

*PD ExpertBriefing:*  
**More Than Meets the Eye: Vision Symptoms of PD**

**Led By:** Daniel Gold, D.O., Assistant Professor of Neurology,  
Ophthalmology, Neurosurgery, Otolaryngology,  
The Johns Hopkins University School of Medicine

Tuesday, March 3, 2015 at 1:00 PM ET.

To also view the session live on the computer by visiting:  
<http://event.netbriefings.com/event/pdeb/Live/vision/>

If you have any questions,  
please contact: Valerie Holt  
at [vholt@pdf.org](mailto:vholt@pdf.org) or call  
(212) 923-4700

**Parkinson's  
Disease  
Foundation**

# Introduction

Robin Anthony Elliott  
President

Parkinson's Disease Foundation

# **Vision and Parkinson's Disease**

Dan Gold, D.O.

Assistant Professor of Neurology,  
Ophthalmology, Neurosurgery,  
Otolaryngology

The Johns Hopkins School of Medicine



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# First, Some Important Questions and Background

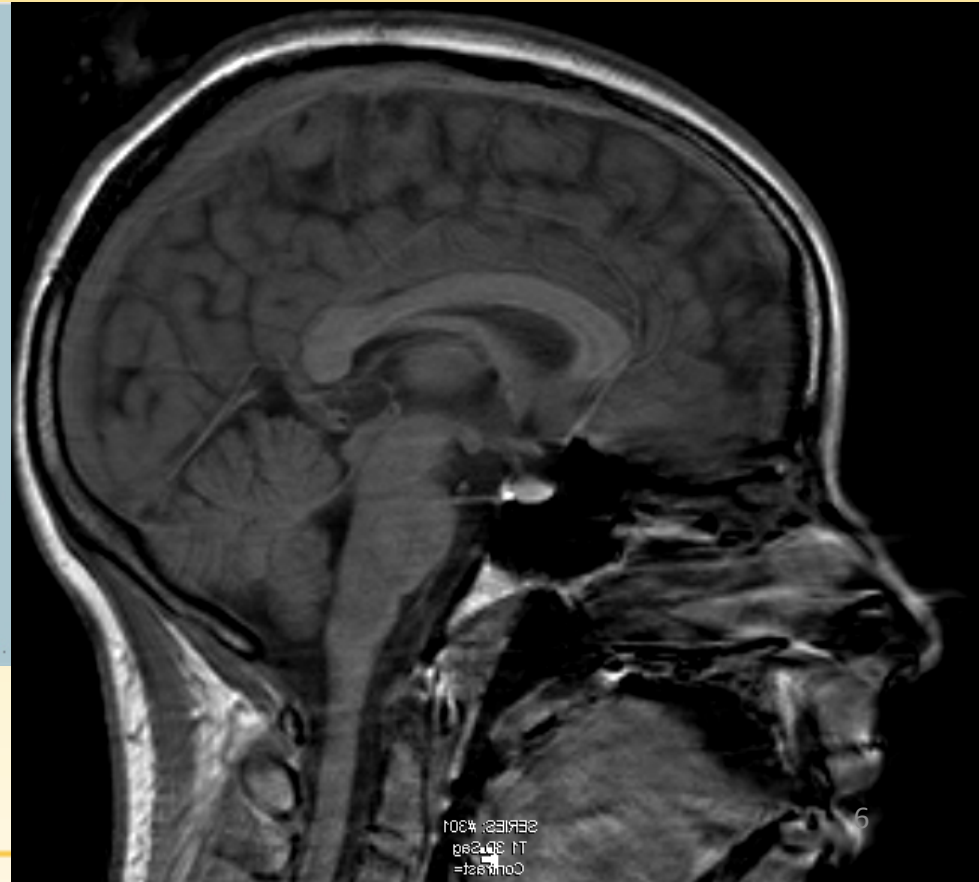
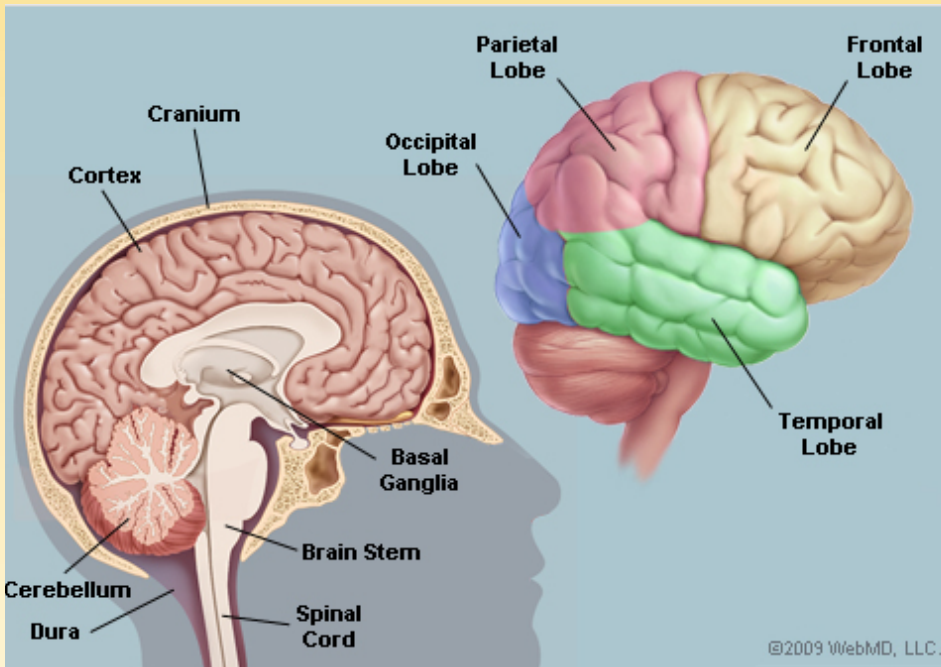
- 1) Why should I care about vision?
- 2) Why did I sign up for this webinar?
- 3) Who is this guy and what is a ***neuro-ophthalmologist***?
- 4) What visual symptoms should I be aware of?



# **1) Why Should I Care About Vision?**

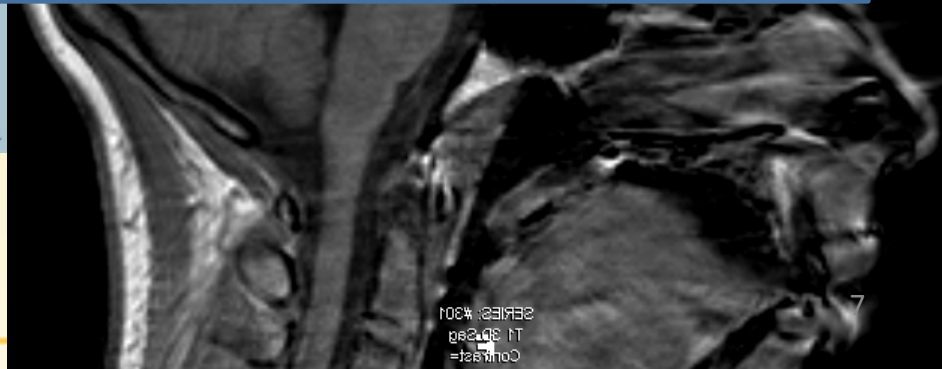
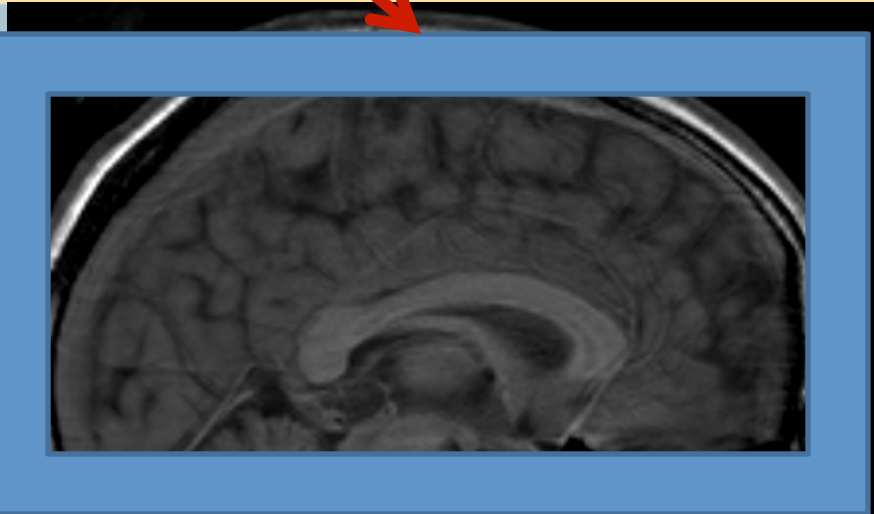
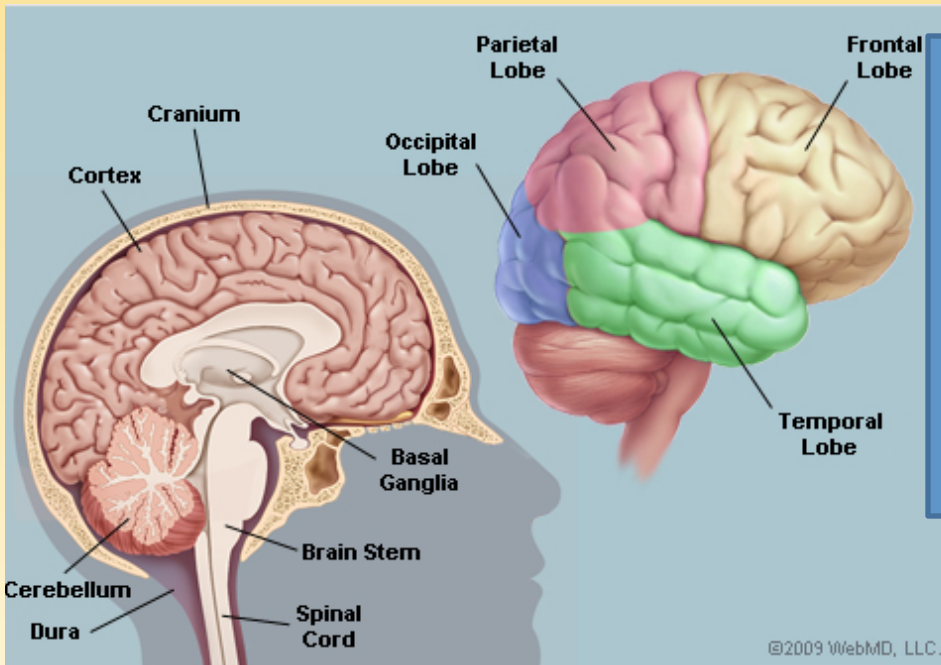
# Vision Is an Important Sense

- 30 percent of supratentorial mass dedicated to vision & visual perception



# Vision Is an Important Sense

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## **2) Why Did I Sign Up For This Webinar?**

# PD: Non-Motor Features

## 1) Visual symptoms

## 2) Sensory

- Anosmia
- Pain
- Akathisia
- Internal tremor
- Fatigue

## 3) Autonomic

- Orthostatic hypotension
- Bladder symptoms
- Constipation
- Sweating
- Dysphagia
- Erectile dysfunction

## 4) Sleep

- Insomnia
- Restless legs syndrome
- REM behavioral disorder
- Daytime sleepiness

## 5) Neuropsychiatric

- Depression
- Anxiety
- Panic attacks
- Apathy
- Executive dysfunction
- Dementia
- Hallucinations and delusions

# PD: Non-Motor Features

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# **3) Who is This Guy and What is a Neuro-ophthalmologist?**

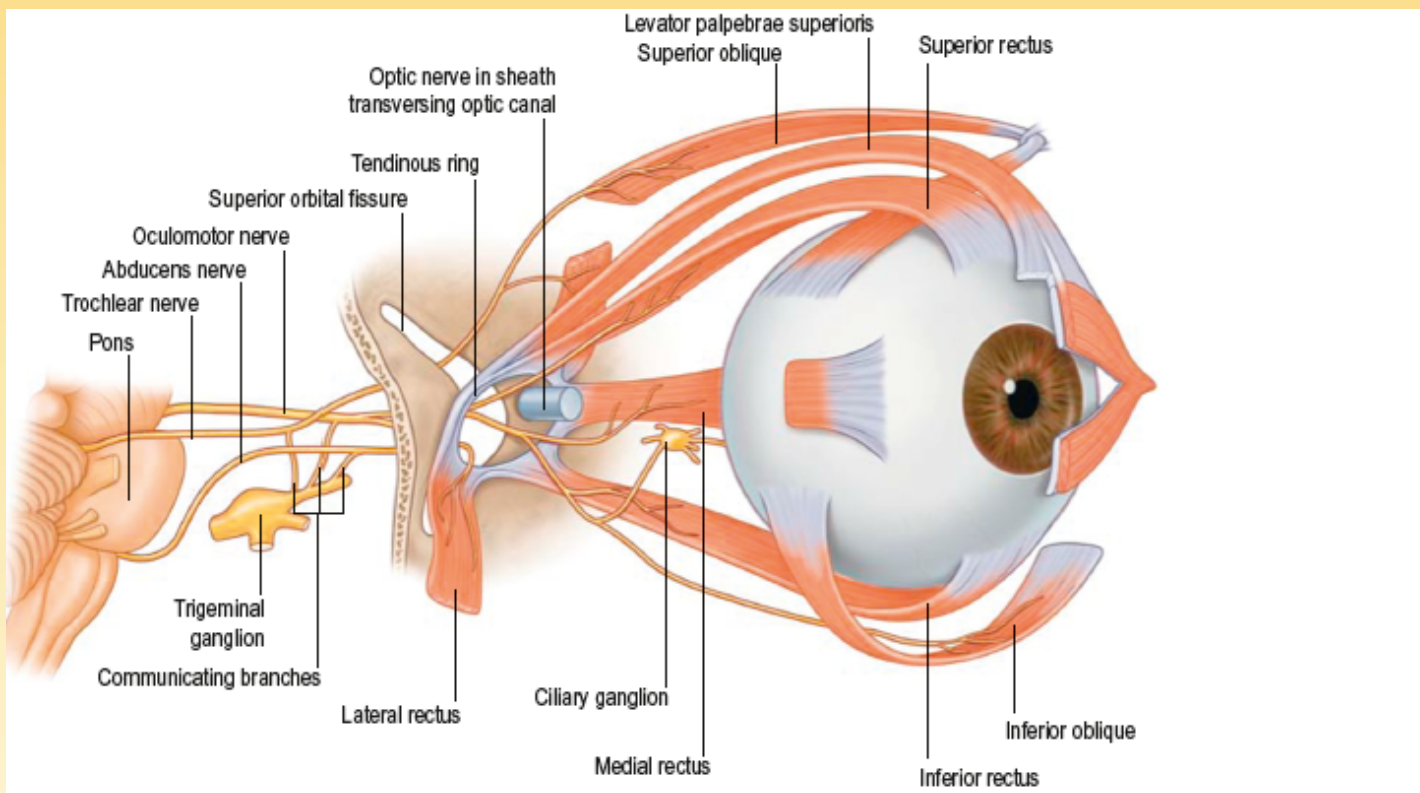
# What is Neuro-ophthalmology?

- How are we different from “regular eye doctors” or other doctors?
  - The three O’s
    - Optician (not a doctor)
    - Optometrist (O.D.)
    - Ophthalmologists (M.D., D.O.)
  - Neurologists (M.D., D.O.)



# What is Neuro-ophthalmology?

- Intersection of the eyes and brain



Liu GT, Volpe NJ, Galetta SL. Neuro-Ophthalmology: Diagnosis and Management. 2nd Edition. Elsevier, 2010.

# What is Neuro-ophthalmology?

- Intersection of the eyes and brain
  - Vision loss from
    - Diseases of the visual pathways connecting the eyes to the brain
  - Tumors of the eye socket
  - Disorders of the eye muscles or nerves that make these muscles act
  - Nystagmus or eye movement problems
  - Double vision problems

# How Do I Evaluate Visual Symptoms?

## Neuro-ophthalmology Exam

- Visual acuity (distance and near, with glasses)
- Color vision (even if colorblind)
- Visual field testing
- Pupil reactions
- Eye movements
- Position of your eyeball in the socket
- Sensory exam
- Health of the front of the eye
- Optic nerve appearance

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- Optic nerve appearance

- 1) Where is the problem?
- 2) What is the problem?
- 3) How can I help the problem?

# **4) What Visual Symptoms Should I Be Aware Of?**

# PD and The Eye

- **Common**

- Dry eye
- Reduced blink rate
- Decreased visual acuity, color vision, and contrast sensitivity
- Double vision
- Visual hallucinations

- **Uncommon**

- Blepharospasm
- Apraxia of eyelid opening
- Vertical eye movement limitations
- Other eye movement abnormalities

**Now that we got that out  
of the way, here's the  
talk...**

# Objectives

- 1) Understand why vision may be affected in PD.
- 2) Understand the normal interaction between the eyelids and ocular surface, and why symptoms arise in PD.
- 3) Understand characteristic eye movement abnormalities seen in PD.



# Where Might Visual Symptoms Come From?

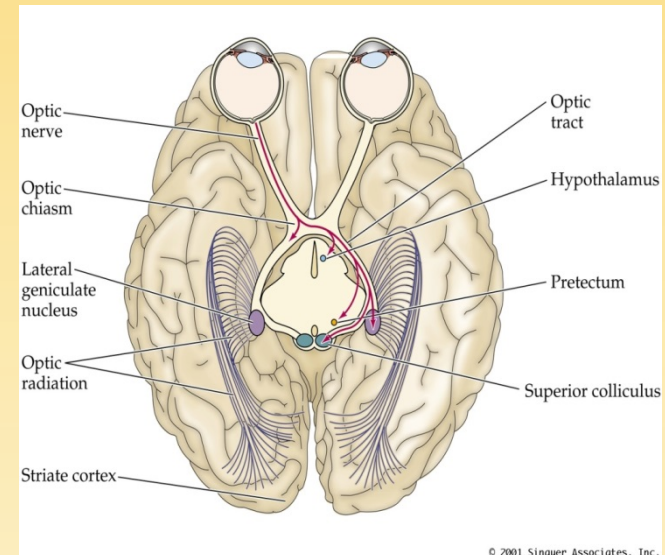
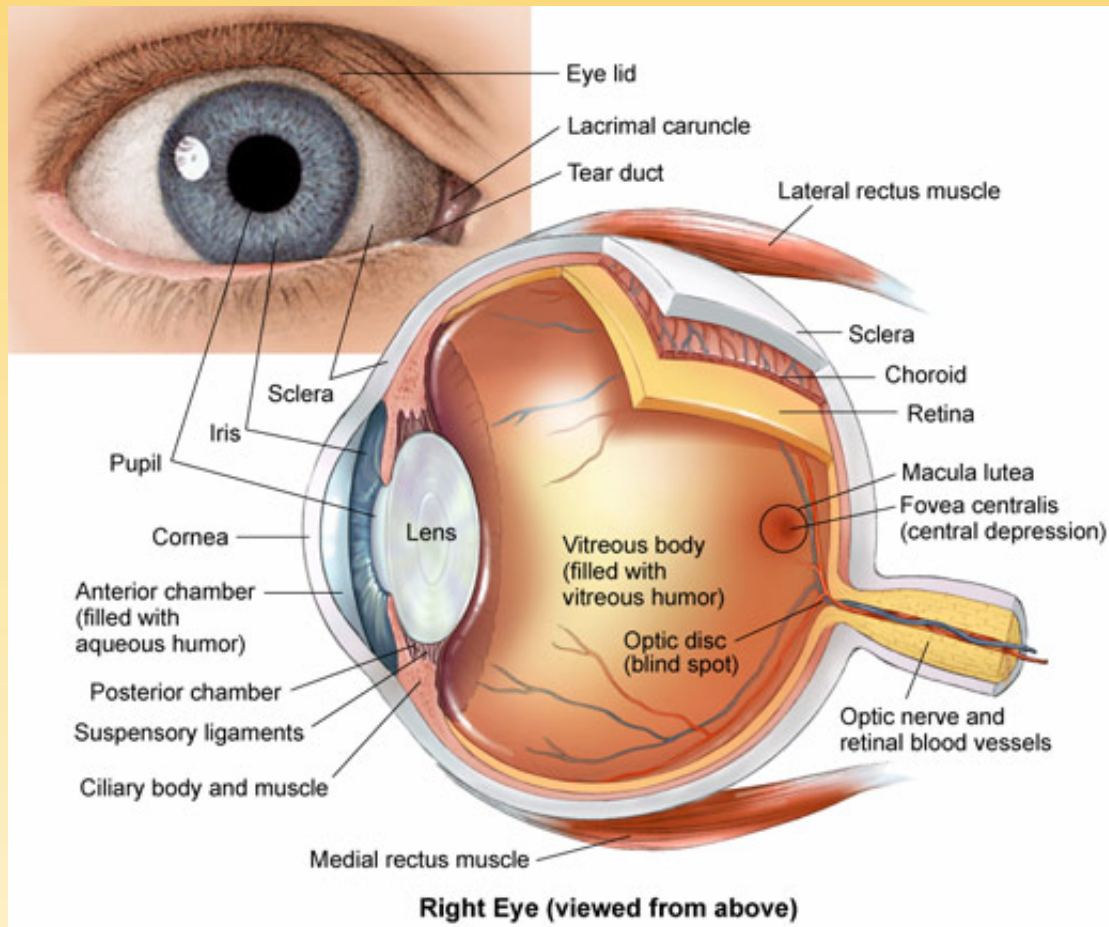
- 1) Central and color vision abnormalities
- 2) Blinking and ocular surface abnormalities
- 3) Eye movement abnormalities
- 4) Other
  - Hallucinations
  - Cataracts
  - Primary open-angle glaucoma

# **1) Central and Color Vision Abnormalities**

# Central and Color Vision Abnormalities

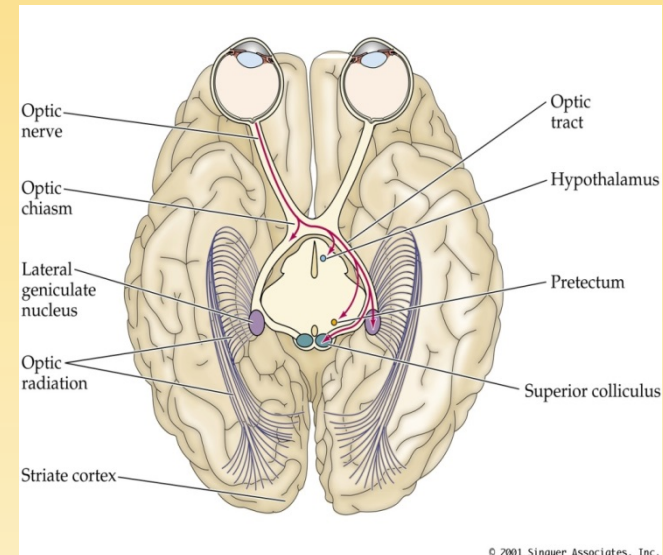
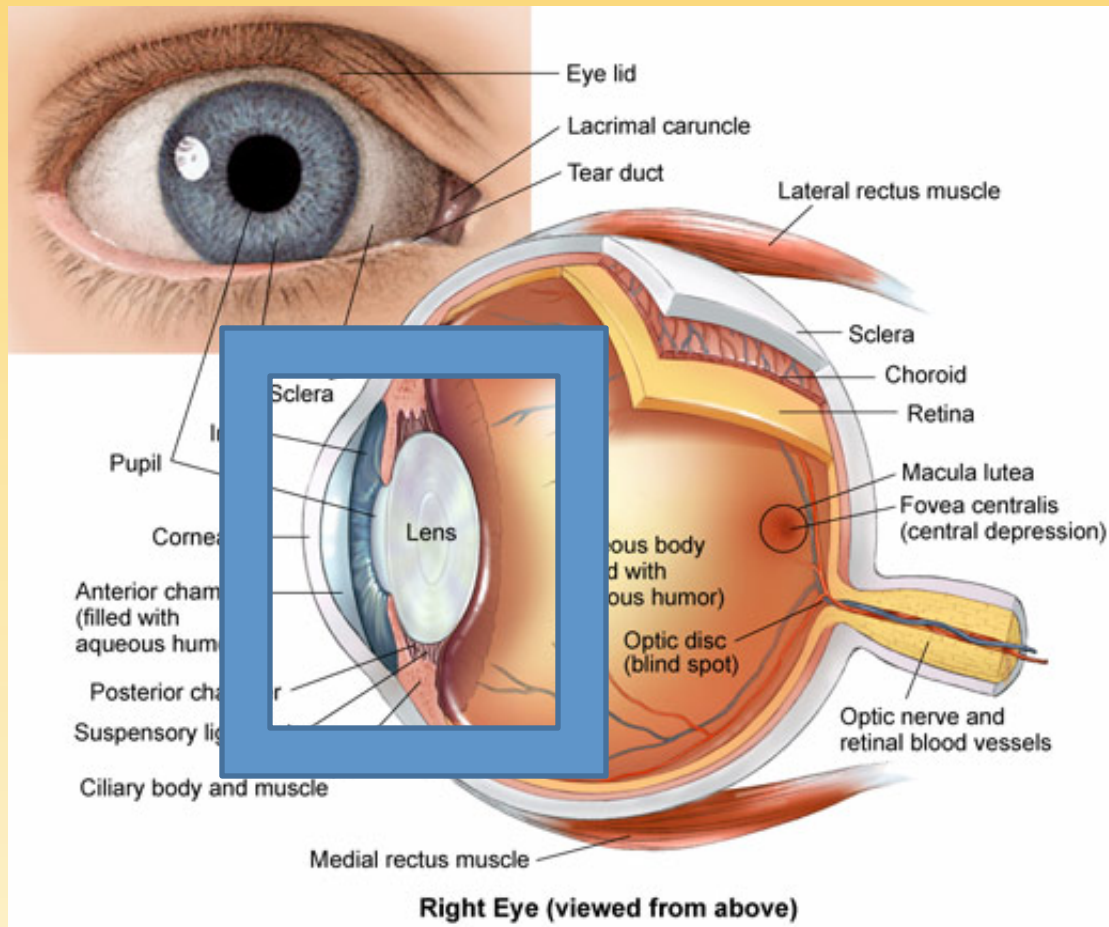
- First, a little bit of neuroanatomy...

# ANATOMY



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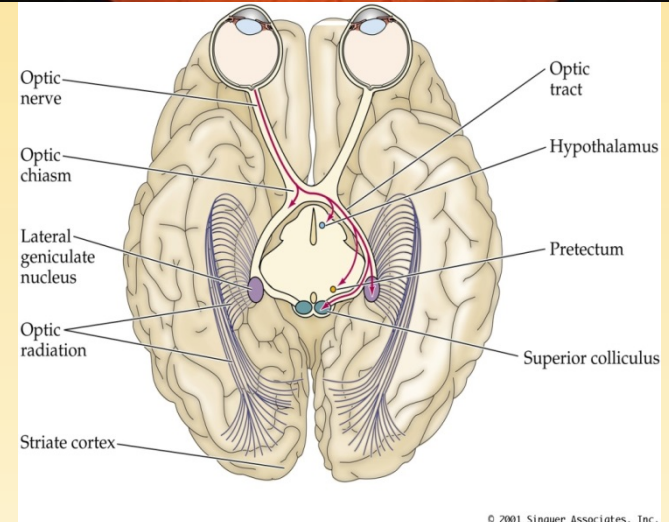
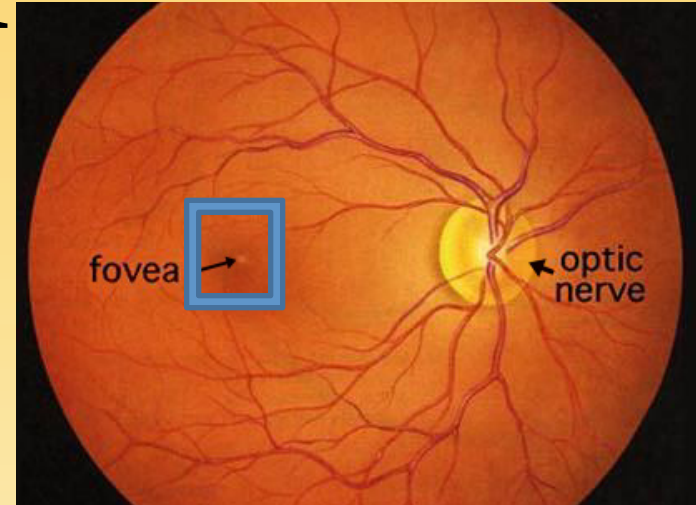
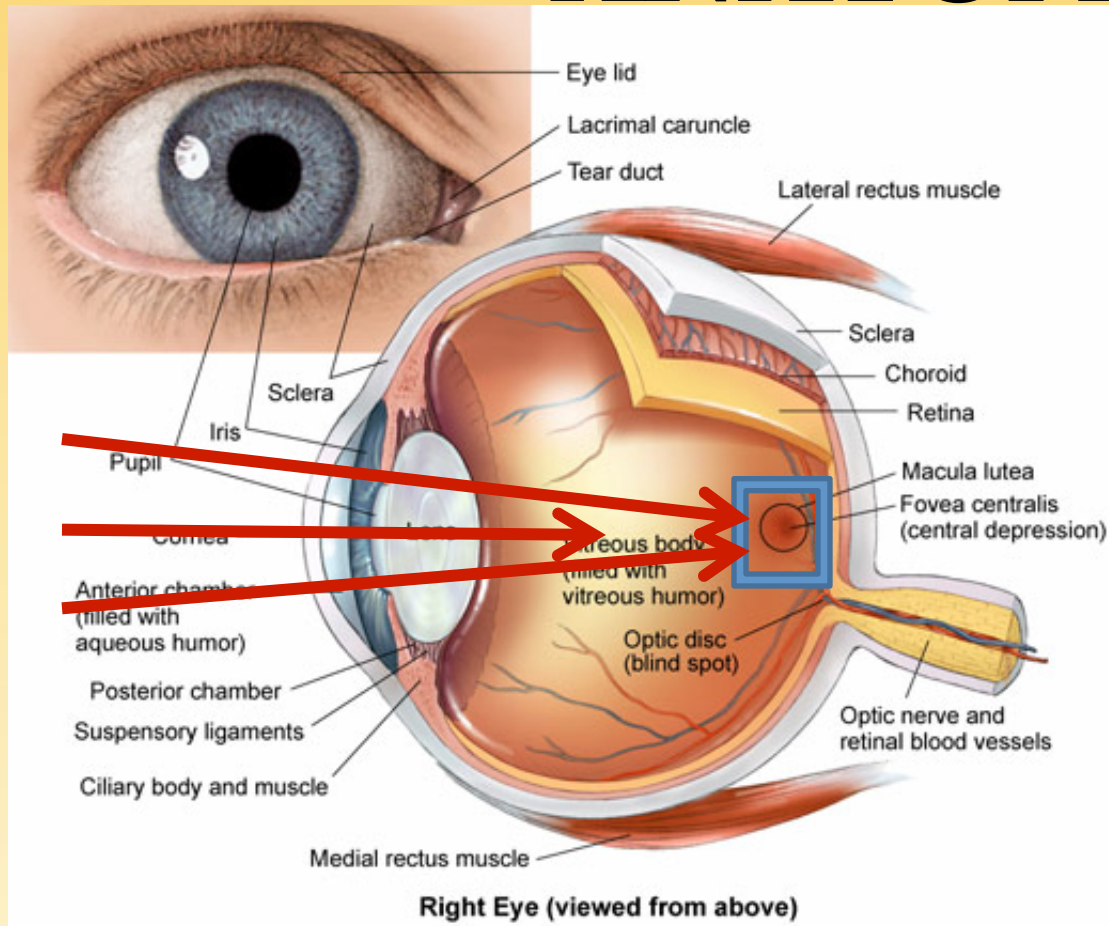
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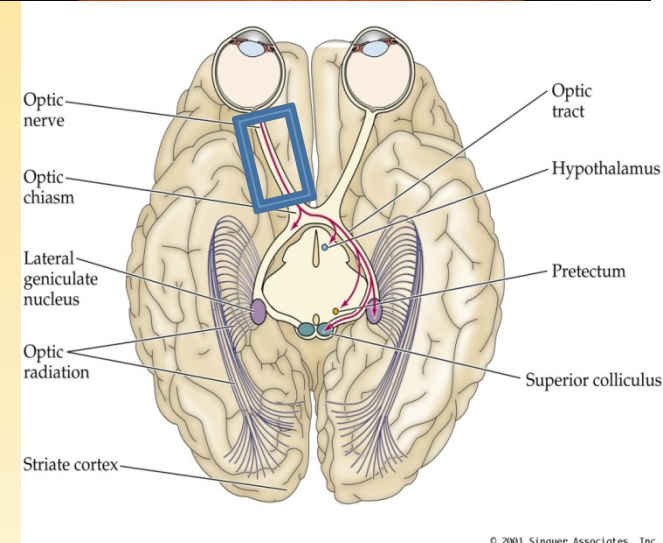
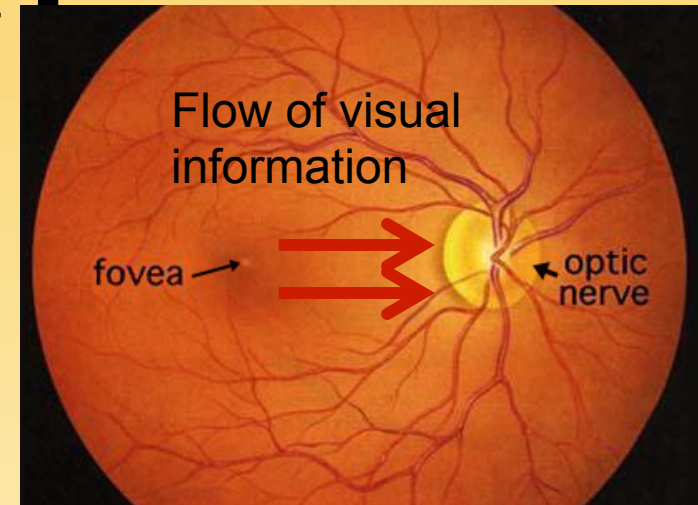
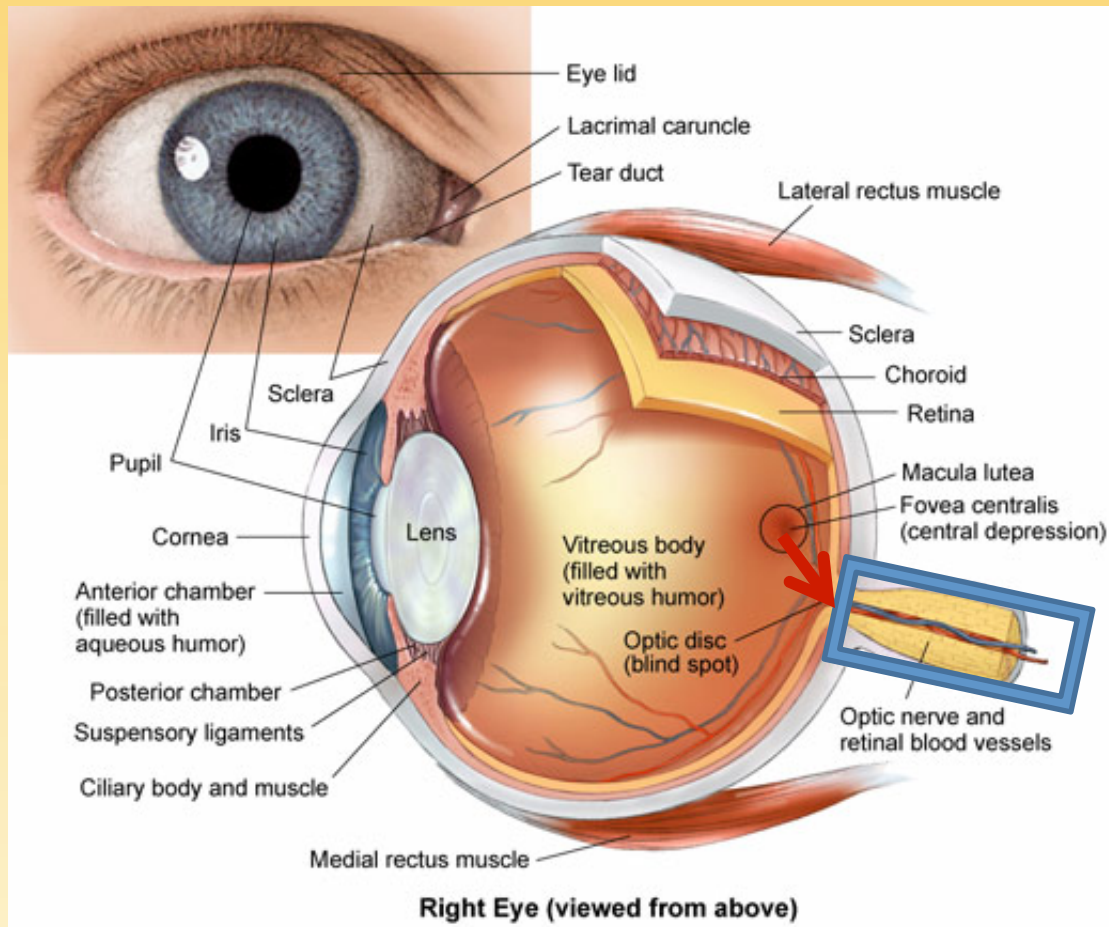


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[www.biographixmedia.com/human/eye-anatomy.jpg](http://www.biographixmedia.com/human/eye-anatomy.jpg)

**\*The eye is designed to focus the clearest possible image directly onto the fovea**

# ANATOMY

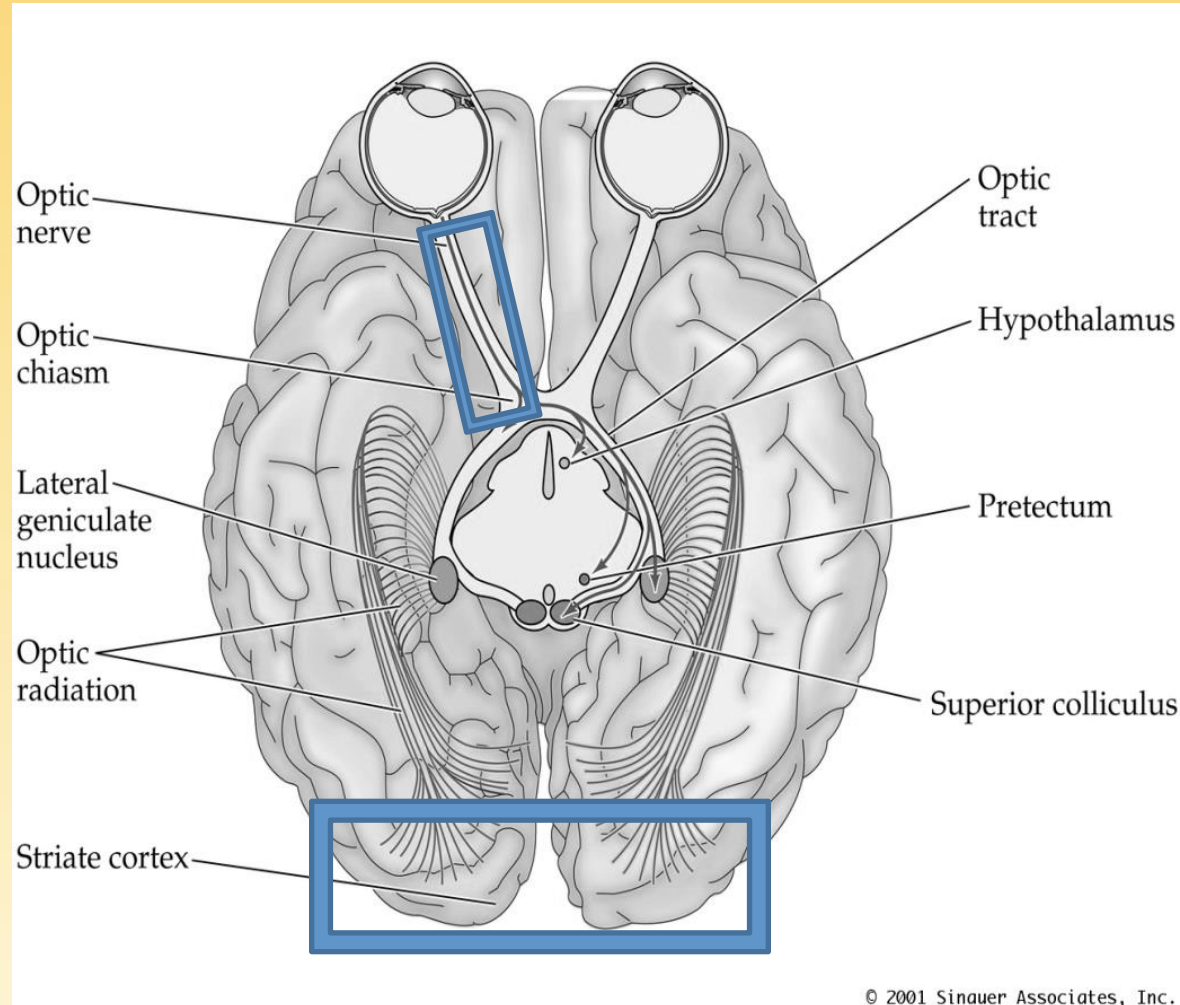
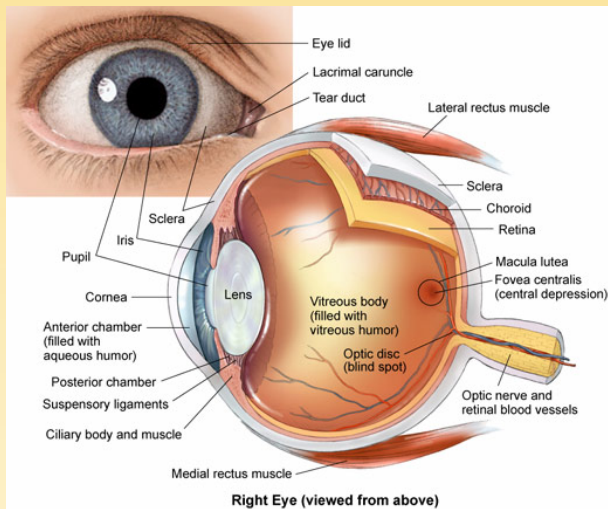


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**\*Visual information travels from the eye to the brain through the optic nerve**



# ANATOMY



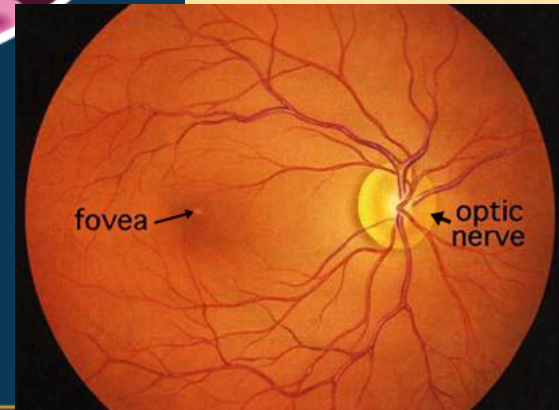
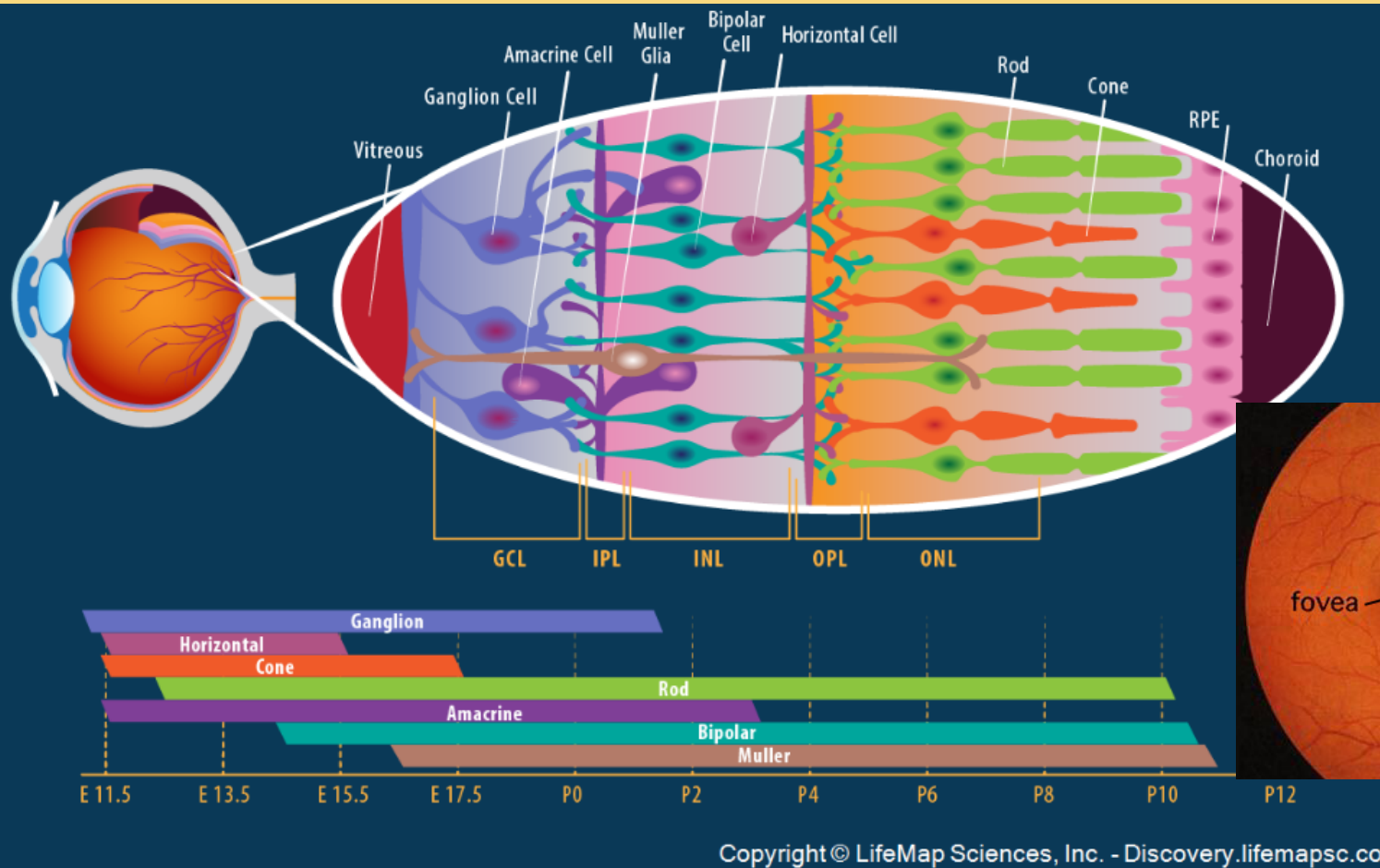
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[www.biographixmedia.com/human/eye-anatomy.jpg](http://www.biographixmedia.com/human/eye-anatomy.jpg)

**\*This visual information must find its way to the back of the brain for interpretation**



# RETINA



\*The retina is extraordinarily complex, and there are retinal cells that produce the dopamine precursor levodopa

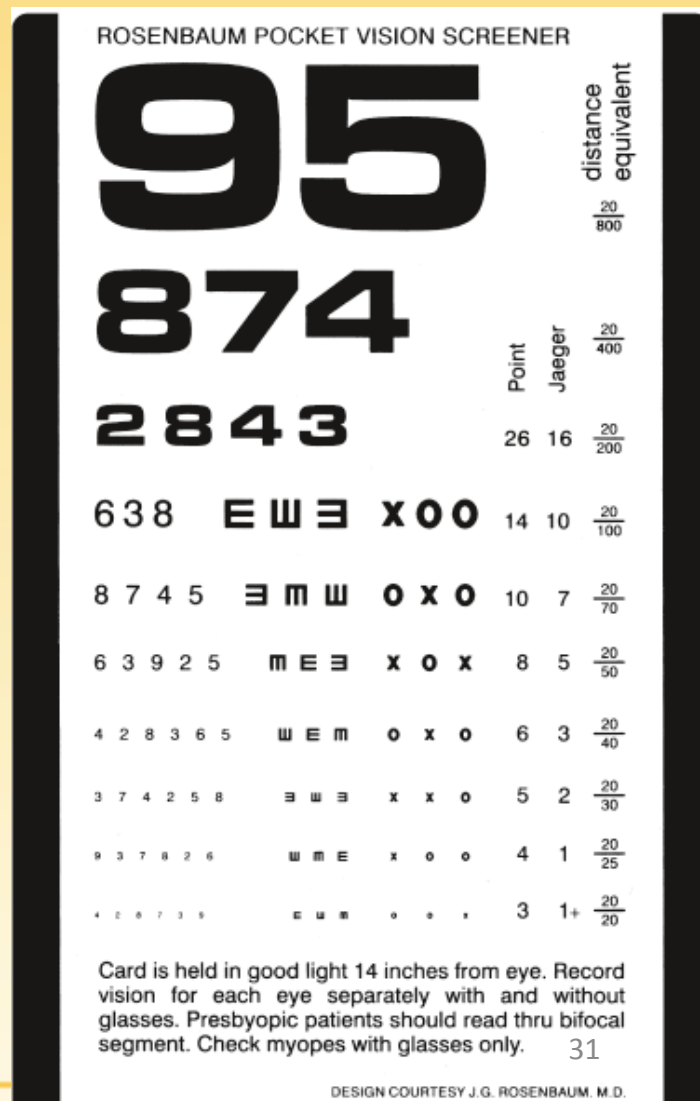
# SYMPTOMS of vision loss

- Decreased central/straight ahead vision
  - Trouble with driving, reading, watching TV
  - Unable to see details
- Poor contrast sensitivity
  - Rain, night, subtle shades
  - Glare, washed out images
- Decreased visual field (bedside and formal field testing)
  - Bumping into things
  - Loss of peripheral vision

# DIAGNOSIS of visual symptoms?

## Neuro-ophthalmology exam

- **Visual acuity (distance and near, with glasses)**
- Visual acuity is usually normal or near normal in PD



# DIAGNOSIS of visual symptoms?

## Neuro-ophthalmology Exam

- **Visual acuity (distance and near, with glasses)**
  - Other measures such as contrast acuity may show abnormalities



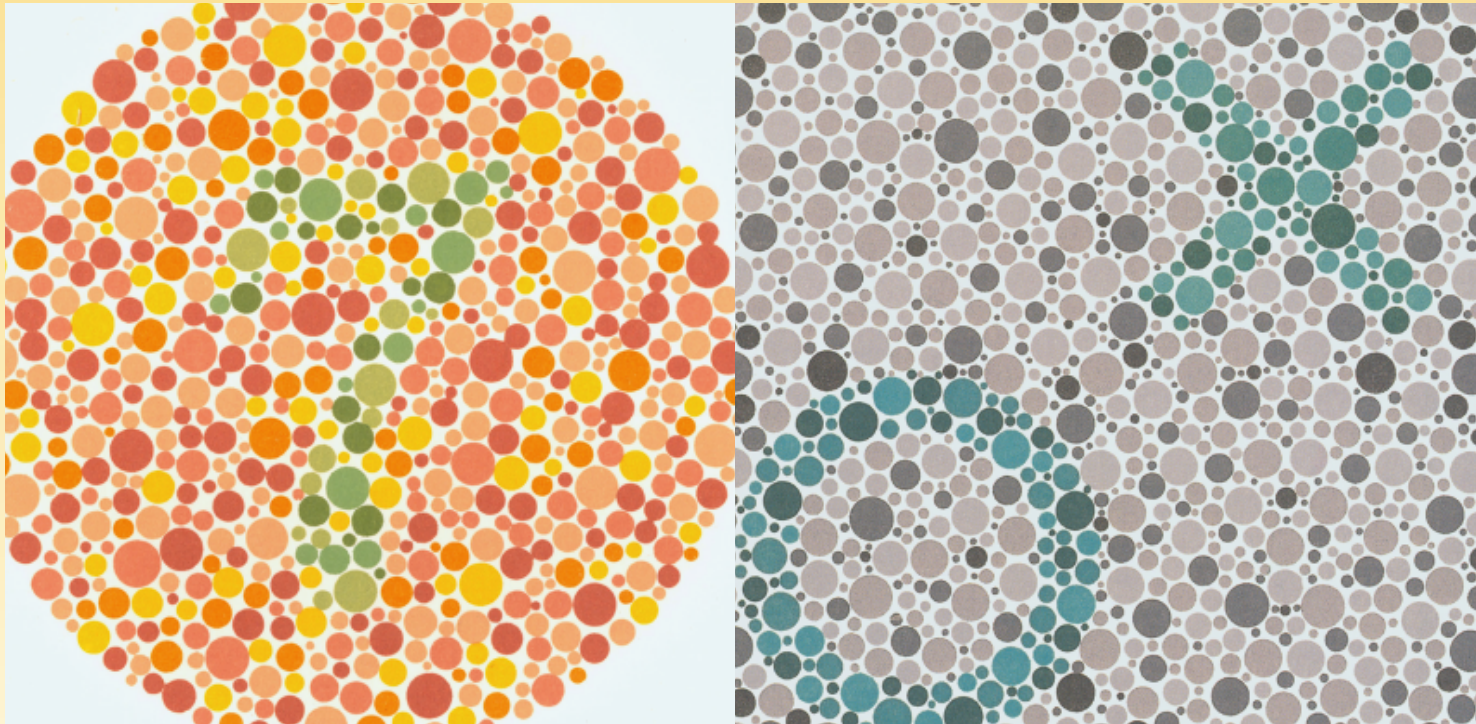
# **SYMPTOMS of impaired color vision**

- Colors are dull, less vibrant

# DIAGNOSIS of visual symptoms?

## Neuro-ophthalmology exam

- **Color vision**  
(even if colorblind)



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# **TREATMENT of Acuity and Color Dysfunction**

- Unfortunately, no good treatment
- Medications may help minimally
- Making sure that other treatable visual issues are addressed

## **2) Blinking and Ocular Surface Abnormalities**



# Why Should We Care About The Ocular Surface?

- Optical clarity
- Protects the eye
- Provides free movement of the eye
- Regulates hydration
- Normal blinking with dry eye → friction

# Why Do We Blink?

- Redistributes tear film uniformly
- Secretion of tears from tear glands
- Reduced (by up to 50 percent) when
  - Reading
  - Computer work
  - Driving

# SYMPTOMS of Ocular Surface Irritation

- Dry eyes
- Gritty/sandy sensation
- Burning
- Redness
- Crusting on the lashes
- Eyes getting stuck shut in the morning
- Sensitivity to light
- Pertinent medical history:
  - Dermatologic disease, menopause, autoimmune disease, medications (Artane/Trihexane Trihexyphenidyl )
- Pertinent ocular history:
  - Contact lenses, ocular surgery, allergy, eyelid trauma/surgery, facial palsy, topical medication use

# Ocular Surface and Blinking in PD

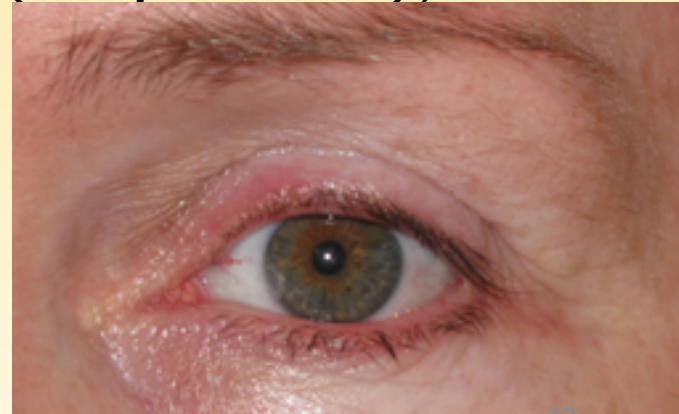
- Ocular surface
  - Poor tear production
- Blinking
  - Reduced
- Result:
  - Poor tear film, dry eye and irritation

# DIAGNOSIS of Ocular Surface Disease

- Thorough evaluation by an ophthalmologist or optometrist

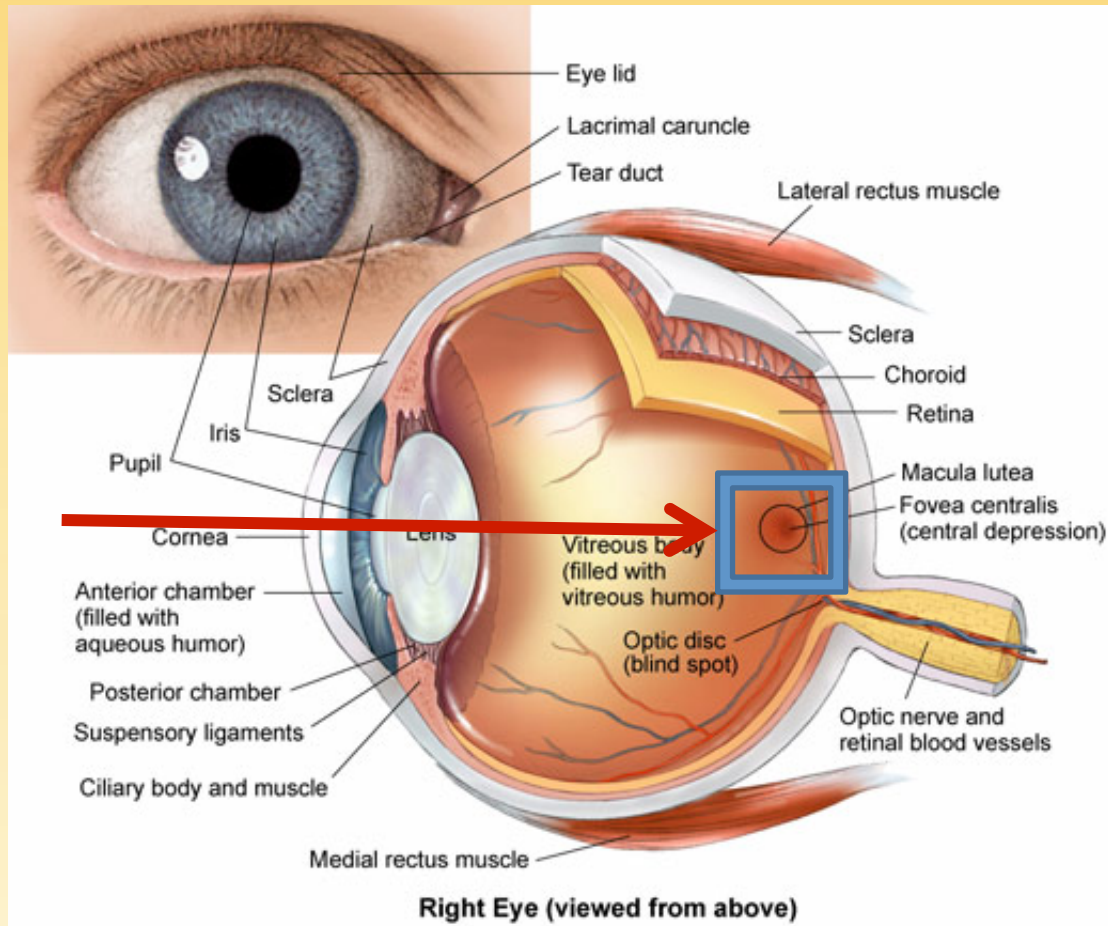
# TREATMENT of Ocular Surface Disease

- Artificial tears
  - Systane, Optive, Genteal, Refresh, others
    - Preservative free preferable
    - Three to four times daily and more as needed
    - Sometimes stronger prescription meds are needed (eg, Restasis)
  - If inflammation of the eyelids (blepharitis), hot compresses or lid scrubs
    - As directed by eye doctor

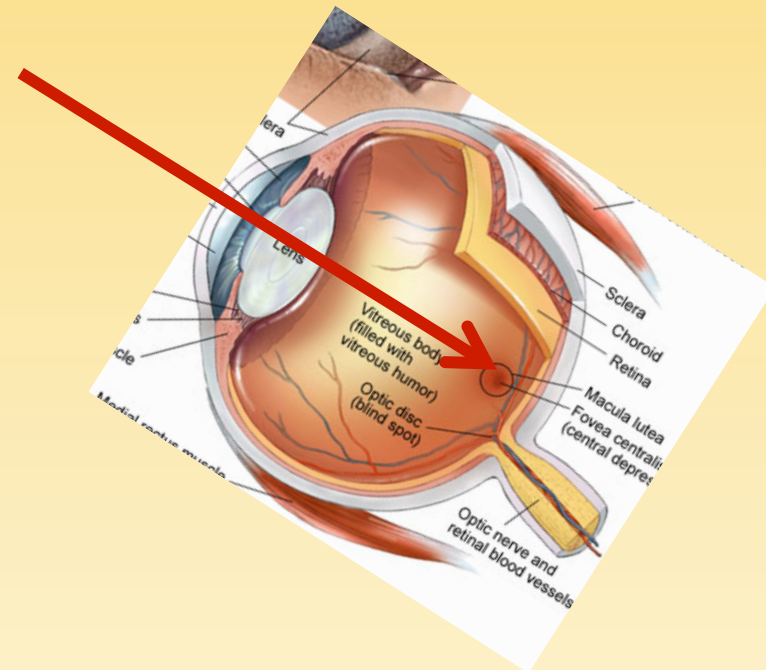


# **3) Eye Movement Abnormalities**

# Why Do The Eyes Move?



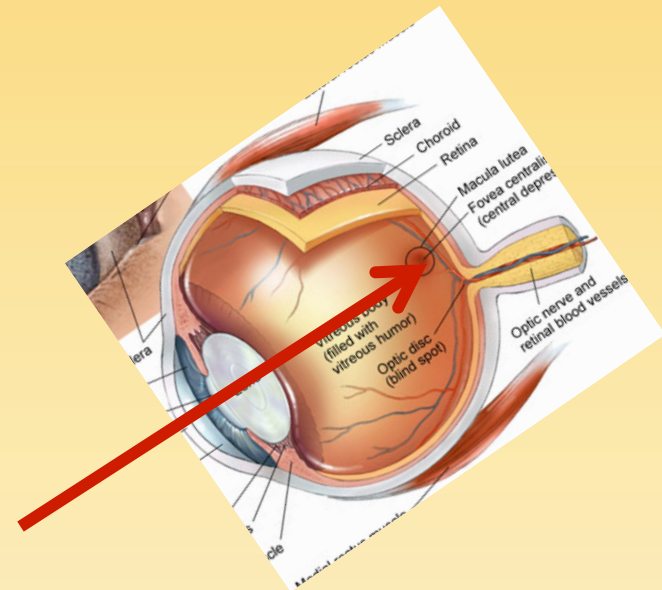
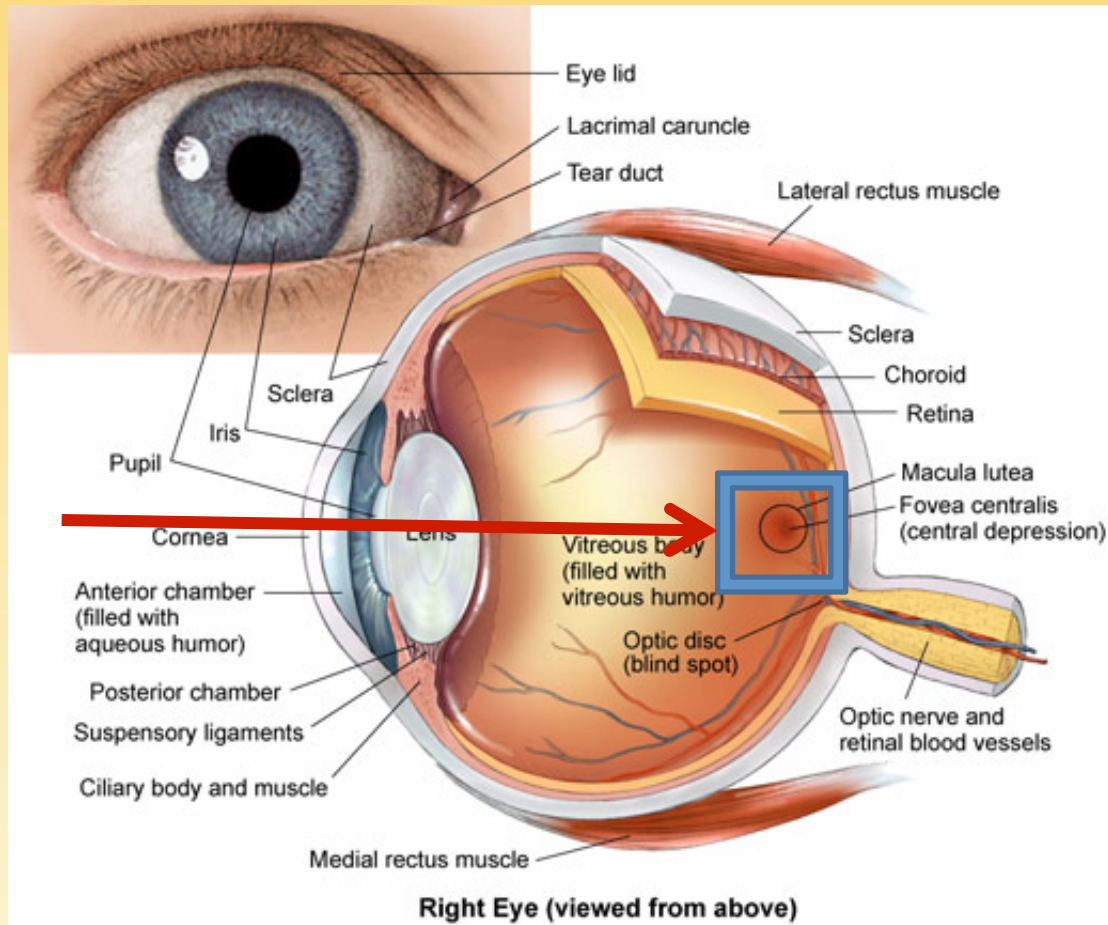
Looking at an object in the sky



**\*To make sure the object of interest falls directly on the fovea (where our best vision is)**



# Why Do The Eyes Move?



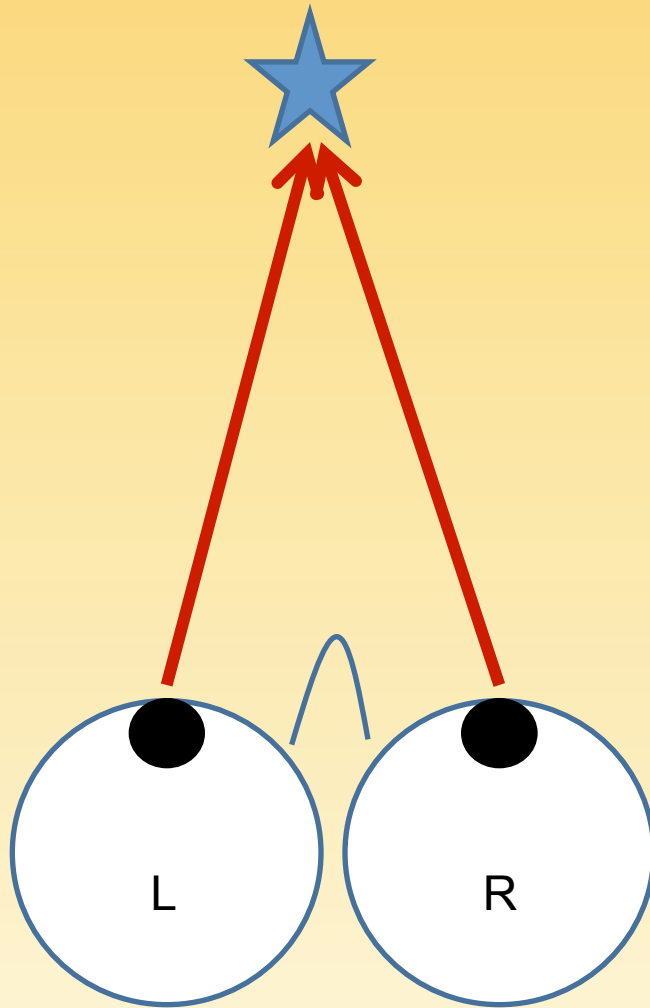
Looking at an object on the floor

\*To make sure the object of interest falls directly on the fovea (where our best vision is)

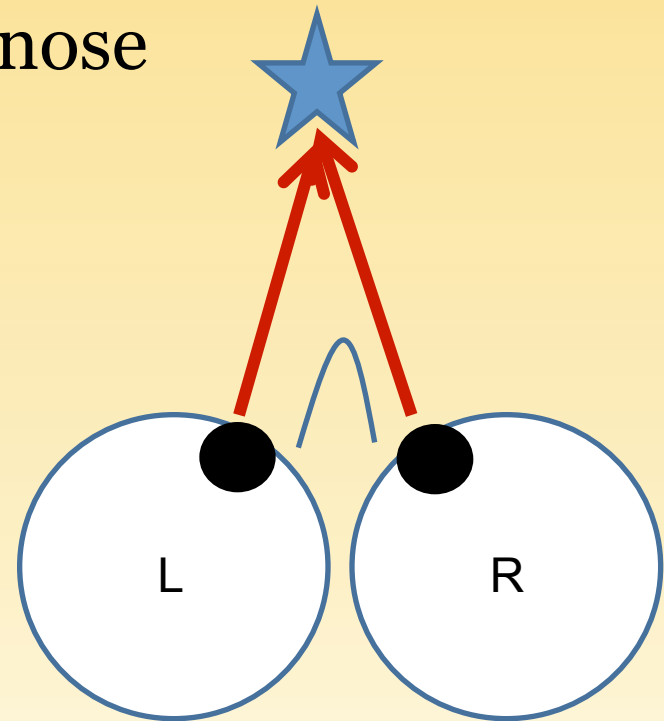
# Eye Movements

- Saccades
  - Quick eye movements
    - Looking from one bird in the sky to another
  - PD – undershoot the target
- Smooth pursuit
  - Slow, tracking eye movements
    - Following a single bird in the sky
  - PD – choppy
- Convergence
  - Bringing the eyes together to view a near target
  - PD – impaired

# Normal Convergence

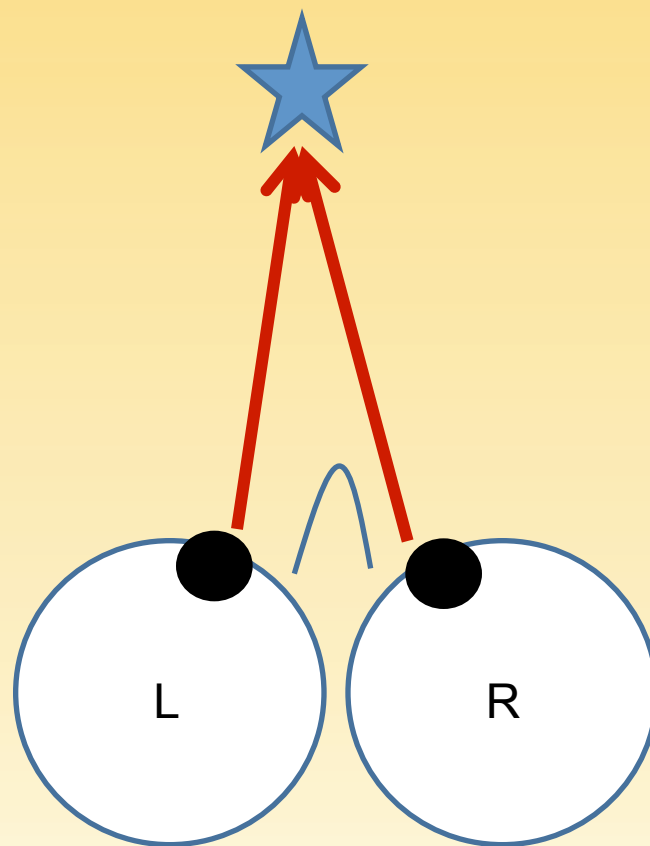


- Viewing a near object, eyes move towards nose



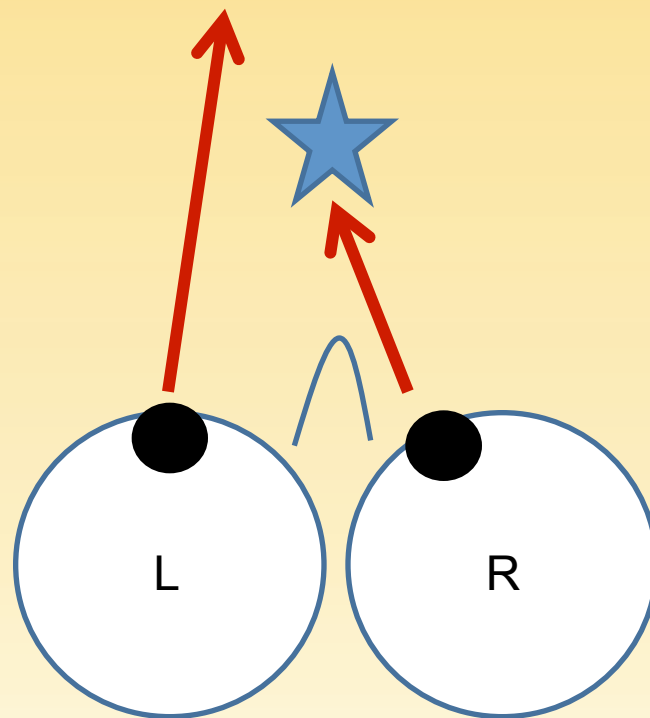
# Abnormal Convergence

- Example
  - The closer the object moves towards the nose, the harder it is to see the same image with each eye



# Abnormal Convergence

- Example
  - When the object is too close, the eyes can no longer move together and one eye moves outwards (L here) and two separate images are seen → double vision



# **SYMPTOMS of Convergence Insufficiency**

- Double vision (side by side images)
- Headaches
- Eyestrain
- Blurred vision
- Loss of place while reading
- Excessive tiredness while reading
- Covering of one eye while reading
- Complaints of the words moving on the page
- Short attention span for reading
- Constant adjusting of the distance of a book or other to see better

# **DIAGNOSIS of Convergence Insufficiency**

- Eye movement examination performed by neurologist, ophthalmologist, or neuro-ophthalmologist



# TREATMENT of Convergence Insufficiency

- Home exercises
  - “Pencil push-ups”
- Therapy or computer exercises
  - Vision therapy?
- Covering one eye, or putting Scotch tape or satin gift tape over one lens
- Prisms placed in reading glasses **ONLY**

# 4) Other

# Hallucinations

- In Parkinson's disease patients, associated with:
  - Daytime somnolence or insomnia
  - Moderate-severe cognitive issues
  - Longer duration of PD
- What about medications?

# Visual Side Effects

Medication	Hallucinations	Visual disturbance	Retinal degeneration (animal studies)
Levodopa/ carbidopa (Sinemet)	+		
Amantadine	++	+	
Entacapone (Comtan)	+		
Rasagiline (Azilect)	+		
Selegiline (Eldepryl)	+		
Pramipexole (Mirapex)	++	+	+
Rotigotine (Neupro)	++		+
Ropinirole (Requip)	++		+

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→ Ropinirole (Requip)	++		+

# TREATMENT of Visual Hallucinations

- If mild with preserved insight
  - Reassurance
  - Evaluate/remove certain medications
- If moderate to severe or bothersome
  - Evaluate/remove certain medications
  - Consider Seroquel or Clozaril



# Ophthalmic (Possible) Associations

- Cataracts
  - Posterior subcapsular
- Primary open-angle glaucoma
- Detectable on any good dilated examination by an ophthalmologist/optometrist

# Conclusions

- Dopamine is present in the visual system, and visual acuity and color vision may be affected
- The eyelids and ocular surface protect the eye and optimize the clarity of what we see
- Convergence insufficiency is a common eye movement abnormality seen in PD
- The earlier symptoms are addressed, the earlier treatment can be initiated and quality of life improved

# Thank You!



# Questions and Discussion



# Resources from PDF

## Fact Sheets

- Parkinson's Disease: More Than a Movement Disorder



## PD Resource List

- 750 resources in the Parkinson's community



## Parkinson's HelpLine

- Available at (800) 457-6676 or [info@pdf.org](mailto:info@pdf.org)
- Monday through Friday
- 9:00 AM – 5:00 PM ET

# **Upcoming *PD Expert Briefings***

## **Maximizing PD Medications: How to Get the Most Out of Your Treatment Plan**

**Tuesday, April 28, 1:00 PM - 2:00 PM ET**

Connie Marras, M.D., Ph.D., Associate Professor of Neurology, University of Toronto, Morton and Gloria Shulman Movement Disorders Centre and the Edmond J. Safra Program in Parkinson's Disease, Toronto Western Hospital, Canada

## **Challenges of Advanced PD and Tips for Better Living**

**Tuesday, June 23, 1:00 PM - 2:00 PM ET**

Peter Fletcher, M.B.Ch.B., M.Sc., Consultant Physician, Department of Old Age Medicine, Gloucestershire Hospitals NHS Foundation Trust, United Kingdom

**Please complete our SURVEY**

Your responses help us to improve  
the work that we do.

Thank you.