

Erdheim-Chester Disease and Eyes



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9:30-10:00AM

OPHTHALMIC PLASTIC AND RECONSTRUCTIVE SURGERY
AND ORBITAL ONCOLOGY FELLOW
DEPARTMENT OF PLASTIC SURGERY
THE UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER
HOUSTON, TX, UNITED STATES

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Making Cancer History®

Outline



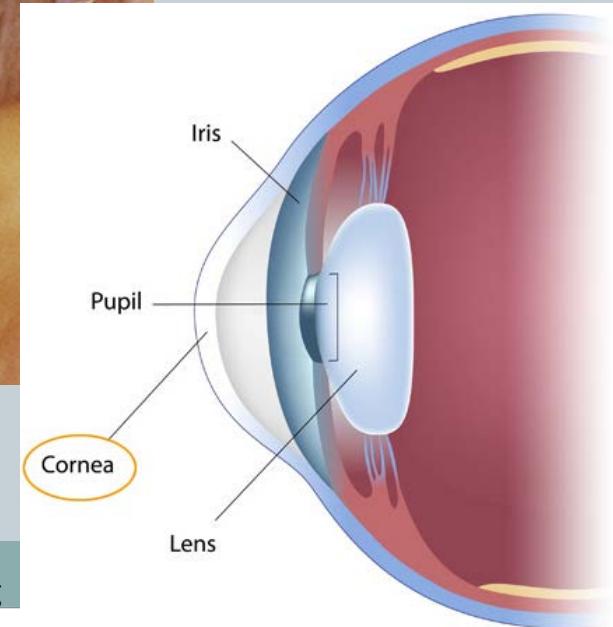
- Anatomy and function of the eye and orbit
- Background and overview of ECD
 - What can ECD do to the eye?
 - Double vision
 - Pain
 - Exophthalmos
 - Overview of an eye exam
 - General eye conditions that may also occur
 - Droopy eyelids
 - Dry eye syndrome
 - Cataracts
 - Refractive error
- Questions
 - Please ask anytime!



Background anatomy

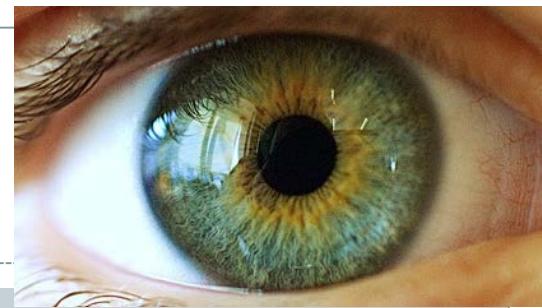


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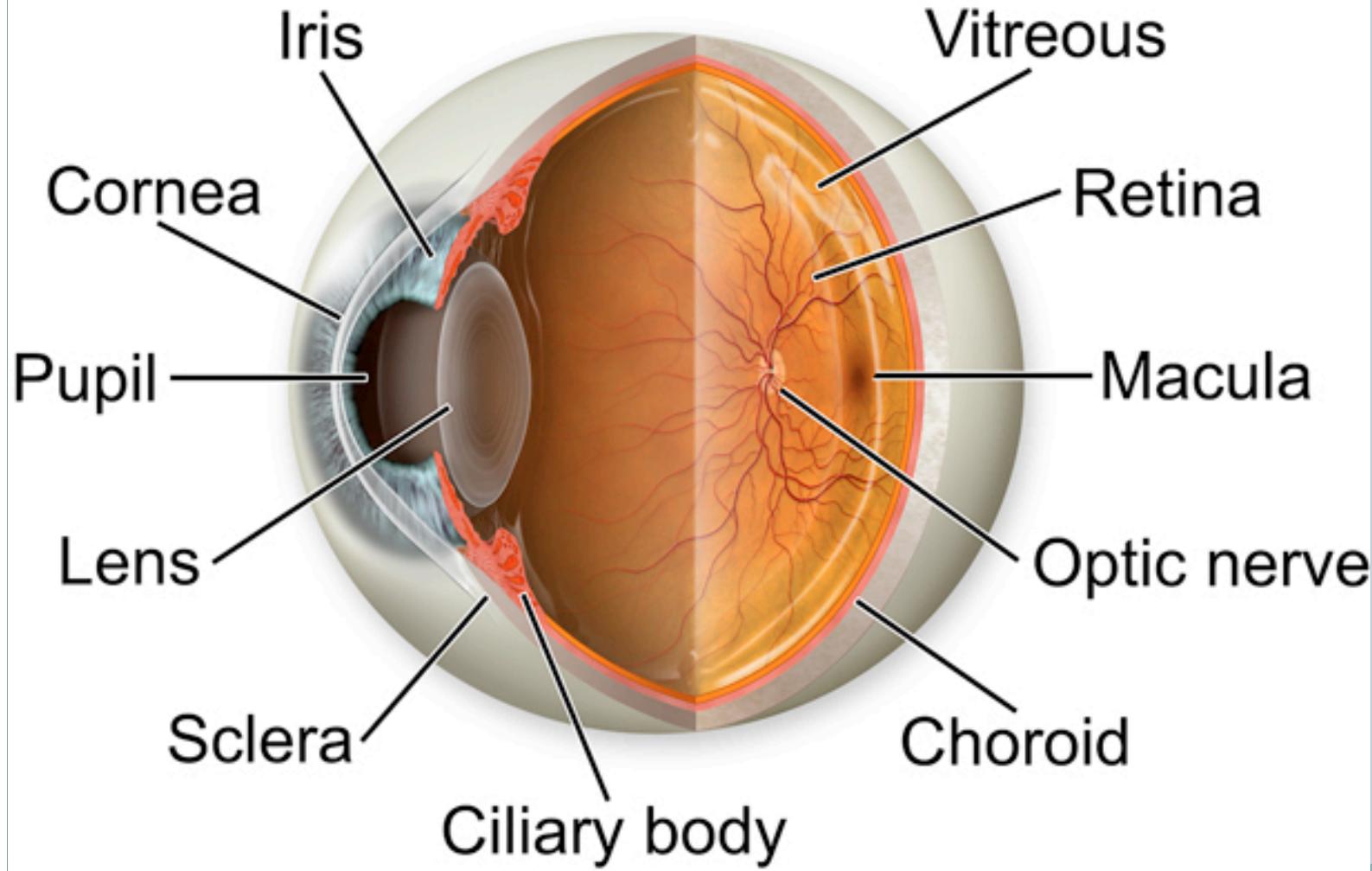


<http://fiftylives.org/blog/wp-content/uploads/2012/08/Cornea.jpg>

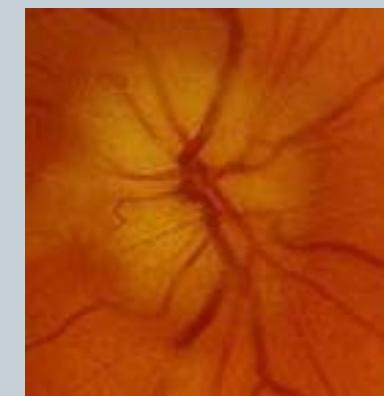
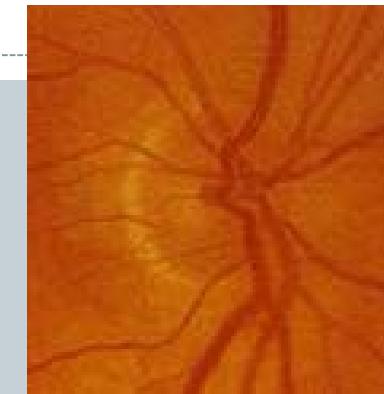
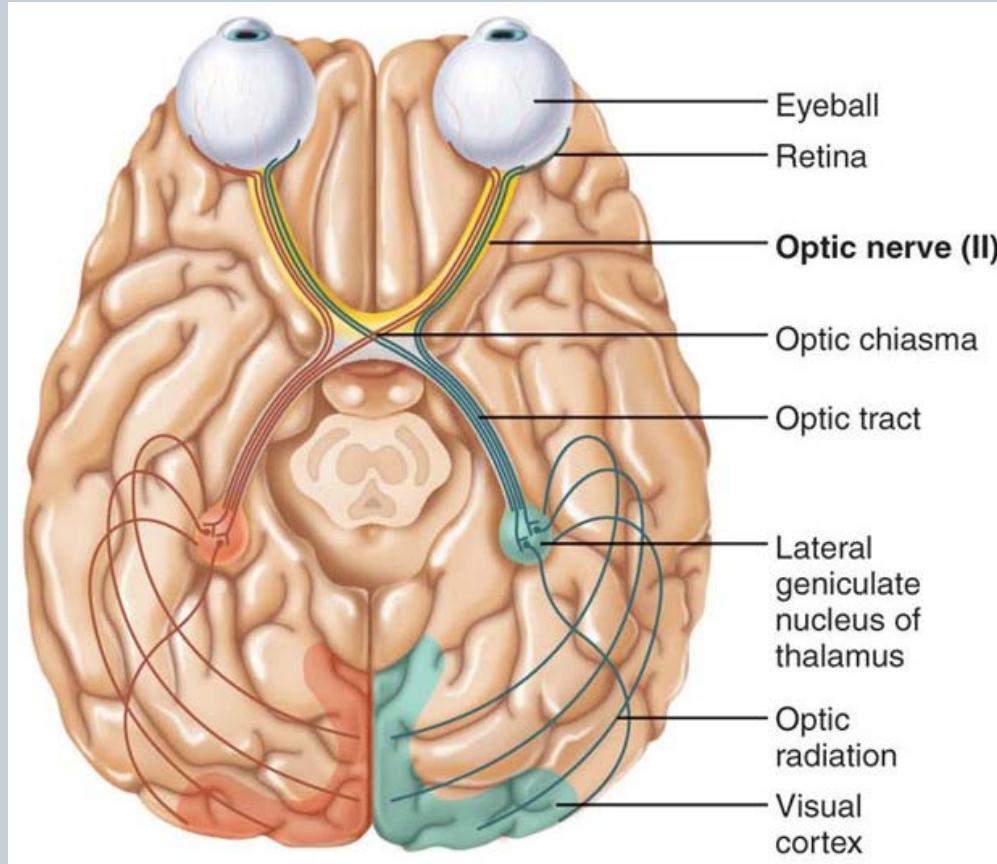
Eye anatomy



https://c2.staticflickr.com/2/1363/542580866_940d2f9a02.jpg

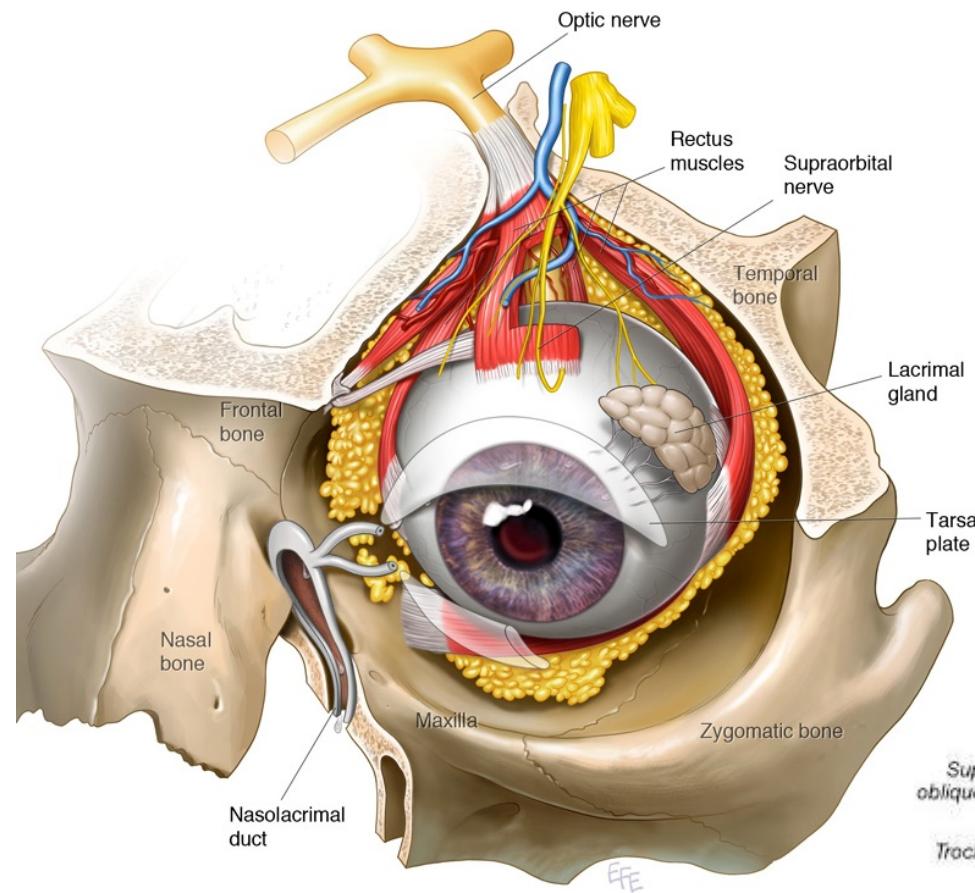


Optic nerves



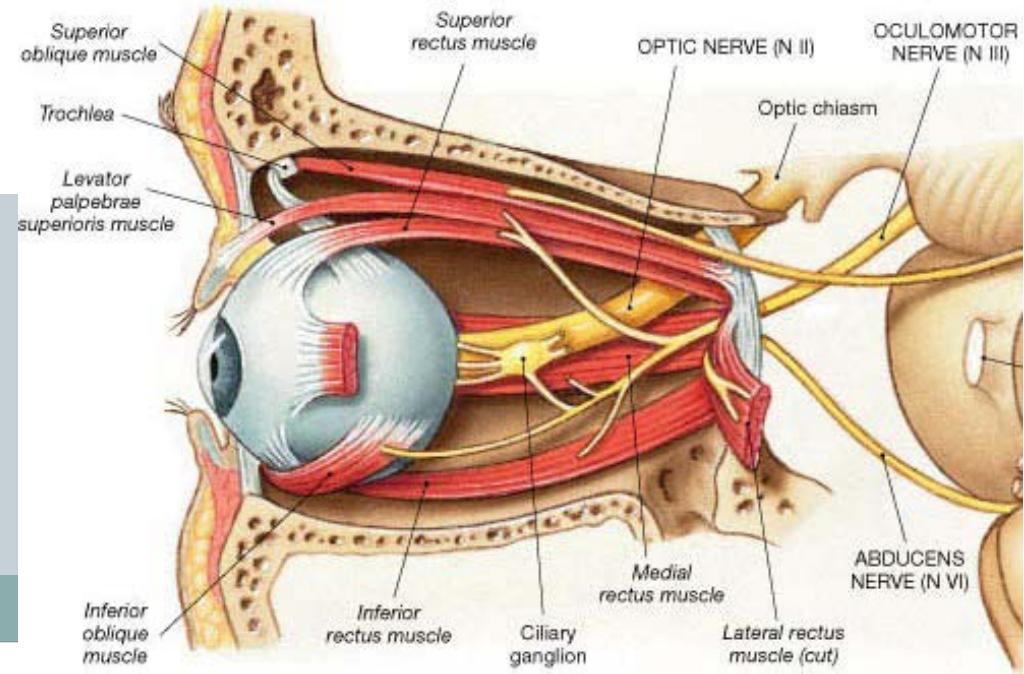
<http://antranik.org/wp-content/uploads/2011/11/optic-nerve-lateral-geniculate-nucleus-of-thalamus-optic-radiation-visual-cortex.jpg?9873a6>
<http://www.vision-and-eye-health.com/images/GCA-AION.jpg>

Orbital anatomy

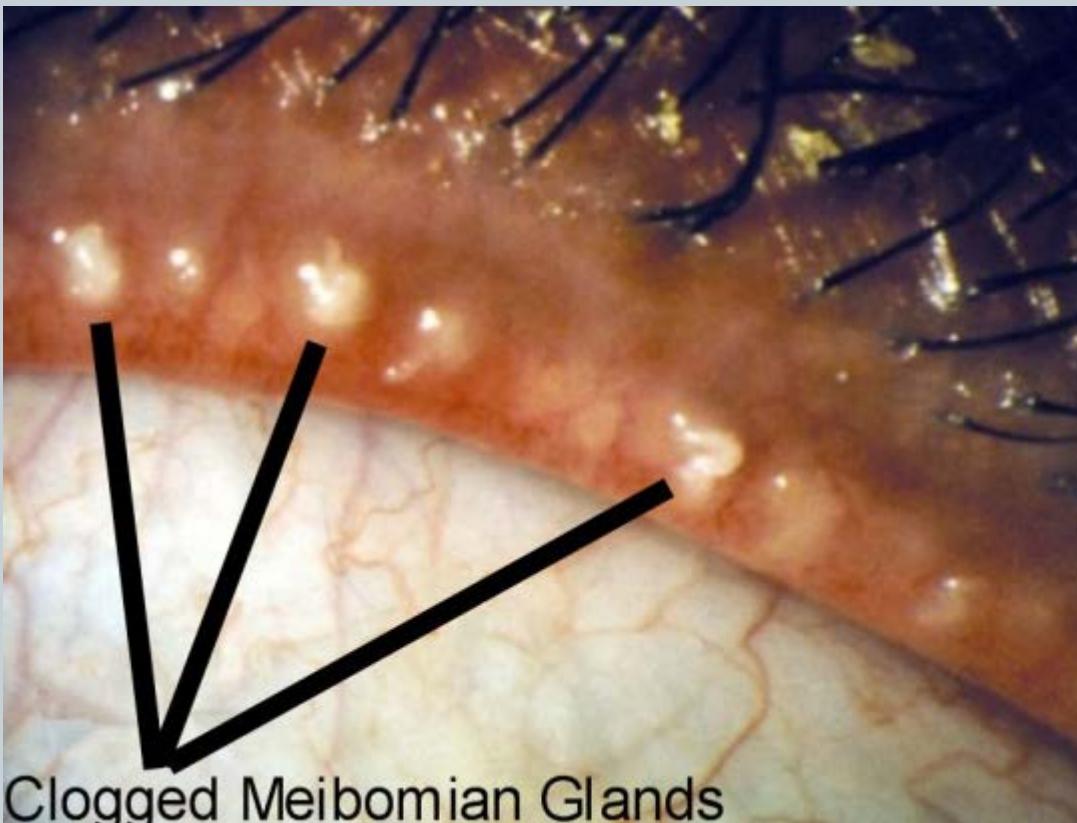


<http://www.leventefe.com.au/portfolio/mi-tec-medical-media-3/>

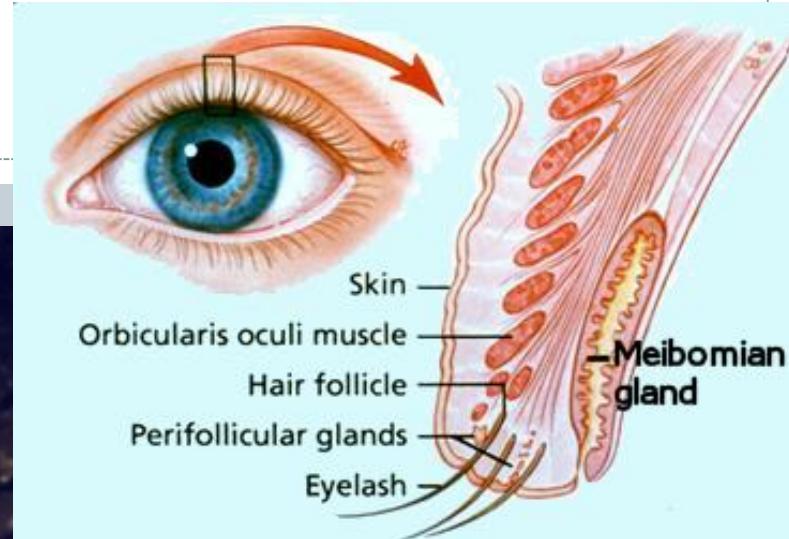
<http://msk-anatomy.blogspot.com/2014/12/cranial-nerves-anatomy.html>



Eyelid structure



<http://www.mastereyeassociates.com/blepharitis>



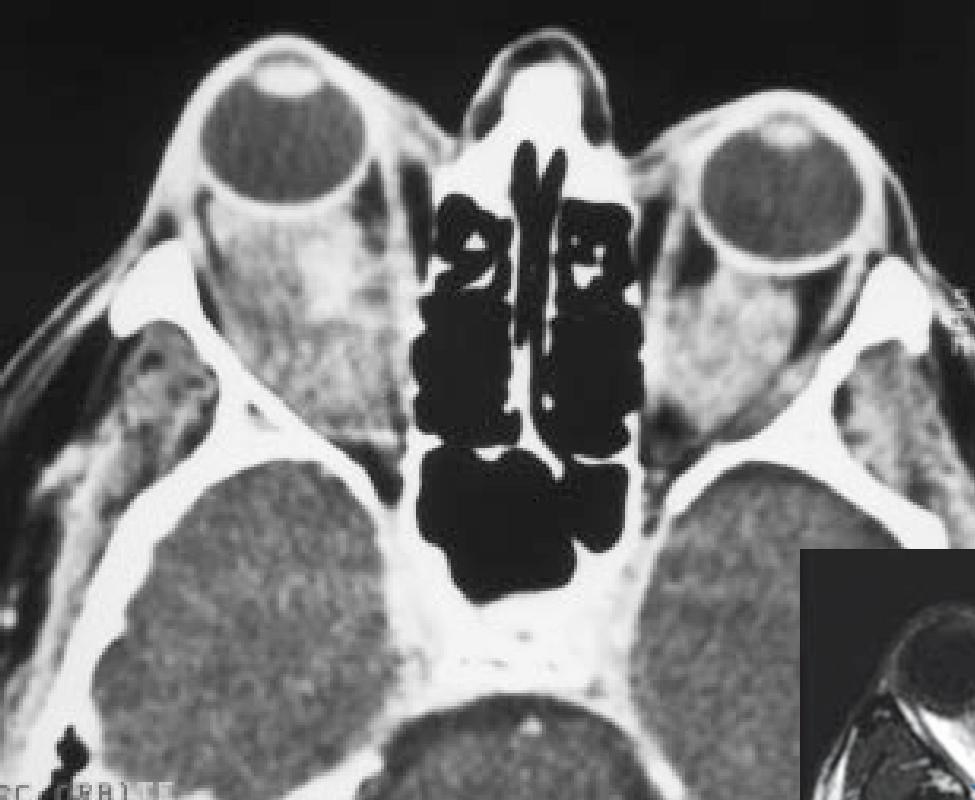
<http://eyestrain.sabhlokcity.com/2011/09/meibomian-gland-disease-mgd/>



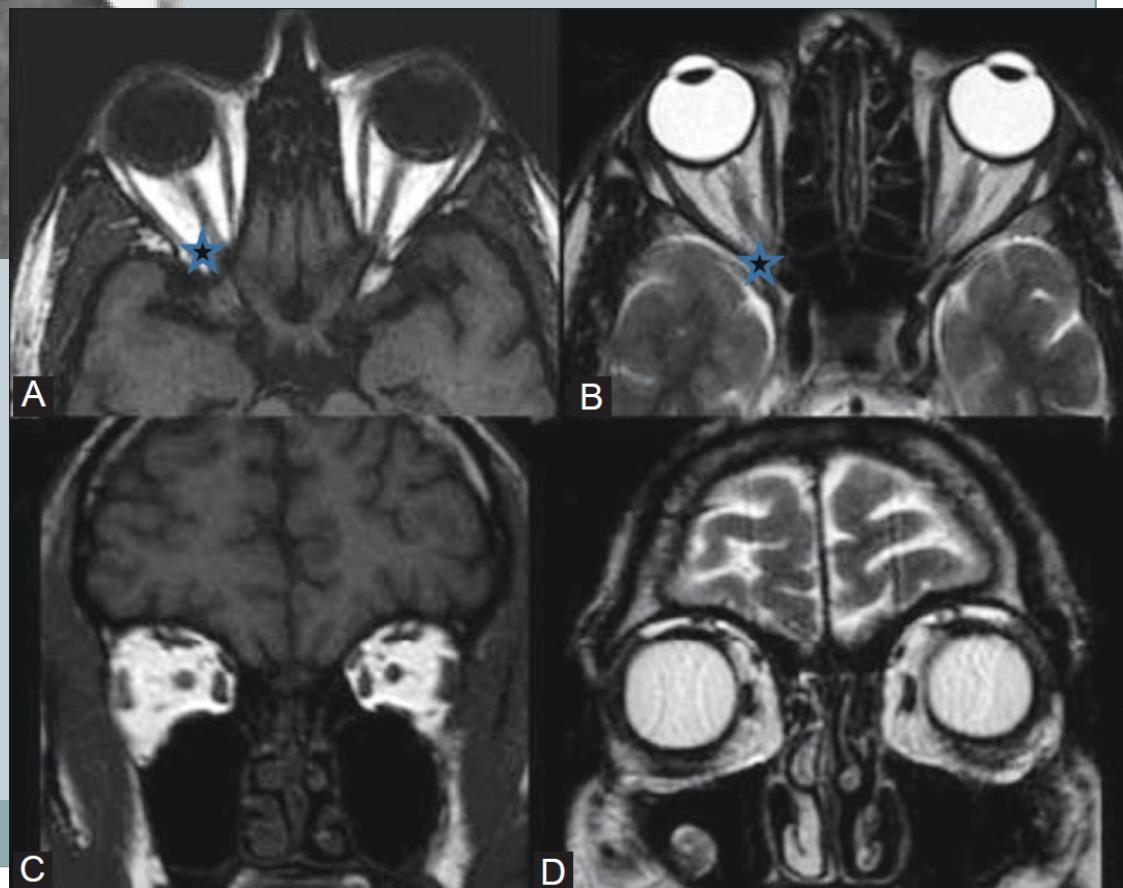
<http://www.medindia.net/patients/patientinfo/granulated-eyelids.htm>

CT and MRI

http://www.ijri.org/articles/2012/22/3/images/IndianJRadiolImaging_2012_22_3_227_107184_u2.jpg



De Palma et al, 1998



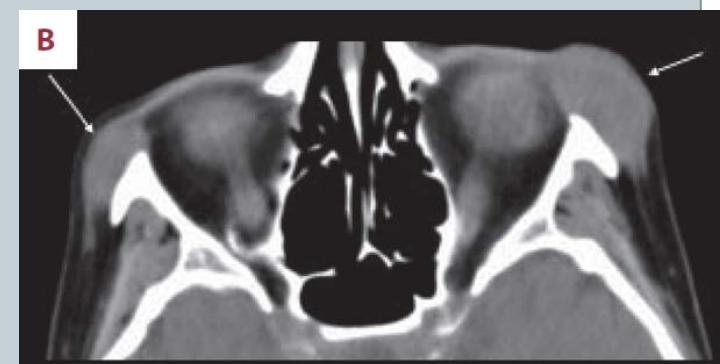
ECD and eyes overview



- Erdheim-Chester Disease (ECD)
- ECD and Eyes
 - Eyelid changes
 - Orbital changes
 - ✖ Symptoms
- Eye exam
 - Overview
- Other common eye problems

Erdheim-Chester Disease (ECD) AKA Polyostotic Sclerosing Histiocytosis

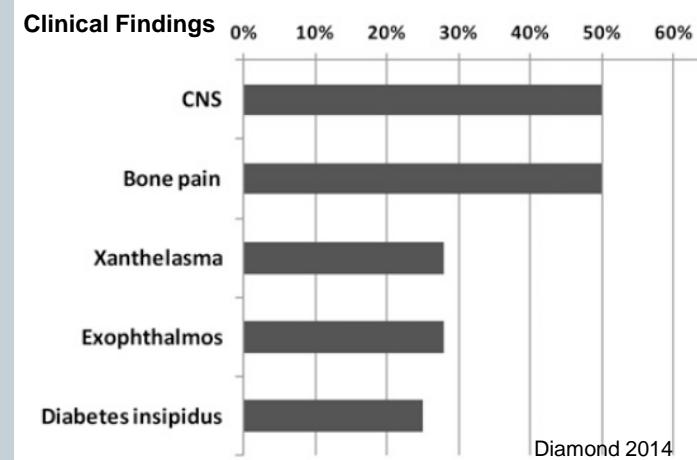
- **Rare infiltrative non-Langerhans-cell histiocytosis**
 - Approximately 500 cases reported
 - Mean age of 53 years
- Wide range of systemic and ophthalmic manifestations
 - Bone, heart, lungs, **orbita**, **central nervous system (CNS)**, pituitary gland, and retroperitoneum
 - Bone involvement in most
 - Osteosclerosis of the long bones most commonly, followed by
 - Neurologic symptoms, diabetes insipidus secondary to pituitary gland involvement, etc.
- Xanthomatous infiltration of tissues by CD68-positive, CD1a-/S100-negative foamy histiocytes surrounded by fibrosis
 - Touton giant cells



Alexiou J1, Klastersky J2. Erdheim-Chester Disease: A Case Report. Am J Case Rep. 2015 Jun 11;16:361-6.

Erdheim-Chester disease (ECD)

- Orbital involvement in 27%
 - Commonly bilateral
 - Exophthalmos, orbital pain, motility deficits, or vision change
 - Orbital masses compressing the optic nerve or the optic chiasm
 - May affect lacrimal gland, muscles, orbital fat
 - May be resistant to medical treatment, requiring surgical debulking
- Involvement of the eyelids or the periorbital spaces in 18%
 - Periorbital yellow xanthogranulomas of skin may occur
- Involvement of structures within the eye
 - Choroid plexus



Xanthelasma - skin manifestation



- Most common cutaneous lesion occurring in one-third of patients
- Yellow eyelid plaques
 - Can also occur in face, neck, axilla, trunk, and groin
- Cholesterol-laden eyelid plaques
- Spectrum of disease
 - Unable to distinguish between ECD and other diseases by skin lesions alone



Lee HY1, Jin US, Minn KW, Park YO. Outcomes of surgical management of xanthelasma palpebrarum. Arch Plast Surg. 2013 Jul;40(4):380-6.

Xanthogranuloma



- Infiltration by lipid-laden, foamy histiocytes surrounded by fibrosis



Sanz-Marco E1, España E2, López-Prats MJ3, Chirivella-Casanova M4, Aviño J3, Díaz-Llopis M5.
Necrobiotic xanthogranuloma. Differential diagnosis, treatment and systemic involvement. Case report.
Arch Soc Esp Oftalmol. 2014 May;89(5):186-9. doi: 10.1016/j.oftal.2012.11.007. Epub 2012 Dec 20.

Orbital xanthogranuloma



- 4 types of orbital xanthogranuloma
 - Necrobiotic xanthogranuloma (NBX)
 - Adult onset xanthogranuloma (AOX)
 - Asthma-associated adult periocular xanthogranuloma (AAPOX)
 - **Erdheim–Chester disease (ECD)**

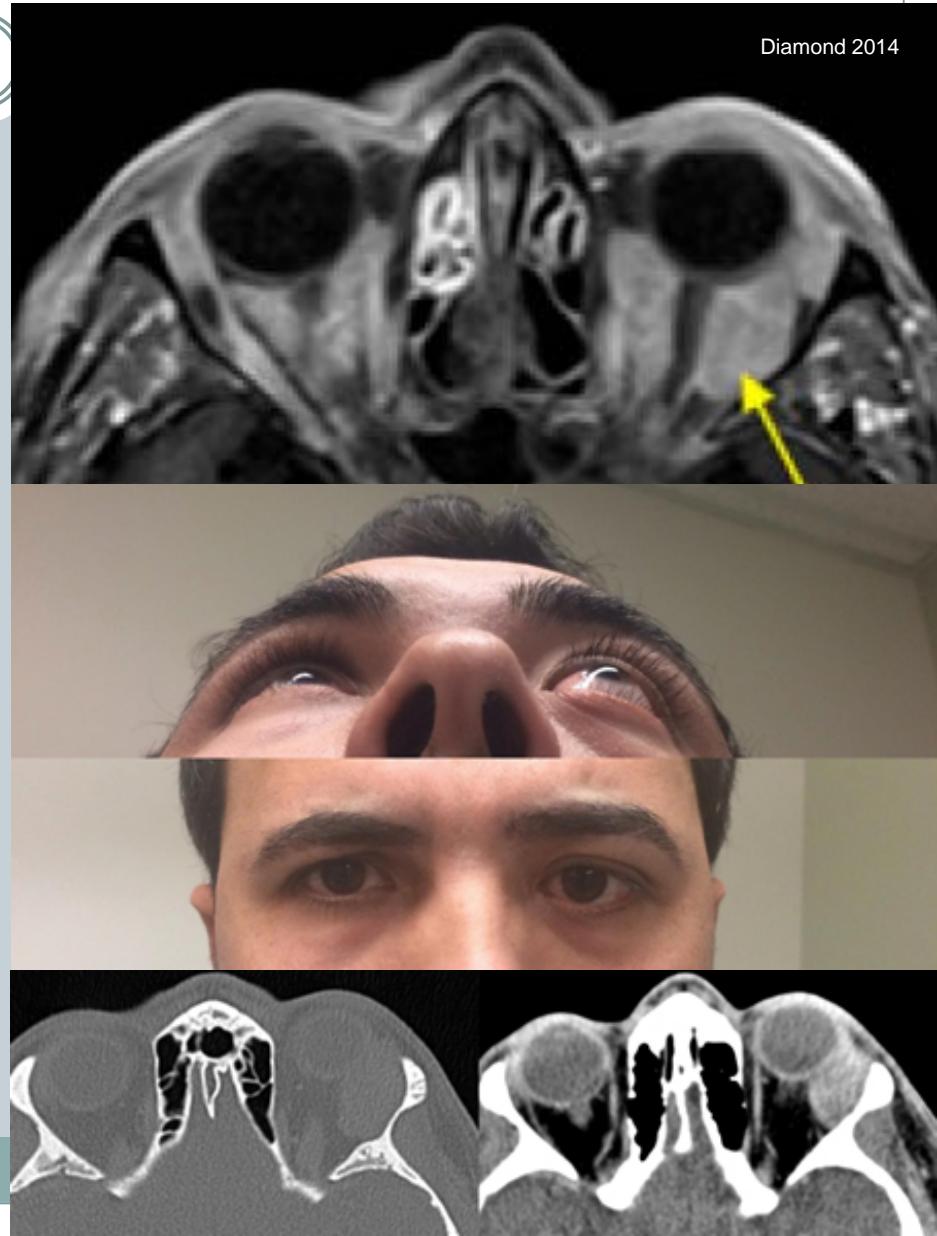


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Arch Soc Esp Oftalmol. 2014 May;89(5):186-9. doi: 10.1016/j.oftal.2012.11.007. Epub 2012 Dec 20.

Orbital xanthogranuloma

- Orbital mass may cause
 - Proptosis
 - Pain
 - Decreased motility of eye
 - Double vision
 - From misalignment of eyes
 - Decreased vision
 - Central vision
 - Visual field
 - Color vision

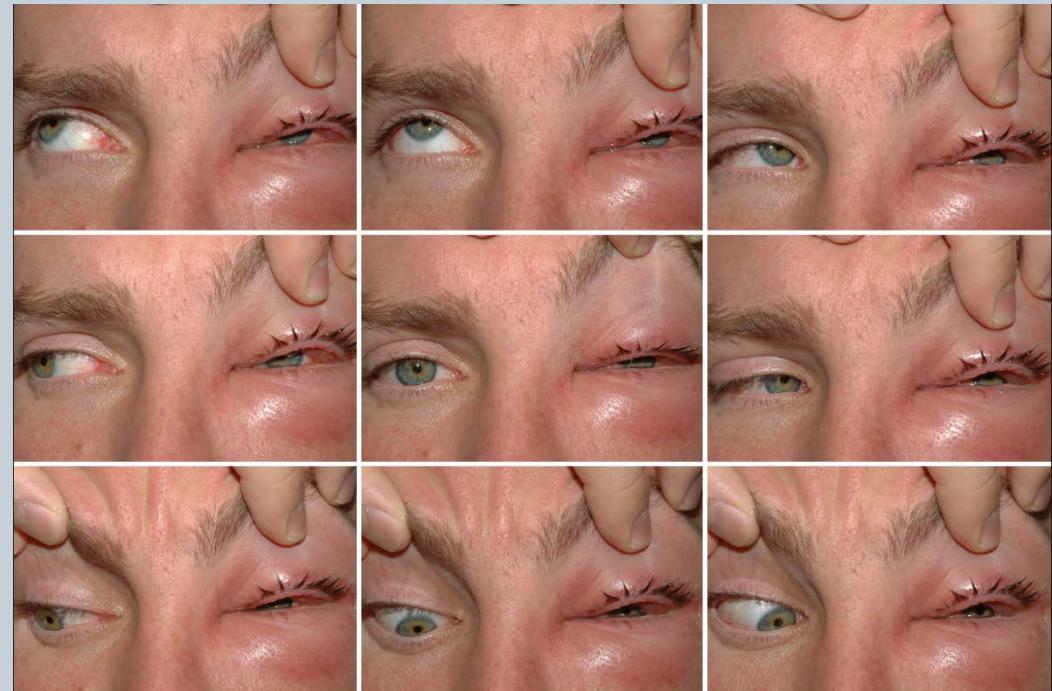
<http://www.healio.com/ophthalmology/cornea-external-disease/news/print/ocular-surgery-news/%7Beb94573b-23bc-4fea-9b56-7e464ee21163%7D/man-experiences-long-term-proptosis-of-left-eye>



Diamond 2014

Orbital lesions

- Mass of the lesion can cause
 - Extraocular motility restriction
 - Double vision from eyes not aligning
 - Compression on optic nerve or blood supply of optic nerve
 - Vision change



Variable presentation

- Eyelid nodule
- Mild eyelid droop



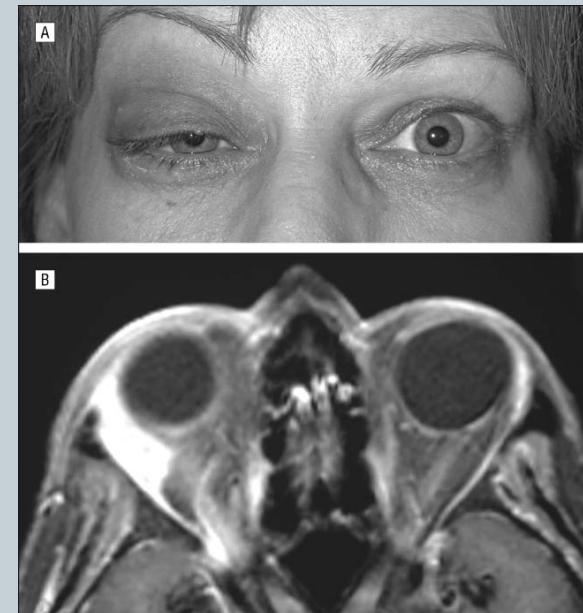
Differential diagnosis



- ECD related retro-orbital involvement may resemble
 - Wegener's granulomatosis
 - Graves disease
 - Langerhans cell histiocytosis
 - Lymphoma
 - Sarcoidosis
 - Sjogren's disease
 - Idiopathic orbital inflammation



<http://webeye.ophth.uiowa.edu/eyeforum/atlas/photos-earlier/pseudotumor.jpg>



Leibovitch I, Prabhakaran VC, Davis G, Selva D. Intraorbital injection of triamcinolone acetonide in patients with idiopathic orbital inflammation. Arch Ophthalmol. 2007 Dec;125(12):1647-51.

Treatment



- **Systemic treatment**
 - Recent discovery of BRAF mutations in up to 54% of patients
 - Led to treatment with BRAF inhibitors
 - Interferon-a-2a and pegylated interferon-a
 - Anticytokine directed therapy
 - Anakinra, infliximab, tocilizumab
 - Serine/threonine kinase inhibitors: vemurafenib (inhibitor of BRAF harboring the V600E mutation) and imatinib
- **Orbit specific treatment**
 - **Steroids may reduce edema acutely, e.g. severe exophthalmos**
 - Not considered effective monotherapy
 - **Radiotherapy has been reported**
 - No response or short-term palliation with disease progression within months
 - **Surgical debulking is limited in ECD to severe orbital lesions or surgically resectable intracranial lesions**

Eye exam



- Take the mystery out of the eye exam

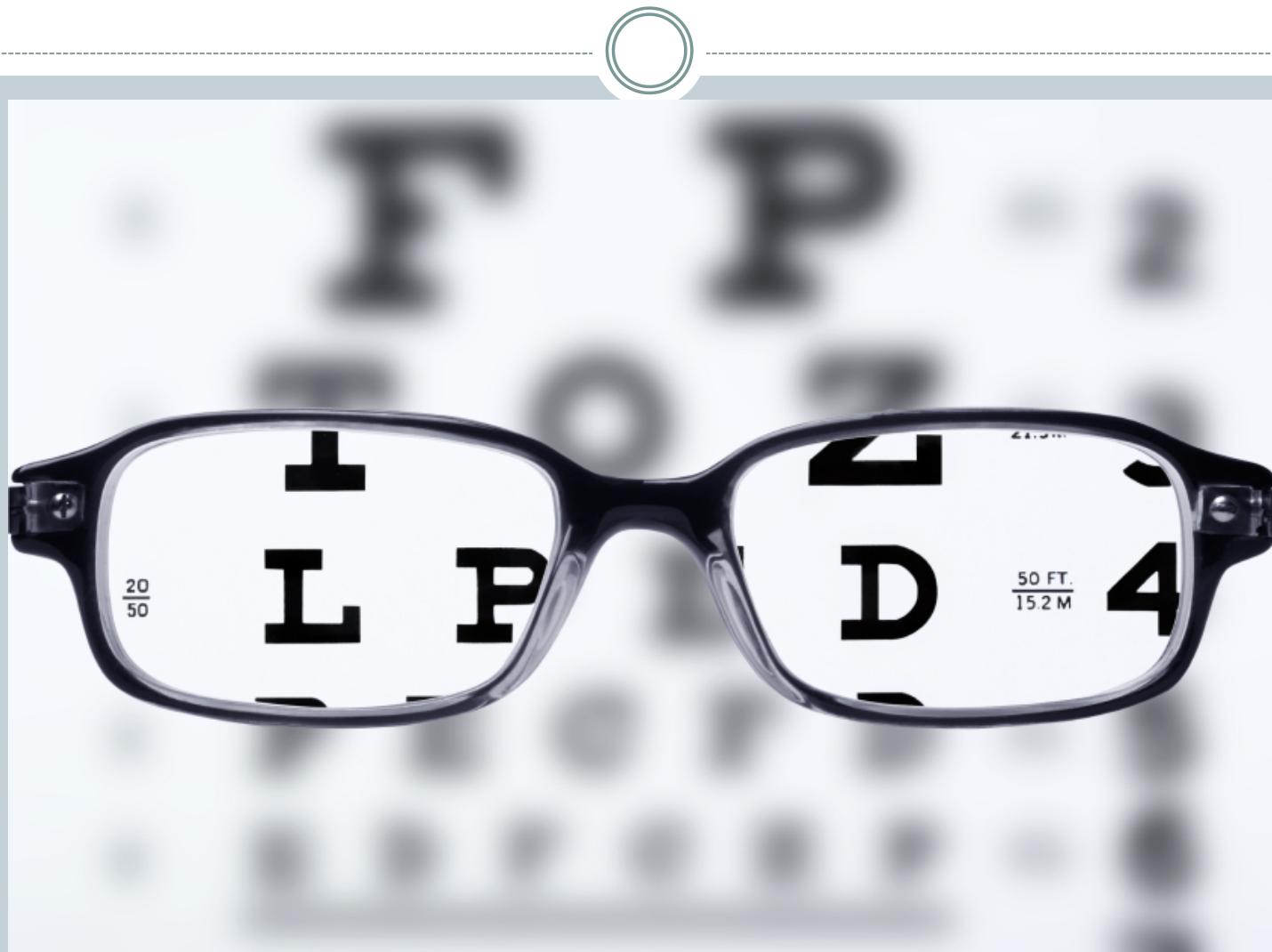


Clinic tests



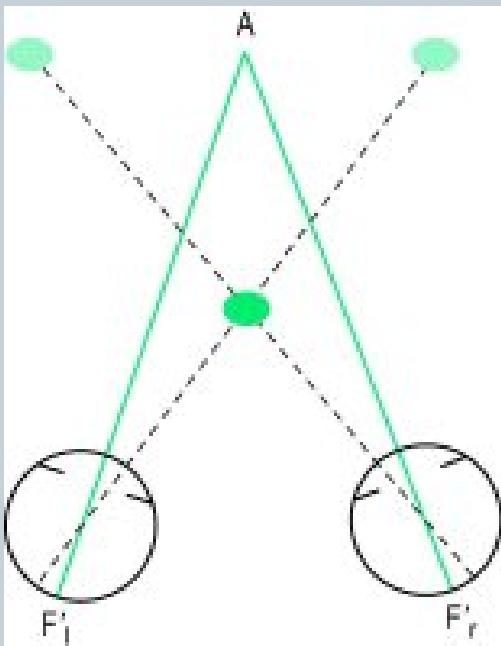
- **Vision**
 - Visual acuity
 - Double vision
 - Color vision
 - Visual fields
- **Pupils**
- **Extraocular motility**
- **Resistance to retropulsion**
- **Intraocular pressure**
- **External exam**
- **Slit-lamp exam**
- **Pupil dilation**
- **Posterior fundus exam**

Visual acuity

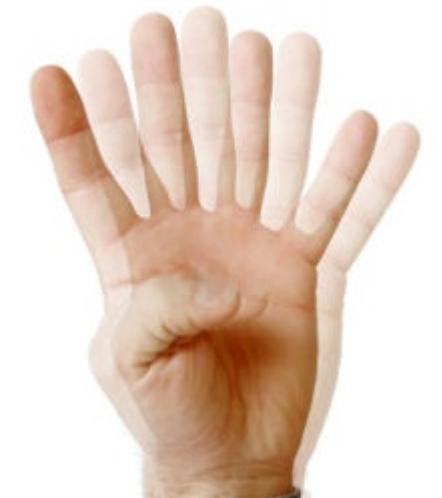


http://news.aapc.com/wp_aapc_content/uploads/2012/11/eye-chart-glasses.jpg

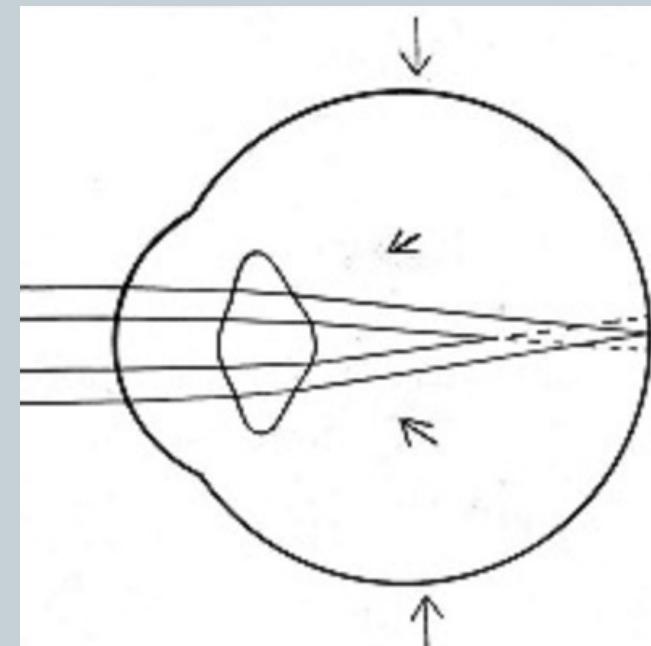
Monocular vs binocular diplopia



[http://img.tfd.com
/ElMill/thumb/F0
D-04-S2958.jpg](http://img.tfd.com/ElMill/thumb/F0D-04-S2958.jpg)



[http://www.stanton
optical.com/wp-
content/uploads/201
3/06/dip01.jpg](http://www.stantonoptical.com/wp-content/uploads/2013/06/dip01.jpg)

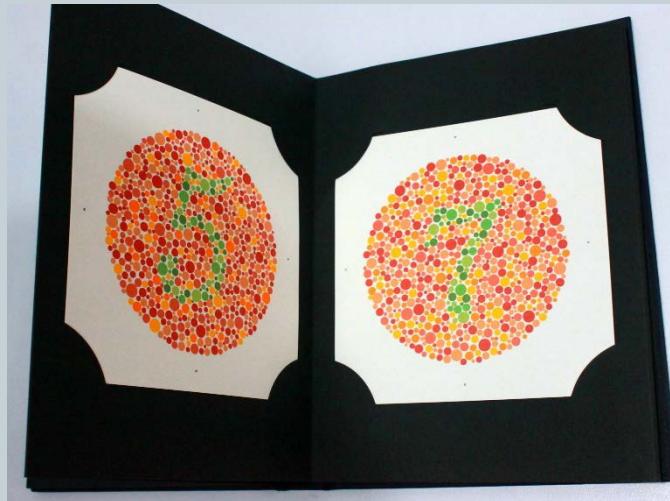


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.com/2013/03/figure-1.jpg](https://arcolin4.files.wordpress.com/2013/03/figure-1.jpg)

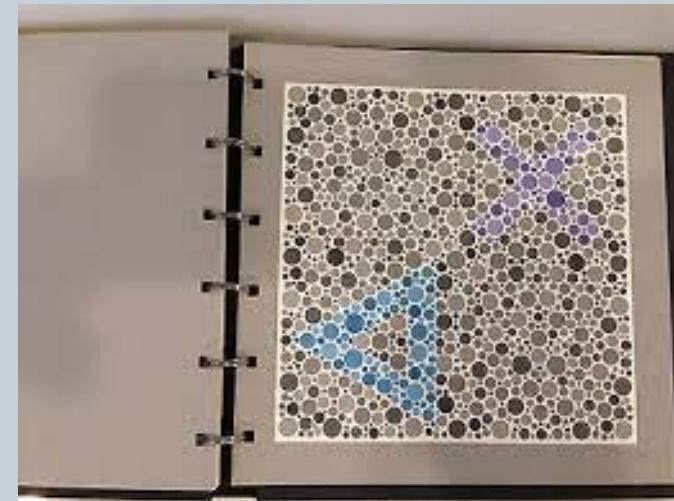
Color vision testing



- Ishihara color plates
- HRR color plates
 - To evaluate if compromise of optic nerve
 - ✖ From compression on the nerve or vascular supply



<http://cdn.lipstiq.com/wp-content/uploads/2010/10/color-vision-chart.jpg>

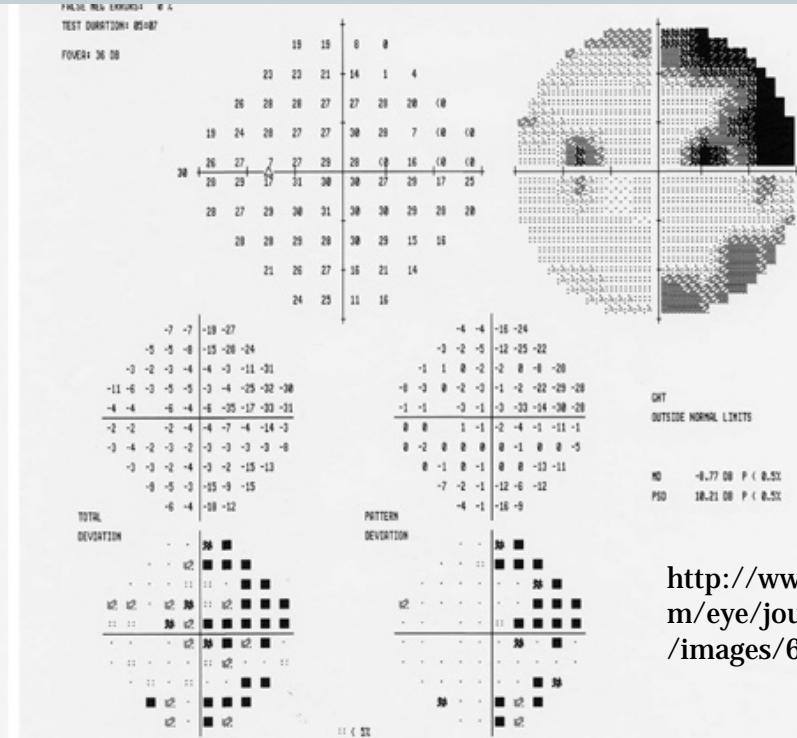
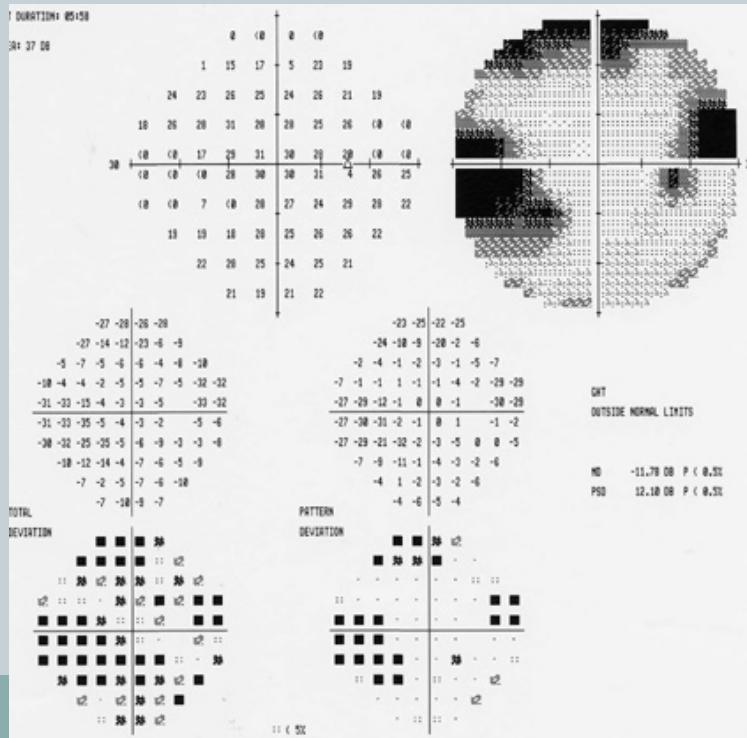


<https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcSKFWRyOk918BLypsUXCMjgRycX6qP7dTWvj85H-j2cd4AtlvXM>

Visual fields



- To evaluate if compromise of optic nerve
 - From compression on the nerve or vascular supply
- For ptosis evaluation



http://www.schwartzeyecare.com/user-files/Humphrey_Automated_Visual_Field.jpg

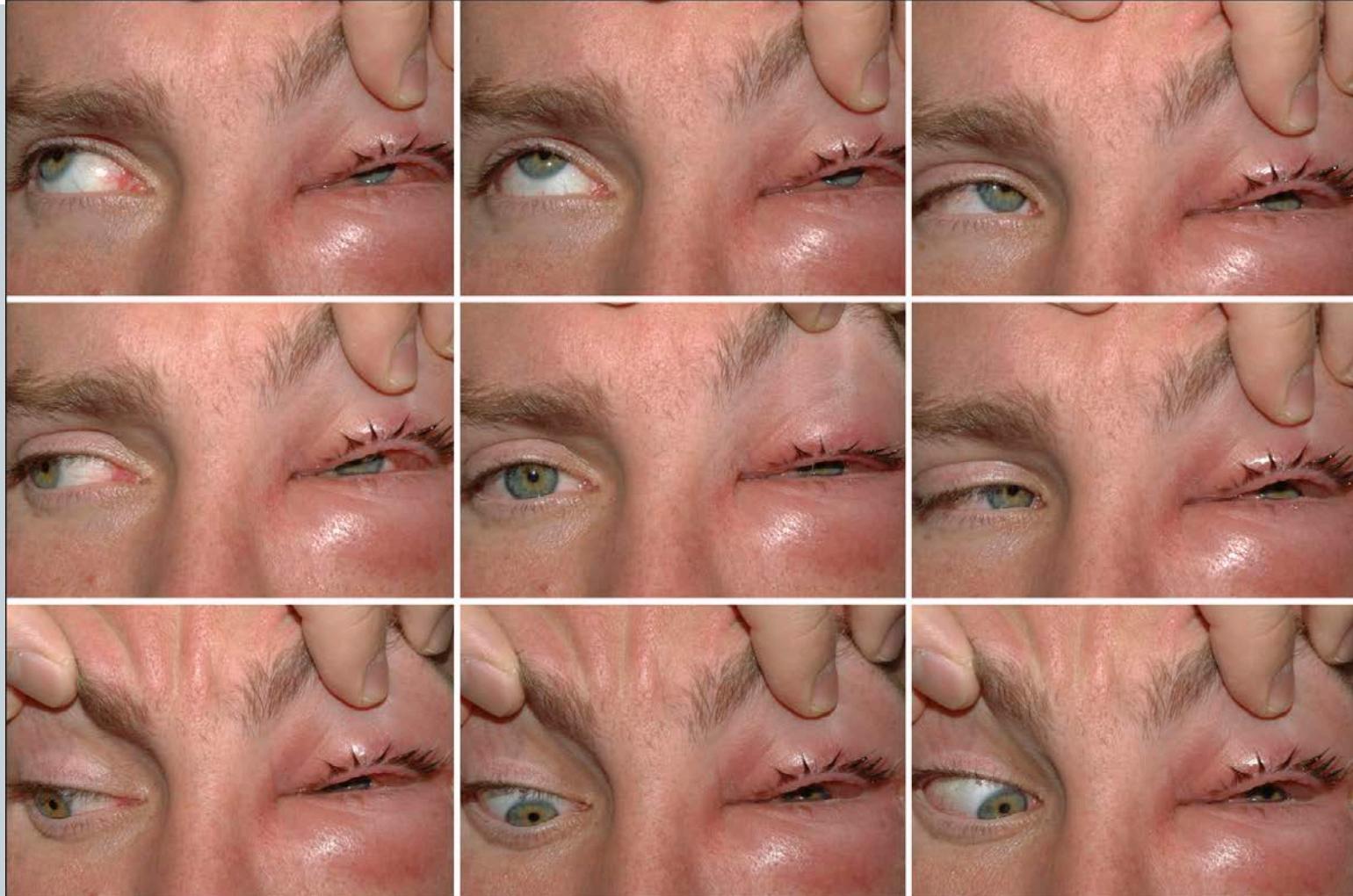
<http://www.nature.com/eye/journal/v18/n8/images/6701339f2.jpg>

Pupils

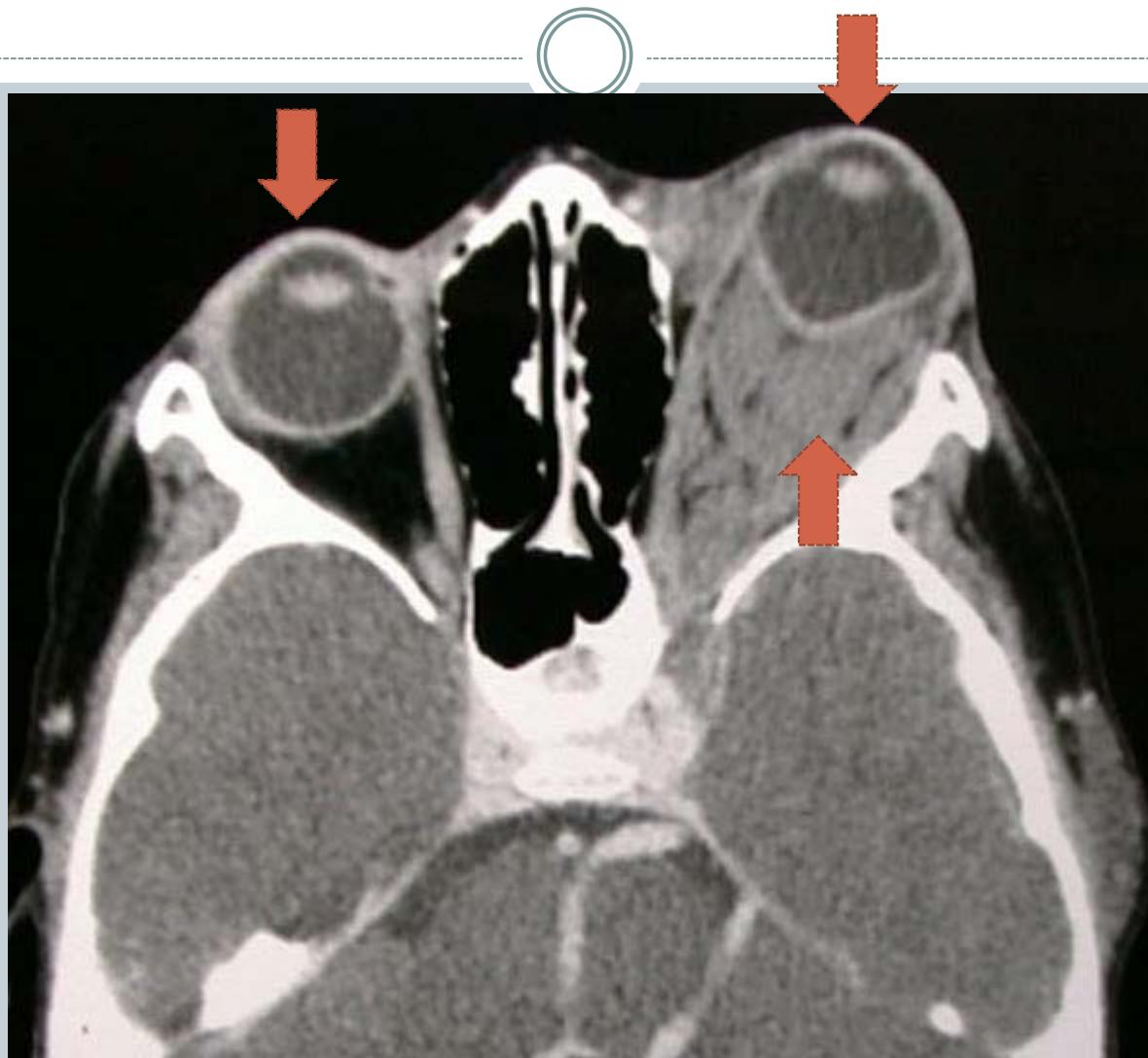


http://umem.org/files/uploads/1109281911_Marcus_Gunn_Pupil.jpg

Extraocular motility

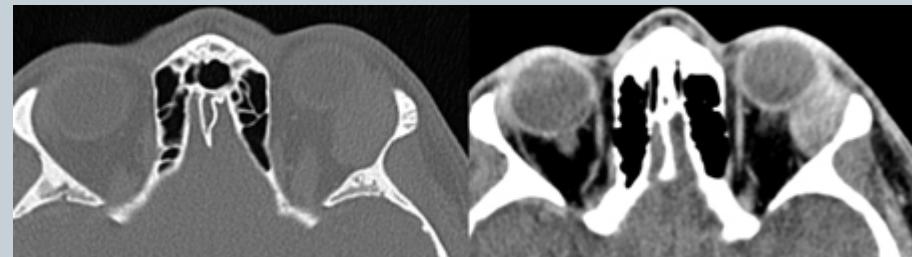


Resistance to retropulsion



Proptosis

- Protrusion of the eye
- More obvious in some views than others
- May be seen on CT and MRI



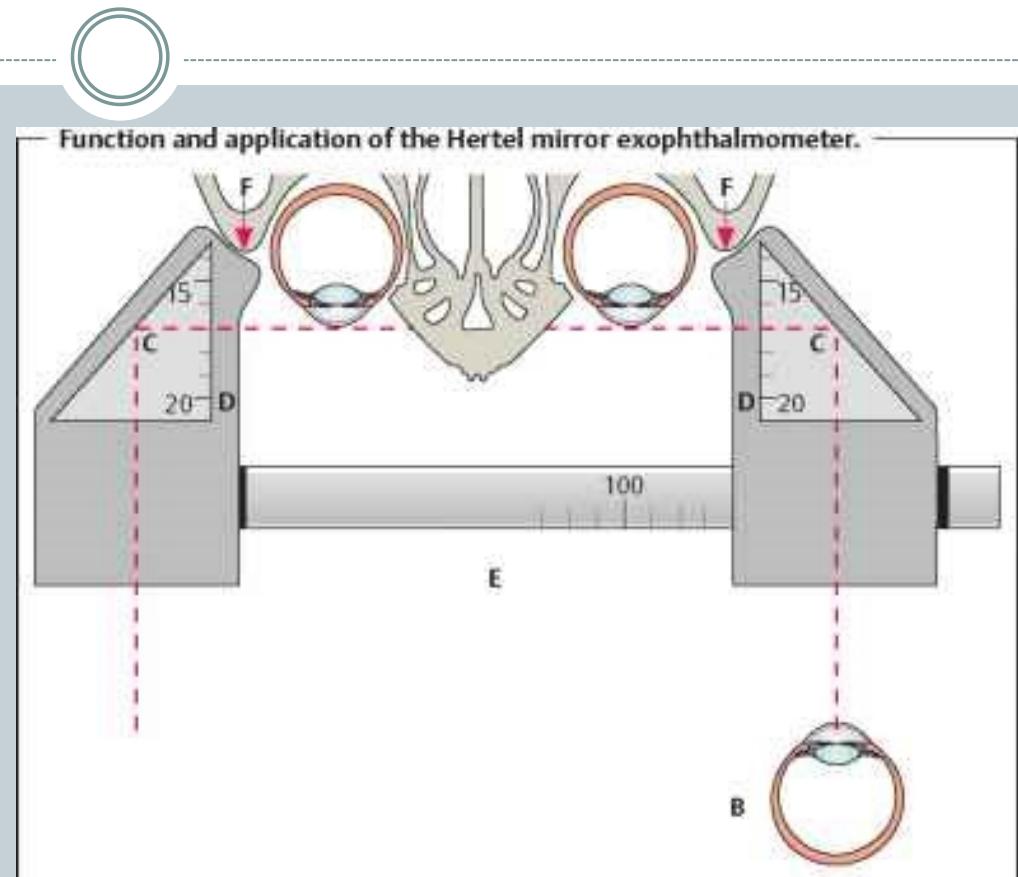
<http://www.healio.com/ophthalmology/cornea-external-disease/news/print/ocular-surgery-news/%7Beb94573b-23bc-4fea-9b56-7e464ee21163%7D/man-experiences-long-term-proptosis-of-left-eye>

Hertel's exophthalmometry

- Measure anterior extent of the cornea
 - In relation to lateral orbital rim



http://www.oculist.net/others/ebook/generalophthal/vaughan/public/co_figures/ch002/ch2fg31.jpg



<http://www.alpfmedical.info/visual-acuity/examination-methods-hke.html>

Intraocular pressure

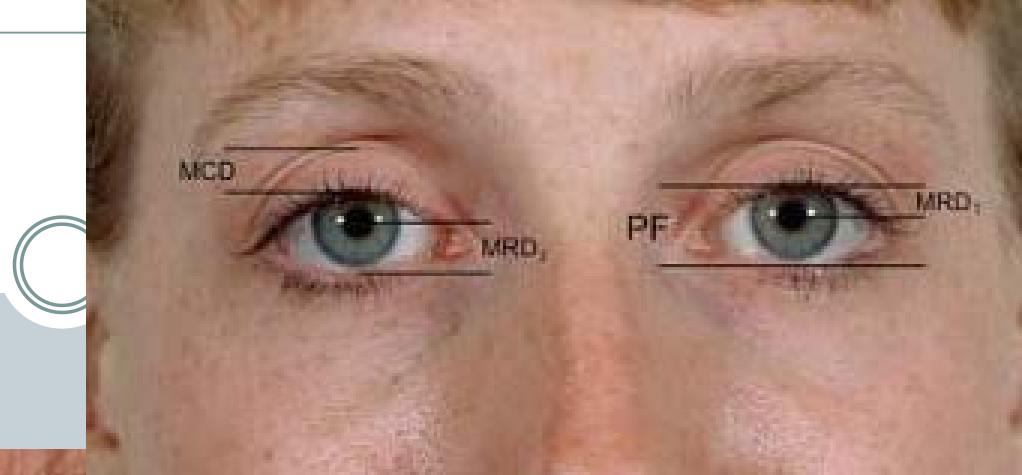


<http://www.afb.org/image.asp?ImageID=6599>



<http://www.johnsonandfurze.co.uk/img/goldmannsmall.png>

Eyelids



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/pi/meds/ckb/23/41323tn.jpg](http://img.medscapestatic.com/pi/meds/ckb/23/41323tn.jpg)

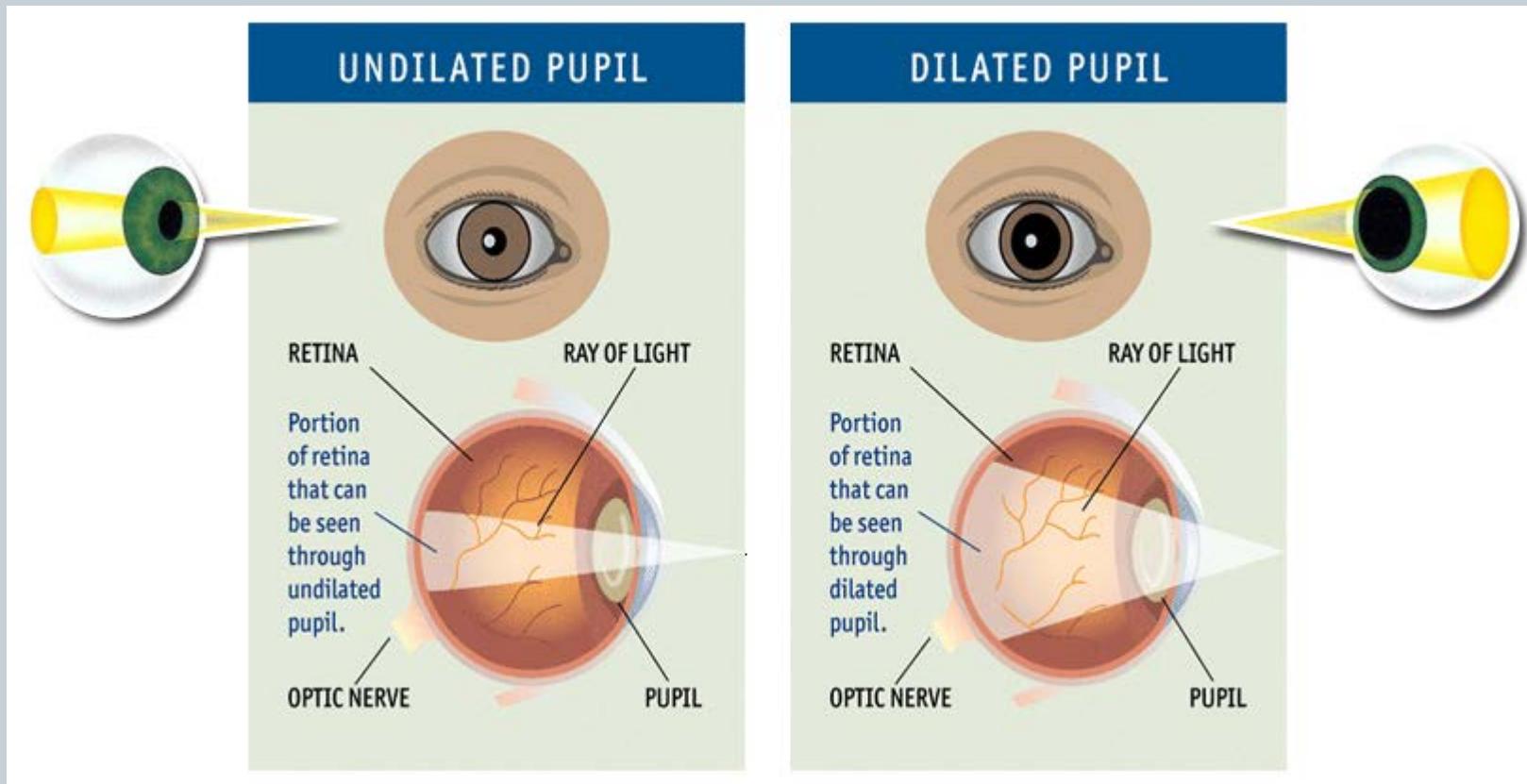


<http://s15.postimg.org/ki8j8n0yz/flippedeyelids.jpg>



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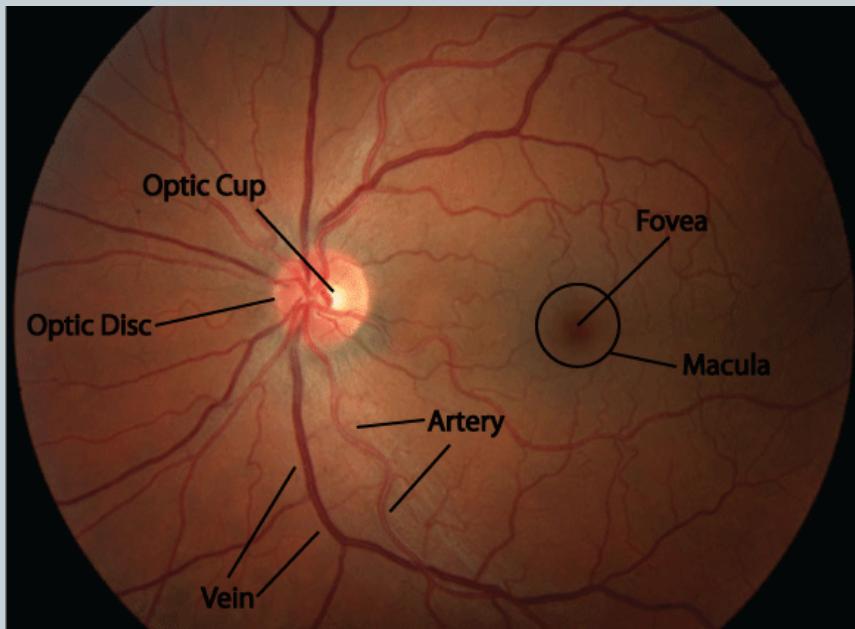
Pupil dilation



Anterior and posterior exam



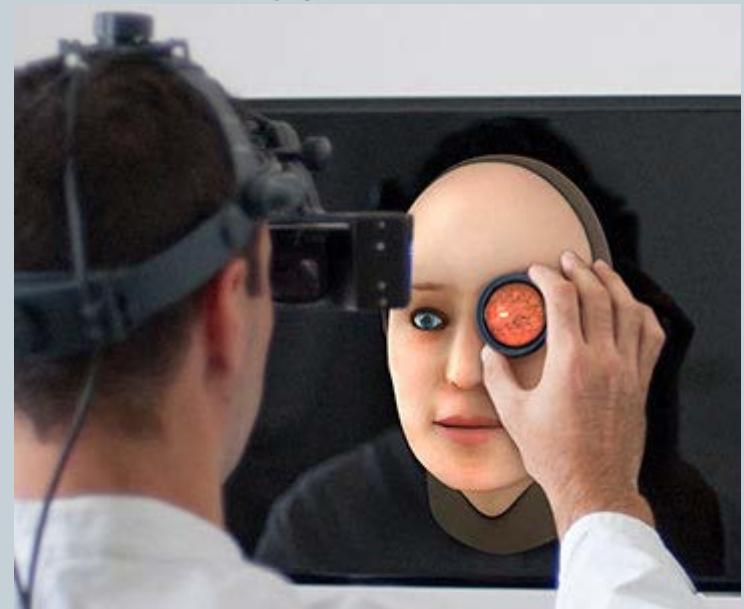
- Slit-lamp exam
- Dilated posterior fundus exam



<http://stanfordmedicine25.stanford.edu/Assets/Images/NormalRetina.gif>



http://www.riceoweek.com/wp-content/uploads/2013/01/5852878952_79da552c11_z.jpg



https://www.vrmagic.com/uploads/pics/eyesi_indirect_1_2_news_1.jpg

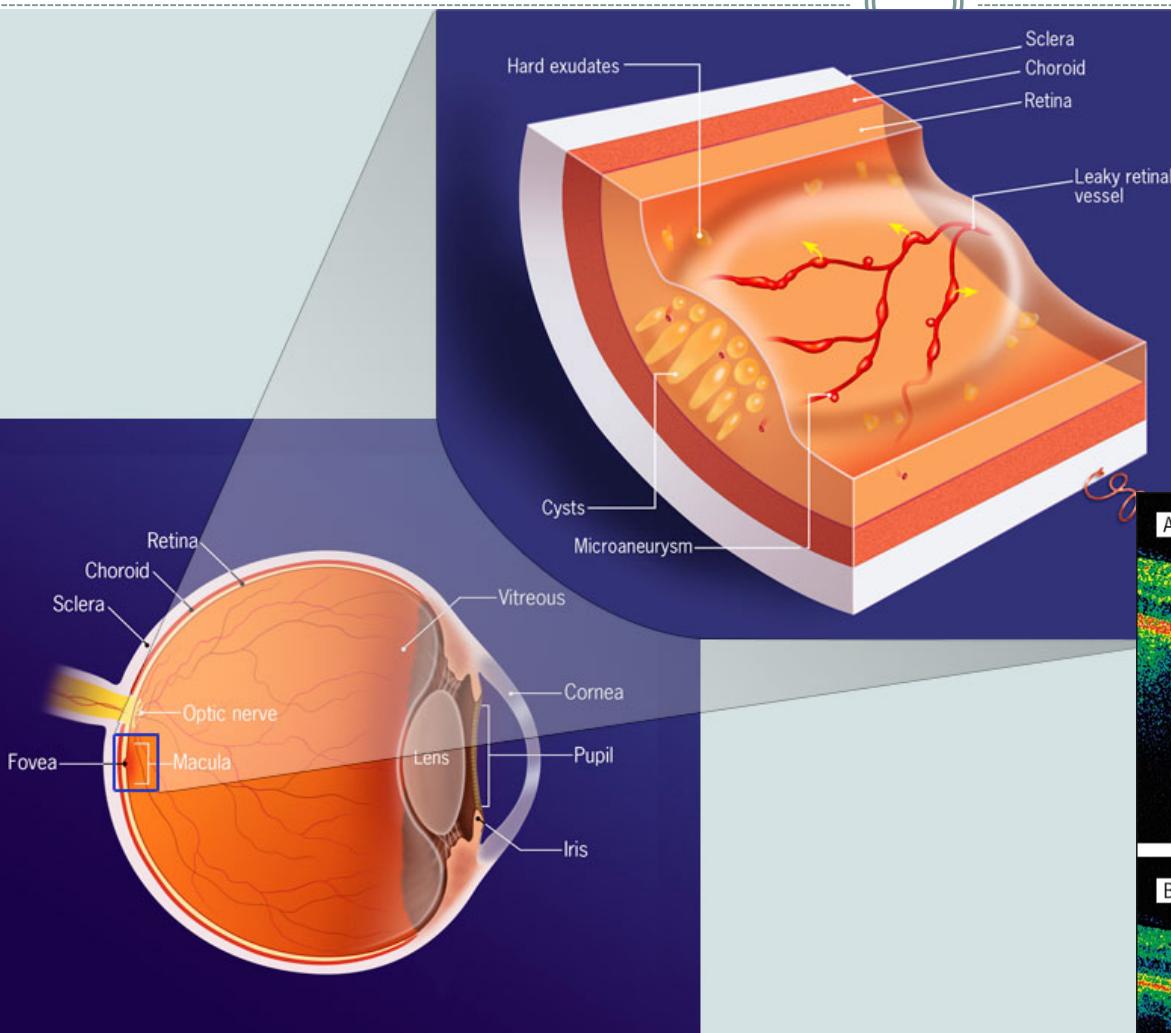
Choroidal involvement

- Posterior part of the eye
 - Fundus exam
 - Fundus photos
 - Ultrasound
 - Optical coherence tomography (OCT)
 - Fluorescein angiography and indocyanine green

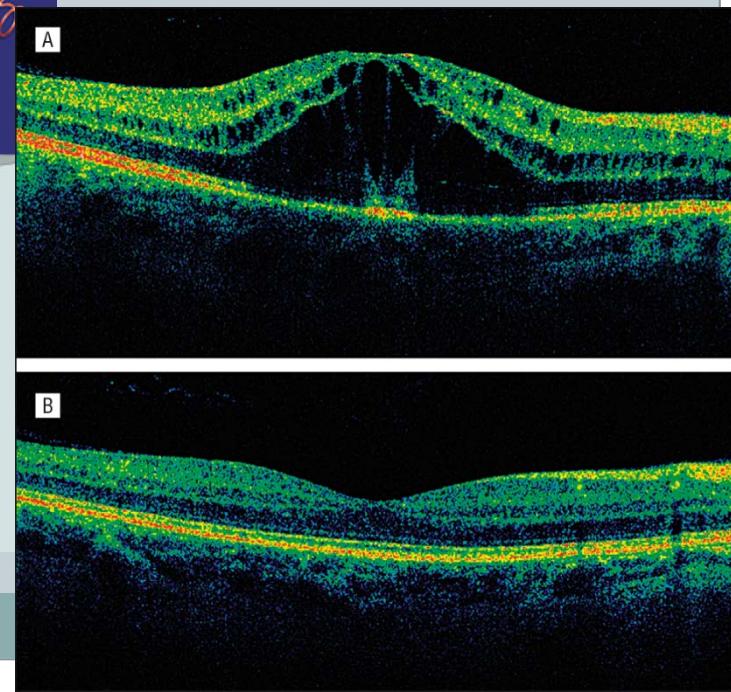


Abdellatif A, Mason CM, Ytterberg SR, Boorjian SA, Salomão DR, Pulido J. Choroidal Involvement in Erdheim-Chester Disease. Ophthalmic Surg Lasers Imaging Retina. 2015 Jun;46(6):674-6. doi: 10.3928/23258160-20150610-13.

Macular edema



<http://amaprod.silverchaircdn.com/data/Journals/OPHTH/6910/eld80014f1.png>



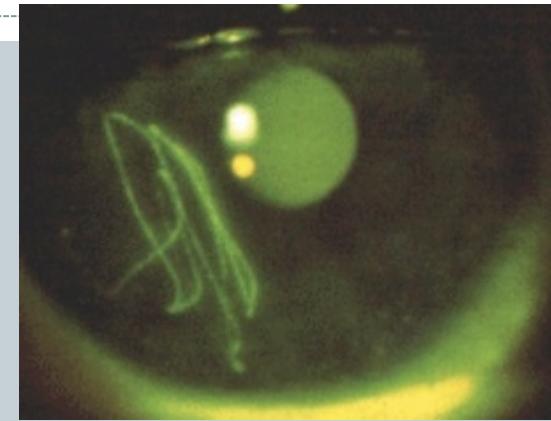
<http://treatmydme.com/images/What-is-DME-image-large.jpg>

Other common ophthalmic conditions

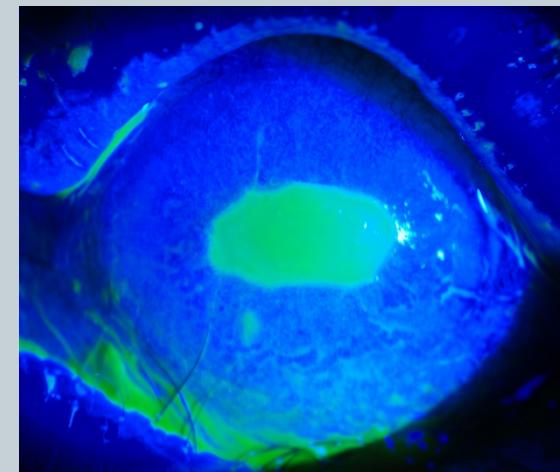


- Not specific to ECD

- Dry eye syndrome
- Corneal abrasion
- Blepharitis
- Dermatochalasis
- Ptosis
- Orbital cellulitis
- Refractive error
 - Myopia
 - Hyperopia
- Presbyopia
- Cataract



https://pedclerk.bsd.uchicago.edu/sites/pedclerk.uchicago.edu/files/uploads/cornealabrasion_0.jpg

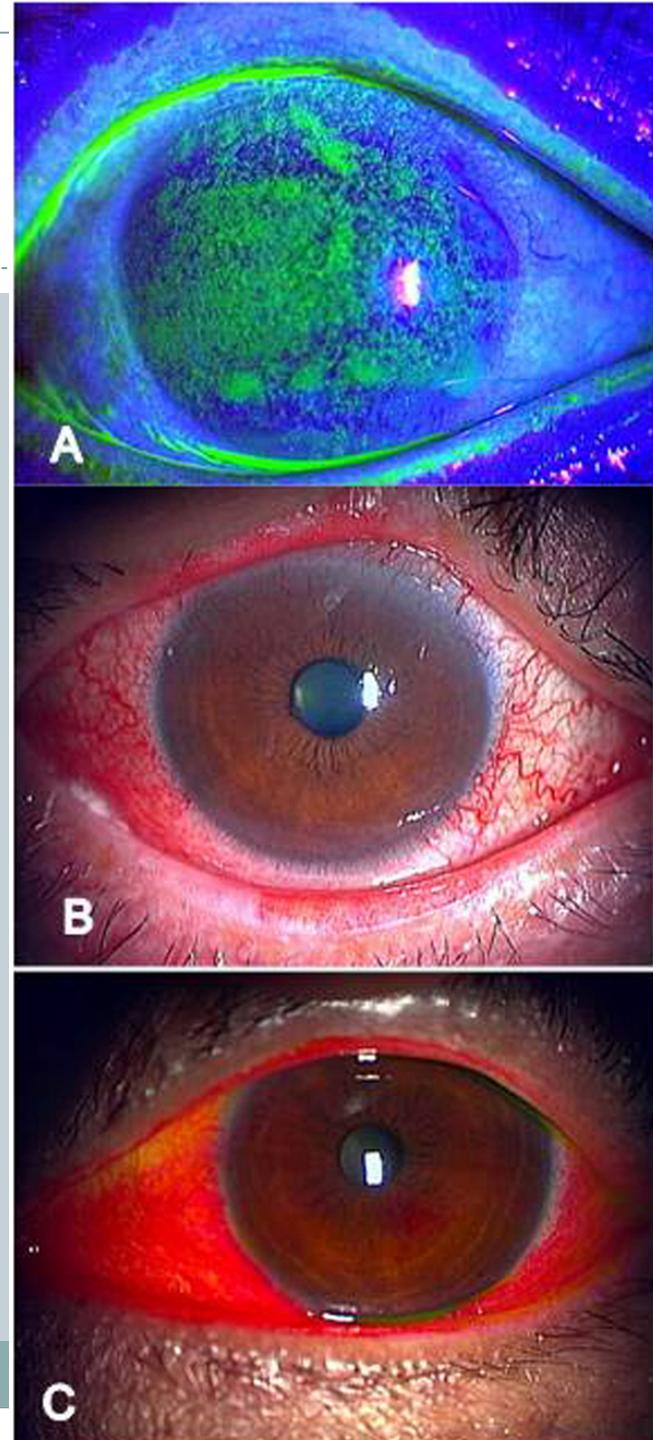


http://www.sightnation.com/files/36084_038.JPG

Dry eye syndrome

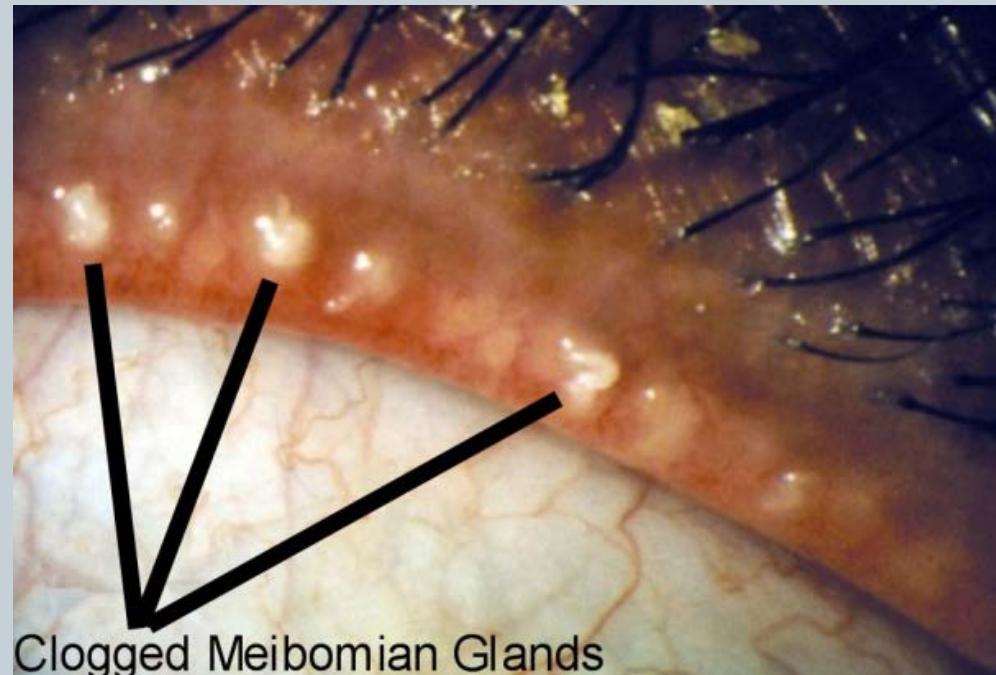


- Irritation
- Foreign body sensation
- Blurry vision
- Redness
- Sticky eyelid sensation in morning
- Treat with
 - Preservative free artificial tears, gels, and ointments



Blepharitis

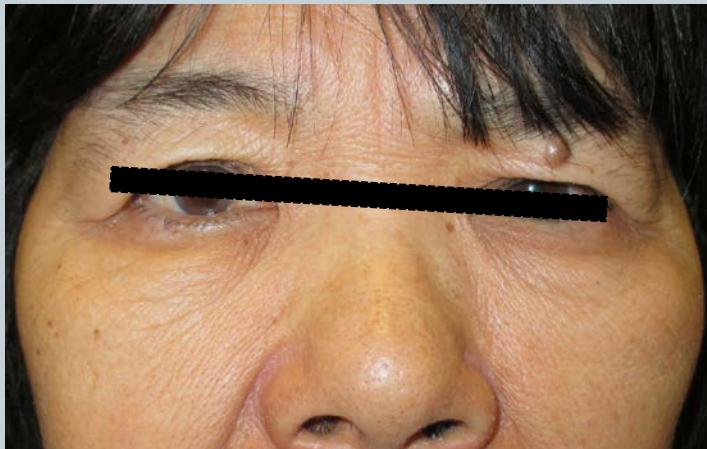
- Causes or exacerbates most cases of dry eye



Dermatochalasis and ptosis



- Excess skin
 - vs
- True droop of eyelid



<http://pediatricophthalmologypa.com/eye-library-5/droopy-eyelids-ptosis/>

Orbital cellulitis



- Pre-septal vs post-septal



[http://www.oculist.net/downaton502/prof/ebook/duanes/graphics
/figures/v2/0340/005af.jpg](http://www.oculist.net/downaton502/prof/ebook/duanes/graphics/figures/v2/0340/005af.jpg)

Refractive error

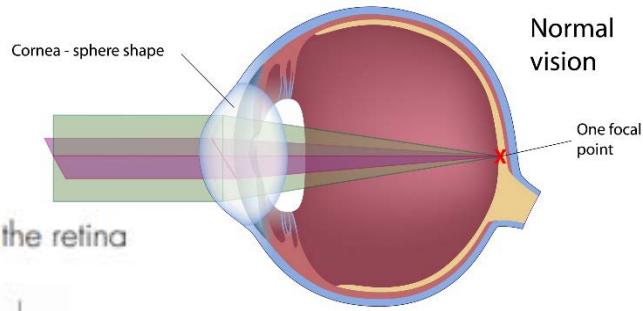
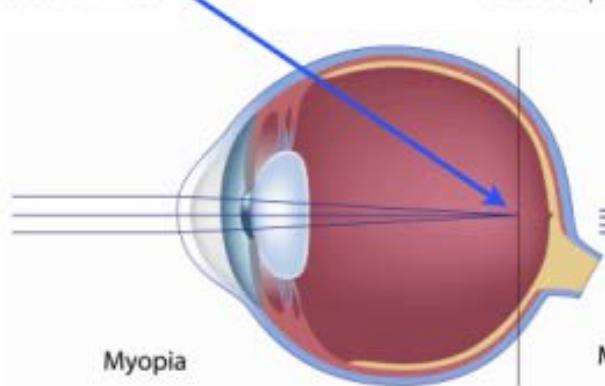


Image focused here



Glasses put the image back where it belongs on the retina

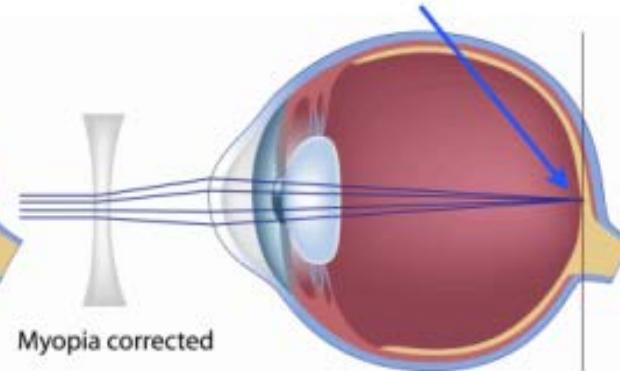
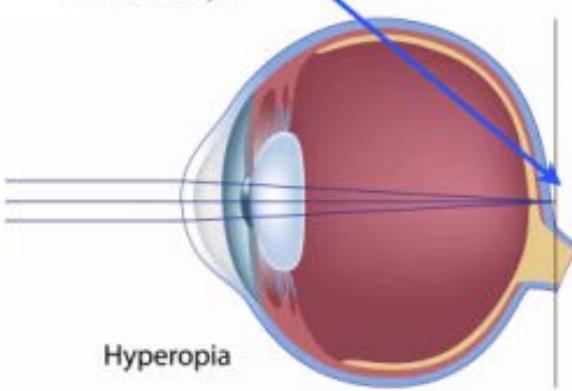
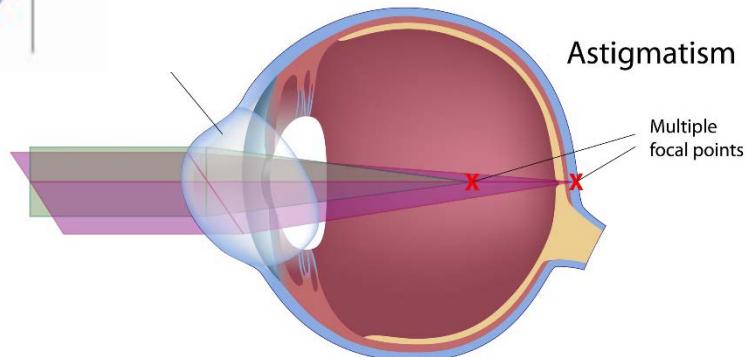
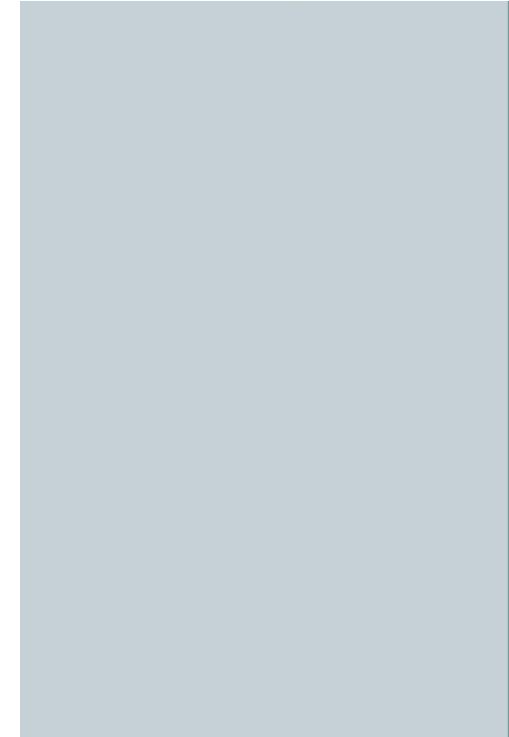
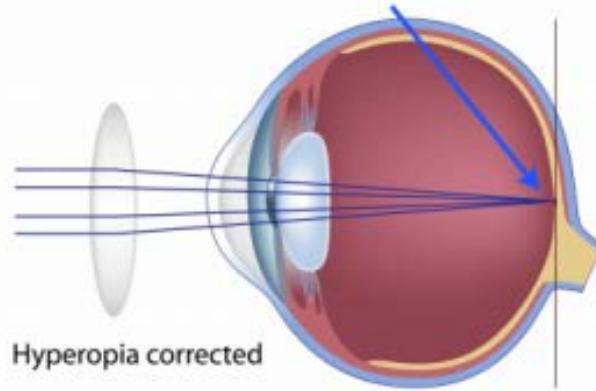


Image focused here
behind the eye



Glasses put the image back where it belongs on the retina



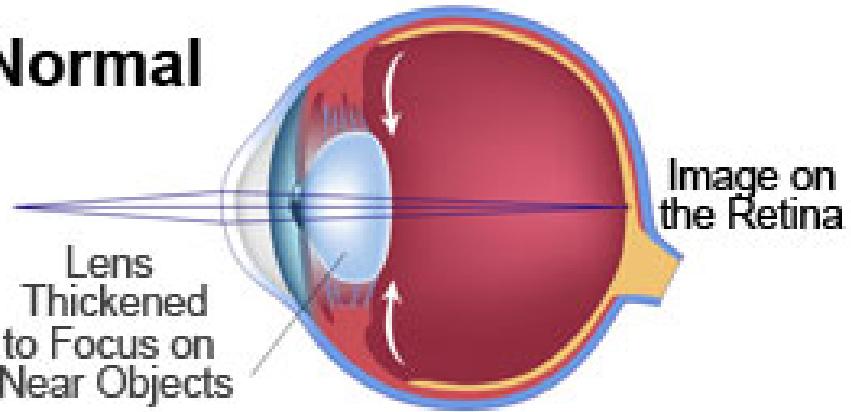
Presbyopia

- Decreased or lost ability of lens to change shape and focus light
 - Age related change

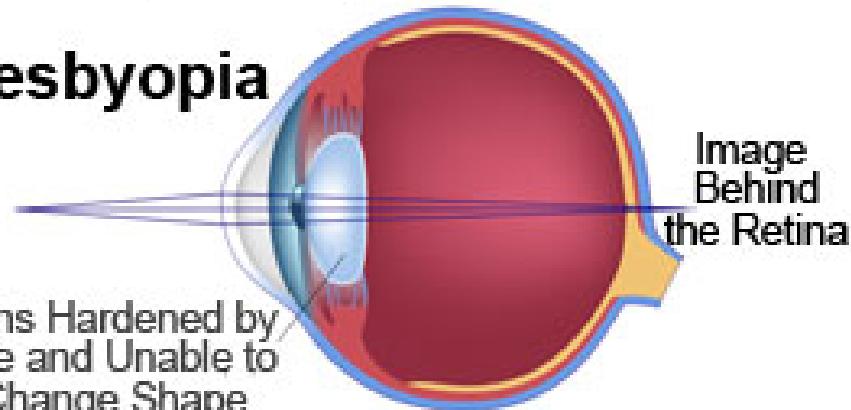


<https://visionhelp.files.wordpress.com/2012/07/presbyopia2.jpg?w=300>

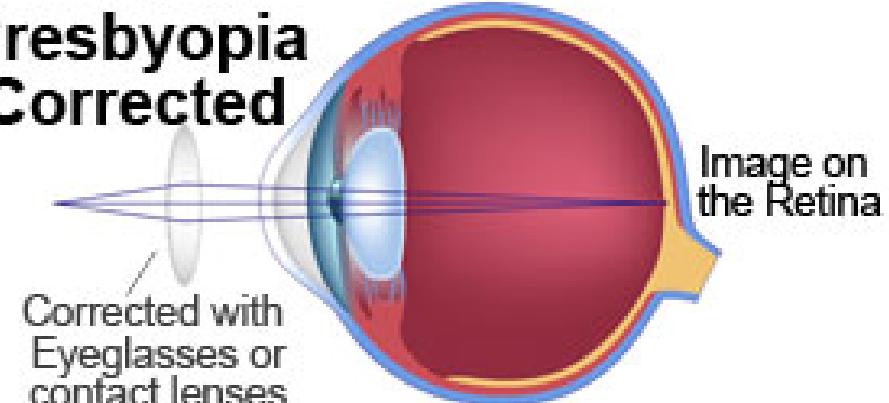
Normal



Presbyopia



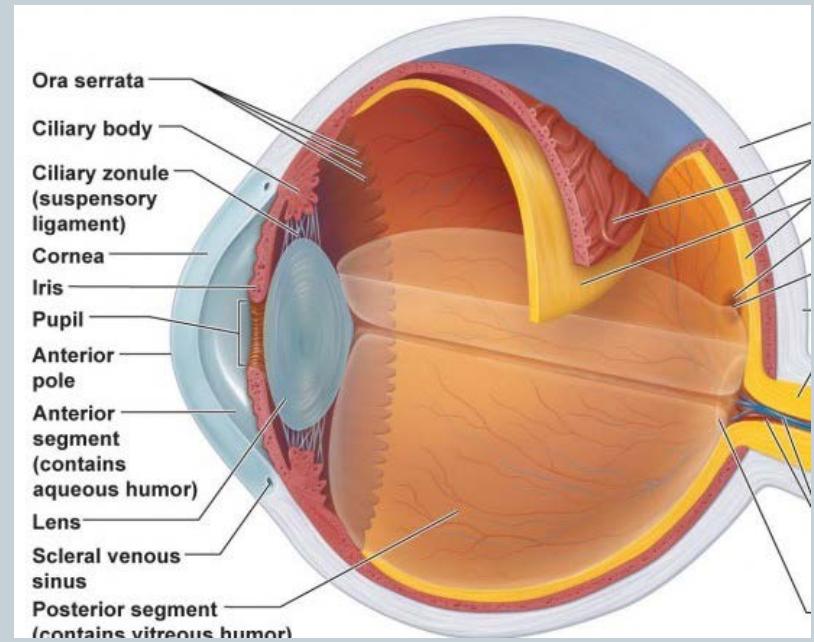
Presbyopia Corrected



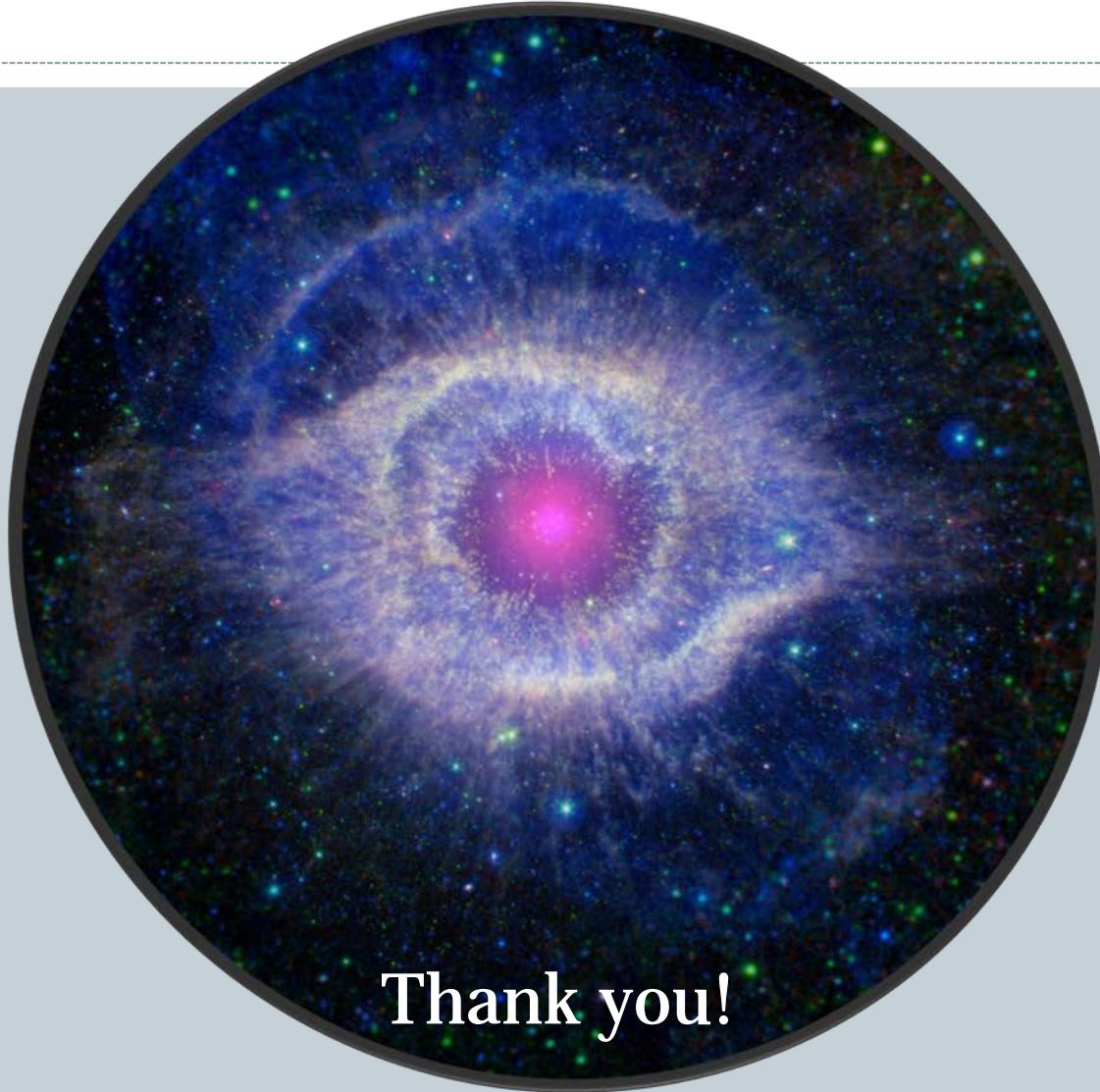
http://www.christophersoneyeclinic.com/eyeclinic_wp/wp-content/uploads/eye_presbyopia_corrected.jpg

Cataract

- Clouding of the natural lens of the eye
 - Can be bilateral and asymmetric
 - Age related lens change but can worsen with medications
 - ✖ Steroids
- Cataract surgery
 - Removal of the natural cloudy lens
 - Placement of an artificial lens
 - Very commonly performed with excellent success rates



Questions??



Thank you!

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