The Aging Eye

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Disclosure

In the past my lab has received support from Zeavision and from JIN Optical

AOA Demographics

- According to the American Optometric Association’s (AOA) 2014 American Eye-Q® consumer survey, 78 percent of adults age 55 or older report experiencing some vision loss.
- Common age-related vision problems include difficulty seeing things up close or far away, problems seeing in low light or at night, and sensitivity to light and glare.
- Aging Americans will represent 19 percent of the population by 2030, up from 12 percent in 2000. The AOA’s American Eye-Q® survey revealed that 40 percent of consumers age 55 or older are worried about losing their ability to live independently as a result of developing a serious vision problem. Many eye diseases have no early symptoms and may develop painlessly; therefore, adults may not notice changes in vision until the condition is quite advanced.

Anterior Segment

- Lids
- Cornea (including dry eye)
- Lens (including presbyopia)

Lids

Cornea (dry eye)
**Lens (Presbyopia)**

- Normal
- Presbyopia

**Posterior Segment**

- Retina
- Macular Pigment
- Optic Nerve

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**Retina**

- Young Eye
- Aged Eye

**Macular Pigment**

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**Selective concentration of carotenoids in the macula**

- Lutein + Zeaxanthin
- 600 in nature
- 50 in food chain
- 13 in human plasma (flu)
- 6 in human plasma (major)
- 2 in the eye

QuantifEYE Device

View through the eyepiece

The QuantifEYE Software

Distribution of MPOD levels in the population

Macular Pigment
- Macular Degeneration
- Cataracts
- Central Serous
- Diabetic Retinopathy
- "Non visual"
  - Skin protection
  - Cognitive function
  - Bone Density
Optic Nerve

Diseases (“The Big Four”)
- Cataract
- Glaucoma
- Macular Degeneration
- Diabetic Eye Disease

“Normal” aging
- Reduced accommodation
- Reduced acuity
- Needing more time to adapt to changes in light levels
- Loss of peripheral vision (being able to see things outside of the direct line of vision) occurring
- Smaller pupils
- Problems with depth perception
- “Floaters”.

Normal Vision

Cataract
For those with age-related eye conditions, the AOA has these tips:

- **Control glare**: Purchase translucent lamp shades, install light-filtering window blinds or shades, use matte or flat finishes for walls and countertops and relocate the television to where it does not reflect glare.
- **Use contrasting colors**: Decorate with throw rugs, light switches and telephones that are different colors so they can be spotted quickly and easily.
- **Give the eyes a boost**: Install clocks, thermometers and timers with large block letters. Magnifying glasses can also be used for reading when larger print is not available.
- **Change the settings on mobile devices**: Increase the text size on the screen of smartphones and tablets and adjust the screen’s brightness or background color.
- **Stay safe while driving**: Wear quality sunglasses for daytime driving and use anti-reflective lenses to reduce headlight glare. Limit driving at dusk, dawn or at night if seeing under low light is difficult.

**Other Diseases**

- Alzheimer’s Disease
- Parkinson’s Disease

**Parkinson’s disease**

Visual motor symptoms

- Some vision difficulties are related to changes in the movement of the eyeball. These are motor symptoms, similar to other motor symptoms caused by loss of dopamine neurons.
- Blurred or double vision, and eye strain, because the eyes may have trouble moving together to focus on things traveling toward or away from a person.
- Trouble reading, because the eye movements needed to follow the lines of a page are slowed and have trouble starting (similar to gait freezing in the legs).
- A person with PD may need to blink in order to change eye position; levodopa can help.
- Trouble opening the eyes voluntarily, known as apraxia (treated with "lid crutches" or lid tape).
- Eyelid spasms, called blepharospasm, and excessive blinking.

Discomfort

- Dry eyes; people with PD may blink only 1-2 times per minute (normal is 16-18 times), leading to itching and burning.
- Skin irritation on the eyelid; known as seborrheic blepharitis, this can worsen dry-eye symptoms.

Changes in perception

- Decreased sensitivity to contrast (color and brightness), making vision less sharp, caused by the loss of dopamine neurons in the eye’s retina.
- Altered color vision, a “sort of” blue-yellow color blindness.
- Difficulty judging distance, and the position of body parts.
- Impaired ability to read other people’s facial expressions.
- Visual hallucinations, such as flickering lights, that could be related to PD medications.

Alzheimer’s and the Eye

http://www.pdf.org/vision_parkinson

Visual Difficulties may include

- decreased sensitivity to differences in contrast (including color contrast)
- reduced ability to detect movement
- changes to the reaction of the pupil to light
- problems directing or changing gaze
- problems with the recognition of objects, faces and colors
- problems with depth perception.
- reduced ability to detect different colors

This can lead to:

- difficulties reading and writing, doing puzzles or playing board games
- problems locating people or objects, even though they may be in front of the person – this may be because of other distracting visual information (such as patterned wallpaper) or because of a lack of color contrast (for example, not seeing mashed potato on a white plate)
- misinterpreting reflections – this may manifest as seeing an ‘intruder’ or refusal to go into a bathroom because reflections make it appear occupied
- mistaking images on the TV for real people
- difficulty in positioning oneself accurately to sit down in a chair or on the toilet – sometimes this difficulty is mistaken for incontinence
- appearing confused or restless particularly in an environment that is visually over-stimulating or difficult to navigate.

Spatial deficits

- bumping into things
- swerving to avoid door frames
- difficulties reaching for things within the visual environment (such as a cup of tea or door handle)
- getting lost or disorientated, even in familiar environments.

This leads to impairments in navigating environment

- misjudging distances and where objects are, even in familiar environments
- stepping very highly over carpet rods or shadows because the change in color looks like a change in level
- difficulties going down stairs due to problems judging how many steps there are and where the next one is
- avoiding shiny flooring because it appears wet or slippery.

Environmental adoptions

- Deliberate use of colors can help significantly. For example, a red plate on a white tablecloth is more easily visible than a white plate.
- Improve lighting levels around the home. This can reduce visual difficulties and help to prevent falls. Lighting should be even around the home and should minimize shadows – some people resist going near dark areas in corridors and rooms.
- Minimize busy patterns on walls and flooring and try to reduce any changes in floor patterns or surfaces – the person may see such changes as an obstacle or barrier.
- Remove or replace mirrors and shiny surfaces if they cause problems.
- Close curtains or blinds at night.
Problems with communication

- Difficulty finding the right words.
- Using familiar words repeatedly.
- Describing familiar objects rather than calling them by name.
- Easily losing a train of thought.
- Difficulty organizing words logically.
- Reverting to speaking a native language.
- Speaking less often.
- Relying on gestures more than speaking.

“Basic 6” for communication

- Approach from the front.
- Call the person by name.
- Establish eye contact.
- Get down to eye level if needed.
- Let them initiate conversation.
- Give directions one step at a time – this helps keep it simple, especially for those having difficulty with processing.

Communication with a patient’s with Alzheimer’s disease

- Don’t make assumptions about a person’s ability to communicate because of an Alzheimer’s diagnosis. The disease affects each person differently.
- Give the person time to respond. Don’t interrupt or finish sentences unless he or she asks for help finding a word or finishing a sentence.
- Humor can be helpful