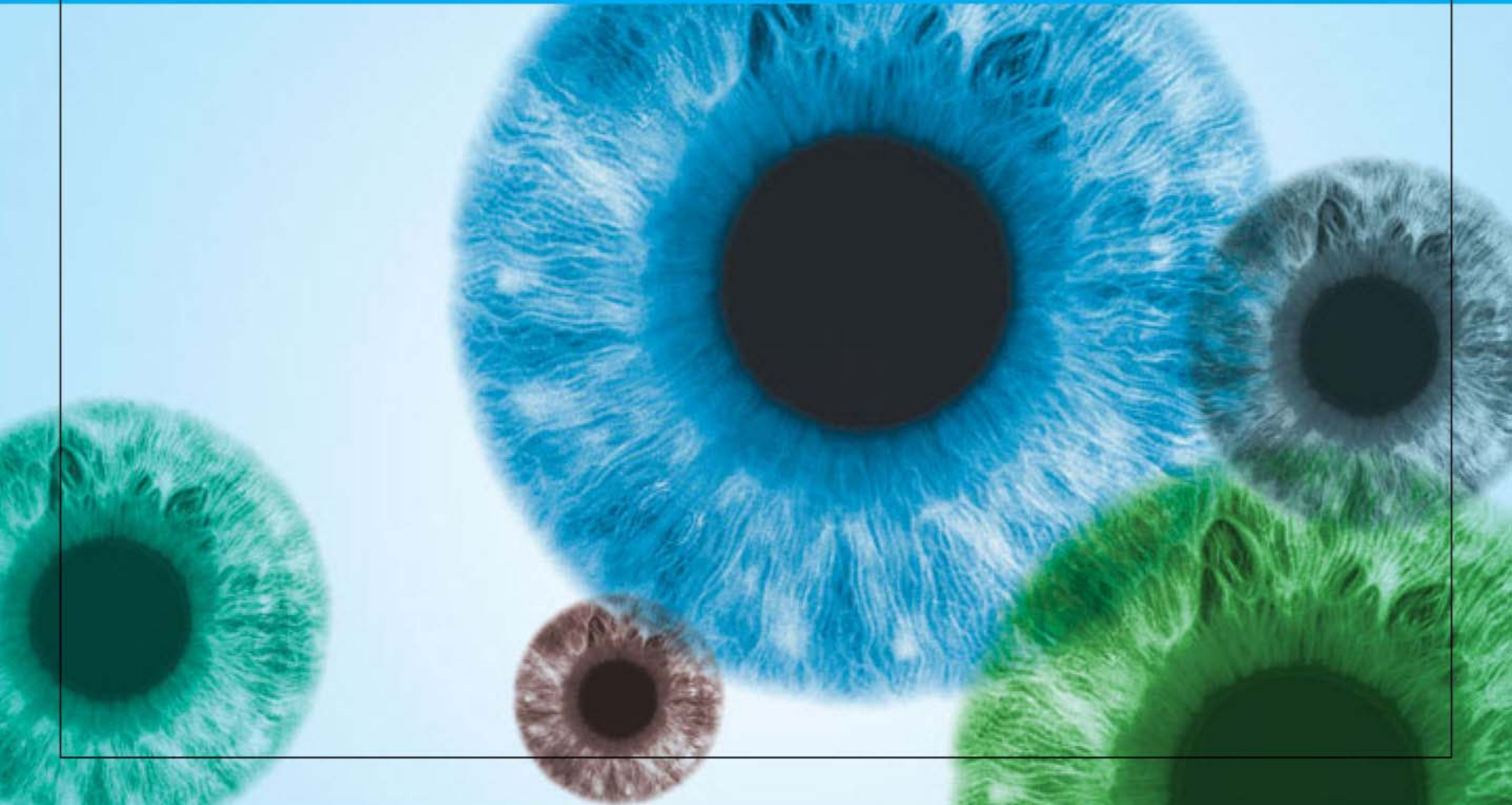


# How The Eye Works

*Michigan Medical, P.C.*

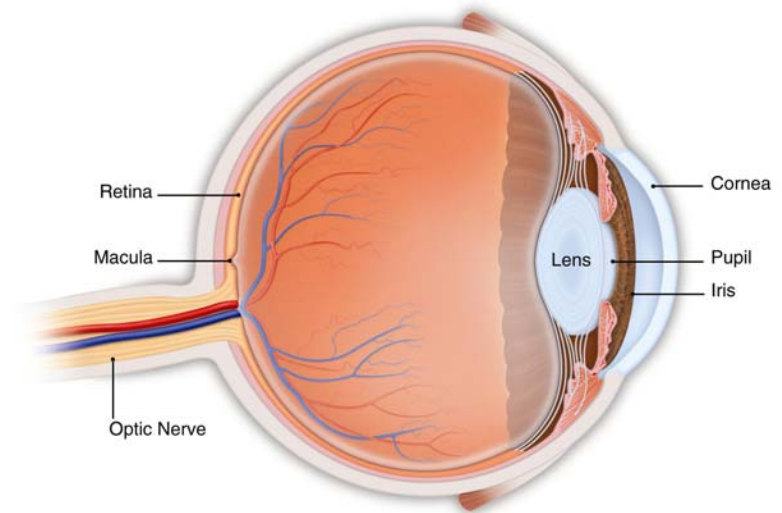
*Ophthalmology*

*Dr. Marko Habekovic*



# The healthy eye

- Light rays enter the eye through the clear cornea, pupil and lens.
- These light rays are focused directly onto the retina, the light-sensitive tissue lining the back of the eye.
- The retina converts light rays into impulses; sent through the optic nerve to your brain, where they are recognized as images.
- 70% of the eye's focusing power comes from the cornea.

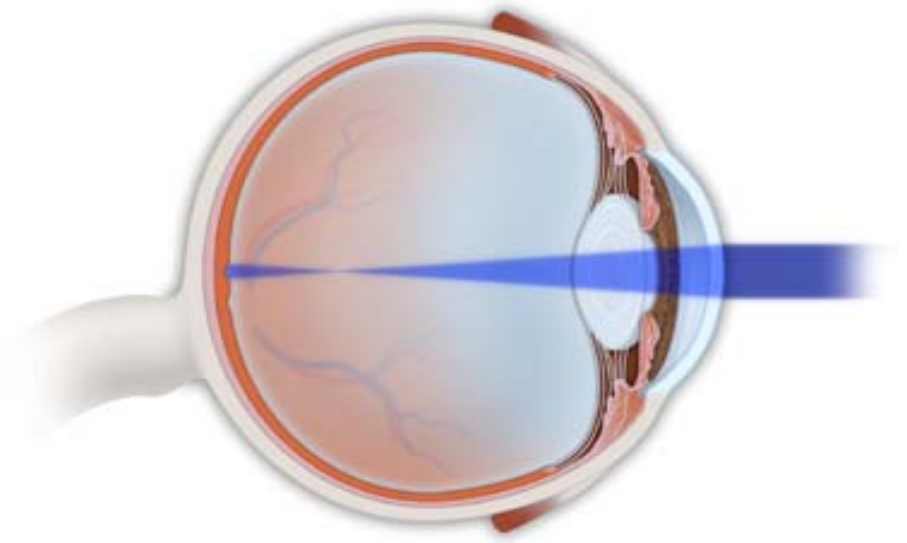


# Refractive errors

- **Inability to see clearly is often caused by refractive error.**
- **Four types of refractive error:**
  - Myopia (nearsightedness)
  - Hyperopia (farsightedness)
  - Astigmatism
  - Presbyopia

# Refractive errors

- In myopia (nearsightedness), the distance between the cornea and the retina may be too long.
- Light rays focus in front of the retina instead of on it.



Myopia

# Refractive errors

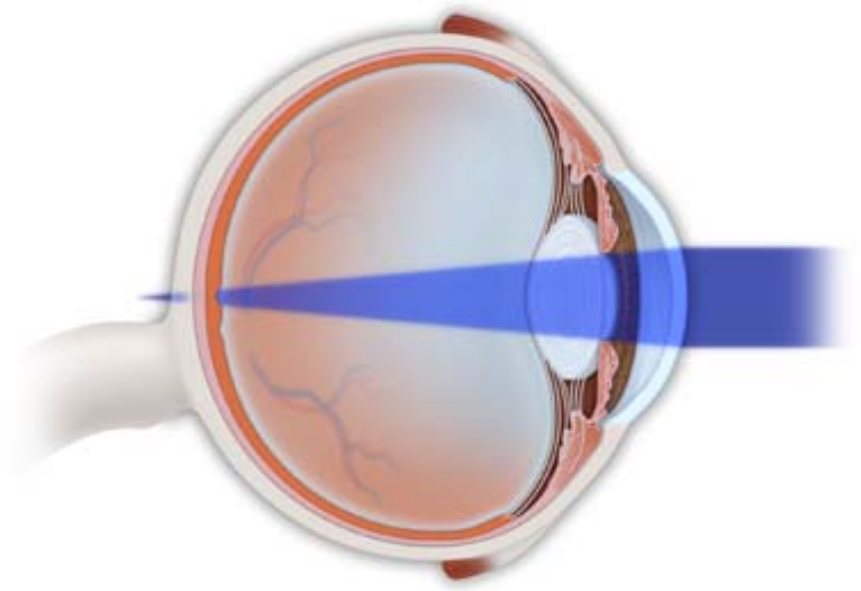
- **Close objects will look clear, but distant objects will appear blurred.**



**Myopia, or nearsightedness**

# Refractive errors

- In hyperopia (farsightedness), the distance between the cornea and the retina may be too short.
- Light rays are focused behind of the retina instead of on it.



Hyperopia

# Refractive errors

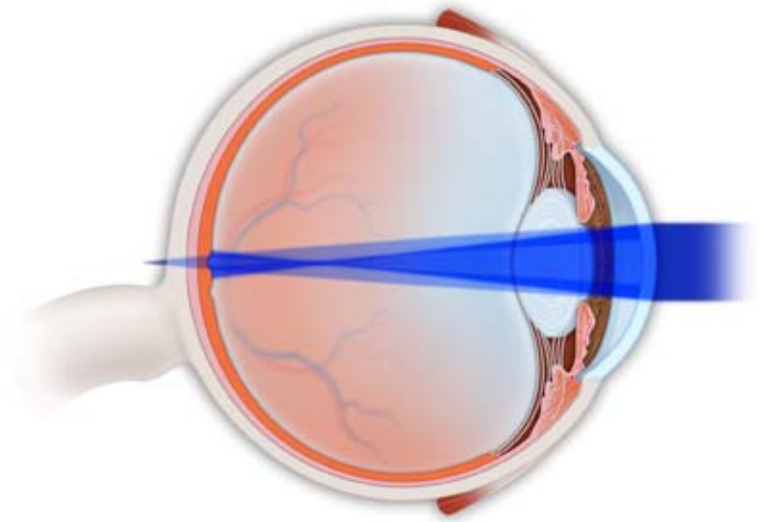
- In adults (but not children), distant objects will look clear, but close objects will appear blurred.



**Hyperopia, or farsightedness**

# Refractive errors

- In astigmatism, the cornea is curved unevenly—shaped more like a football than a basketball.
- Light passing through the uneven cornea is not properly focused on the retina.
- Distance and close vision may appear blurry.



Astigmatism occurs when light passes through uneven cornea

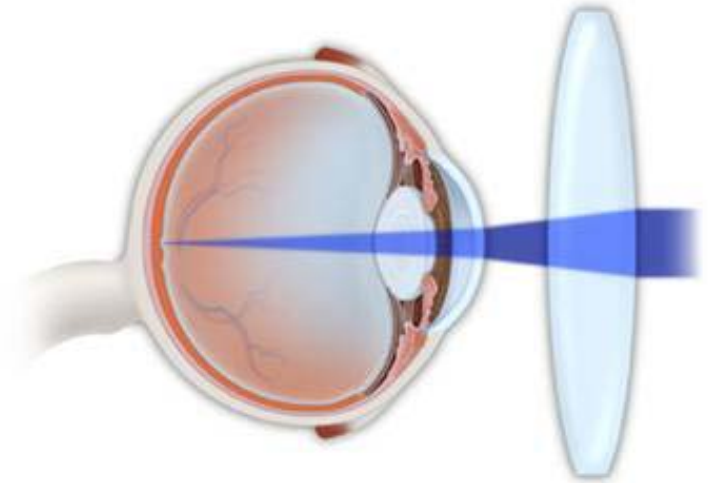
# Refractive errors

- **Presbyopia is a normal condition in which your eyes gradually lose the ability to see things up close.**
- **When we are young, the lenses in our eyes are flexible and are able to change focus easily between near and far objects.**
- **At around age 40, this flexibility begins to gradually decrease, making it more difficult to see objects up close.**



# Correcting refractive errors

- **Eyeglasses are the most common methods of correcting refractive errors; they refocus light rays on the retina.**

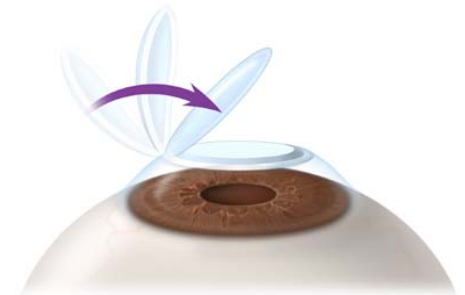
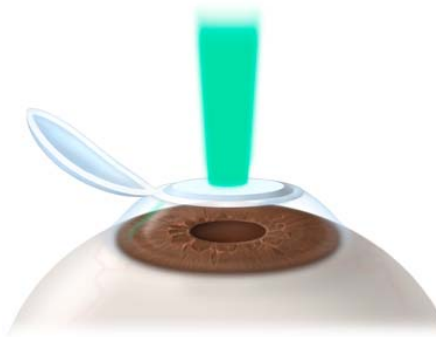
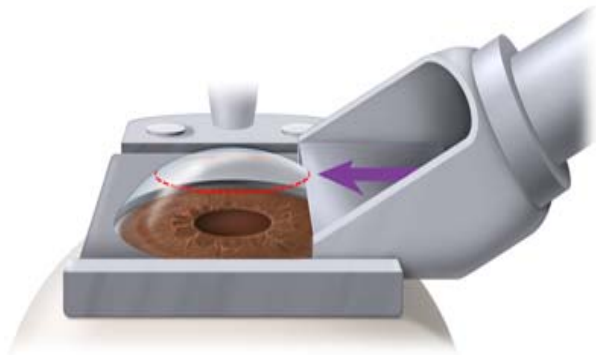


## Correcting refractive errors

- **Contact lenses: float on the tear film that coats the cornea—they refocus light rays on the retina.**

# Correcting refractive errors

- **Refractive surgery:** surgical procedure that alters the shape of your cornea to refocus light rays on the retina to improve vision.



**LASIK refractive surgery**

## Common causes of vision loss

- **Many kinds of eye disease can affect your sight; vision changes are not always evident right away.**



# Common causes of vision loss

## Age-related macular degeneration (AMD)

- A leading cause of severe vision loss in people over 65 years of age.
- Part of the natural aging process; the macula may lose effectiveness over time, or abnormal blood vessels grow under retina, affecting your central vision.
- Early stage AMD may be hardly noticeable, and may only occur in one eye.
- Symptoms: blurry vision; dark or empty areas in central vision; straight lines look wavy.
- No treatment for “dry” form of AMD; laser or photodynamic therapy (PDT) may treat “wet” form.



With AMD, dark areas may appear in your central vision

# Common causes of vision loss

## Glaucoma

- **Leading cause of blindness in the United States, especially for older people.**
- **Disease of the optic nerve; usually due to increased intraocular pressure (IOP). When optic nerve fibers are damaged, blind spots develop.**
- **Blind spots usually go undetected until optic nerve is significantly damaged.**
- **Treatment: eyedrops, laser surgery or conventional surgery may be required, depending on the type of glaucoma and its stage.**
- **Early detection and treatment are keys to preventing vision loss from glaucoma.**



**Normal vision**



**Vision as it might be affected by glaucoma**

# Common causes of vision loss

## Diabetic retinopathy

- **Diabetes Mellitus is the inability of the body to use and store sugar properly, resulting in high blood sugar levels.**
- **Results in changes in veins, arteries and capillaries in the body, including the eyes. Damage occurs to the fragile blood vessels inside the retina.**
- **Symptoms: blurred or decreased vision.**
- **Treatment: usually laser surgery; occasionally conventional surgery.**
- **You can significantly lower your risk of vision loss by maintaining strict control of your blood sugar level and making frequent visits to your ophthalmologist.**

# Common causes of vision loss

## Cataract

- **Age-related cataract is most common form.**
- **Eye's normally clear lens becomes cloudy, preventing light from focusing sharply on the retina.**
- **Symptoms: blurry vision; glare or sensitivity; poor night vision; yellowing or fading of colors.**
- **Treatment: surgery that removes the cloudy lens and replaces it with an artificial intraocular lens implant (IOL).**
- **If cataract symptoms are not adversely affecting your daily activities, you may not need surgery (simply have eyeglass prescription changed as needed).**

# Preserve good vision with regular visits to an ophthalmologist or other medical professional

- **Infants and young children should visit an ophthalmologist or other medical professional at the following intervals:**
  - Newborn to 3 months
  - 6 months to one year
  - 3 to 3 1/2 years
- **Other medical professionals include pediatricians, family physicians, nurse practitioners or physician assistants.**

# Preserve good vision with regular visits to an ophthalmologist

## Visit your ophthalmologist at the following intervals:

- **Age 20-29 years: At least once during this period.**
  - Those with risk factors for glaucoma (people of African descent or those who have a family history of glaucoma) should be seen every 3-5 years.
- **Age 30-39 years: At least twice during this period.**
  - Those with risk factors for glaucoma (people of African descent or those who have a family history of glaucoma) should be seen every 2-4 years.
- **Age 40-64 years: Every 2-4 years.**
- **Age 65 years or older: Every 1-2 years.**

