
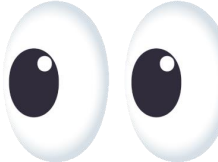


Why study Vision Science?

- Diabetic retinopathy - ~18 million Americans have diabetes. 75% will develop diabetic retinopathy. 
- Glaucoma - ~2.2 million Americans have been diagnosed with glaucoma. 2 million more may be undiagnosed.
- Age-related Macular Degeneration (AMD) – One study estimates 11 million Americans and 196 million worldwide in 2020 have AMD. 
- Inherited retinal diseases (IRDs) - ~200,000 Americans and several million worldwide as of 2013.
- IRDs are the most common cause of childhood blindness worldwide.

What is Retinitis Pigmentosa (RP)?

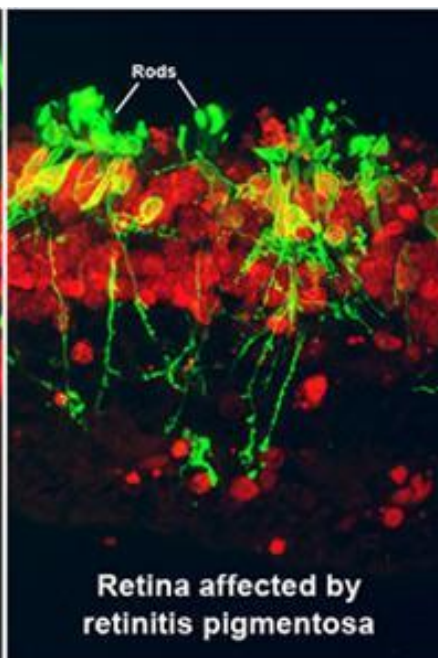
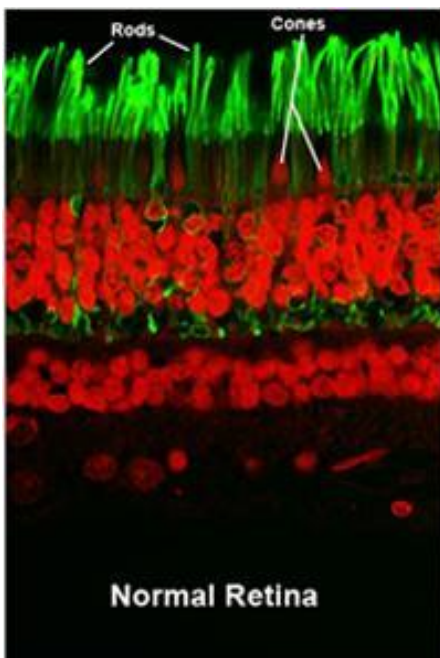
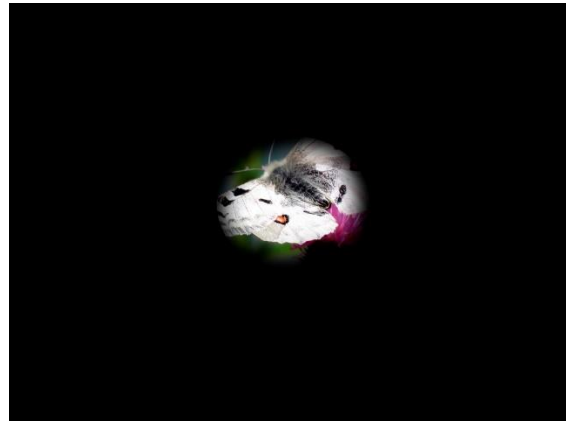
- RP results from the death of rod photoreceptors, and later, cones (cells in the retina).
- Night blindness and a progressive loss of the peripheral visual field, developing tunnel vision.



Normal Vision



RP Vision



NASA needs you



What is SANS?

- It is Space-Associated Neuro-Ocular Syndrome.
- It is experienced by members of the International Space Station.
- Symptoms include swelling in the optic disc, which is where the optic nerve enters the retina and flattening of the eye shape.
- SANS represents a critical risk for deep space exploration, where astronauts will experience spaceflight for longer periods of time and cannot easily return to Earth to address a medical emergency.
- Future research is planned to study both the eye and brain.



Do you know?

- Humans (and all mammals) are unable to grow new retinal cells after development ends.
- Once the mammalian retinal cells are lost due to injury or disease, they cannot be restored.
- However, many species including Zebrafish and Xenopus are known to have remarkable regenerative abilities.
- They are able to completely regenerate their retina and share the same gross structure of eyes as humans.
- Insights derived from retina regeneration and rewiring in these models may provide leverage to develop therapeutic targets to treat retinal degeneration.



Cataract



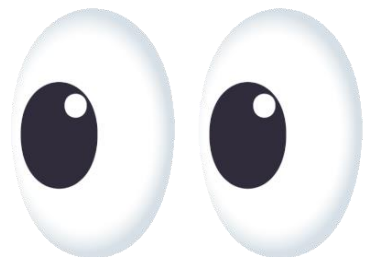
- A cataract is a clouding of the normally clear lens of the eye.
- **Cataracts** affect more than 24.4 million Americans aged 40 and older. By age 75, approximately half of all Americans have cataracts.



Normal Eye



Eye with Cataract





Refractive errors

- **Uncorrected Refractive errors:** Most prevalent, but treatable, visual impairments in the world
- ✓ More than 150 million Americans have a refractive error — but many don't know that they could be seeing better.
- ✓ Poor visual health impacts a teenager's life in multiple ways, affecting not only their school performance but also their overall development.

- More than 34 million Americans aged 40 and older are myopic, or 23.9% of that population.

- Nearly 14.2 million Americans aged 40 and older are hyperopic, or 8.4% of that population.

- Astigmatism occurs in about 1 in 3 people and may occur in combination with near- or farsightedness. It causes blurry vision and is due to the cornea being less than perfectly rounded.

VISION DISORDERS

