detachable Reading Stand</td>
</tr>
<tr>
<td>• Easy-to-use tactile controls</td>
<td>• With the stand there are two fixed magnification levels, the lower is fixed at 3X, higher at 6.5X.</td>
</tr>
<tr>
<td>• 28 available viewing modes</td>
<td>• Three user-friendly tactile buttons: 1) on/off and mode; (2) magnification; (3) freeze frame.</td>
</tr>
<tr>
<td>• Freeze Image feature with capability to magnify</td>
<td>• Writing is possible by holding the Aukey off of the reading material</td>
</tr>
<tr>
<td>• Foldable handle with comfort grip</td>
<td>• Rechargeable Li-Ion battery with 2500mAh; battery working time 2.5 hours</td>
</tr>
<tr>
<td>• Easy writing capability</td>
<td>• Lightweight 120g</td>
</tr>
<tr>
<td>• Auto focus</td>
<td>• Available in black, purple, green, white, red and orange.</td>
</tr>
<tr>
<td>• Over 2 hours battery life (rechargeable/replaceable batteries included)</td>
<td>• Two-year manufacturer’s warranty</td>
</tr>
<tr>
<td>• On/Off light option for reduced glare</td>
<td></td>
</tr>
</tbody>
</table>
II. Basic LV Devices Kit

1) Distance Devices
   - Hand-held monocular telescope (2.8x, 4x and 6x)
   - MaxTV 2.1x glasses
   - 2.8x, 4x Galilean sports binoculars
   - 7x Beechers

2) Near Devices
   - Non-illuminated Pocket magnifier (3x, 5x)
   - Illuminated Hand-held magnifier (3x, 4x, 5x, 7x)
   - Illuminated Stand magnifier (4x, 5x, 6x)
   - Non-illuminated stand magnifier (4x)
   - MaxDetail 2.0x glasses
   - Prism half eyes (4D, 6D, 8D, 10D, 12D)
   - Dome magnifier (4x) large and small sizes
   - Portable electronic magnifier e.g. Compact Mini or Mattingly TV Mouse

3) Other
   - Filters
     - NOIR fitovers or Solarshields
       - Grey (light grey and dark grey),
       - Amber (light amber and dark brown),
       - Yellow
       - Plum
       - Dark green
     - Chadwick Optical has a set of flippers with tint lenses
   - Fresnel prism trial lens kit
   - Floor lamp with rolling base and movable arm

4) Non-Optical Aids (some examples):
   - Bump dot stickers
   - Check writing guide/Typoscope
   - 20/20 Bold Pen
   - Yellow acetate filter paper
   - Large print or Talking watch
   - Large or Talking blood pressure/blood sugar monitor
   - Pre-filled insulin syringes
   - Large print or Audio books on tape
   - Large playing cards
   - Computer screen magnification software
   - Liquid level indicator