

Vision and ageing

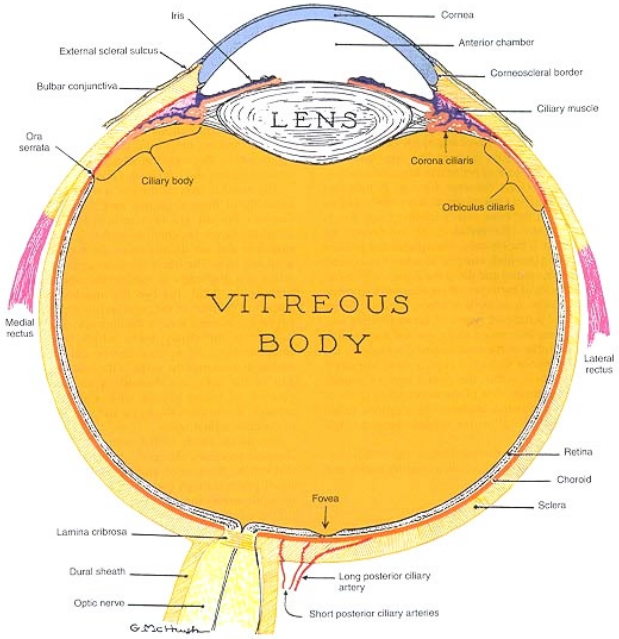
Agenda

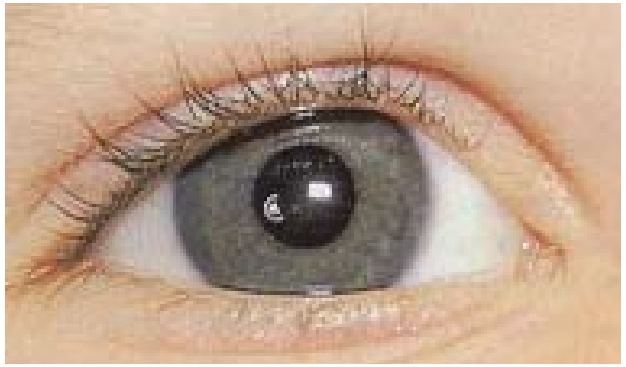
- Normal changes with age
- Common eye disorders with age
- What can be done?
  - Prevention
  - Treatment
  - Rehabilitation

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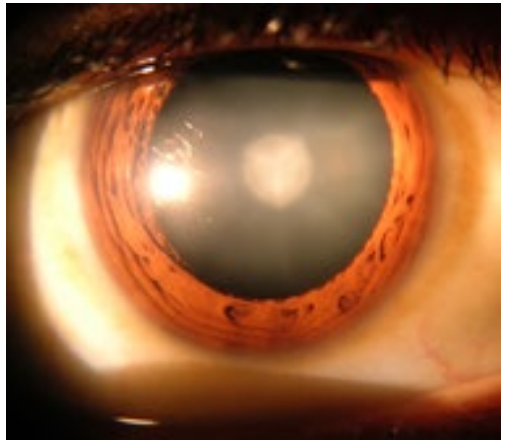
Normal changes

- Cataract – ubiquitous with age
  - Decreases VA and CS
  - More glare
  - Even though common ⇛ cataract surgery





Young eye; From Kanski 1989



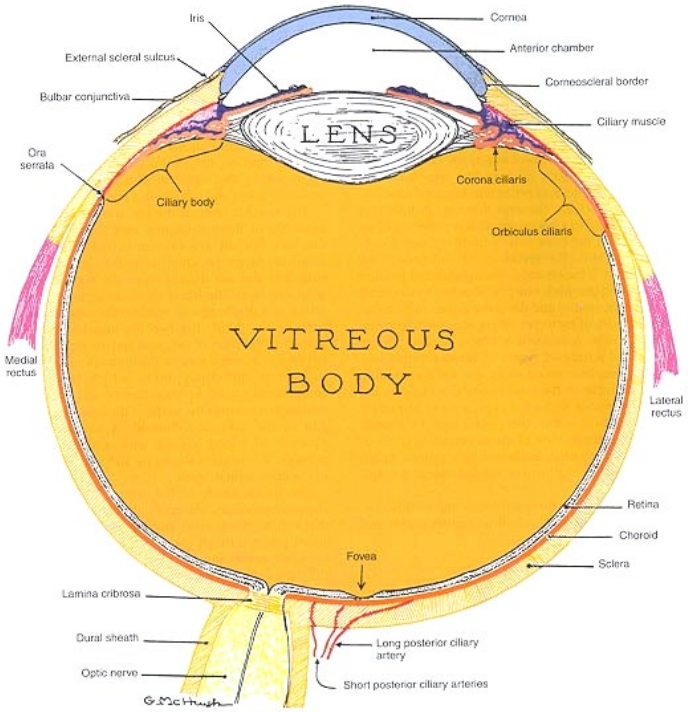
http://en.wikipedia.org/wiki/Cataract

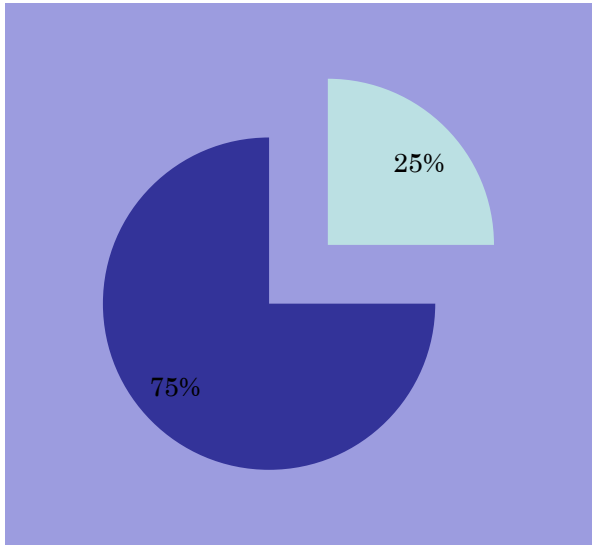


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Vitreous

- Becomes more liquid
- Increase in floaters
- Posterior vitreous detachment (PVD)
  - Flashes and floaters
  - May cause haemorrhage and retinal



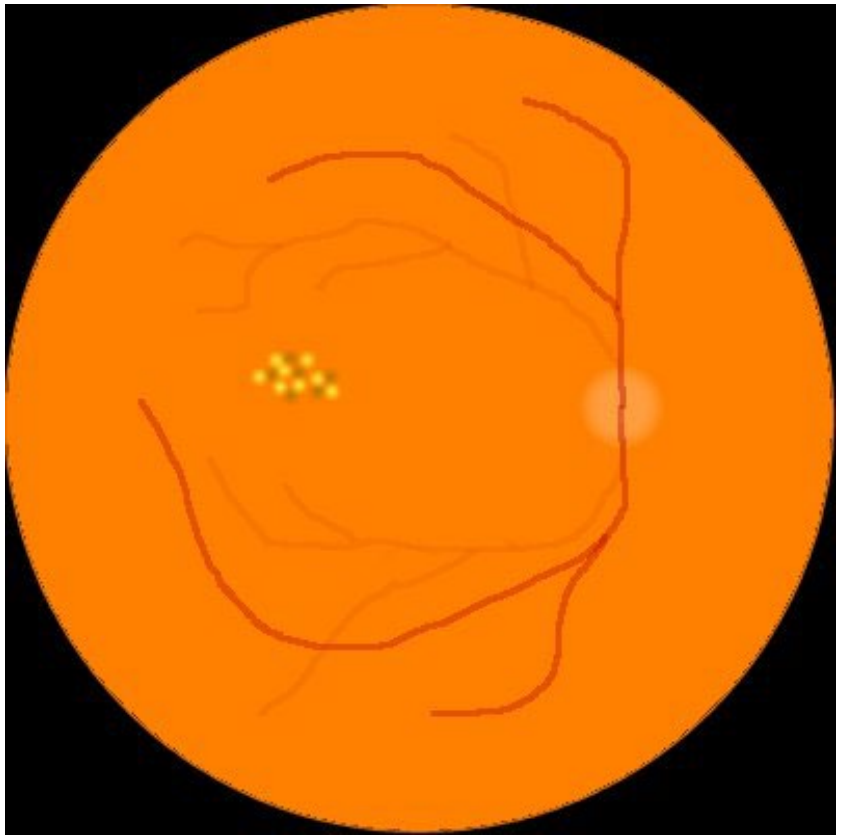


- Occurs in 75% of people over 65
- Occurs in many over 40 years

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Drusen

- Precursor of macular degeneration



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Visual acuity

- VA change begins at age 50
- Many retain good VA into old age
- 2x poorer by age 90
- So less affected in high contrast/high illumination



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Low contrast acuity in low light

- Low contrast acuity
- 4x worse in 90’s



Haegerstrom-Portnoy G. (2005). Optom Vis Sci 82: 87-93

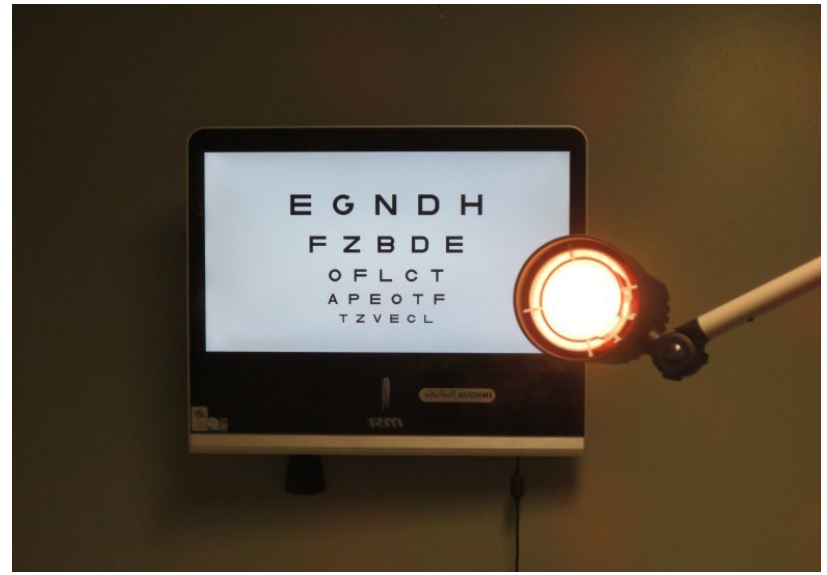
- Low contrast acuity in low light
- 6x worse in 90’s

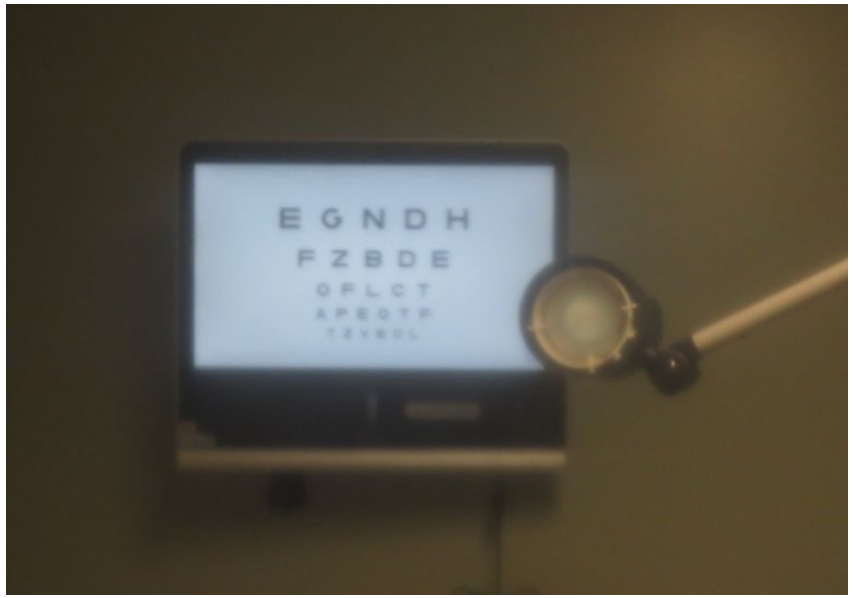


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Glare recovery and vision in glare

- Glare recovery; 15x longer
- Vision in glare; 18x poorer







Haegerstrom-Portnoy G. (2005). Optom Vis Sci 82: 87-93

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Common diseases with older age

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Diabetic retinopathy?

- What is diabetes?
- Diabetes is a chronic disease that has no cure.
- It is a leading cause of death in Canada.
- Approximately 6% of Canadians have diabetes.

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The 2 common types of diabetes

- Type 1 diabetes occurs when the body (the pancreas specifically) no longer produces insulin. We need insulin to use sugar for energy.
  - Approximately 10 per cent of people with diabetes have type 1 diabetes.

- Type 2 diabetes occurs when the pancreas does not produce enough insulin or when the body does not effectively use the insulin that is produced.
  - 90% of people with diabetes have type 2 diabetes.

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Diabetes and the eyes

- Diabetic eye problems include:
  - Fluctuating vision
  - Cataract
  - Glaucoma
  - Diabetic Retinopathy

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Diabetic retinopathy

- Diabetic Retinopathy is the most serious ocular complication of diabetes.



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Diabetic retinopathy

- 1/3 of diabetics have diabetic retinopathy
- It is now the most common cause of blindness under age 65, and the most common cause of new blindness in North America.

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What happens with diabetic retinopathy

- Over time, the ability to deliver blood (and oxygen) to the retinal tissues of the eye is lost.
- New, abnormal, weak blood vessels may start to grow.
- The new or existing blood vessels become "leaky."
- Blood and fat (blood lipid) can seep out of these damaged capillaries.
- This makes the retina bleed and swell.

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Diabetic retinopathy



Hemorrhages and
soft exudates



Proliferative
Retinopathy

Treatment is to control the diabetes, antiVEGF, and laser therapy

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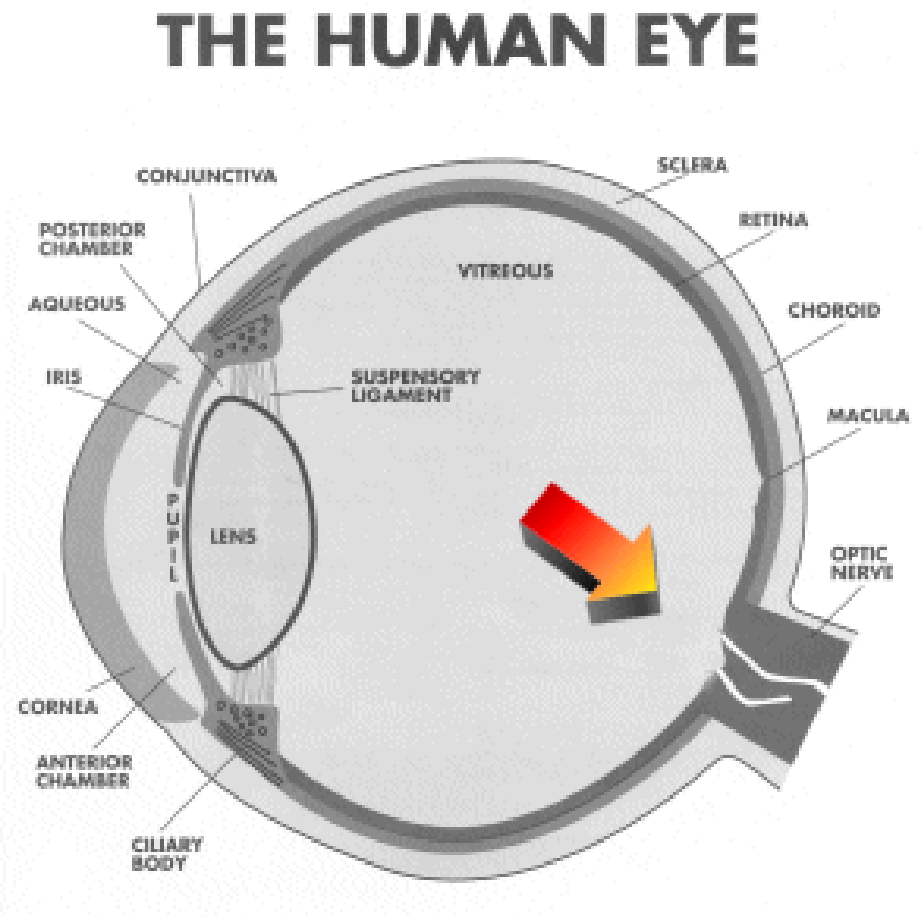
Glaucoma

- Glaucoma is an eye disease where the eye's optic nerve is damaged.
- It is usually painless and has no symptoms.
- Glaucoma is the second most common cause of irreversible vision loss in seniors in Canada
- Stats indicate almost 250,000 Canadians have glaucoma and only 125,000 are aware they have it. (ref. CNIB)

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Eye anatomy

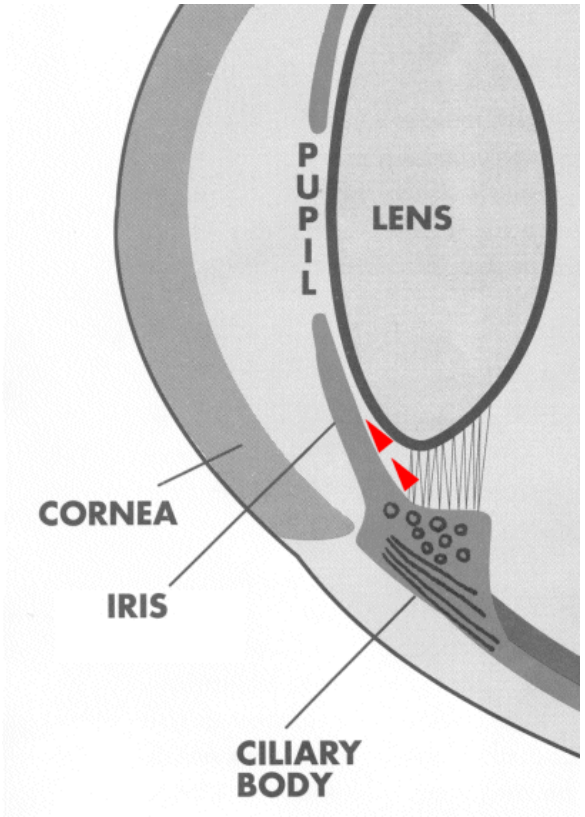
- The optic nerve is a bundle of nerve fibers.
- It carries visual information from the retina to the brain.

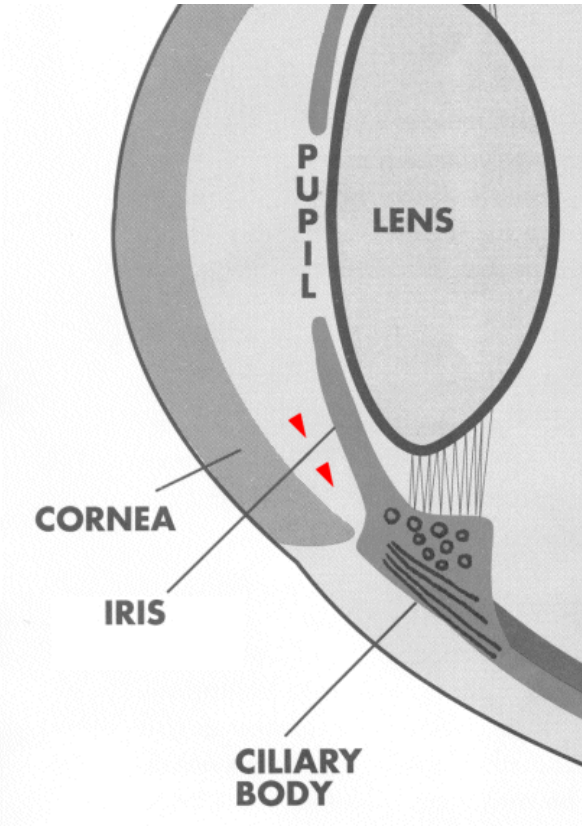


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Fluid circulation

- The eye has an internal fluid circulation system.
- Fluid is produced at the base of the iris.
- The fluid exits the eye at the angle between the iris and the cornea where it drains through a spongy meshwork.





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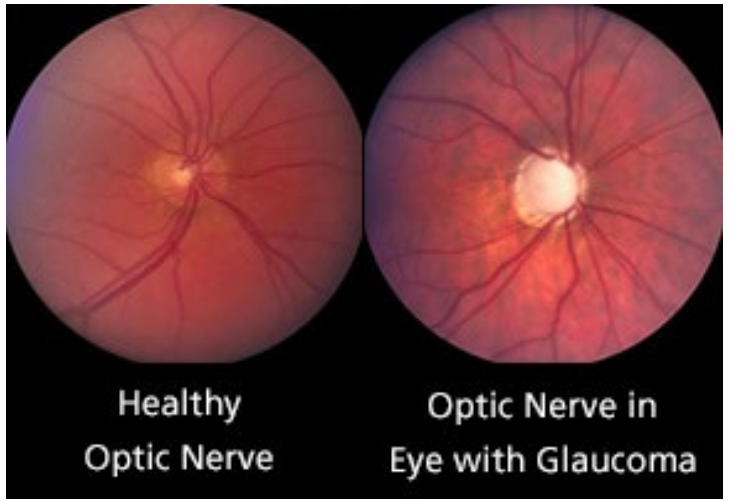
Forms of glaucoma

- There are several different forms of glaucoma
  - Primary Open Angle Glaucoma (most common)
  - Low Tension Glaucoma
  - Secondary Glaucoma
  - Angle Closure Glaucoma

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Primary open angle glaucoma (POAG)

- Fluid drainage is poor and fluid builds up in the eye and the internal eye pressure goes up.
- This increased pressure can cause damage to the optic nerve and vision loss.
- The exact mechanism of damage is still unknown.
- First stage of treatment is to decrease the pressure with drops – this is on-going treatment



Glaucoma Research Foundation.
https://www.glaucoma.org/treatment/optic-nerve-cupping.php

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Low tension glaucoma

- Low Tension (or Normal Tension) Glaucoma is not as common.
- In these cases, the eye pressure is in the normal range but the optic nerve still gets damaged.
- The exact mechanism of damage is still unknown.

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Secondary glaucoma

- Glaucoma can develop as a complication from other conditions including:
  - Eye injuries
  - Uveitis (internal eye inflammation)
  - Pigment dispersion
  - Diabetes (Neovascular glaucoma)
  - Steroid use

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Angle Closure Glaucoma

- This type of glaucoma is an emergency situation.
- It occurs when the iris itself blocks the drainage angle and results in a sudden increase in pressure.
- Symptoms include severe eye pain, nausea, eye redness and very blurred vision.
- Immediate treatment (surgery) is required.

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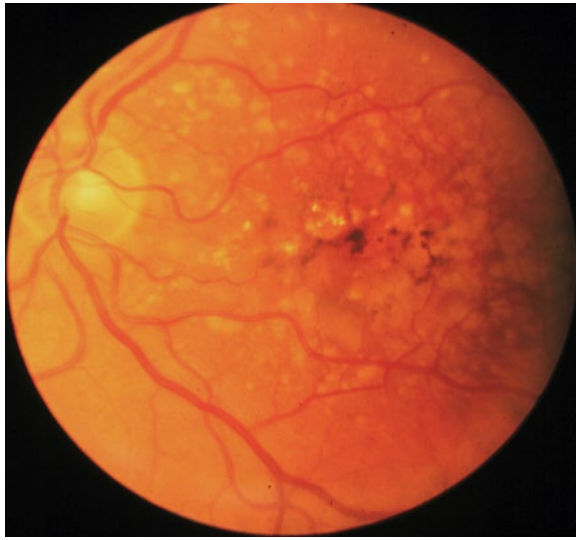
Age-related Macular Degeneration (AMD)

- AMD is an eye disease that causes loss of central (detail) vision but spares peripheral vision
- It is the leading cause of blindness in adults over the age of 55 in North America
- About 2 million Canadians have AMD
- 250,000 have an advanced form of the condition

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Macular degeneration

Dry and Wet



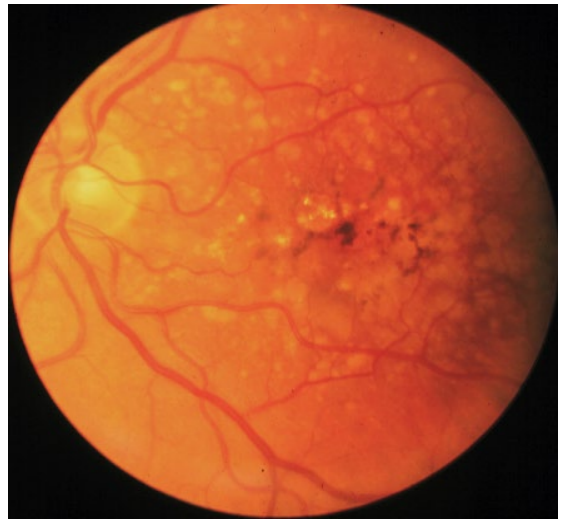
from A. Cullen

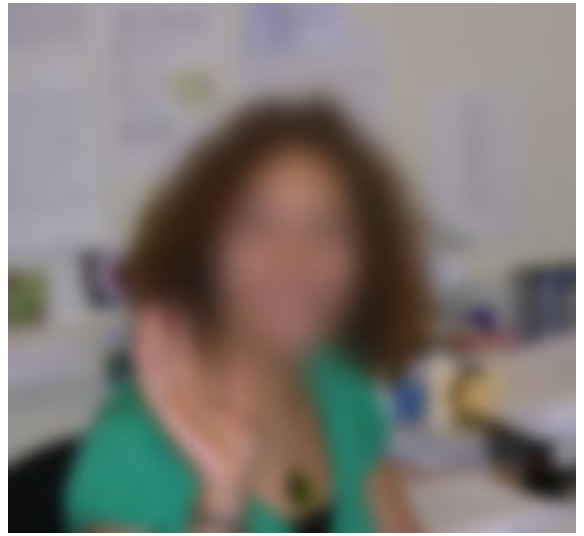


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Dry AMD

- Dry AMD is the milder form of the disease and is the most common type
- There is gradual degeneration of the cells in the macula and accumulation of lipids and pigment in the retina
- Decreased VA generally develops slowly over time
- Treatment = prevention (diet, no smoking, supplements)



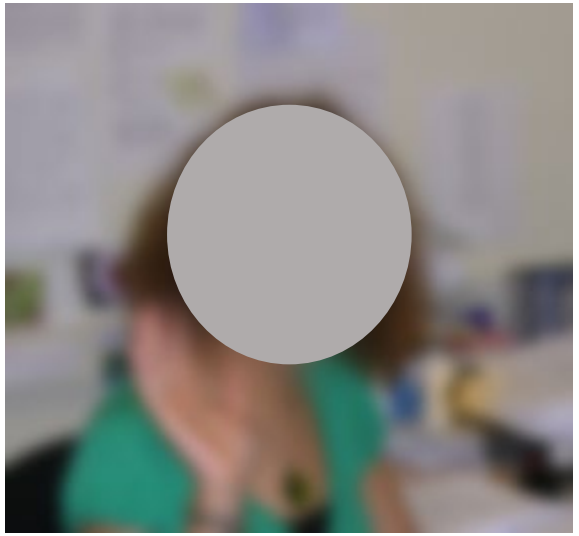


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Wet AMD

- About 10% of cases of Dry AMD advance to become Wet AMD
- Abnormal blood vessels develop under the macula. These weak blood vessels can leak fluid and bleed
- Wet AMD can develop quickly and cause severe vision loss (deceased VA and central field loss)
- Treatment = antiVEGF





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Dry eye disease

- Prevalence
  - 14% over 40 years
  - 19% over 80 years
  - Higher in women
  - Reduced tear production/poor tear quality/allergy/meibomium gland dysfunction
- Symptoms
  - Grittiness, dryness, burning, excessive tears, fluctuating vision, stringy tears

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Refractive error

- Most common correctable cause of poor vision = incorrect or no glasses
- Almost all >50 will need glasses for either distance or near vision or both
- Prescription changes more quickly when older

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What to do from here?

Routine eye examinations

- Many ocular diseases have no visual warning signs!
- Most respond better to treatment when detected early



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Refractive error

- Maintaining vision helps to maintain:
  - Overall wellness and quality of life
  - Social involvement
  - Independence
  - Driving
  - Cognitive function

  And
  - Decreases depression
  - Reduced risk of falls

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Tools at our disposal

- Prevention
  - Macula Risk
  - Nutrition and supplements
  - Stop smoking
  - UV protection
  - Diabetes control

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Tools at our disposal

- Treatment
  - Glasses update
  - Cataract surgery
  - Dry eye therapies
  - AntiVEGF
  - Laser
  - Topical medication/surgery for glaucoma

- Future treatments
  - Gene therapy
  - Stem cell
  - New drugs

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Low vision rehabilitation

What is Low Vision?

- Low Vision is a visual impairment that interferes with a person's ability to perform everyday activities, not correctable with conventional glasses, contact lenses or medical or surgical intervention.
- Low vision can occur from birth defects, genetic disorders, injury, the aging process, or acquired ocular diseases.

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Low vision rehabilitation: care and intervention

- To enable people with low vision to use their remaining vision to achieve the tasks which they want to perform, in order to achieve as independent a lifestyle as they desire.

- we use magnifying and other devices, change the task, suggest alternative methods, train in new techniques, adapt the environment or a use a combination of these.





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Low vision rehabilitation: interventions and training

- Hand held / stand magnifiers
- High powered reading glasses
- Distant viewing binoculars
- Telescopes for spotting









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Low vision rehabilitation: interventions and training

Lighting





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Low vision rehabilitation: interventions and training

Specialised glare controlling tints (indoor / outdoor)









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Low vision rehabilitation: interventions and training

- Training
  - E.g. Eccentric viewing training

When a dense cent[redacted]cotoma is present,



When a dense central scotoma is present,

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Electronic low vision aids

- Digital portable reading devices
  - Pebble HD
  - Smartlux digital
  - Ruby
  - Compact Plus



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High tech low vision aids

- Closed circuit television systems
- Video head borne binoculars for distance and near
  - E.g. eSight
- Magnification computer software
  - Zoom text
  - Jaws

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New age low vision devices

- Accessibility on regular devices
  - Cell phone apps (RIM / CRTC mandate)
  - Tablets
- The future
  - Bionic Eye (Agnus II approved in Ontario for RP)
  - Trekker Breeze – GPS

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Additional organizations

- CNIB (including Vision Loss Rehabilitation Ontario)
- Foundation Fighting Blindness
- NOAH (National Organization for Albinism and Hypopigmentation)
- Canadian Council of the Blind (advocate for the visually impaired)
- AMD Alliance
- Alliance for Equality of Blind Canadians

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Financial assistance for LV devices

- ADP (Assistive Devices Program) – the cost of low vision devices may be partially funded by the ADP program. A patient is allowed 3 low tech devices over a 5 year period (unless vision changes)
- Veteran Affairs for individuals with coverage
- Disability Tax Credit – a person is eligible with vision of 20/200 or less in the better eye or very constricted visual field

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Additional ideas

- High contrast environment (milk in black mug)
- Large button phones / remote controller
- Good spotlight to read with
- Signature / line guides
- Large print calendars / cards / books
- Writing with black felt tip pen
- Audio books – available from public library

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Acknowledgments

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