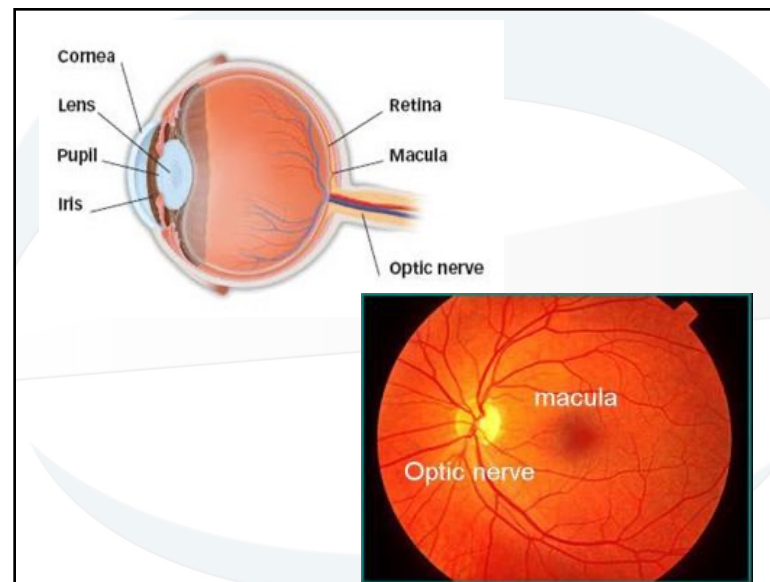


All The Things Your OD Can See: Ocular Manifestations of Systemic Disease

Cecelia Koetting, OD, FAAO DipABO
University of Colorado School of Medicine

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Most Common Systemic Diseases with Ophthalmic Manifestations

- Diabetes Mellitus
- Hypertension
- HSV/HZO
- Graves Disease/Thyroid Disease
- Rheumatoid Arthritis
- Multiple sclerosis

3



DIABETES MELLITUS

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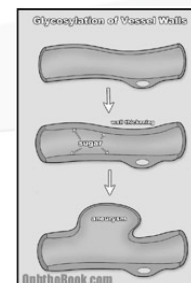
Epidemiology

- Systemic, microvascular disease affecting (not limited to) the liver, kidneys, and eyes.
 - Type I caused by destruction of the Islets of Langerhans in the Pancreas.
 - Type II caused by the body's developed resistance to insulin.
- It is the most common cause of blindness in the 20-70 year old population.
 - Diabetic retinopathy is prevalent in 30% of the diabetic population.

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Diabetes Mellitus

- Damages blood vessel lining and smooth muscle
- Who is affected:
 - 9.3% of Americans (almost 30 million people)
 - 28.5% of those older than 40 with diabetes have retinopathy



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Neuropathy is end stage organ damage

- Diabetics know this first hand
- All diabetics get dry eye, few complain about it.



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Diabetic Retinopathy

- Occurs due to a breakdown in the retina's ability to auto regulate its blood supply properly.
 - Hyperglycemia increases retinal blood flow and therefore causes "capillary hypertension."
- This hypoxic environment causes an up-regulation of the angiogenic factor VEGF.
 - VEGF stimulates the growth of new blood vessels to meet the needs of the starving retina.

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Risk factors for developing DR

- Duration of DM
- Control of DM delays onset
 - Fasting BS <126 and A1C <7%
- Hypertension/Hyperlipidaemia
- Renal Disease
- Pregnancy
- Sleep apnea
- Obesity
- Smoking
- Anaemia



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ETDRS Classification of Diabetic Retinopathy

DR Level	Retinal Findings
Mild NPDR	At least one MA and 1 or more of following <ul style="list-style-type: none"> • Retinal hemorrhages • Hard exudates • Soft exudates
Moderate NPDR	Hemorrhages and MA or soft exudates, VB, and IRMA present
Severe NPDR	Any of the following and no signs of PDR (4-2-1 rule) <ul style="list-style-type: none"> • >20 intraretinal hemorrhages in each of 4 quadrants • Definite venous beading in 2 or more quadrants • Prominent IRMA in 1 or more quadrants
Very Severe NPDR	• 2 or more of lesions of Severe NPDR
PDR	One of either <ul style="list-style-type: none"> • Neovascularization • Vitreous/preretinal hemorrhage

AOA Optometric Clinical Practice Guideline® Diabetic Mellitus. St. Louis, MO. American Optometric Association.

10

Severe NPDR

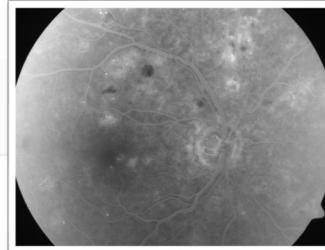
- Within one year, 52-75% of patients falling into this category will progress to PDR ([Aiello 2003](#)).



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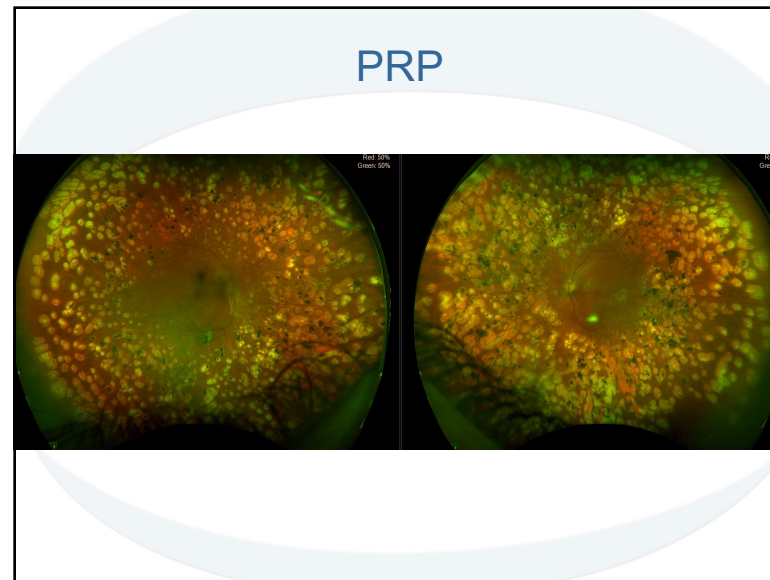
New Treatments Diabetic Retinopathy

- Proliferative Disease:
 - Pan Retinal Photocoagulation or Focal Laser
 - Ranivizumab (Lucentis) and Aflibercept (Eylea)-anti-VEGF
- RISE/RIDE studies showed a 3 line VA improvement in diabetic eyes treated with anti VEGF



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Diabetic Macular Edema

- DME incidence based on duration and type of diabetes
 - IDDM
 - <8 years rare
 - 10 years 7-10% incidence DME
 - 20 years 25-30% incidence DME
 - NIDDM
 - 10 years 5% incidence DME
 - 20 years 15% incidence DME
 - NIDDM w/ insulin use
 - 10 years 10% incidence DME
 - 20 years 30-35% incidence DME

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DME

- DME is also closely associated with degree of DR present
 - Mild NPDR ~ 3 % incidence
 - Moderate- Severe NPDR ~40% incidence
 - PDR ~71% incidence

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Current Treatment

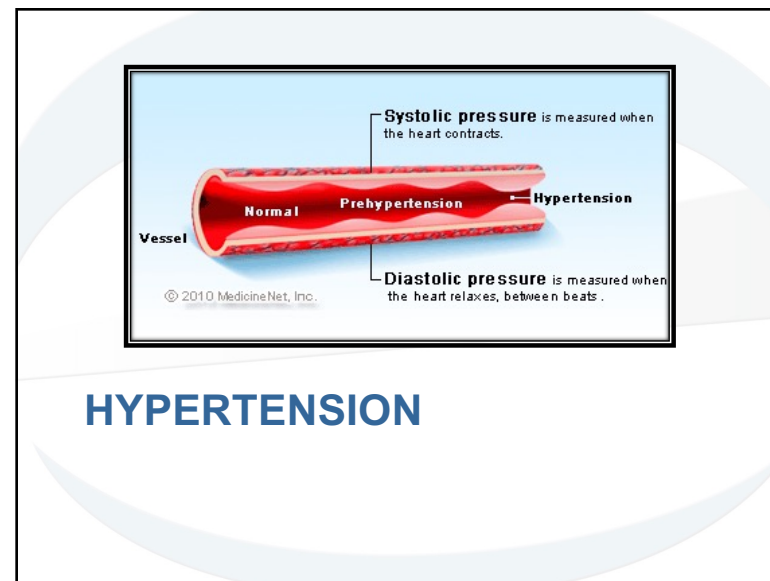
- New mainstay treatment: Intravitreal Injections
 - Lucentis (FDA)
 - Eyelea (recent FDA)
 - Ozurdex (recent FDA)
 - Avastin
 - Triamcinolone, Dexamethasone (Ozurdex), Fluocinolone acetonide
- Focal laser with intravitreal injection

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Hypertension

- Chronic elevated blood pressure
 - Essential vs secondary
- The following guidelines were published by the Joint National Committee of Prevention, Detection, Evaluation, and Treatment of High Blood Pressure:

Classification of Hypertension⁴

BP Classification	Systolic BP		Diastolic BP
Normal	<120mm Hg	and	<80mm Hg
Prehypertensive	120-139mm Hg	or	80-89mm Hg
Stage 1 hypertension	140-159mm Hg	or	90-99mm Hg
Stage 2 hypertension	≥160mm Hg	or	≥100mm Hg
Hypertensive Emergency	>180mm Hg	or	>110mm Hg

The 7th report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. December 2003

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Risk Factors HTN

- Genetic predisposition
- Excess salt
- Adrenergic tone
- Obesity
- Race
 - African American 33.5% vs caucasian 28.7%

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HTN

- Persistent high BP causes organ damage
 - Affects brain, heart, kidneys, and eyes
- Vascular changes occur with both chronic and acute elevated BP
 - Affect both retina and choroid
 - Early warning signs of organ damage from HTN

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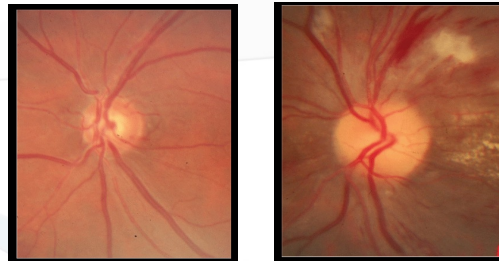
Ocular Manifestations of HTN

- | | |
|---|---|
| • Anterior ischemic optic neuropathy | • Glaucoma |
| • Central or branch retinal artery occlusion (CRAO or BRAO) | • Hypertensive retinopathy |
| • Central or branch retinal vein occlusions (CRVO or BRVO) | • Idiopathic polypoidal choroidal vasculopathy (IPCV) |
| • Choroidal infarction | • Macroaneurysms |
| • Cranial nerve palsies | • Ocular ischemic syndrome |
| • Progression of diabetic retinopathy | • Subconjunctival hemorrhage |
| | • Transient visual obscurations |

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HTN Retinopathy

- HTN patients have 50-80% chance of developing HTR
 - Patients with signs of HTR are more likely to have high BP



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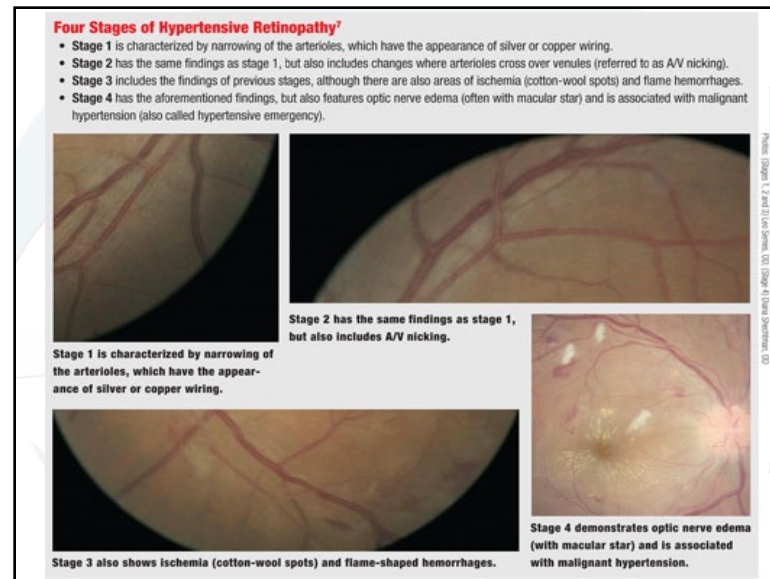
23

HTR Classification

- **Keith-Wagener-Barker Hypertensive Retinopathy Classifications**
 - *Stage 1*: Mild retinal vascular changes (generalized arteriolar narrowing).
 - *Stage 2*: Moderate to severe retinal vascular changes (arteriovenous crossing changes).
 - *Stage 3*: Stage 1 and 2 findings, plus cotton-wool spots, retinal hemorrhages and exudates
 - *Stage 4*: Stage 3 findings, plus associated optic nerve head swelling and macular star formation.

Keith NM, Wagener HP, Barker NW. Some different types of essential hypertension: their course and prognosis. Am J Med Sci 1974 Dec;268(6):336-45.

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HTR Management

- Stage 1-3
 - observation and management of BP with DFE often
- Malignant HTN $\ast >200/140$
 - Emergency referral for treatment with PCP or ER

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Vein Occlusions

- Arteriosclerosis associated with CRVO and BRVO due to arteries and veins sharing of tissue
- End result is blood stasis and hypoxia; cycle occurs when blood backs up in capillary beds, then leakages, edema, and flame hemorrhages in anterior capillary bed and then inter-retinal hemorrhages in deeper capillary bed
- Aging, HTN, elevated cholesterol, diabetes, increased IOP
- HTN contributes to thrombosis leading to vein occlusion
50% BRVO linked to HTN



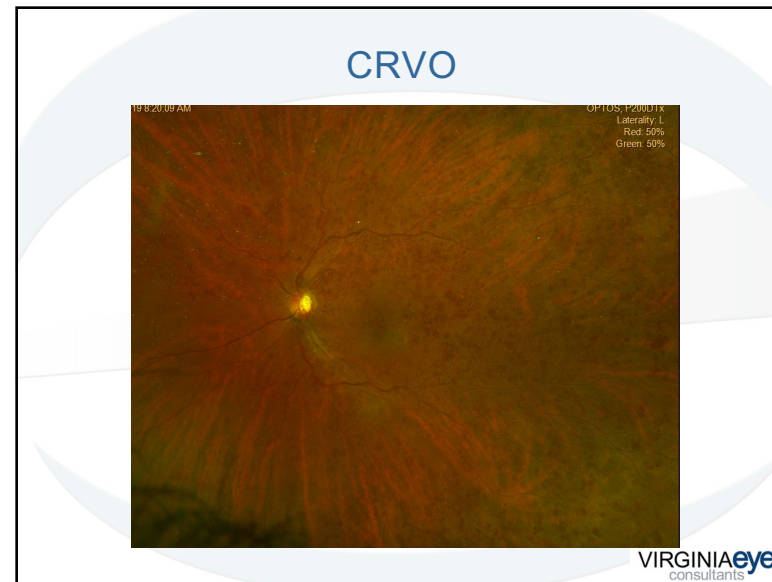
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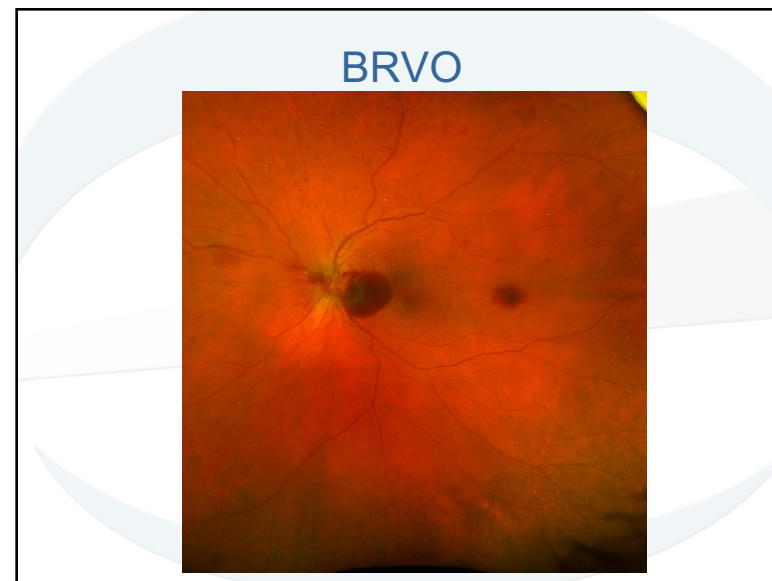
Risk Factors

- Increase risk with aging, HTN, elevated cholesterol, diabetes, increased IOP
- HTN contributes to thrombosis leading to vein occlusion
 - 50% BRVO linked to HTN

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CRVO/BRVO Treatment

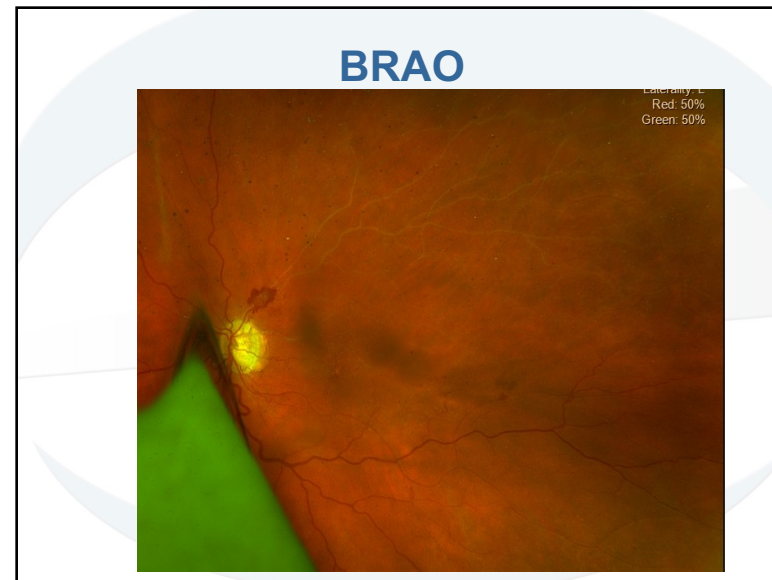
- Treat the complications
 - Neovascularization vs macular edema
 - Injections
 - Steroid vs anti-VEGF
 - Laser photocoagulation
 - Surgical therapy

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Artery Occlusions

- Occlusion of the bloodflow in the retinal blood vessel
 - Embolism (hollenhorst plaque), thrombus, inflammatory, traumatic
- Central retinal artery occlusion (CRAO) vs branch retinal artery occlusion (BRAO)
- High risk
 - Atherosclerosis
 - Cardiac disease
 - Coagulopathy (sickle cell, oral contraceptive, platelet)
 - Collagen vascular disease

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HERPES: HSV/HZO

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All in the family. . .

- Herpes virus
 - Herpes simplex virus type 1 (HSV-1)
 - Orofacial and ocular infections
 - Herpes simplex virus type 2 (HSV-2)
 - Genital infections
 - Varicella-zoster virus (VZV)(HZV)
 - Cytomegalovirus (CMV)
 - Epstein Barr virus (EBV) (Mono)

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What are the Triggers?

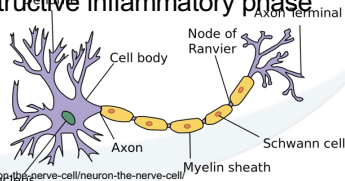


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Herpes Simplex Virus

- Can be contagious through contact with saliva or an open blister
 - HSV-2 periodically sheds the virus
- Primary vs. recurrent infections
 - More common as a recurrent HSV
- Remain dormant in cell bodies of neurons in the sensory ganglia
 - More than 90% carry the latent virus
- Active phase can lead to destructive inflammatory phase



<http://shajitheodore.com/neuroscience/drug-addiction/neuron-the-nerve-cell/neuron-the-nerve-cell/>

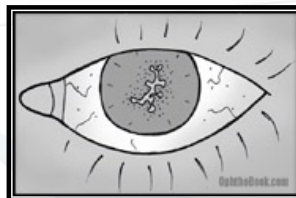
38



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HSV Ocular Signs and Symptoms

- Symptoms
 - Pain
 - Photophobia
 - Blurred VA
 - Tearing
 - Redness
 - FB sensation
- Signs
 - Recurrent
 - Unilateral
 - Eyelid vesicles
 - Epithelial dendrites
 - Decreased K sensitivity
 - K edema
 - KPs
 - Iris stroma / sphincter
 - High IOP
 - Vitritis
 - Retinitis
 - Papillitis



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Primary Ocular HSV Infection

- Unilateral blepharoconjunctivitis
 - Follicular conjunctivitis
 - Palpable preauricular lymphadenopathy
- Skin or eyelid vesicles
- Epithelial keratitis
- Stromal keratitis / uveitis are rare



Photo accessed from <http://zizzur.com/viewarticle.php?id=173>.

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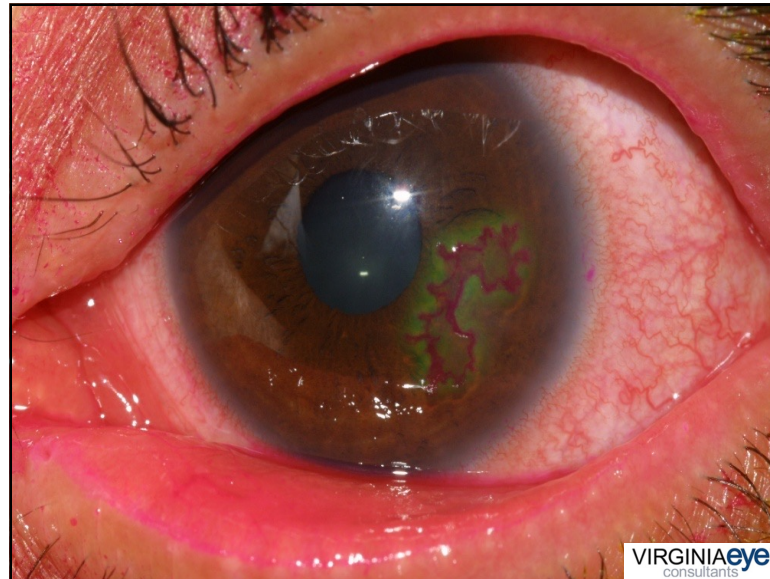
41

Recurrent Ocular Infection

- Reactivation of virus in latently infected sensory ganglion
- Recurrence 27% at 1 year, 50% at 5 years, 63% at 20 years
 - Increased risk with each occurrence
 - Increased risk with DES and CL use
- Can occur in almost any ocular tissue
 - Blepharoconjunctivitis
 - Epithelial keratitis – lowest risk
 - Stromal keratitis – highest risk
 - Iridocyclitis

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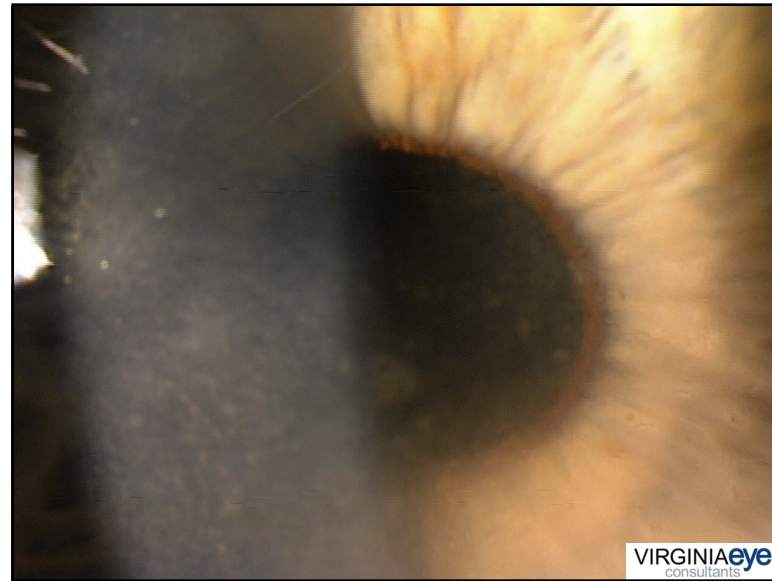
43

Treatment for HSV Epithelial Keratitis

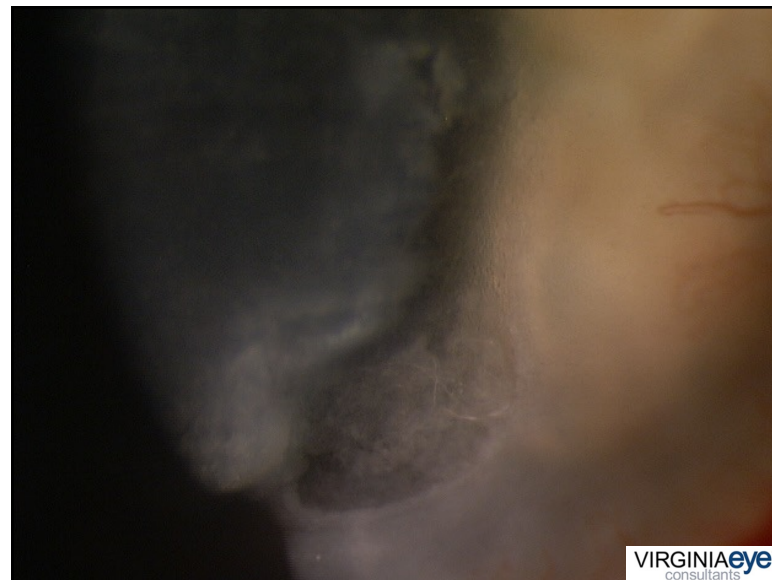
- Dendritic keratitis usually resolves within 3 weeks
- Goal to minimize stromal damage and scarring
- Consider epithelial debridement
- Topical / Oral antivirals
- Topical steroids??

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Diagnosis

- HSV Epithelial Keratitis OS
- Treatment:
 - Zirgan 5X daily
- Zirgan 0.15% ganciclovir ophthalmic gel
 - Approved for treatment of acute herpetic keratitis
 - Dosage – One drop 5 times a day until healed, then one drop 3 times a day for 7 days
 - Supplied in 5 gm tube

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Treatment for HSV Stromal Keratitis

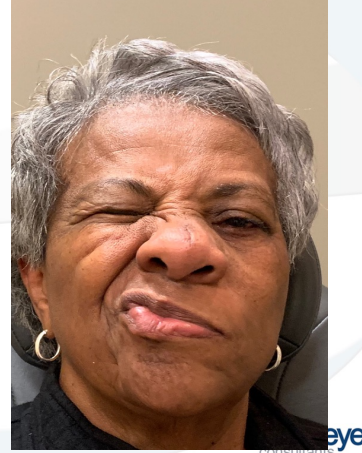
- Topical corticosteroids
 - Prednisolone acetate 1% q2h with taper over 1-2 weeks
 - Difluprednate qid
- Topical / oral antiviral
 - Trifluridine QID
 - OR
 - Acyclovir 400 mg BID
 - OR
 - Valacyclovir 500 mg QD
 - Use concurrently until patient off steroids

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Herpes and Bell's Palsy

- HSV or HZV has been shown to cause Bell's Facial Nerve Palsy
- Main concern is dry eye secondary to poor lid function



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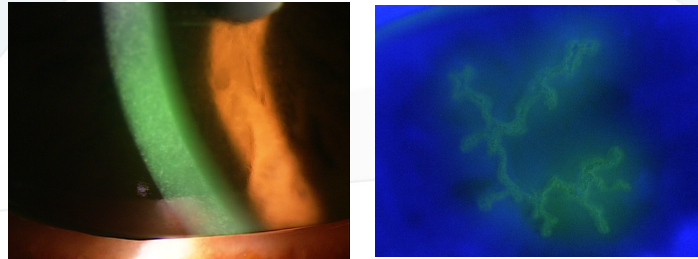
Oral Antivirals

- Inhibit viral DNA polymerase without inhibiting normal cellular activity
- Works best if treatment initiated within 72 hours
- Pregnancy category B
- Caution in patients with renal disease

Antiviral Drug	HSV	HZO
Acyclovir	400 mg 5x/day for 1 week	800 mg 5x/day for 1 week
Valacyclovir	500 mg TID for 1 week	1000 mg TID for 1 week
Famciclovir	250 mg TID for 1 week	500 mg TID for 1 week

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Orals for Simplex???



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Herpes Varicella-Zoster Virus

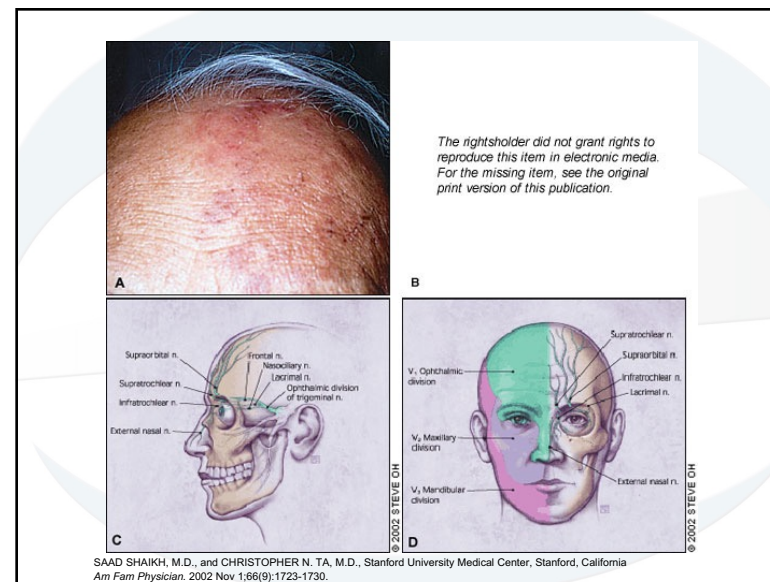
- Aka Shingles, HZV, chicken pox
- Primary Infection: chicken pox
 - Remains latent in dorsal root or other sensory ganglia after primary infection, for years to decades
- Later Infection: reactivation is called Zoster or Shingles
 - Virus specific cell-mediated immune responses decline
 - Localized cutaneous rash erupting in a single dermatome
 - HZO accounts for 10-25% of all cases of shingles

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Zoster

- Vesicle placement respects the midline of the face
- Follows dermatome of the nerve
- Very painful!!
- Traditionally in people >60 YOA
 - Increase incidence in younger people since introduction of chicken pox vaccine
 - Decreased incidence overall since introduction of Shingles vaccine
 - Increase risk in people w/ decreased immune system, HIV, on immunosuppressive drugs

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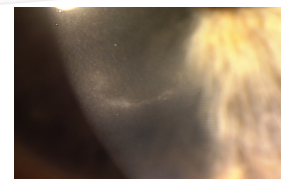
Herpes Zoster Ophthalmicus

- HZO accounts for 10-25% of all cases of shingles
- 90% of U.S. population infected with VZV by adolescence
- 100% of U.S. population by 60 years of age
- 1.5-3.4 cases per 1,000 individuals

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Herpes Zoster Ophthalmicus

- Conjunctivitis
- Scleritis
- Pseudodendrites
- Keratic precipitates
- Iritis
- Synechiae
- Neurotrophic keratitis
- Elevated IOP
- Potential vascular occlusion
- Nerve palsies
- Glaucoma (longer-term)



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HZO: Signs and Symptoms

- Prodromal phase: fatigue, malaise, low-grade fever
- Unilateral rash over the forehead, upper eyelid, and nose
 - 60% of patient have dermatomal pain prior to rash
 - Erythematous macules to papules to vesicles to pustules to crusts
 - Other symptoms: eye pain, conjunctivitis, tearing, decrease VA, eyelid rash
 - Hutchinson's sign
- Post-herpetic neuralgia: >12 months for 50%

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HZO

- Treatment
 - Oral and topical antiviral drugs
 - Topical steroid vs oral steroid
 - Wound care

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Vaccines for HZO - Zostivax

- Zostivax is live attenuated herpes zoster (HZ) virus
 - 50% reduction in the incidence of HZ
 - 60% reduction in symptom severity in patients who developed HZ
 - 66.5% reduction in postherpetic neuralgia.
- Must have chicken pox as a child
- May help patients who've had HZO already



1. Oxman MN, Levin MJ, Johnson GR, et al. A vaccine to prevent herpes zoster and postherpetic neuralgia in older adults. N Engl J Med. 2005 Jun 2;352(22):2271-84.

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THYROID DISEASE

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Thyroid Disease Causes

- Hypothyroidism
 - Hashimoto's Disease
 - Thyroid removal
 - Pituitary gland malfunctions (TSH)
 - Low iodine intake*
 - Lithium exposure
- Hyperthyroidism
 - Autoimmune (Grave's Disease)
 - Toxic adenomas
 - Subacute thyroiditis
 - Pituitary gland malfunctions (TSH)
 - Cancerous growths in thyroid

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Systemic: Hypo vs. Hyper

- Hypothyroidism
 - Fatigue, sleepiness
 - Weight gain (decreased appetite)
 - Cold intolerance
 - Depression
 - Menstrual disturbances
 - Hair loss
 - Dry skin
- Hyperthyroidism
 - Nervousness
 - Anxiety
 - Increased perspiration
 - Heat intolerance
 - Hyperactivity
 - Palpitations
 - Weight loss

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Ocular Manifestations

- Anterior segment
 - Evaporative DES
 - SLK (65% have thyroid dysfunction)*
 - Lid retraction (Dalrymple's sign)
 - Lid lag
 - Exophthalmos
- Posterior Segment
 - Optic nerve hypoplasia
 - Optic nerve swelling/compression
 - Chorioretinal striae
- Intra-Orbital
 - EOM restriction (IM SLO)
 - EOM enlargement
 - Optic nerve compression



Image 1: <http://galleryhip.com/superior-limbic-keratoconjunctivitis.html> (SLK)



Image 2: <http://www.eyecalcs.com/DWAN/pages/v5/v5c021.h> (inferior rectus restriction)

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Grave's Disease

- Autoimmune Disease
- Women > Men (3-10 times)^
- Occurs in 4th – 5th decade of life^*
- When men are affected, symptoms are worse^
- Ocular manifestation generally appear 2.5 years after onset of disease ^
- 25-50% Grave's dz patients develop ocular manifestations.
- Most common in Hyperthyroid, but can occur with hypothyroidism

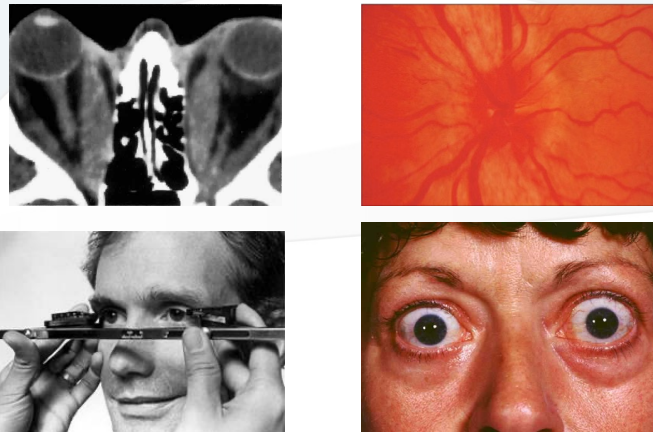
64

Grave's Disease

- Symptoms are easy to expect, when process is understood.
 - Antibodies affect extraocular muscles, orbital fat, and the levator, causing swelling and immobility.
 - Swelling of EOM can cause optic nerve compression, and result in exophthalmos
 - Levator involvement results in lid retraction and lag
 - Antibodies can also affect lacrimal gland

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Ocular Manifestations



1.) <http://www.eyecalcs.com/DWAN/pages/v5/v5c021.html> 2.) Yanoff & Duker Ophthalmology 3rd edition.
 3.) <http://cmoptical.ca/digital-retinal-imaging/4>.) <http://www.patient.co.uk/doctor/thyroid-eye-disease>

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Diagnosis/Testing

- Tonometry (primary gaze and up gaze)
- Exophthalmometer
- Appearance
- Thyroid panel/ Autoimmune markers
- Imaging (CT and MRI)
- Forced duction/motility

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Grave's Disease

- Optic Nerve Compression
 - Visual field defects
 - Contrast abnormalities
 - Color vision defects
 - RAPD
 - Decreased Visual Acuity
 - Pale atrophic optic disc
 - Rare: Occurs in 10% *
 - 40-50% of patients with compression have normal appearing fundus^{^*}.

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Treatment options

- Self Limiting: Graves' disease usually runs a progressive course for 3–5 years and then stabilizes.*
- Concern is patient comfort and treatment of Dry eye concerns.
- Lid weights/taping/tarsorrhaphy may be required to decrease exposure

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RHEUMATOID ARTHRITIS

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Rheumatoid Arthritis

- Chronic autoimmune disease causing symmetrical and destructive joint inflammation
- Exact cause unknown
- Middle aged women
- Morning stiffness
- Diagnostic Testing
 - Positive rheumatoid factor
 - Anti-CCP present
 - Elevated CBC
 - Joint X-ray

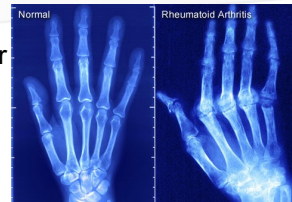


Photo accessed from
http://img.webmd.com/dtmcms/live/webmd/consumer_assets/site_images/articles/health_tools/rheumatoid_arthritis_overview_slides_how/rheumatoid_arthritis_x-ray_of_rheumatoid_arthritis.jpg

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Rheumatoid Factor (RF)

- Differentiates RA from other chronic arthritides
- Positive values (titers > 1:80) occur in approximately 70% of patients with rheumatoid arthritis
- Positive in only 5% of patients with JRA
- Can be positive in the following
 - Sjogren's
 - SLE
 - Syphilis
 - Chronic infections
 - Sarcoidosis
 - Liver disease

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Rheumatoid Arthritis

- 25% RA patients have ocular manifestations
 - Keratoconjunctivitis sicca - 15-25% patients
 - Sjogrens frequently accompanies RA
 - Episcleritis – 0.17%
 - Scleritis - 0.67%
 - Most common systemic condition associated with scleritis
 - Uveitis



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Rheumatoid Arthritis Treatment

- NSAIDs
- Steroids
- Disease Modifying Anti-rheumatic Drugs
 - Methotrexate
 - Sulfasalazine
 - Hydroxychloroquine

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Recent Clinical Findings for Sjögren's Diagnostics¹⁻⁴

Current Screening	New SS Panel
<ul style="list-style-type: none"> Combined serology sensitivity & specificity is around 40-60% 	<ul style="list-style-type: none"> Combined serology sensitivity & specificity is 87% and 82.5% respectively Cumulative specificity of 92.2% for CA6, SP-1, and PSP
<ul style="list-style-type: none"> None of the serology test diagnose SS early Misses approximately 25-35 % cases 	<ul style="list-style-type: none"> Approximately 50% of the early & new cases are identified (Ro and La Negative) Picks up additional cases
<ul style="list-style-type: none"> All serology tests identifies are non-organ specific auto-antibodies and could occur in other autoimmune diseases 	<ul style="list-style-type: none"> Comprises of both organ/non-organ specific auto-antibodies

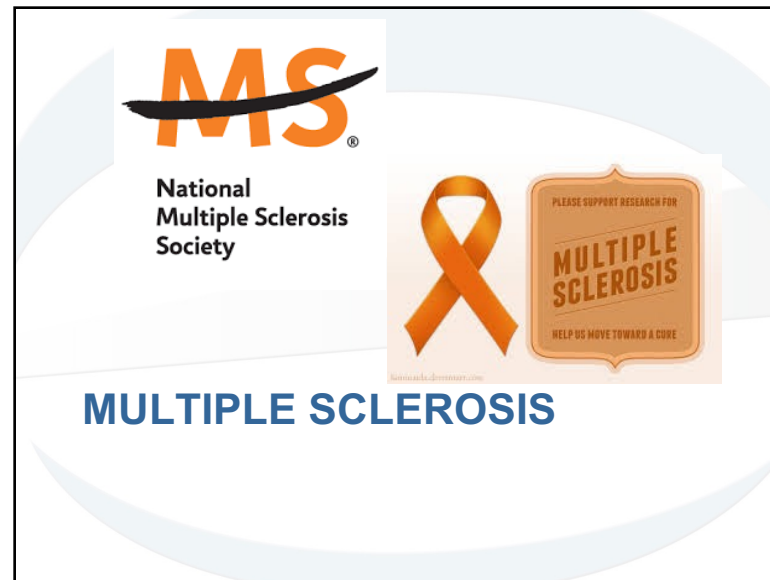
1. Tincani A, et al. Novel aspects of Sjögren's Syndrome in 2012. BMC Med Apr 4 2013;11:93. doi: 10.1186/1741-7015-11-93. 2. Shen L, et al. Novel autoantibodies in Sjögren's Syndrome. Clin Immunol 2012;145:251-255. 3. Huang Y, et al. The immune factors involved in the pathogenesis, diagnosis, and treatment of Sjögren's Syndrome. Clin Dev Immunol 2013; Article ID 160491. doi:10.1155/2013/160491 4. Ramos-Casals M, Brito-Zeron P, Siso-Almirall A, Bosch X. Primary Sjögren's Syndrome. BMJ 2012;344:e3821

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Multiple Sclerosis

- Immune-mediated process directed against the CNS
 - Attacks the myelin and the nerve fibers
 - Damaged myelin forms scar tissue (sclerosis)
 - Damage to myelin sheath or nerve fibers causes distortion or interruption to impulses traveling along involved nerves
 - Triggered by combination of 1 or more environmental factors in genetically susceptible individual

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Risk Factors

- Age: can occur at any age, but most common 15-60 YOA
- Women>Men 2:1
- FmHx
- Hx of certain viruses ie. Epstein-Barr (mono)
- Caucasian>Asian>African>Native American
- Increased risk with Thyroid Dz, Diabetes Type 1, and IBD
- Smokers

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Diagnosing MS

- Must meet MS diagnostic McDonald criteria :
 - Find evidence of damage in at least 2 separate areas of the CNS including brain, spinal cord, and optic nerves –AND- 2 or more attacks (relapses)
- MRI scan of the brain (T1 and T2) with fluid attenuated inversion recovery sequencing (FLAIR) and gadolinium infusion
- CSF abnormal in 90% of cases
 - Increased IgG

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Symptoms of MS

- Vary, depending on the location of affected nerve fibers
 - Numbness or weakness in one or more limbs that typically occurs on one side of your body at a time, or the legs and trunk
 - Partial or complete loss of vision, usually in one eye at a time, often with pain during eye movement
 - Double vision or blurring of vision
 - Tingling or pain in parts of your body
 - Electric-shock sensations that occur with certain neck movements, especially bending the neck forward
 - Tremor, lack of coordination or unsteady gait
 - Slurred speech
 - Fatigue
 - Dizziness
 - Problems with bowel and bladder function

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Multiple sclerosis

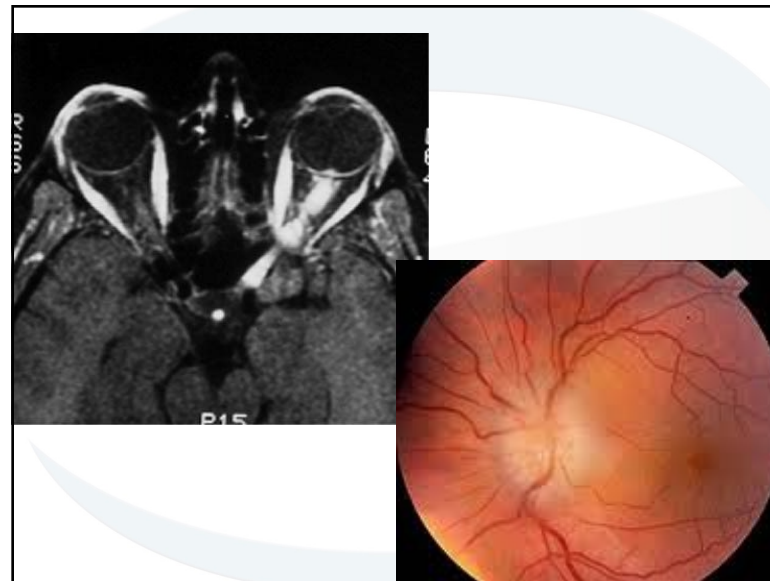
- Immune-mediated process directed against the CNS
 - Attacks the myelin and the nerve fibers
- Visual Field defects
 - Result of demyelination along visual pathway
- Bilateral internuclear ophthalmoplegia (INO)
 - diplopia
- Brain stem and cerebellum lesions
 - Dysmetria (undershoot/overshoot saccades)
 - Nystagmus
 - Cranial nerve palsies: CN6 and CN3
- **Optic Neuritis**
 - **75% occurrence, initial symptom in 14-25%**

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Optic Neuritis

- 6.4 per 100,000 in US
- Unilateral in 70%
- Most often 30's, range 20-60 YOA
- Triad
 - 1. loss of vision
 - Decrease varied, over hours to days
 - 2. dyschromatopsia
 - 3. eye pain (worse with movement)
- Optic disc swelling
- (+)APD
- VF defect (central scotoma)
- Orbital MRI will show inflammation of ON

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Optic Neuritis

- Prognosis
 - Visual recovery is good 65-80% recover VA of 20/30 or better within a few months
 - Residual abnormalities in contrast sensitivity, CV, VF loss, and photophobia
- High risk of developing MS (50%)
 - **15-year risk of MS was 50% overall**
 - **25% risk of MS when MRI is normal**
 - **75% risk of MS when MRI shows one or more lesions**

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Treatment of MS

- For Optic Neuritis
 - High dose methylprednisolone (ONTT) followed by oral prednisone
- Interferon-beta treatment
 - Avonex and Rebif
 - CHAMPS study
 - Early tx with Avonex during first episode may help delay development of definite MS
- Copaxone
 - Mimic myelin basic protein, early stages
 - Immune modulator that blocks attacks on myelin

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Neuromyelitis Optica (NMO)

- Previously thought of as variant of MS
- Demyelination of optic nerve and spinal cord
- Associated with aquaporin-4 (a water channel present in glial cells) antibodies.
- Testing for NMO-IgG should be considered in those patients with bilateral ON or ON coupled with longitudinally extensive transverse myelitis (LETM), recurrent ON, or brain MRIs atypical for MS
- No cure, but similar treatment to MS
- Poor prognosis, loss of muscle function, often death occurs 2/2 respiratory complications

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Conclusions

- The eyes are affected by what is going on in our body
- Important to work alongside primary care physicians and specialists to monitor and treat systemic diseases

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Thank you!



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References

- http://www.emedicinehealth.com/high_blood_pressure/article_em.htm
- AOA Optometric Clinical Practice Guideline® Diabetic Mellitus. St. Louis, MO. American Optometric Association
- Adam T. Gerstenblith MD, Michael P. Rabinowitz MD. **The Wills Eye Manual: Office and Emergency Room Diagnosis and Treatment of Eye Disease** 6th Edition
- Peter K. Kaiser MD, Neil J. Friedman MD, Roberto Pineda II MD. **The Massachusetts Eye and Ear Infirmary Illustrated Manual of Ophthalmology**, 4e 4th Edition
- Brad Bowling FRCSEd, FRCOphth FRANZCO, **Kanski's Clinical Ophthalmology: A Systematic Approach**, 8e 8th Edition
- [Fong DS, Aiello L, Gardner TW, King GL, Blankenship G, Cavallerano JD, Ferris FL 3rd, Klein R](#) Diabetes Care. 2003 Jan;26 Suppl 1:S99-S102. **Diabetic retinopathy**; [American Diabetes Association](#).
- The 7th report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. December 2003
- Keith NM, Wagener HP, Barker NW. Some different types of essential hypertension: their course and prognosis. *Am J Med Sci* 1974 Dec;268(6):336-45.
- SAAD SHAIKH, M.D., and CHRISTOPHER N. TA, M.D., Stanford University Medical Center, Stanford, California. *Am Fam Physician*. 2002 Nov 1;66(9):1723-1730
- Oxman MN, Levin MJ, Johnson GR, et al. A vaccine to prevent herpes zoster and postherpetic neuralgia in older adults. *N Engl J Med*. 2005 Jun 2;352(22):2271-84.
- Bartley GB, Gorman CA. Diagnostic criteria for Graves' ophthalmopathy. *Am J Ophthalmol*. 1995;119:792-5.
- *<http://www.eyecalcs.com/DWAN/pages/v5/v5c021.html>
- ** Yanoff & Duker Ophthalmology 3rd edition.
- *Kendler DL, Lipps J, Rootman J. The initial clinical characteristics of Graves' orbitopathy vary with age and sex. *Arch Ophthalmol*. 1993;111:197-201.
- http://www.nationalmssociety.org/NationalMSSociety/media/MSNationalFiles/Brochures/Paper-TipSheet_-_2010-Revisions-to-the-McDonald-Criteria-for-the-Diagnosis-of-MS.pdf

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References

- 1. Santaella RM, Fraunfelder FW. Ocular adverse effects associated with systemic medications: recognition and management. *Drugs* 2007;67(1):75-93.
- 2. Kapoor KG, Mirza SN, Gonzales JA, Gibran SK. Visual loss associated with tacrolimus: Case report and review of the literature. *Cutan Ocul Toxicol* 2010;29(2):137-139.
- 3. Tehrani R, Ostrowski RA, Hariman R, Jay WM. Ocular toxicity of hydroxychloroquine. *Semin Ophthalmol* 2008;23(3):201-209.
- 4. Talbert Estin KA, Sadun AA. Risk factors for ethambutol optic toxicity. *Int Ophthalmol* 2010;30:63-72.
- 5. Ozturk BT, Genc E, Tokgoz M, Kerimoglu H, Genc BO. Ocular changes associated with topiramate. *Curr Eye Res* 2011;36(1):47-52.
- 6. Azzouni F, Abu Samra K. Are phosphodiesterase type 5 inhibitors associated with vision-threatening adverse events? A critical analysis and review of the literature. *J Sex Med* 2011 Jul 19. [Epub ahead of print].