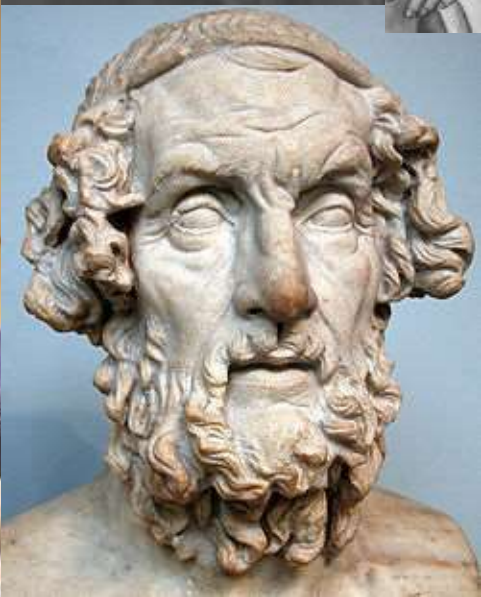
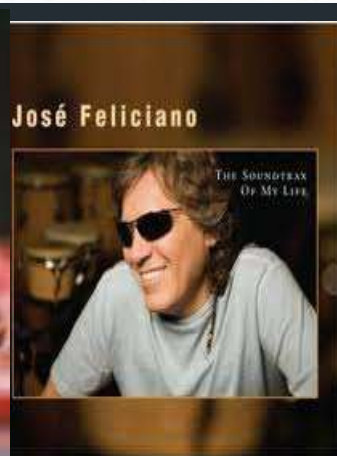




# Visual Impairment

There is no better way to thank God for your sight than by giving a helping hand to someone in the dark.”

Helen Keller





<http://www.kernersvillerotary.org/images2009/052107BlindSchool7.JPG>

# Facts

## According to WHO:

- It is estimated that over seven million people become blind every year.
- 75% of blindness is avoidable
- 80% of visual impairment is avoidable
- 63% of those with low vision and 82% of blind people are over 50 years of age
- Cataract remains the leading cause of blindness globally, except in the most developed countries.
- Cataract surgery and correction of refractive errors are among the most cost-effective health interventions.



# Key Facts

- 1.4 million children under age 15 are blind.
- Correction of refractive errors could give normal vision to more than 12 million children (ages 5-15).
- The number of people blinded by infectious diseases has been greatly reduced. Age related impairment is increasing.
- Blinding trachoma affects 40 million people today, compared to 360 million in 1985.

# DEFINITION

- A key issue in any discussion of blindness is its definition. The elements of this definition that need attention are
  - level of distance visual acuity,
  - presenting or best-corrected visual acuity
  - visual field constriction.
- In the United States, legal blindness is defined as distance visual acuity  $\leq 20/200$ .
- According to (ICD-10):H54

**Low Vision:** Visual acuity of less than 6/18 but equal to better than 3/60 or corresponding visual field loss to less than 20 degrees in the better eye with the best possible correction

- **Blindness:** Visual acuity  $< 3/60$  or a corresponding visual field loss to less than 10 degrees in the better eye with the best possible correction.
- **Visual Impairment** Includes low vision as well blindness



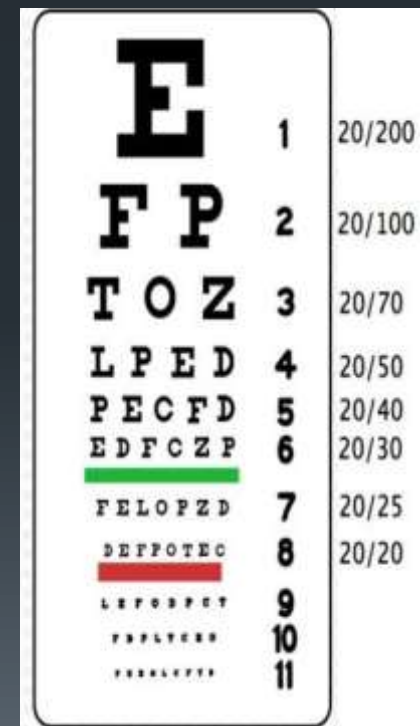


# DEFINITION

- This definition, based on best-corrected visual acuity, excludes the large number of people worldwide who are visually impaired due to uncorrected refractive error.
- Visual field constriction, independent of visual acuity, causes functional impairment. The inclusion of visual field criteria in the definition of blindness is recommended by the ICD-10
- Visual fields are difficult to assess and many studies have not included visual field constriction in estimates of the prevalence of visual impairment.
- In addition, visual function is comprised of many other components. These include
  - visual field
  - color perception
  - stereoacuity
  - glare recovery
  - dark adaptation
  - contrast sensitivity function.

# Levels of Visual Function

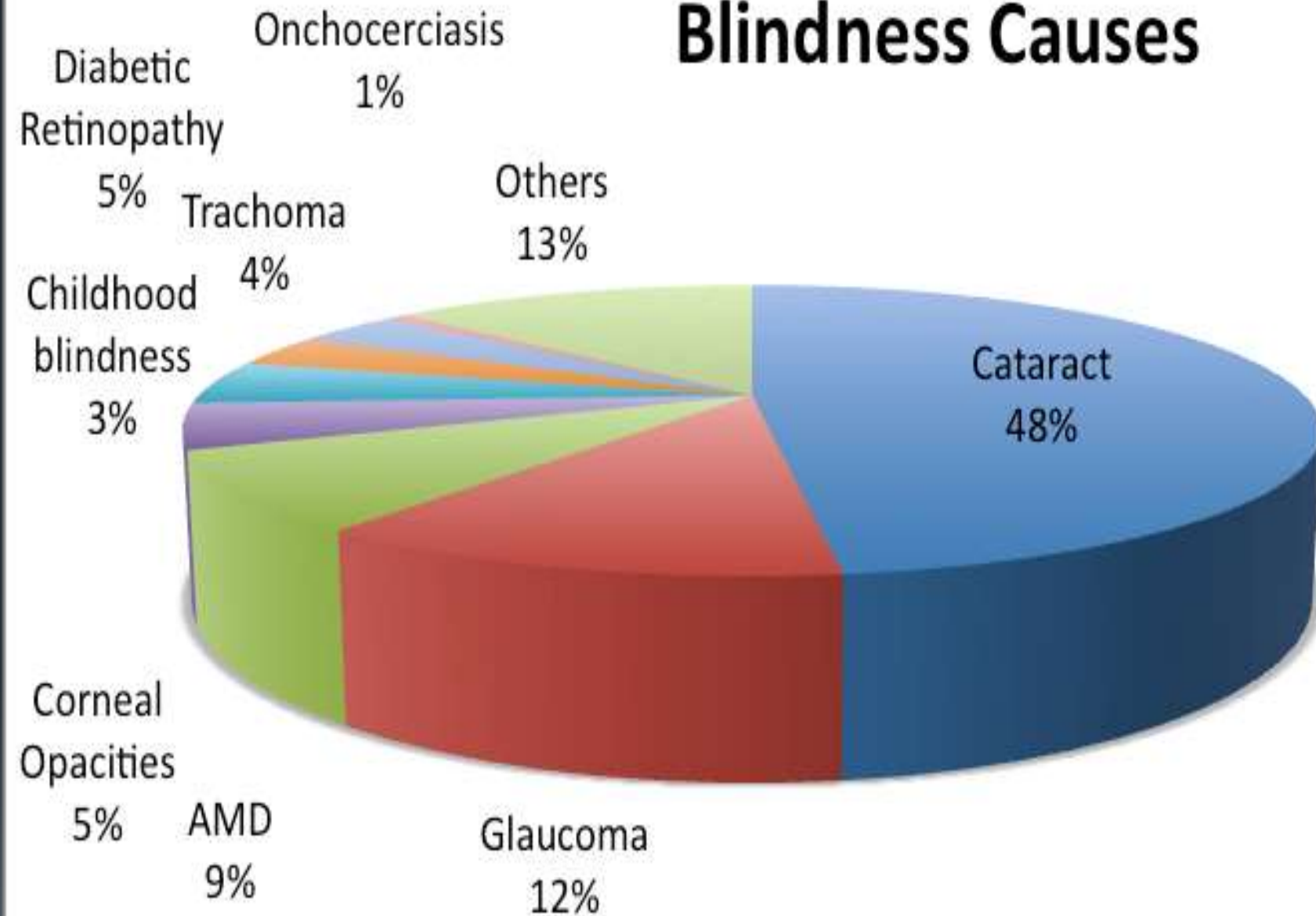
- 1.- Normal vision
- 2.- Moderate visual impairment
- 3.- Severe visual impairment
- 4.— Blindness



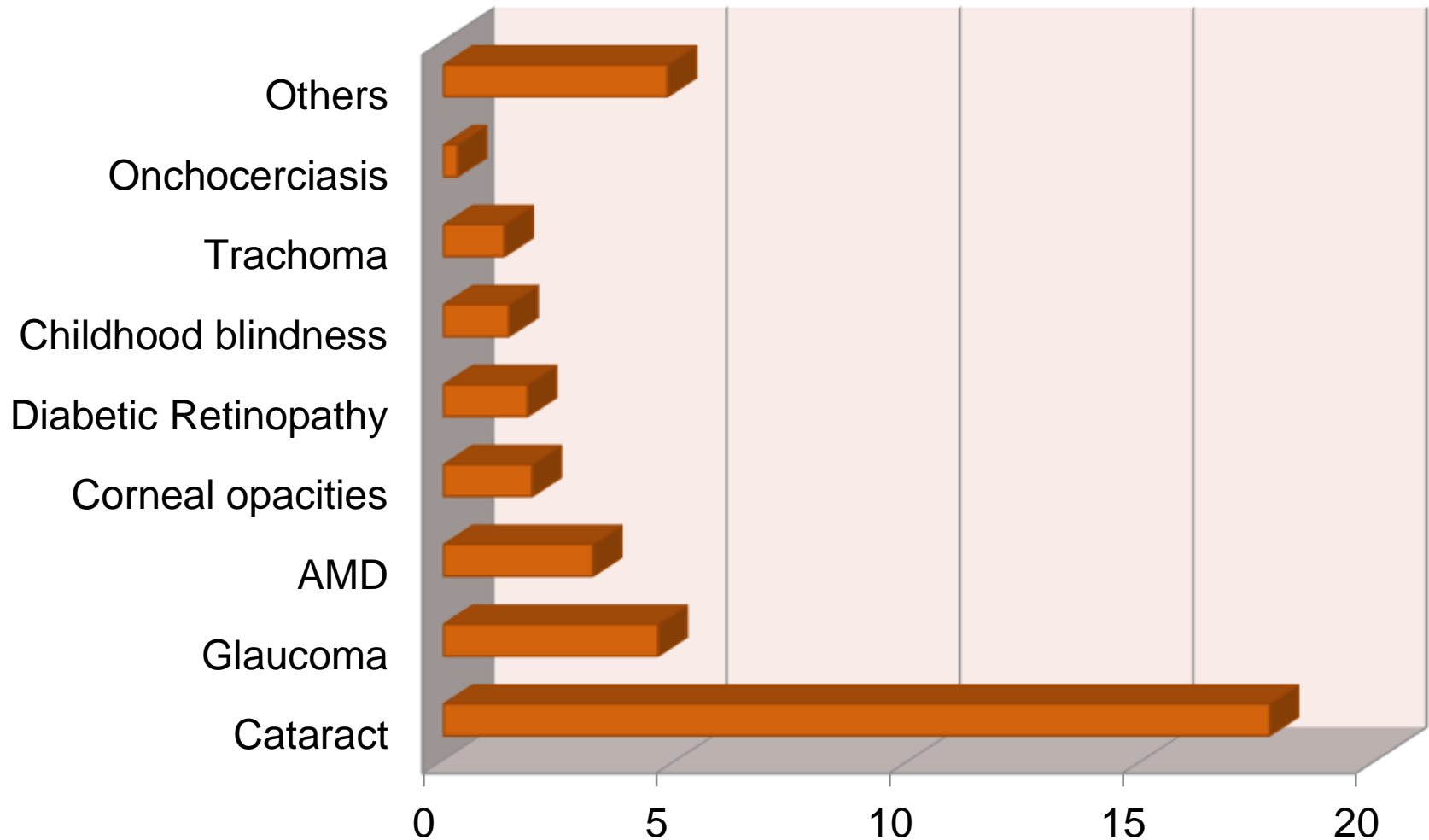
Proposed revision of categories of visual impairment		
Category	Worse than	Equal or better than
Moderate or visual impairment	3/10 (0,3) 1/10 (0,1) 20/70	6/60 1/10 (0.1) 20/200
Severe Visual Impairment	6/60 1/10 (0.1) 20/200	3/60 1/20(0.05) 20/400
Blindness 3	3/60 1/20(0.05) 20/400	1/60 1/50(0.02) 5/300 (20/1200)
Blindness 4	1/60 1/50(0.02) 5/300 (20/1200)	Light perception
Blindness 5	No light perception	



# Blindness Causes



## Causes of global blindness in millions of people (WHO 2002)





# Causes of VI

- Ocular Diseases
- Anamolies
- Environmental Factors
- Genetic Factors
- Refractive Errors

# causes of Blindness in Children

1.4 million children under age 15 are blind.

The major causes of blindness in children vary widely from region to region and are largely determined by socioeconomic development, the availability of primary health care and eye care services.

The available data suggests that, worldwide, corneal scarring is the single most important cause of avoidable blindness in childhood, followed by cataract and ROP.



# CATARACT



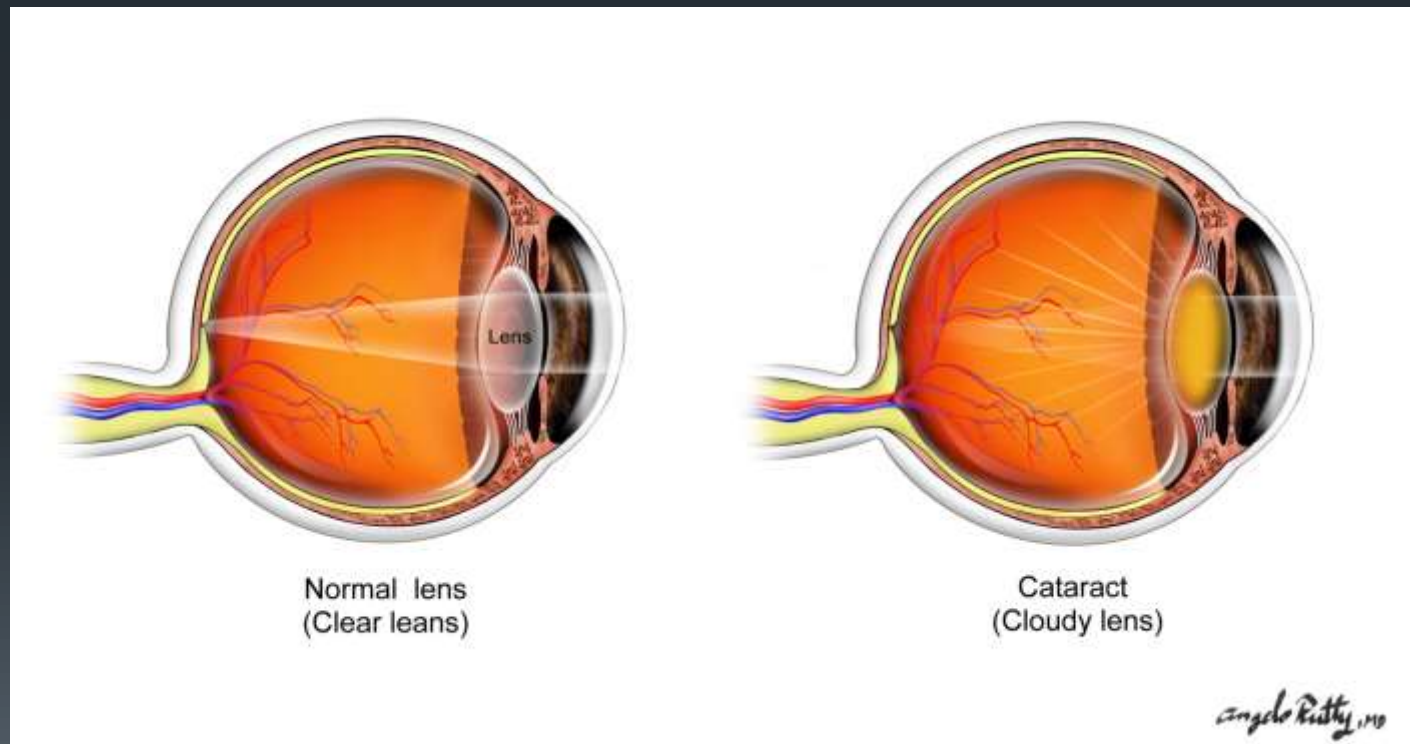
<http://www.who.int/entity/blindness/causes/cata%20djb%2096.JPG>



# CATARACT

- The primary function of the ocular lens is to transmit light and to focus it on the retina.
- A cataract occurs when the lens loses its clarity such that visual acuity is compromised.
- Cataracts can result from genetic, metabolic, nutritional, or environmental insults or can be secondary to other ocular or systemic conditions, such as diabetes.
- The most important risk factor is age; age-related cataract constitutes the great majority of all cataracts.
- Cataract remains the leading cause of blindness globally.

# CATARACT







# CATARACT TREATMENT

- There are no medications or eye drops to treat cataracts.
- Cataracts never get better on their own.
- Treatment for cataract is surgery to remove the cloudy lens and replace it with clear artificial lens.
- The surgery is usually performed on an outpatient basis under local anesthesia.
- Cataract surgery is one of the most cost-effective health interventions.

# GLAUCOMA





# GLAUCOMA

- Glaucoma is a group of diseases which results in progressive damage to the optic nerve.
- Optic nerve damage leads to slow irreversible constriction of peripheral vision and, if untreated, blindness.
- Optic nerve damage can be seen as excavation or 'cupping' of the optic nerve head.
- Glaucoma is often but not always associated with elevated intraocular pressure.

# GLAUCOMA



Normal vision



Glaucoma



# GLAUCOMA TREATMENT

Glaucoma can be controlled by lowering intraocular pressure using

- Medication (eye drops)
- Laser therapy
- Surgery

# AGE-RELATED MACULAR DEGENERATION





# AGE-RELATED MACULAR DEGENERATION

- Age related macular degeneration (AMD) results in progressive damage to the macula, the small area in the retina responsible for sharp and central vision.
- The major risks for AMD are age and family history.
- AMD causes central vision loss. Central vision is critical for reading and recognizing faces
- AMD is the leading cause of irreversible blindness in industrialized countries.



# AGE-RELATED MACULAR DEGENERATION



Normal vision



Macular degeneration



# AGE-RELATED MACULAR DEGENERATION

- Dry AMD is characterized by progressive atrophy of the retinal pigment epithelium, accumulation of retinal metabolic products and loss of retinal photoreceptor function.
- Dry AMD can be slowed using a combination of Vit A, Vit E, Vit C, Zinc and Copper.
- Wet AMD is characterized by bleeding underneath the retina
- Wet AMD is treated by injection of anti Vascular Endothelial Growth Factor antibodies into the eye

# DIABETIC RETINOPATHY





# DIABETIC RETINOPATHY

- Diabetic retinopathy (DR) is the leading cause of blindness in people of working age in industrialized countries.
- DR can be a complication of diabetes type 1 or type 2.
- DR results from damage to the blood vessels of the retina, the 'photographic film' of the eye.
- Initially, DR is asymptomatic. If not treated though it can cause low vision and blindness.
- Risk factors associated with DR include duration of diabetes and poor blood sugar control.



# DIABETIC RETINOPATHY TREATMENT

The best treatment for DR is prevention – control of blood sugar

Once DR threatens vision treatments can include:

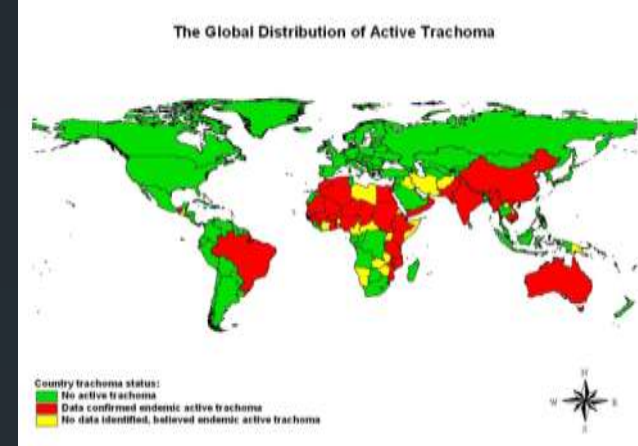
- Laser therapy to seal leaking blood vessels (focal laser)
- Laser therapy to reduce retinal oxygen demand (scatter laser)
- Surgical removal of blood from the eye (vitrectomy)

# Trachoma



# TRACHOMA

- Trachoma is caused by infection of the ocular surface by the bacteria *Chlamydia trachomatis* serotypes A-C.
- *Chlamydia trachomatis* is endemic in many countries of Africa Middle east, South America, and Asia.
- Trachoma can cause a severe inflammation of the ocular surface resulting in scarring of the eyelids. This causes eyelashes to grow in the wrong direction and rub the cornea (clear front 'window' of the eye)
- Multiple reinfections can cause scarring and opacity of the cornea.



<http://www.vision2020.org/image/Diagrams/global%20active%20may%202006.jpg>



# The Life Cycle of Trachoma

## INFECTING THE EYES

Flies carrying the micro-organism land on children's eyes, to feed on discharge.

## FAMILY CONTACT

Women who take care of children also get the infection.

## SPREADING OUT

Flies that breed in human feces spread the disease to others.

Dirty hands or face cloths also spread the disease.



## HOW TRACHOMA BLINDS



Infections inflame and thicken the upper eyelid.



Scarred eyelids turn inward.



The lashes scratch the cornea, leading to blindness.

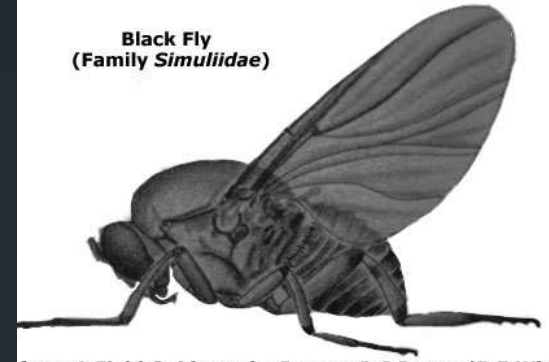


# TRACHOMA TREATMENT

- The World Health Organization (WHO) recommends carrying out an initiative called 'SAFE'. SAFE stands for:
- **S**urgery to repair damage to the eye.
- **A**ntibiotics to treat the infection.
- **F**ace washing to reduce the spread of infection.
- **E**nvironmental changes, such as providing access to clean water and suitable sanitation.

Mass antibiotic treatment with single-dose oral azithromycin reduces the prevalence of active trachoma and ocular infection in communities.

Black Fly  
(Family Simuliidae)



from A Field Guide to the Insects D.J.Borror/R.E.White

# ONCHOCERCIASIS

- Onchocerciasis, also known as river blindness, is caused by the filarial nematode *Onchocerca volvulus*
- This worm is transmitted by the *Simulium* black fly, which breeds in the rivers and streams of Africa, Brazil, Mexico, the Middle East, and parts of Central America.
- Onchocerciasis is endemic in at least 27 sub-Saharan African countries, and in Yemen
- Studies indicate that most eye clinical manifestations occur in response to degenerating microfilariae and the release of endosymbiotic *Wolbachia* bacteria.

[http://whqlibdoc.who.int/publications/2010/9789241500722\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241500722_eng.pdf)

# Onchocerciasis Treatment

- The treatment for onchocerciasis is ivermectin.
- A single dose of ivermectin needs to be taken annually to be effective
- Targeting endosymbiotic *Wolbachia* species has emerged as a new approach in the control of onchocerciasis
- *Onchocerca* embryogenesis is completely dependent on the presence of *Wolbachia*, studies of doxycycline therapy (100–200 mg/d for 6 wk) have shown great promise.



# Retinopathy of Prematurity





[ftp://ftp.nei.nih.gov/eye\\_exam/exam13\\_150.tif](ftp://ftp.nei.nih.gov/eye_exam/exam13_150.tif)

# Retinopathy of Prematurity (ROP)

- ROP is a disease that affects premature infants and is an important cause of childhood blindness in developed countries.
- Retinopathy of prematurity (ROP) results from damage to the retina due to incomplete development of retinal blood vessels prior to birth.
- The primary risk factor for ROP is low gestational age at birth and the smaller a baby is at birth the more likely that the baby is to develop ROP.
- Major risk factors
  - Low birthweight (less than 1500 grams)
  - Low gestational age (32 weeks or less)
- Over 80% of infants born at less than 28 weeks' gestational age develop ROP and 60% of infants born at 28–31 weeks develop ROP.



# Retinopathy of Prematurity

- Successful treatment for ROP requires early detection and timely laser therapy by skilled practitioners
- Despite improvements in detection and treatment, ROP remains a leading cause of lifelong visual impairment among children in developed countries



# Vitamin A deficiency





# Vitamin A deficiency

- Vitamin A deficiency (VAD) can result in Xerophthalmia (severe dryness and scarring of the eye), corneal ulceration and perforation (keratomalacia) and night blindness
- VAD is the single most important cause of childhood blindness in developing countries.
- An estimated 2.8 million preschool-age children are at risk of blindness from VAD
- Vitamin A supplements at a cost of only 5 US cents a dose, can reduce child mortality by up to 34% in areas where Vitamin A deficiency is a public health problem

# Education

- Approximately 90% of visually impaired children in low-income countries are deprived of an education. Lack of infrastructure, affordable health care, production of accessible and suitable school materials and qualified teachers prevent visually impaired children from attending school

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<http://www.kilimanjaro-blindtrust.org/pictures/school10.JPG>

"Alone we can do so little, together we can do so much."

Helen Keller