



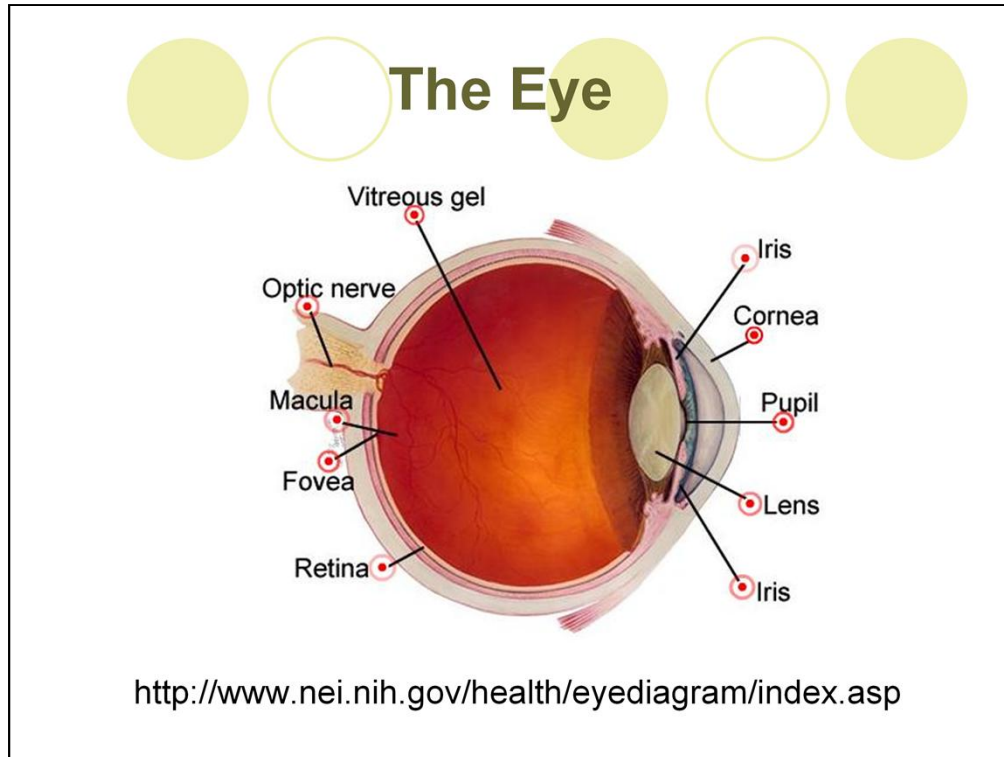
E-Readers & Accessibility

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Changing Vision with Age

As with most body systems, there are vision changes that will occur for most of use
– these are typical or expected changes.

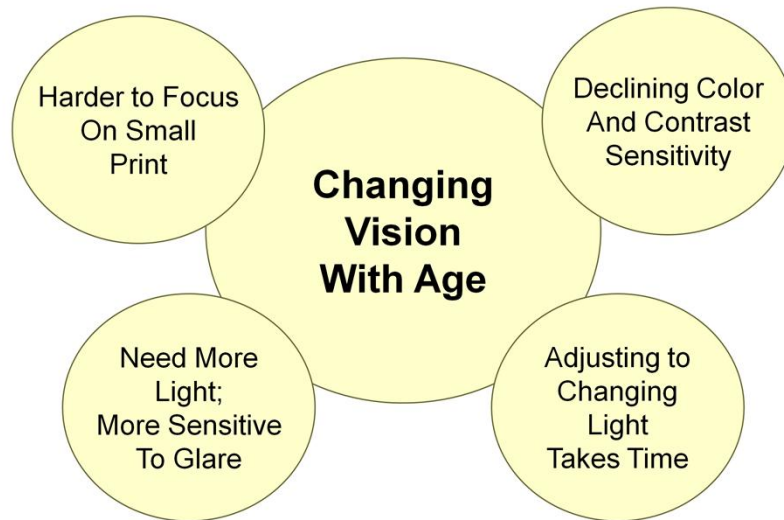


Few parts to mention

Pupil

Lens

What Perceptions Do You Have About Eyes and Aging?



Question – How do your eyes change with age?

Point – there are gradual changes that become noticeable in middle age and continue through older year; none of these changes prevent a person from being able to read standard text; focus is the most noticeable and corrected with eye glasses prescriptions; others are often improved when cataracts are removed

How can a library be more inviting to older patrons?

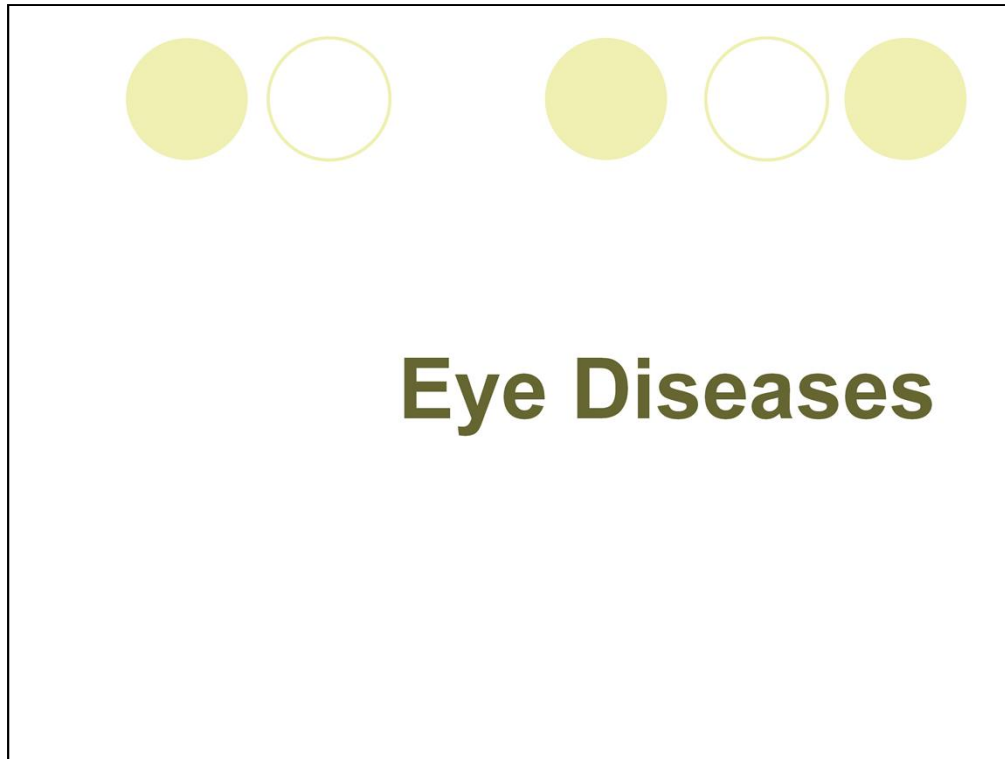
- Good task lighting available at work stations
- Large print used whenever possible
- Appreciate that an older person may not be able to “see” a book on the shelf or easily see title – too busy, not enough contrast, poor light
- Magazines can produce a lot of uncomfortable glare

Cataracts

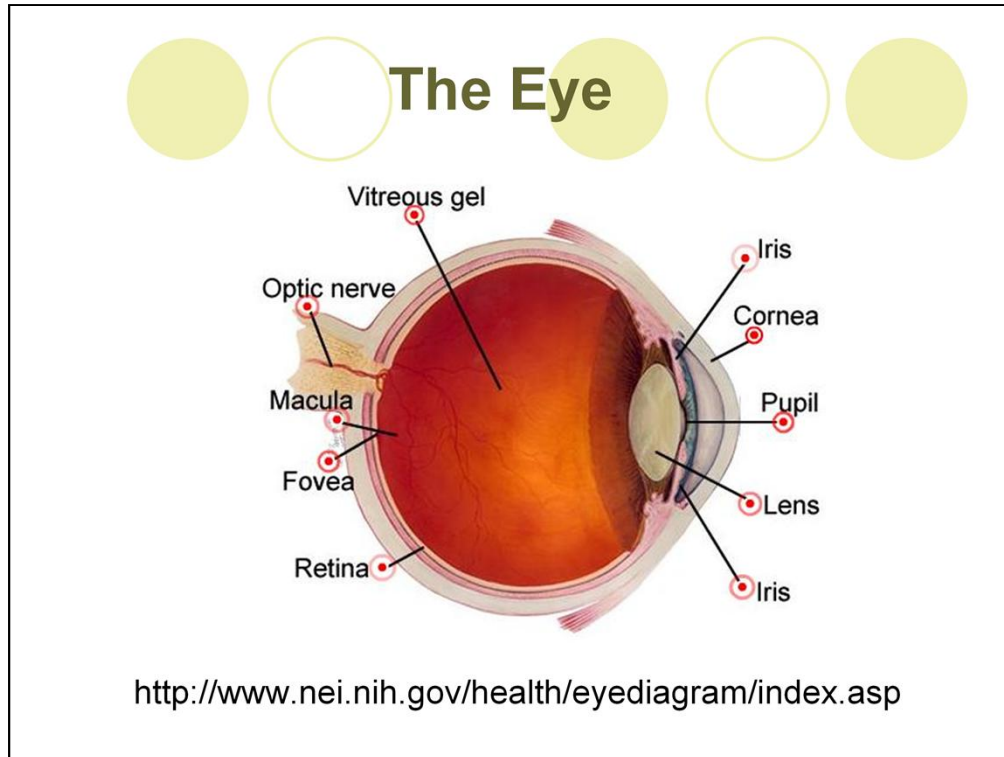


- Degradation of image; cloudy or blurry
- Reduced contrast sensitivity
- Difficulty seeing in poorly lit environments
- Increased sensitivity to light and glare

Clouding of the lens
Degradation of image
Cloudy or blurry vision
Reduced contrast sensitivity
Difficulty seeing in poorly lit environments
Increased sensitivity to light and glare
Colors appear faded or changed in hue



There are also eye diseases that are more likely to occur as we age. They don't occur in all older people and not even in most older people, but they occur at a frequency that we need to be aware of them as possible reasons why people might not participate in reading or not read at the same level as they used to.



Few parts to mention
Optic nerve
Retina and macula
Lens
Meshwork for flow of fluid

Age-Related Macular Degeneration



Normal vision



The same scene as viewed by a person with age-related macular degeneration

- Dark spaces in center area of vision
- Blurred or distorted central vision
- Wavy or bent appearance of straight lines
- Glare sensitivity

Age-Related Macular Degeneration

A disease that gradually destroys sharp, central vision. Central vision is needed for seeing objects clearly and for reading and doing tasks with our hands.

- Blurred or distorted central vision
- Wavy or bent appearance to straight lines of text
- Dark spaces in center area of vision (scotomas)
- Increased sensitivity to glare
- Reduced contrast sensitivity
- Reduced color abilities

Glaucoma



Normal vision



Same scene as viewed by a person with glaucoma

- Loss of peripheral vision
- Increased light/dark adaptation time
- Glare sensitivity
- Reduced contrast sensitivity

Glaucoma

A group of diseases that can damage the eye's optic nerve. Glaucoma occurs when the normal fluid pressure inside the eyes slowly rises.

- Loss of peripheral vision
- May eventually lose central vision
- Increased light/dark adaptation times
- Glare sensitivity
- Reduced contrast sensitivity

Diabetic Retinopathy



Normal vision



Same scene viewed by a person with diabetic retinopathy

- Scotomas
- Blurred, hazy vision
- Light and glare sensitivity

Diabetic Retinopathy

A group of eye problems that result from complications of diabetes. Diabetic retinopathy damages the blood vessels in the retina, causing blind spots. A person with diabetes is nearly twice as likely to get glaucoma as other adults.

Increased sensitivity to bright light and glare

Poor color vision

Overall blurred or hazy vision making printed text distorted

Reduced contrast sensitivity

Scotomas

Reduced light/dark adaptation

Adult Vision Loss in WI

● Prevent Blindness (preventblindness.org)

○ Total Population ≥ 40	2,731,216
○ Blindness	27,873
○ Age Related Macular Degeneration	41,106
○ Glaucoma	48,442
○ Diabetic Retinopathy	137,532

Vision Problems in the U.S.: Prevalence of Adult Vision Impairment and Age-Related Eye Disease in America

What do you think causes adult vision loss?

Vision Impairment with Age



Vision Problems in the US: Prevalence of Adult Vision Impairment and Age-Related Eye Disease in America
http://www.preventblindness.net/site/DocServer/VPUS_2008_update.pdf?docID=1561

The likelihood of vision impairment increases with age. Vision impairment occurs across all ethnic groups, but not all for the same reason.

Vision Loss in WI

● Under age 5	0.6%
● Age 5-17	0.5%
● Age 18-64	1.2%
● Age 65 & over	5.4%
● Overall incidence in WI	2.7%

2010 American Community Survey

Estimated number of persons with "vision difficulty"

Vision loss is a low incidence disability. Blindness is often recognized; vision impairment is rarely recognized. Even though the disability is low incidence, it is also a fast growing disability group due to 2 factors:

1. fast growing older population
2. increase in the occurrence of diabetes in the US and type II occurring at younger ages than in the past



Reading With Eye Disease

The most frequent request by clients we serve is to be able to read again. Local newspapers seem to be the most common reading request, then books, then “spot” reading (mail, medication bottles, food preparation packages, cards).

Can an e-reader help?

- **Study:**

- Compared reading speed using a newspaper article, on-line version of article printed on standard paper, and online version of article read on e-reader
- Some readers had low vision

- **Results:**

- If typical vision, preferred newspaper
- If 20/50 – 20/80 visual acuity measure, preferred the iPad
- Reading speed was 114 WPM for newspaper and 128 WPM for iPad



- **Study:**

- Reading 5 chapter in standard book, iPad at 12 point font, iPad at 18 point font, Kindle at 12 point font, and Kindle at 18 point font
- Some readers had low vision



- **Results:**

- If 20/40 – 20/200 visual acuity measure, showed greatest improvement in reading speed using iPad
- Reading speed increased significantly on iPad with font magnified to 18 point font



- **Study:**
- Extended reading time using e-ink reader (Sony e-reader) and LCD display readers (iPad)
- Participants did not have low vision



- **Results:**
- Both types of displays led to comfortable reading for several hours without visual fatigue or reducing reading speed

Central Vision Loss

- Add task lighting
 - Position of light
 - Type of light
- Add magnification
 - Handheld
 - Electronic
 - E-reader
- Add audio
 - Talking books
 - E-reader

-3x, 7x, 10x magnifiers

-Focal point issues

- Closer to eye
- Less in the lens
- Have few letters in window so are always stringing letters together; work hard on each word that the meaning can get lost

Portable electronic magnifiers

-Benefits of flexibility

-Inverse image

-Sharp white

-Cognitive load

Central Vision Loss

- Flexibility of e-readers

- Magnification
- Spacing
- Inverse image

- Issues with e-readers

- Touch cues
- Auditory cues
- Navigation cues

Peripheral Vision Loss

- Similar to aging eyes for reading
 - Size of reading material and repositioning text or self
- Magnification has to balance available field of vision
 - Bigger isn't always better
 - Move to audio book options

Basic E-Readers



Nook Simple Touch



Sony Reader



Kobo Touch



Kindle Paperwhite



Kindle Keyboard

E-reader that only reads electronic books and periodicals

Wi-fi or basic internet connectivity to download books

Lots of examples

Let's look at accessibility for low vision users on a basic e-reader, the Kindle Paperwhite

Tablet E-Readers



Nook HD



iPad



Kindle Fire HD

E-reader that is also a tablet computer

Does everything that can be done on a desktop / laptop computer

- Email

- Internet browsing

- Games

- Lots of apps

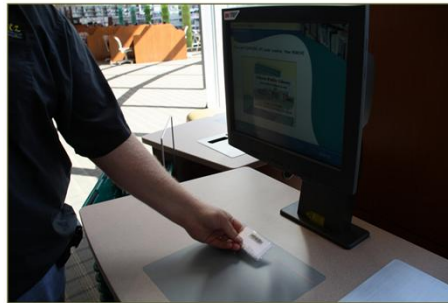
Lots of examples



Questions / Comments

Thank you!

Other library activities?



To quickly magnify computer internet page: ctrl + or ctrl forward scroll wheel; these don't require user to have to find the magnification level icon

LONG ID numbers when have to sign in

Marker on tray indicating where to place library card

Technology at the Library



Large Computer
Monitors

High Contrast
Keyboards

Screen Reader

No one keyboard works for all people; yellow with black lettering seems to work for many

Large monitors can get too big

Free screen reader

Electronic magnifier station – a learning curve for how to explore what is on a page when only a small part of the page shows at once