60 Is the New 40
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Geriatrics: 60 is the new 40
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Homecoming 2015

Introduction
• Demographics
  – Senior population growing disproportionately greater rate than the total US population
  – Oldest of the old growing fastest of all

Growth in the Older Population
Between 2000 and 2010:
• The population 65 years and over grew at a faster rate than the total population.
• The older population grew **15.1 percent** (from 35.0 million to 40.3 million).
• The total population grew **9.7 percent** (from 281.4 million to 308.7 million).
• Source: www.census.gov

Vision Assessment
• Visual Acuity
  – High contrast
• Functional Vision
• Neurology

Mean high contrast visual acuity


Visual Impairment
• Visual Impairment
  – Trends similar for 40 – 60 age group
  – 4% 65- to 74-year age group
  – 16% 80- to 84-year age group
  • SEE
Vision Impairment
• Vision relatively well preserved until 70s
  – Odds are
    • Not Visually Impaired
    • Based on 'Best Corrected' High Contrast VAs

But......
• May report vision has changed.
• Assess: FUNCTIONAL VISION

Functional Vision: How the patient actually sees the world
How you may think the patient sees
How they may actually see

Vision as assessed by self-report:
Population based studies
• Condition
  – Cataracts?
• Function
  – Do you have trouble seeing?
• Activity
  – Can you read newspaper print?

• Participation
  – Hobbies that require vision?
• Environment
  – Wear eyeglasses?

Vision as assessed by self-report:
Population based studies
• National Health Interview Survey
• CDC Behavioral Risk Factor Surveillance System (BRFSS)
• Longitudinal Supplement on Aging
• Census
• American Community Survey
• Medical Expenditure Panel Survey

BRFSS VI
• Activity
  • "How much difficulty, if any, do you have in recognizing a friend across the street?"
  • "How much difficulty do you have, if any, do you have watching television?"
• Increase with
  – Age
    • 50+ years of age
  – Ethnic minorities
  – Less education
  – Low income
“How much difficulty, if any, do you have in recognizing a friend across the street?”

- High Contrast VA

- Other factors
  - Contrast sensitivity
  - Glare sensitivity
  - Visual field
  - Color vision

“How much difficulty do you have, if any, do you have watching television?”

- High Contrast VA

- Other factors
  - Contrast sensitivity
  - Glare sensitivity
  - Visual field
  - Color vision

Overview

- Causes of non-refractive complaint of decreased vision in the geriatric population

- ‘Normal’ visual findings in geriatric population

- Clinical considerations

- Case Management
  - What can you do for your patients?

- Public Health Implications
  - The Big Picture

“My vision isn’t as good as it use to be.”

- No refractive cause found.

Blurry Vision

Mean high contrast visual acuity

Visual acuity

- High contrast acuity insensitive to reduction effective contrast
  - Small pupils
  - Cloudy media
    - Cornea
    - Lens

Other Factors

- Convergence
- Color vision
- Contrast
- Glare
- Stereopsis

Nearpoint of Convergence

- Recedes with age
- Reasons
  - Decrease in the amplitude of accommodative convergence
  - Increase in target blur from decreased amplitude of accommodation
  - Decrease in neural control

Near Point of Convergence

- Testing
  - Vergences
  - NPC

Near Point of Convergence

- Complaint diplopia, asthenopia

- Consider
  - Reading only glasses with prism
  - Vision training

Light scatter

- Smaller pupils
- Clarity of cornea and lens
Light scatter

• Reduces effective contrast
  — Especially with glare

Pupils Smaller with Age

• Less light reaches the retina
  — Dim light: 2/3 light in 80 year old vs. 25 year old
  — With ocular media (including nuclear lenticular) changes
    • 10% in 80 year old vs. 29 year old

Let there be...

• Light
• Tint/filters
• Anti-reflective coat

Color Perception Changes: Acquired Color vision deficiency

• Lenticular changes: things look yellow
  — Reduces transmission shorter (blue) wavelengths
• Systemic disease
• Ocular disease

Testing

• Pseudoisochromatic plates
  — Ishihara
    • Test R-G deficiency
    • Does not test B-Y deficiency

Testing

• Pseudoisochromatic plates
  — HRR
    • Tests R-G deficiency
    • Tests B-Y deficiency
    • Classification
      — Mild
      — Moderate
      — Severe

Source: www.goodlite.com
Testing

- Farnsworth D-15
  - Moderate, Severe color deficiency
    - R-G
      - Classify deutan, protan
    - B-Y
      - Classify tritan
    - ** if all correct
      - Mild color deficiency or non-color deficient

Source: www.goodlite.com

Color vision: D-15

- Those with congenital CV defects excluded
- Relatively few CV defects until after age 70
- Primarily B/Y (tritan) defects


But what can I do?

- Education
  - Patient, others
- Cataract procedure

Functional Vision

- Contrast sensitivity
  - High
    - Visual acuity
      - Black and white
  - LOW
    - Ability to detect subtle differences of lighter and darker objects at a given distance
    - Hard for patients' to describe

Contrast Sensitivity

Source: The Brooding Hyacinth: http://gregmolyneuxphotography.com/the-brooding-hyacinth/
Contrast Sensitivity

- A person's contrast sensitivity function
  - their contrast thresholds for different spatial frequencies
    - High, middle, low

- CS may be a sensitive indicator of disease and disease progression
  - Glaucoma, cataract, optic neuritis
  - Refractive surgery

- Reducing letter contrast can make someone more sensitive to reductions in effective luminance

Low spatial frequency loss

- Like viewing through plastic bag

Example

Example

Contrast Sensitivity

- Associated with
  - Reading performance
  - Ambulation mobility
  - Driving
  - Face recognition
  - Tasks of daily living
Contrast sensitivity testing

- Vistech chart
  - Developed by Ginsberg in 1984
  - 5 rows 3 inch diameter sine wave gratings
  - Each row sample grating with reducing contrast
    - Different frequencies (1, 2, 4, 8, 12 cycles per degree)
    - Different contrast levels
  - Pt reports orientation of each grating
  - Functional Activity Contrast Test
    - FACT

Vistech chart

- Contrast sensitivity function
- VAs estimated based on projected X-axis
- Not portable
- Administration time
- Difficult for patient to understand
- Used clinically?

Contrast sensitivity testing

- Pelli-Robson

Pelli-Robson

- Tests different contrast levels
  - Each set 3 letters reduce contrast by 0.15 log units
- Tests one frequency
  - Letters correspond to 4 cycle/degree
  - Peak CSF curve
Pelli-Robson

- 2 piece of information of CFS curve
- High frequency
  - VA chart
- High Contrast
  - Average 1.75 log units

Pelli-Robson

- Clinically used?
  - Administration quick
  - Different methods of scoring

MARS cards

Letters OD, OS, OU  Numbers OD, OS, OU

Contrast sensitivity testing

- Mars cards
  - Card held at 40 – 50 cm
  - 20/480
  - Near correction
  - Undilated

Mars card

Mars scoring sheet
Mars Norms: Log contrast sensitivity

- Normal middle/young adult: 1.72-1.92
- Normal >60: 1.52-1.76
- Moderate CS loss: 1.04-1.48
- Severe CS loss: 0.52-1.00
- Profound CS loss: <0.48

Mars contrast test

- Results similar to Pelli-Robson
  - High contrast visual acuity
  - Low contrast tested

- Portable
- Easy to administer
- Easy to score
- Qualifies CS loss

Contrast sensitivity testing

- Low contrast distance acuity charts
  - A drop of 1.5 lines or greater from high contrast to low contrast is considered significant

  - Bailey-Lovie
  - Illuminated Cabinets/Charts

Bailey-Lovie

- Difference in lines/letters read comparing high/low contrast.

Contrast sensitivity testing

- Low contrast near acuity cards
  - A drop of 1.5 lines or greater from high contrast to low contrast is considered significant

Clinically

- Battery of problem based tests
- Easy to interpret
Contrast sensitivity

• Overall decrease in contrast sensitivity function with age, more loss at high spatial frequency
  – Visual acuity

• What happens at lower frequency?

Low Contrast Distance Acuity

Mean contrast sensitivity

Difficulty with low contrast: not visually impaired

• Spatial orientation/mobility

• Difficulty with facial recognition
  – Person as well as expression

• Reading ability

Difficulty with low contrast: not visually impaired

• Predict future visual acuity loss
  – For each doubling of threshold 2.5x increased risk of high contrast loss

** Consider monitoring these patients more carefully
The Results

- Low spatial frequency loss
  - Need lighting to compensate
  - Help discern shades of gray
  - Patient/family education

What Can You Do For Your Patients With Contrast Issues

Lighting

What Can You Do For Your Patients

- Education about environment

Example

- Patient education
  - Ocular disease implications
  - Driving
    - Night driving
    - But I ‘passed’ DMV test
**Functional Vision**

- Disability glare
  - Effect of surrounding glare on target

- Glare recovery
  - Time taken to recover after exposure to glare

**Disability Glare**

- What happens
  - Linear increase in glare sensitivity with age
    - SEE

**Glare recovery**

- Can take more than a minute in the older patients studied

- Variability increases with age
Glare disability/recovery

- BAT
  - Brightness acuity test
    - Subjectively determine the effect of a glare source;

While viewing through the aperture in the BAT and wearing the best subjective distance correction, the patient reads the distance chart under low, medium, and high settings. The fellow eye is occluded.

Glare disability/recovery

- Illuminated Cabinets/Charts
- ESV3000 EDTRS
  - Difference in lines/letters read comparing high/low contrast.

Source: www.goodlite.com

Median acuities: not VI

- Larger variability among the 89 vs. 64
- High contrast, bright light
  - Does not portray accurately how patients will see glare light, low illumination


Glare Issues

- Patient education
  - Driving
    - May take an extended period to recover from glare
- Cataracts
  - Referral for ECCE
- Optical
  - Tints
  - Polarized lenses
  - A/R coats
Functional Vision

• Stereopsis

Stereopsis

• Reduced stereopsis results in patient symptoms:
  – Risk for falls/hip fractures
  – Walking stairs more difficult
  – Threading needles
  – Pouring liquids
  – Driving/parking car

Stereopsis

• With age there is a significant decline in stereopsis

  • Different visual acuity or contrast sensitivity between eyes
    – 3 lines - sharp rise in stereo threshold
    – 5 lines – most stereoblind

  • Studies have also found decreased stereopsis even with maintained foveal function in each eye

Stereopsis: 40 sec of arc common clinical cutoff

Decline in Stereopsis: Progressive

- Not observed
  - Good ocular function
  - Amsler grid
    - monocular
  - Disability glare
    - Binocular
  - Tool to aid in screening ocular health?


Geriatric patients’ vision

- Dim
- Yellowed
- Reduced contrast

Education/Optical/Referral

- Color vision
- Glare
- Stereopsis

Functional Vision

- Patients
- Community

Public Health

- Workplace of the Future
  - Today 5 working adults for every person over 65
  - In 2030 projected 2 working adults for every person over 65
  - National and global trend
Workplace

• Extended workplace careers
  – Barriers

• 'Normal' vision changes
  – Patient education
  – Employers

Public Health

• National Eye Health Education Program (NEHEP)

Public Health

• National Eye Health Education Program (NEHEP)
  – See Well for a Lifetime an educational series on Vision and Aging

NEHEP: See Well for a Lifetime

• 3 modules
  – Module 1: Making Vision a Health Priority
  – Module 2: Age-Related Eye Diseases and Conditions
  – Module 3: Low Vision

NEHEP: See Well for a Lifetime

• Key Program Messages:
  • Everyone aged 50 and older should have a comprehensive dilated eye exam.
  • Eye diseases have no early warning signs or symptoms.
  • Early detection and treatment may prevent vision loss or blindness.

See Well for a Lifetime Toolkit

• Each module
  – Powerpoint presentation
  – Powerpoint presentation with speakers notes
NEHEP: See Well for a Lifetime: Toolkit

- Good example of program that you could use to promote eye health among seniors and employers.
- Give a chance to ask questions
- Promote understanding

Conclusion

- Standard VA may underestimate vision impairment especially in older patients
- Functional Vision
  - Testing
  - Patient Management
- Provide best vision to patients serve
  - Many aspects
- Education
  - Patients, community

Hope you enjoyed Homecoming 2015
Cognitive Function Impairment and Assessment

Memory Issues: “Normal” or more Serious?

- Memory loss can range from age-related impairment (a normal degree of forgetfulness) to several types of dementia.
- With age, older persons find it more difficult to recall names and words.
- A reassuring adage is: “You need not worry if you forget where you put your car keys; you need only worry if you forget what they are used for.”

Systemic Disease: Delirium, Dementia and Alzheimer’s

Delirium

- Acute clouding of consciousness with decreased awareness and ability to sustain attention

• Also referred to as acute confusion state (ACS), acute brain syndrome and toxic psychosis
• Rapid development of symptoms:
  – fluctuation of cognitive functions (especially at night)
  – disturbed sleep patterns
  – impaired memory
  – problems with orientation
  – reduced awareness of immediate environment
  – attention disorders
  – improved cognition after treatment of underlying condition
• Hallmark sign is major change in mental status in a matter of hours or days
• Causes:
  – Tumor
  – Cardiovascular disease
  – Cerebral vascular disease
  – Head trauma
  – Systemic infection
  – Metabolic disorder
  – Severe trauma
  – Sensory deprivation
  – Temperature regulatory disorders
  – Exogenous substances

• Secondary factors that exacerbate the development of delirium
  – Sensory impairment
  – Memory loss
  – Substance abuse
  – Sleep deprivation
  – Acute physical illness in combination of fragile psychological status

• Management
  – Identification and treatment of underlying cause

Dementia
• Dementia is caused by damage to brain cells, interfering with the ability of brain cells to communicate with each other
• Prompt recognition and treatment is important
• Dementia is most frequent in the population over the age of 75
• Often not diagnosed for months or even years after its onset
• As many as 15% of cases are potentially reversible

Clinical Presentation and Course
• Decrease in memory, cognitive capacities, adaptive behavior without alteration of consciousness
• Dementia is a syndrome characterized by a generalized and sustained decline in intellectual functioning from a previously attained level
  – Memory loss is a universal feature
  – affects several areas of cognition: Speech, memory, judgment, mood
• Progressive disorder typically measured in months or years

• Initial symptoms include
  – Forgetfulness
  – Attention deficits
  – Concentration deficits
  – Increasing repetitiousness or inconsistencies in usual behavior
• Symptoms later in the process
  – Impaired judgment
  – Inability to abstract or generalize
  – Personality change
    • Rigidity, perseveration, irritability, easy confusion
    – Inability to perform personal hygiene and nutrition
Management

- Correct diagnosis and underlying etiology
- Attempts at medical management of overall condition and symptoms
- Referral for support and management

Alzheimer’s Disease

- Accounts for 60-80% of Dementia in the elderly
- Neurodegenerative disease of unknown etiology
- About 5-7% of people over 65 have Alzheimer’s
- About 20% of people over 80 will have Alzheimer’s
- Course of Alzheimer’s varies from 2-20 years, typically 6-10 years until death

Prevalence Alzheimer’s

- 2012, 5.4 million Americans of all ages have Alzheimer’s
- 5.2 million people age 65
- 200,000 younger-onset Alzheimer’s
- One in eight people age 65 and older
- Incidence of ALZ doubles every 5 years from age 65 to 85
- Nearly half of people age 85 and older (45 percent)
Clinical Presentation and Course

- Mildly forgetful
- Decreased performance in demanding work or social situations
  - Poor concentration
  - Visuospatial deficits
  - Speech problems
- Loss of short term memory
  - Unable to travel alone
  - Complex tasks are impossible
  - Decreased knowledge of current events

Later and final stages

- Delusions
- Depression
- Agitation
- Incapacitation
- Disorientation
- Incontinence
- Personality and emotional change
- Death

Initial presentation can be vague visual complaints

- ‘Visual agnosia’
  - Reading difficulties
  - Bumping into things

Abnormal visual perception and visuospatial processing

- Misjudge distance
- Difficulty locating objects or maintain view
- Inability to copy, worsening handwriting
- Difficulty spatial localization
- Difficulty driving

VEP is reduced

Management includes:

- Drugs for memory enhancement
- Management of memory enhancement and agitation
- Management of behavioral disorder
- Adaptation of home environment
- Management of the family

Depression

- Depression often first symptom due to awareness of diminished cognition

When to screen for a problem?
Is there a problem?

- Screening tests can be easily done in office
- Diagnostic screenings should be considered to assist when signs of cognitive impairment are exhibited
- Referrals for treatment and management can be made

Identifying Cognitive Impairment/Dysfunction

**Brief Diagnostic Screenings**

1. Clock Drawing Test
2. Abbreviated Mental Test Score (AMTS)
3. Mini Mental State Exam (MMSE) and MMSE Blind
4. Short Portable Mental Status Questionnaire (SPMSQ)
5. Montreal Cognitive Assessment (MoCA)

Administration Times

- Clock drawing and score – 5 Minutes
- ATMS – 5 Minutes
- MMSE – 15 Minutes
- SPMSQ-5 Minutes
- MoCA – 15 minutes

Clock Drawing Test

- Primarily tests executive function
- Independent of education
- Quick and Easy to decide whether further evaluation and/or referral warranted
- Visual task but patient can draw any size
- Can put the test into your patient’s chart
- Many methods of scoring and admin have been published

Instructions for the Clock Drawing Test

Step 1: Give patient a sheet of paper with a large predrawn circle on it. Can also start with blank paper and have patient draw the circle. Indicate the top of the page.

Step 2: Instruct patient to draw numbers in the circle to make the circle look like the face of a clock and then draw the hands of the clock to read a time such as: "10 after 11."
The person is instructed to draw a clock with all the numbers on it, then to add hands to designate a specific time. The examples below are AD patients, ranging from 1-10 (1 being the worst). Test is not affected by a person’s education level, it is inexpensive, brief, and easy to administer. In one study (N=67) people with AD had average score of 4.9 and control group had average of 8.7.

**Scoring (Shulman et al., 1993)**

Higher scores reflect a greater number of errors and more impairment. A score of 23 represents a cognitive deficit, while a score of 1 or 2 is considered normal.

Score the clock based on the following six-point scoring system:

- **Score Error(s) Examples**
- **1 “Perfect”** No errors in the task
- **2 Minor visuospatial errors**
  - a) Mildly impaired spacing of times
  - b) Draws times outside circle
  - c) Turns page while writing so that some numbers appear upside down
  - d) Draws in lines (spokes) to orient spacing
- **3 Inaccurate representation of “10 after 11” when visuospatial organization is perfect or shows only minor deviations**
  - a) Minute hand points to 10
  - b) Writes “10 after 11”
  - c) Unable to make any denotation of time
- **4 Moderate visuospatial disorganization of times such that accurate denotation of “10 after 11” is impossible**
  - a) Moderately poor spacing
  - b) Omits numbers
  - c) Perseveration: repeats circle or continues on past 12 to 13, 14, 15, etc.
  - d) Right-left reversal: numbers drawn counterclockwise
  - e) Dysgraphia: unable to write numbers accurately
- **5. Severe level of disorganization as described in scoring of 4**
  - See examples for scoring of 4
- **6. No reasonable representation of a clock**
  - a) No attempt at all
  - b) No semblance of a clock at all
  - c) Writes a word or name

**More scoring**
Stahelin et al. Int Psychogeriatr 1997

- Score out of 6:
  - 12 must appear on top (3 points)
  - 12 numbers present (1 point)
  - Two distinguishable hands (1 point)
  - Time must be identified correctly (1 point) A score less than 4 is impaired

Abbreviated Mental Test Score (AMTS)


• For general cognition and mental status (primarily dementia), assess for confusion and other cognitive impairment
• Administration: extremely brief (2-3 minutes if a cognitively intact older adult) The full version has 20 questions
• Relatively vision-free administration (one item of visual recognition as opposed to 4 or 5 on the Mini-Mental State Exam (MMSE)
• Developed and originally validated on older adults N=700, aged over 65yo

Abbreviated Mental Test Score (AMTS)

• There is one point per question
• 10 questions total
• >6 is normal
• 4-6 moderate impairment
• 0-3 severe impairment
• A score of less than 6 suggests dementia

Abbreviated Mental Test Score (AMTS)

• For general screening of cognitive impairment
  — Widely used and known, Medicare has dictated use in some instances
  — Copyright (Mini-Mental State Examination. Psychological Assessment Resources, Inc.

Mini-Mental State Exam (MMSE)

• Brief administration
• Somewhat vision-free administration (4 or 5 items of requiring vision) and mostly hands-free (use of a writing implement required on 2 items worth only 2 points total)
• Can be done over intervals of time to track cognitive changes

• The Folstein Mini-Mental State Examination (MMSE) is used to evaluate a person's cognitive and mental function and was designed as a screening test for dementia.

• The MMSE is a global cognitive evaluation tool. It explores:
  — sense of time and space
  — Retention
  — attention to detail
  — ability to calculate
  — language skills
  — constructional praxia
• The results can be interpreted based on normative values for a person’s age and education

The Mini-Mental State Exam

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your age? (1 point)</td>
<td></td>
</tr>
<tr>
<td>What time is it now? (1 point)</td>
<td></td>
</tr>
<tr>
<td>Give patient an address, and ask him or her to repeat it at the end of the test. (1 point)</td>
<td></td>
</tr>
<tr>
<td>e.g. 42 West Street</td>
<td></td>
</tr>
<tr>
<td>What is the year? (1 point)</td>
<td></td>
</tr>
<tr>
<td>What is the name of the hospital or number of the residence where the patient is situated? (1 point)</td>
<td></td>
</tr>
<tr>
<td>Can the patient recognize two persons (the doctor, nurse, home helper, etc)? (1 point)</td>
<td></td>
</tr>
<tr>
<td>What is your birth date? (day and month sufficient) (1 point)</td>
<td></td>
</tr>
<tr>
<td>What year did World War I begin? (1 point)</td>
<td></td>
</tr>
<tr>
<td>Other dates can be used, with a preference for dates some time in the past.</td>
<td></td>
</tr>
<tr>
<td>Name the present (e.g. president) (point lost if president) (1 point)</td>
<td></td>
</tr>
<tr>
<td>Otherwise, the question “What did you come in for today? ‘ has been suggested</td>
<td></td>
</tr>
<tr>
<td>Count backwards from 20 down to 1. (1 point)</td>
<td></td>
</tr>
</tbody>
</table>
Normal MMSE
A score above 27 (out of 30) indicates normal cognition or very mild cognitive impairment that may or may not progress to dementia.

MMSE 24 - 27
This score is indicative of mild cognitive impairment

MMSE 10-20
Indicates moderate cognitive impairment

MMSE ≤ 9
Severe cognitive impairment

http://www.cwhn.ca/en/HPmemoryMMSE

MMSE norms

5 – What is Year, Season, Date, Day, Month
5 – Where are we State, Town, Country, Building, Floor
3 – Name three objects, “Pen Pencil Chair”
5 – Spell “WORLD” backwards
3 – Repeat the three objects again
1 – Repeat “No if’s, ands or buts”

• Not a substitute for full MMSE

Scoring
High Educated
75-84yo, 17 or less
85+yo, 16 or less
Middle Educated
All ages, 16 or less
Low Education
75-79yo, 16 or less
80+yo, 15 or less
Short Portable Mental Status Questionnaire (SPMSQ)
Folstein MF et al.

• Questions asked to estimate cognitive ability

1. What is the date today?
2. What day of the week is it?
3. What is the name of this place?
4. What is your telephone number (or street address)?
5. How old are you?
6. When were you born?
7. Who is the President of the United States?
8. Who was the President before him?
9. What was your mother’s maiden name?
10. Subtract 3 from 20 and keep subtracting 3 from each new number all the way down to zero.

Scoring

• 0-2 errors = intact
• 3-4 errors = mild intellectual impairments
• 5-7 errors = moderate intellectual impairments
• 8-10 errors = severe intellectual impairment

• Allow one more error is subject had no grade school education
• Allow one fewer error is subject has had education beyond high school


• N=150
• MMSE identified significantly fewer false positives than AMT and MSQ
• The major effect of intelligence on cognitive test scores previously underestimated.
• Age, social class, sensitivity of hearing and history of CVA were also significantly correlated with scores
• Years of full time education and depression only affected longer tests (longer MMSE and CAMCOG)
• Scores are affected by variables other than cognitive function, more assessment of identified cases is needed

<table>
<thead>
<tr>
<th></th>
<th>Sensitivities</th>
<th>Specificities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMSE</td>
<td>80%</td>
<td>98%</td>
</tr>
<tr>
<td>AMT</td>
<td>77%</td>
<td>90%</td>
</tr>
<tr>
<td>MSQ</td>
<td>70%</td>
<td>89%</td>
</tr>
</tbody>
</table>
Montreal Cognitive Assessment
www.mocatest.org
• MoCA developed in 1996 Dr. Nasreddine (neurologist)
• Screening instrument to detect mild cognitive impairment or mild Alzheimer’s disease
  – Validated
  – Higher sensitivity for early cognitive changes vs. MMSE
• Recognized by NIH
• Freely available for use in 46 languages
  – Alternate versions in some languages to decrease learning effect
• Can be done on paper or electronically

Cognitive Domains that are assessed:
• Executive Function
• Language
• Orientation
• Calculation
• Conceptual thinking
• Memory
• Visuoconstructional skills
• Attention and concentration

• Useful in detecting:
  – Alzheimer’s disease
  – Vascular Cognitive Impairment
  – Parkinson’s disease
  – Lewy Body
  – Fronto-temporal dementia
  – Multiple Sclerosis
  – Huntington disease
  – Brain Tumor
  – ALS
  – Sleep Apnea
  – Heart Failure
  – Substance abuse
  – Schizophrenia
  – HIV
  – Head trauma

• Total possible score is 30, above a score of 26 is considered normal

http://www.kvccdocs.com

MOCA SCORES

<table>
<thead>
<tr>
<th>Normal Control (NC)</th>
<th>MoCA Cognitive Impairment (MCI)</th>
<th>Alzheimer’s Disease (AD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>90</td>
<td>94</td>
</tr>
<tr>
<td>MoCA average score</td>
<td>27.4</td>
<td>22.1</td>
</tr>
<tr>
<td>MoCA standard deviation</td>
<td>2.2</td>
<td>3.1</td>
</tr>
<tr>
<td>MoCA score range</td>
<td>25.2 – 29.6</td>
<td>19.0 – 25.2</td>
</tr>
<tr>
<td>Suggested cut-off score</td>
<td>&gt;26</td>
<td>&gt;26</td>
</tr>
</tbody>
</table>
- There is a Basic MoCA-B for screening in illiterate and low education populations

MoCA Blind

Managing Presbyopia and Cataracts
- Multifocal Contacts
- Spectacles
- Multifocal IOLs

- The baby boomers are motivated to stay looking younger
- These patients will have expectations and demand solution
- Careful patient education and material selection will be key
  - Matching patient expectations with the available options
- Patients will have experience in progressive addition lenses, MF contacts as they transition to possible MF IOLs

Multifocal Contact Lenses

Thank you for clinical pearls from Drs. Harthan, Sicks, Reeder, Jurkus, Hodur and Boyce
CL Options

- Distance contacts: single vision distance CLs with readers over top
- Monovision: If the span is greater that +1.75, likely too much blur. Disruption of binocularity
- Multifocal: In a head to head study, 76% of patients preferred multifocal over monovision when directly compared (OSU study by Richdale, et al. “Comparison of multifocal and monovision soft contact lens corrections in patients with low-astigmatic presbyopia.” Optometry & Vision Science 83.5 (2006): 266-273.)

Physiological considerations for this age group include (L. Sicks, OD):

- Reduced corneal sensitivity – can help with adaptation to CLs (especially GP multifocal)
- Reduced tear quantity/quality – make sure to begin to treat this before starting CL wear
- Reduced lid tension – may have difficulty with translating GP designs
- Smaller pupil size – need to be aware of pupil zones in some multifocal designs; for example, a center distance lens with a tiny pupil may not get the best acuity at near.

Practice management tips (L. Sicks, OD):

- When you tackle fitting any lens-follow the fitting guide
- Use actual reading material (not a near card)
  - Crowding and contrast vary dramatically
- Make sure lenses are centered over the visual axis for best outcomes (can use a topographer over the lens to assess centration).
- Over-refract with loose lenses.
  - “Goal is to meet 80% of your visual needs” (allows you to over-deliver)
  - Center distance or center near – choose based on patient’s critical vision

Soft MF Lenses

- Alcon Air Optix Aqua Multifocal (monthly)
  - +6.00 to -10.00
  - Low, Medium, High
  - Aspheric back surface
  - Work with dominant and non-dominant eye in medium and higher adds
- CooperVision Biofinity MF (monthly)
  - +6.00 to -6.00
  - Add powers: +1, +1.50, +2, +2.50
  - Spherical center with aspheric surround
  - D lens (distance center) and N lens (near center)

- B+L PureVision 2 for Presbyopia (monthly)
  - +6.00 to -10.00
  - Low add (up to +1.50) and High add (+1.75+2.50)
  - Center near aspheric optics
- J&J Acuvue Oasys for Presbyopia (biweekly)
  - +6.00 to -9.00
  - Low, Medium, High add
  - Front zonal with aspheric progressive back aspheric
One days

- Coopervision Proclear 1 day MF
  - +6.00 to -6.00
  - Single power profile, center near aspheric design
  - Dominant eye-full Rx, Non dominant-use near boost
- Coopervision Clarity 1 day MF
  - +5.00 to -6.00
  - Center near multifocal with back aspheric
  - Low (up to +2.25) and High (+2.25 to +3.00)

Alcon Dailies AquaComfort Plus MF
- +6.00 to -10.00
- Low, Medium and High adds
- Aspheric back surface
- Use dominant/nondominant approach

J&J 1-Day Acuvue Moist MF
- +6.00 to -9.00
- Low, Medium and High adds
- Aspheric front surface

Soft Toric MF

- Essentials Series
  - -6.00 to +9.00
  - Cyl -0.75 to -3.00 at any axis in 0.25 Steps
  - Add power is +2.50
  - Canada (?)

GP Multifocal simultaneous and translating

- Simultaneous are easier to fit (less factors to consider) and are usually center distance. They are fit slightly flat to allow for some translation. Today’s designs are often front surface aspheric and can accommodate higher add powers for absolute presbyopes. These designs are also effective for computer users.
- Translating designs are prism ballasted or truncated and may have segments like flat top spectacles. These lenses are good for patients with critical vision demands or more advanced presbyopes. Pupil size is also not much of an issue so for those with the smallest of pupils, this may be the best option. Watch lid anatomy – need to support the lens on the lower lid so make sure lower lid isn’t sitting too far from lower limbus.

GP Multifocal

- Renovation and Renovation E from Art Optical
  - Simultaneous design
  - Power: +/-20.00D in .25 steps
  - Add: +1.00 to +3.50D in .25 steps
  - Diameter: 9.0 to 10.0 mm in .10 steps
  - Base Curves: 6.30 to 8.50 mm in .05 steps
  - Available in back, front and bi-toric designs
- Reclaim HD from Blanchard
  - Simultaneous design
  - Base Curve: 7.00 mm to 8.30 mm
  - Power: ±20.00D .25D
  - Diameter: 8.80 mm to 10.2 mm
  - Progressive adds from +1.00 to +4.00

- Metro Progressive from Metro Optics
  - Simultaneous design
  - Base Curve: 5.45 mm (62.00 diopters) to 10.55 mm (32.00 diopters)
  - Power: ±10.00 to ±20.00 diopters
  - Diameter: 8.8 mm to 9.5 mm
  - Add Power Up to ±2.75 diopters

- Expert Progressive design from Art Optical
  - Translating design
  - Diameter 8.5 mm, 9.0 mm, and 9.5 mm
  - Base curve from 6.90 mm to 9.00 mm in .05 steps
  - Powers -20.00D to +20.00D
  - Up to +4.00D add
  - Standard 1.5 prism
  - Manufactured exclusively in Bausch & Lomb Boston® ES, EO, XO, and XO2 materials
Hybrid
• Duette MF from SynergEyes

Sclerals
• Scleral and corneoscleral MFs are available for patients who need both vision and comfort and for those patients who have more astigmatism

“Presbyopia has been around for a long time, but now with hand held devices as well as laptop and desk top, the 65 and older generation is on the computer and other devices more than most folk. Contact lenses in all formats promote a problem due to eye dryness. Blink rate drops to 4 times per minute while doing near work. Hydrophilic and SiHi materials will dry and may not be comfortable physically as well as visually after 4 to 6 hours with the people over 65. Corneal rigid lenses will provide optics, but there are limitations with the multifocal lenses available today, plus they have a tendency to build up dried tear material. I think the answer will be with scleral lenses. There is a moisture barrier with the scleral lenses which may reduce lens build up as well as irritation and decreased optics...Right now, I would recommend one of the back surface aspheric corneal rigid lenses...”

-Dr. Neil Hodur

What to think about
• Frame selection
• Digital lens design
• MF selection
  – FT, Round or blended, PAL
• Material
• AR Coating
• Tints
• Photochromatic
• Occupational or hobby specific lenses

Some examples of Occupational Progressive

Access by SOLA
- Designed to provide near power in the bottom, intermediate power in the top
- Two power ranges: 0.75 D power decrease, 1.25 D power decrease from bottom to top
- Access power shift occurs over a 10mm section in the middle of the lens
- Fitting instructions
  - Write usual distance/near Rx, near Rx is placed in bottom, top is less plus according to lens design
  - Fit near pupillary distance, half-frame height for regular full fields
- Fitting instructions
  - Fit as a progressive, the fitting cross over pupil center
  - Prescribe the distance Rx and addition power

Technica by AO
- Designed to provide large near at bottom, intermediate in center, small distance at very top
- corridor length is 30mm from 15mm above to 15mm below fitting height
- Fitting instructions
  - Fit like a spherical single vision lens for near, with the fitting cross at the lower pupil margin
  - Write usual distance/near Rx, near Rx is placed in bottom, top is less plus according to lens design

Office by Shamir
- Designed for near in the lens bottom, intermediate in the top
- Three designs with different dynamic powers 0.75D (actual 0.84D decrease), 1.25D (actual 1.38D decrease) and 1.75D dynamic power
- Power shift or decrease occurs over a 26mm section in the middle of the lens from 13 mm above to 13 mm below fitting height

Interview by Essilor
- Designed for near in the lens bottom, intermediate in the top
- There is only one power shift or decrease of 1.00 D (actual 0.86D decrease)
- Power shift or decrease occurs over a 25mm section in the middle of the lens from 10 mm above to 15 mm below fitting height
- Fitting instructions
  - Write usual distance/near Rx, near Rx is placed in bottom, top is less plus according to lens design
- Fitting instructions
  - Fit near pupillary distance, half-frame height for regular full fields
  - Fit 5mm below top rim for half eye frames
  - 0.75 D change recommended for adds < 1.75D
  - 1.25 D change recommended for adds > 1.75D

“Premium” IOLs

Lifestyle Lenses
- Multifocal – ReStor, Technis, ReZoom
- Accommodating – Crystalens
- Toric – Acrysof, Technis, Star
- Accommodating/Toric – Crystalens Trulign

Premium IOL Costs

- Multifocal IOLs can range from $1,500 to $4,000 out of pocket expense

Increasing Success

- Education, Education, Education
- Understanding the patient's lifestyle needs and visual expectations
- Select a particular IOL based on the functional benefits and limitations of that IOL
Good Candidates for Multifocal IOLs?

- Determining good candidates for multifocal IOLs is the willingness to accept some compromise in the clarity of distance vision for the convenience of being less dependent on computer glasses and/or reading glasses after cataract surgery.

- Multifocal IOLs are effective at improving near vision relative to monofocal IOLs.
- Whether that improvement outweighs the adverse effects of multifocal IOLs will vary between patients.
- Motivation to achieve spectacle independence is likely to be the most important factor.

When to Use Multifocal Intraocular Lenses

By Christopher P. Majka, MD, and Alan N. Carlson, MD
Edited by Ingrid U. Scott, MD, MPH, and Sharon Fekrat, MD

"Cataract removal is the most common surgical procedure in the United States, with nearly 3 million operations performed annually. This number will likely grow, according to National Eye Institute statistics that predict an increase in the number of people in the United States with cataracts from the current level of 20 million to more than 30 million by the year 2020. This estimate is further supported by data from the Framingham Eye Study showing that the prevalence of cataracts increased with age from 4 percent in the 52 to 64 age group, to 50 percent in the 65 to 74 age group, to more than 90 percent in the 75 to 85 age group."

Success in the Pseudoaccommodative IOL Patient

Christopher P. Majka, MD, and Alan N. Carlson, MD

1. Avoid patients with unrealistic expectations and those with overly critical personalities.
2. Avoid commercial pilots and those patients who anticipate a significant amount of driving at night.
3. Avoid patients who have ocular pathology that precludes normal visual potential.
4. Remind patients (and document this reminder in the chart) that retaining near vision comes at the cost of sacrificing some quality of their distance vision and this may manifest itself as glare or halos.
5. Hyperopic patients with presbyopia and some degree of cataract are the patients most likely to have a satisfactory outcome.
6. Extremely myopic patients with clear lenses are usually better served with a phakic refractive IOL.

7. Young patients with clear lenses and only moderate degrees of myopic astigmatism are usually managed better with laser refractive surgery of the cornea.
8. Target emmetropia with a calculated target range of +0.25 D to plano as these patients will be bothered by a residual refractive error, particularly astigmatism that exceeds 0.5 D.
9. Preoperative topography and precise IOL calculations using both immersion A-scan biometry and optical biometry are helpful.
10. Patients need to know in advance that a small percentage of them may require postoperative surgery to correct a residual refractive error.
11. Exercise caution in a patient with a long-standing history of monovision contact lens wear, as you are offering an option different from what the patient is already comfortable with.
12. Address all charges with the patient preoperatively. This includes any additional charge that might be associated with postoperative care or additional surgery that might be necessary.

Discussion points with patients

- Distance vision in both eyes with anticipated need for reading glasses after surgery
- Monovision outcome that typically respects ocular dominance, targeting the dominant eye for distance vision and the nondominant eye for the degree of myopia at which the patient reads and does near activities
- Partial monovision arrangement so the patient may retain acuity at an intermediate distance to facilitate activities such as working at a computer or reading a watch, restaurant menu, price tag or newspaper
• Use of a multifocal or accommodating IOL, with quality of vision that may be limited by optical aberrations such as night glare and halos

• Using a combination of different types of multifocal IOL or a multifocal IOL in one eye and a standard monofocal IOL in the other eye

• May need enhancement Lasik procedure — Residual refractive error > -0.50 cyl can be unacceptable

Precautions
• Main complaint with Premium IOLs has been night glare, halos and decreased contrast
• Vision degradation can be more apparent (than a standard IOL) when there is surface dryness, blepharitis, basement membrane dystrophy, corneal scarring, corneal edema, IOL tilt, decentration, posterior capsular opacification, macular edema, any residual refractive error or even astigmatism greater than 0.5 D.

Postoperatively
• Patients may need to be reminded that there might be a change in working distance for those who have gotten used to moving near objects increasingly farther away with increasing presbyopia.
• Patients may not experience the full “synergistic” benefit of this technology until the second eye is treated.
• Postoperative complaints should prompt evaluation for residual refractive error, anterior segment conditions, IOL misalignment or capsular opacification

Removal of the Cataract
• For the best visual outcomes with multifocal IOLs, the exact placement of the lens inside the eye is critical — even more critical than when a standard monofocal IOL is used.
• For this reason, cataract surgeons recommend a laser-assisted cataract surgery procedure.
• Use of a femtosecond laser during certain steps in cataract surgery can help the surgeon better position the multifocal IOL to take full advantage of the design of the lens for optimal vision at all distances

• With the laser approach to cataract surgery, the surgeon creates a precise surgical plan with an OCT
• The goal is to create an incision with a specific location, depth and length in all planes, and with the OCT image and a femtosecond laser, it can be performed exactly
• This is important not only for accuracy but also for increasing the likelihood that the incision will be self-sealing at the end of the procedure, which reduces the risk of infection
Multifocal

Lifestyle Lenses
• Multifocal – Reflec, Technica, Rezolve
• Accommodating – CRYSTAL\(\text{\textregistered}\), Alcon
• Accommodating/Flex – Crystalens Frustration

• AcrySof IQ ReSTOR multifocal IOLs, marketed by Alcon, have been approved for use in the U.S. since 2005
• These multifocal lens implants feature a patented “apodized diffractive” design that optimally distributes light to distance, intermediate and near focal points, depending on the amount of ambient light available. This optimizes image quality in all lighting conditions, according to Alcon.
• AcrySof IQ ReSTOR multifocal IOLs also feature aspheric optics to reduce a specific type of higher-order aberration called spherical aberration. This reduces halos around lights at night and improves image quality for enhanced visual clarity, the company says.

Astigmatism Correction at the Time of Cataract Surgery
• With advanced intraocular lenses that provide good vision without glasses after cataract surgery, it is important that the surgery results in minimal astigmatism.
• Surgeons perform astigmatic keratotomy or AK free-hand with a diamond blade, and it is quite effective in reducing astigmatism.
• During refractive laser-assisted cataract surgery, the OCT image can be used to plan the AK incisions in a very precise location, length and depth, and then the laser accurately creates them. Since the laser minimizes the variables involved, the AK procedure becomes more accurate and reproducible.

ReSTOR®

• The ReSTOR® IOL uses a series of tiered steps to provide focusing ability at a range of distances.
• The outer edge reflects light to provide focusing ability for distant objects, while the inner portion of the lens does so for near objects.


• Three separate optical principles (refraction, diffraction and apodization) to achieve satisfactory near and far visual acuity.
• The refractive portion of the optic functions like a standard IOL, with the optic periphery dedicated to distance vision and designed to optimize night vision when the pupil dilates under scotopic conditions.
• The diffractive portion of the optic consists of 12 concentric rings on the anterior surface of the optic, and it is located within the central circle, which is 3.6 mm in diameter and is designed to provide distance and near vision in moderate to bright light.
• Apodization is the radial variation in optical properties that comes from decreasing the height of each concentric ring from the center toward the periphery of the optic surface (from 1.3 to 0.2 μm). This balances the amount of light energy that is distributed between distance and near as a function of pupil size, which improves the efficiency and effectiveness of the quality of near vision achieved and reduces problems with glare and halos. Ring location, spacing and variation of height serve within the pupillary aperture to provide a satisfactory near image at approximately 25 to 33 cm.
The side effect profile of the ReStor multifocal lens is very similar to that of traditional monofocal IOLs. However, with the ReStor, there is a greater chance of having significant halos (5 percent of all patients) or glare (5 percent) compared with a monofocal lens (1 percent) and 2 percent, respectively. The halos or glare were severe enough that in studies conducted for Alcon by independent consultants 0.5 percent of patients requested that their ReStor IOL be removed. Another side effect of the ReStor IOL’s complex optics is increased adjustment time compared with a monofocal IOL. Driving at night or reading in the evening under dim illumination may be more difficult due to qualitative vision changes compared with a standard IOL.

Distance Dominant IOL by Abbott Medical Optics
Better for Hyperopic patients
Aspheric transitions between zones provide intermediate vision
Near add of +3.5 diopters at IOL plane, +2.85 diopters at the spectacle plane
OptiEdge® design that minimizes the potential for edge glare and facilitates 360-degree capsular contact
It is advised not to implant the ReZoom IOL in patients with significant dry eye, corneal scarring, pupil size less than 2.5 mm, a monofocal implant in the first eye, uncorrected astigmatism greater than 0.5 D or unstable capsular support.

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The TECNIS® Multifocal Family of 1-Piece IOLs delivers a full range vision with enhanced performance at one of three focal points, giving you the ability to personalize your patients’ near-to-intermediate distance vision
– New +2.75 D IOL for enhanced performance at ~50 cm theoretical reading distance
– New +3.25 D IOL for enhanced performance at ~42 cm theoretical reading distance
– +4.0 D IOL for enhanced performance at ~33 cm theoretical reading distance
Accommodating IOLs currently are the only FDA-approved intraocular lenses (IOLs) that use a method called accommodation, enabling sharper vision at multiple distances for people who have undergone cataract surgery.

- The Trulign IOL is a toric version of Crystalens; it is the first of its kind to provide both accommodation and astigmatism correction – Cylinder of 1.25 to 2.75
- The Crystalens® IOL bends and flexes just like the natural lens of the eye.

- In accommodative IOLs, a change of tension in the ciliary muscle results in a shift in the focal length of the IOL-eye optical system
- Shifts position with the action of eye muscles and movement to improve eyesight

- In May 2013, the FDA approved a second accommodating IOL – the Trulign Toric posterior chamber IOL.
- The Trulign is a modification to the Crystalens IOL, the only differences being Trulign’s toric optic on the posterior surface and axis marks on the anterior surface to correct astigmatism.
- The Trulign Toric lens is available in cylindrical powers of 1.25 D, 2.00 D and 2.75 D (at the IOL plane), and can correct astigmatism between 0.83 D and 2.50 D.

- Accommodating IOLs such as the Crystalens or Trulign may not provide as much of a range of focus (near to far) as multifocal IOLs, and this might lead to the need for reading glasses.
Investigational Accommodating IOLs

- The Synchrovue (Vision) is a silicone accommodating IOL that has a two-part optic to help stabilize the lens. The Synchrovue is approved in Europe and is undergoing clinical trials for FDA approval in the United States. Maybe similar to BiSoft with fewer visual distortions and better intermediate distance vision.
- The Tecoflex (Vivinex) is an accommodating IOL with a square-edged, acrylic optic. This lens enables sight at multiple distances through changes in thickness that respond to movement of the eye’s ciliary muscules. This lens is undergoing late-stage U.S. clinical trials for possible FDA approval.
- The NuVeris (Alpha) is billed as potentially having the ability to provide up to 10 dioptries of accommodation for a wider range of focus, compared only about two dioptries provided by currently approved IOLs. Early research leading to human studies was conducted on primates at the Instituto Optomáticos de A Coruña in Spain. NuVeris has a unique design, which works like a piston. Eye muscles push against a silicone gel lens, which changes shape to provide focus at varying distances.
- The FluidVision accommodating IOL (PowerVision) uses fluid-based mechanics to change its shape in response to the movement of eye muscles. The lens is in the early stages of future clinical trials, but so far appears capable of providing more than 5 dioptries of accommodation.
- The Tel-Clear IOL (Deka) has been introduced in Germany as a square-edged, accommodating IOL capable of shifting position in response to natural movement of the eye’s ciliary muscles.

Multifocal versus monofocal intraocular lenses after cataract extraction

Daniel Calladine, Jennifer E Evans, Sweata Shah, Martin Leyland
Cochrane Eyes and Vision Group Published Online: 12 SEP 2012

- Two authors collected data and assessed trial quality of 16 trials (1608) participants.
- There was moderate quality evidence that similar distance acuity is achieved with both types of lenses (pooled risk ratio (RR) for unaided visual acuity worse than 6/6: 0.98, 95% confidence interval (CI) 0.91 to 1.05).
- There was also evidence that people with multifocal lenses had better near vision but methodological and statistical heterogeneity meant that we did not calculate a pooled estimate for effect on near vision.
- Total freedom from use of glasses was achieved more frequently with multifocal than monofocal IOLs.
- Adverse subjective visual phenomena, particularly haloes, or rings around lights, were more prevalent and more troublesome in participants with the multifocal IOL and there was evidence of reduced contrast sensitivity with the multifocal lenses.

What does the research say?

- Extensive overview of best clinical practice pertaining to selection and use of multifocal intraocular lenses
- Appropriately selected patients can achieve spectacle independence and good visual outcomes at both near and distance with current multifocal IOLs.
- This begins with proper patient education and individualized weighing of benefits and side-effects of multifocal IOLs.
- Given the high sensitivity of multifocal IOL function to minor ocular aberrations, preoperative clinical evaluation is crucial to postoperative success.
PUPIL ISSUES

- The size and shape of the pupil is important when considering multifocal IOL implantation.
- Patients with a large pupil are at increased risk for glare dysfunction following surgery.
- Patients with an atrophic iris are at risk for increased glare, photosensitivity, and often zonular weakness (due to past inflammation) with multifocal IOLs just as they are with monofocal IOLs.
- Patients with a small pupil present some challenges when placing multifocal IOLs. The small pupil may require expansion for a safe capsulorhexis and nucleofractis. A decentered capsulorhexis is a risk factor for a decentered IOL, which can lead to poor function of multifocal IOLs.

Clinical Pearls

1. Multifocal IOLs have predictable results in terms of distance and near visual acuity, but all cause some reduction of contrast sensitivity, halo, and glare.
2. Most multifocal IOLs are similar in design to current monofocal IOLs, so their adoption requires less modification to surgical technique compared with the implantation of accommodating IOLs.
3. Current single-optic accommodating IOLs may result in less halo, glare, and reduction in contrast sensitivity associated with multifocal IOLs, but may yield less amounts of near vision.
4. The near vision from single-optic accommodating IOLs may partly be due to pseudoaccommodation (presumed mechanism was forward axial movement of the optic caused by contraction of the ciliary muscle), which can also occur in monofocal IOLs.
5. Dual-optic accommodating IOLs offer larger amounts of accommodation, but current designs require a larger incision that could offset some visual gains with induced astigmatism.

Multifocal IOLs should expect to obtain similar distance vision to patients with monofocal IOLs, while also having less reliance on spectacles for near vision.

However, patients did have reduced contrast sensitivity and a higher incidence of glare and halos.

Given the complex optical surfaces of multifocal IOLs, it is not surprising that optical aberrations secondary to intraocular stray light are more common compared to monofocal IOLs.


Positive and negative dysphotopsias (undesired visual phenomena) occur after implantation of monofocal IOLs, and can rarely be disabling to patients. Visual complaints after multifocal IOL implantation are more common than after monofocal IOL implantation, but still rarely require significant intervention. A better understanding of the risk factors and optical causes of dysphotopsias will allow for IOL design and patient selection that maximize satisfaction after cataract surgery.

Ametropia and astigmatism, posterior capsular opacification, dry eye syndrome, large pupil size, IOL decentration, and retained lens fragment

In a retrospective analysis of 2600 eyes that underwent diffractive multifocal IOL implantation, severe glare and halos were reported in 6.1 and 2.1% of patients, respectively.

In a prospective, randomized clinical trial of multifocal versus monovision monofocal IOLs, six patients (5.7%) in the multifocal arm underwent IOL exchange for visual symptoms, whereas none in the monovision arm did.

Another recent prospective randomized study compared monovision with multifocal IOL implantation in 75 patients. Multifocal IOL insertion was associated with less dependence on spectacles overall but significantly more dysphotopsias.
Another study on 43 patients similarly demonstrated more disturbing visual symptoms in patients who underwent multifocal IOL implantation compared with those who had pseudophakic monovision.

In a retrospective series of 9366 eyes implanted with a multifocal IOL, severe dysphotopsias necessitated an IOL exchange in 0.6% of eyes.

Multifocal IOLs are able to provide patients with excellent uncorrected distance and near visual acuity resulting in high levels of spectacle independence.

Dissatisfaction following implantation of multifocal IOLs is rare and is often amenable to treatment.

Some cases of dissatisfaction are due to the occurrence of phenomena inherent to the design of multifocal IOLs (such as glare and halos) and are therefore more difficult to treat.

This demonstrates the importance of preoperative patient education, careful selection of cases, and individualized weighing of benefits and side-effects of multifocal IOLs.

- There was a statistically significant reduction in anterior chamber depth on accommodation in participants who received accommodative IOLs compared to those who received monofocal IOLs at six and after 12 months post-treatment.
- These reductions of anterior chamber depth on accommodation, typically accounted for by an anterior displacement of IOLs, suggest some validity in the focus shift hypothesis for accommodative IOLs.
- But the clinical relevance of small changes in anterior chamber depth on accommodative effect observed after 12 months is questionable (mean difference 0.21 mm)

Technology Tips

- Computer
- Electronic Readers
- Smartphones
Accessibility features

- Magnify/Increase Font
- Increase size of cursor, icons
- Enhance contrast
- Supply light
- Change color
- Talk to you
- Read to you

Computer Accessibility Options

- Control (or roller wheel or ball on mouse) + or – to zoom in and out on webpages
- Customize email
- Accessibility options for Windows
  - Different steps for different window version
  - Start → Programs → Accessories → Accessibility → Magnifier
- Accessibility options for Mac
  - Built in

E-Readers

- Screen Size
- Font Size
- Contrast
- Screen Reader

- Kindle is very accessible

iPhone and iPad

- Zoom
- Invert colors
- Speak selection
- Larger type
- Bold text
- Contrast enhancement
- VoiceOver
  - screen reader

Android

- Increasing accessibility features, but limited
  - Magnify screen with triple tap

Apps to name a few...

- SuperVision+
- TapTap See
- Color ID
- CamFind
- MagLight+
- Be my eyes
- GPS apps
- Many, many, many apps...
Apps video to play here

Questions?