

The Optometrist's Role in Systemic Disease

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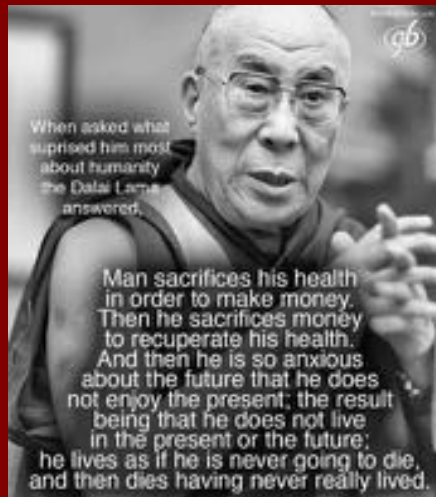


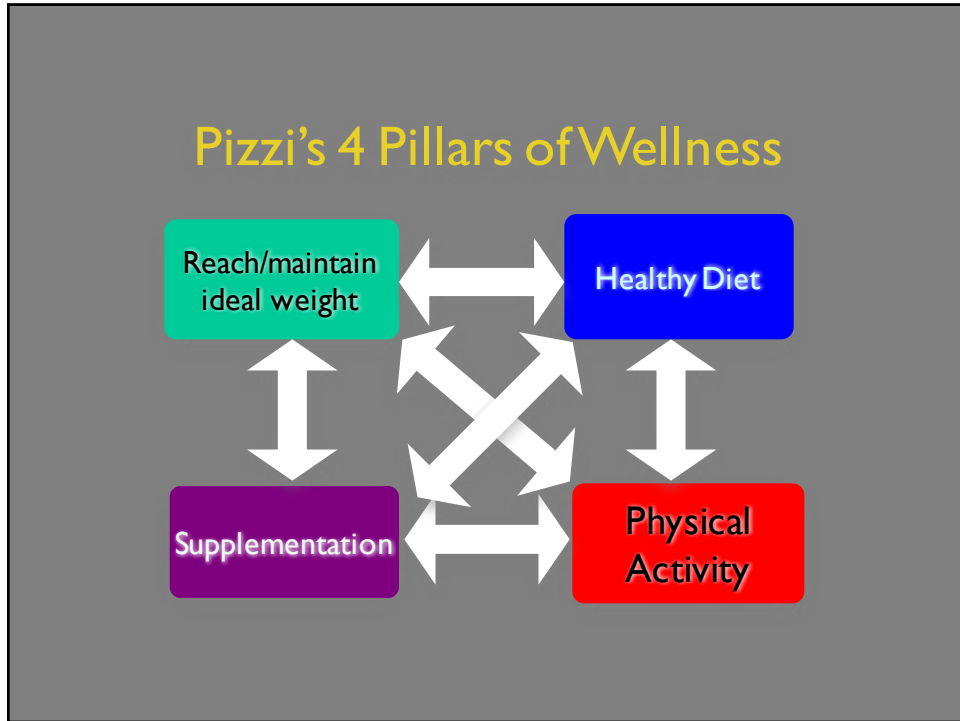
Course Goal

- To provide the participant with useful clinical information about caring for patients living with oculosystemic disease.

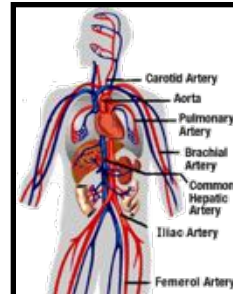


QUESTIONS AND ANSWERS





- ❑ The eye does not exist in isolation. It is an extension of the brain/CNS.
- ❑ The anatomy of the eye is structured to serve the functions of the retina.
- ❑ Primary reason for dilation is to detect systemic disease.



The eye is the only part of the body where neurological and vascular tissues can be viewed directly.

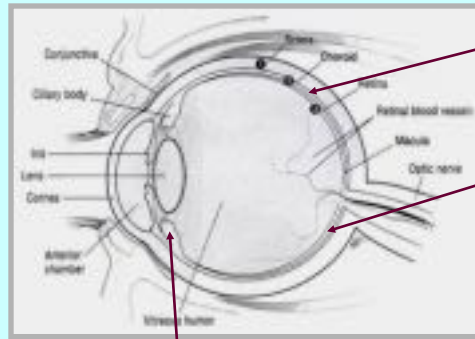


The Eye in Systemic Disease

- Inflammatory
- Infectious
- Vascular
- Endocrine
- Neurologic
- Collagen-vascular
- Neoplastic



Ocular Blood Flow



Choroid 80%
Sympathetic NS

Retina 5 %
Auto-regulated

Iris / Ciliary Body 15%

The Eye in Systemic Disease



Inner and Outer Blood Retinal Barriers

Retina/RPE, Choroidal Pigmentation



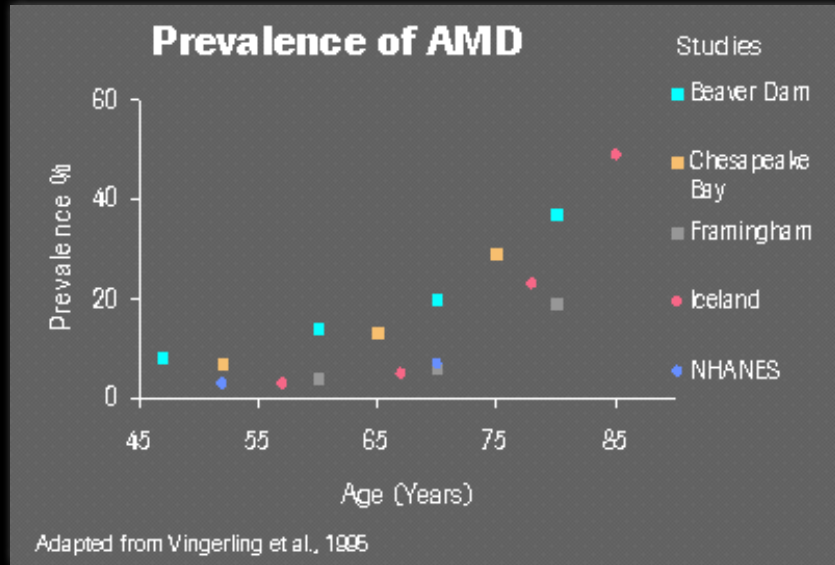
Medical Nutrition Therapy



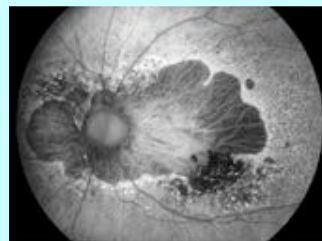
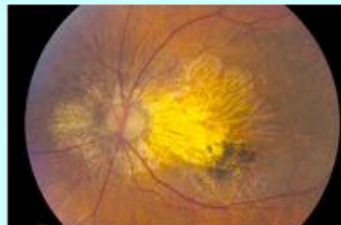
The AMD Epidemic



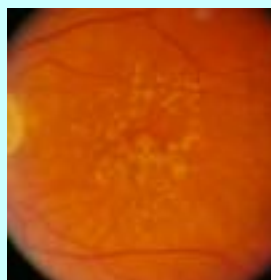
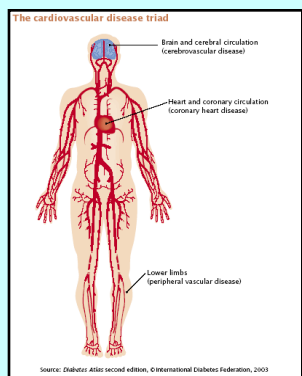
Epidemiology



AMD: a sick eye in a sick body?



Is AMD a Systemic Disease?



Johanna Seddon, MD (Tufts U)

“ Don’t smoke; follow a healthful diet rich in dark green leafy vegetables and low in fat; eat fish a few times a week; maintain a normal weight and waist size; exercise regularly; and control blood pressure and cholesterol.”



“Anyone with signs of intermediate-level macular degeneration in both eyes or advanced macular degeneration in one eye should also take dietary supplements that contain lutein, zeaxanthin, vitamin C, vitamin E, and zinc.”

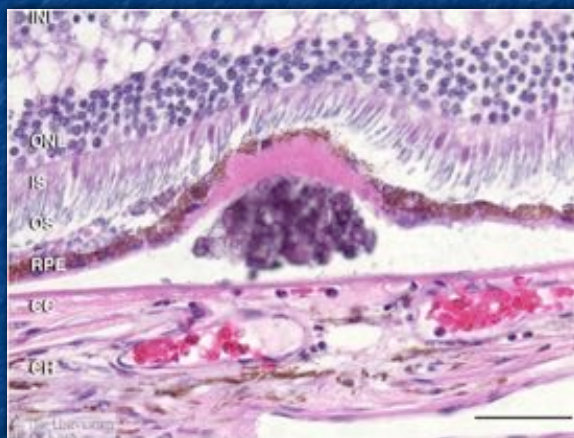
AMD and Drusen

- AMD is a disease resulting from poor “Waste Management”.



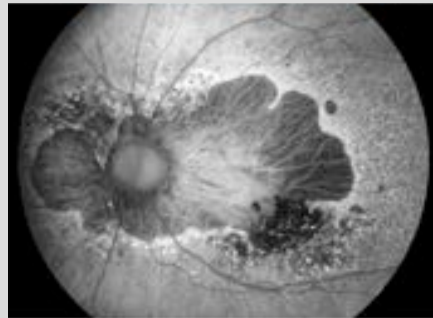
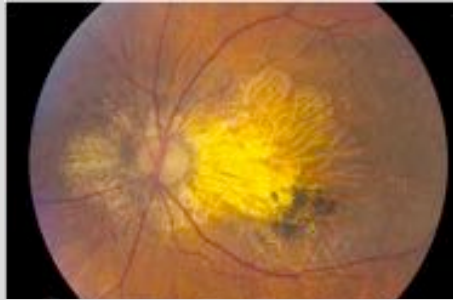
- Drusen are “pockets of inflammation”
 - Recent investigations show that proteins associated with inflammation and immune-mediated processes are prevalent in drusen.

Drusen

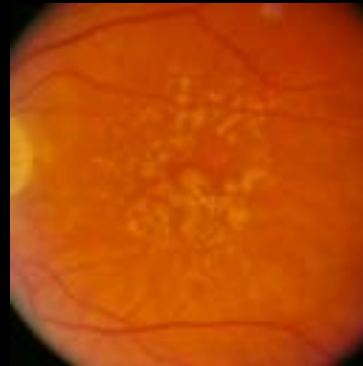
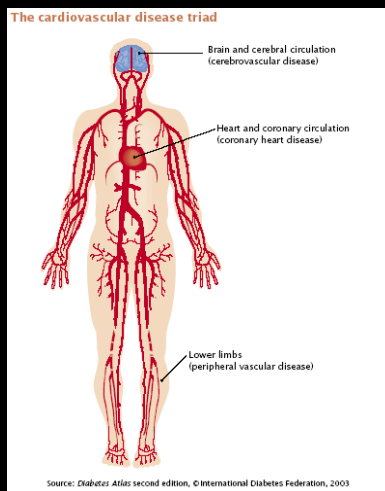


Drusen is the earliest clinically detectable feature of AMD.**

AMD: a sick eye in a sick body?



AMD and Cardiovascular (Heart) Disease



Parallel Worlds: Heart Disease and AMD

- Diet – Low fruit/vegetable consumption increases risk of AMD and CVD
- Obesity and physical inactivity
- C-reactive protein (elevated)
 - Inflammatory marker
- Homocysteine (elevated)
- Omega-3 EFA may be beneficial for AMD patients
- Cholesterol (elevated)
- Serum Iron – Increased amounts may increase AMD and CVD

The 4 Seasons of AMD

- Oxidation
- Inflammation/Ischemia
- Atrophy
- Neovascularization

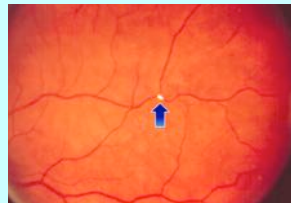
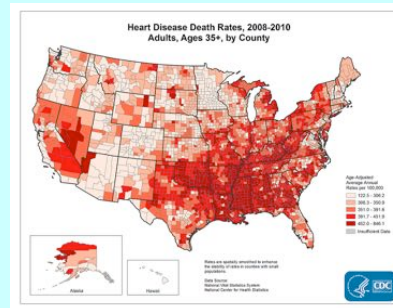


Questions & Answers



Key Points

- Myocardial Infarction is the most common cause of death in USA.
- 697,000 per year
- **Cardiac valve disease** is most common cause of cardiac emboli to the eye.**






2023 Heart Of
America Eye Care
Congress

The Optometrist's
Role in Systemic
Disease

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Dr. Carlo J. Pelino
2023 Heart of American Eye Care Congress



2023 Heart of America Eye Care Congress The Optometrist's Role in Systemic Disease

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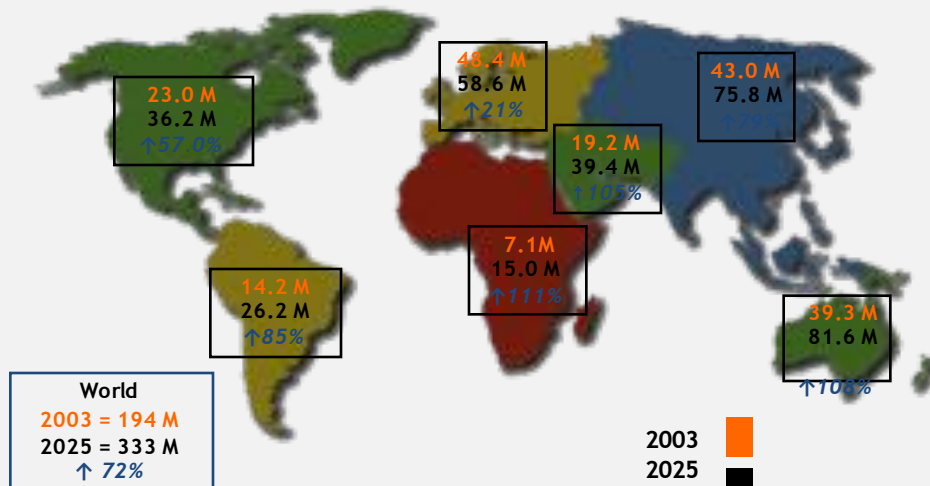
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The Future

By 2050 - 100 million Americans will have diabetes



Diabetes Atlas Committee. *Diabetes Atlas 2nd Edition*: IDF 2003

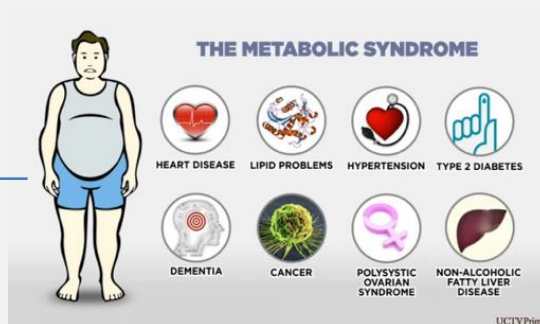
So what is the metabolic Syndrome (syndrome X) ?

- Increased Hb A1C
- Increased blood pressure
- Increased BMI >30

- Low HDL

- Increased triglycerides

Must have 3 of the 5 above



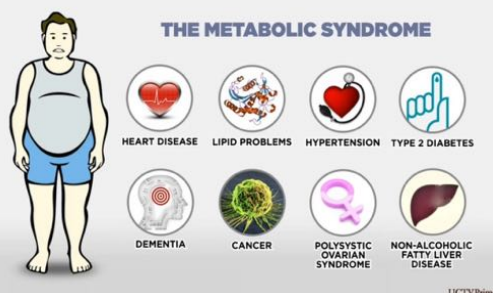
So what is the metabolic Syndrome (syndrome X) ?

The metabolic syndrome is responsible for 75% of all healthcare dollars in the United States

HDL / Triglyceride ratio should be 2 , example $100 \text{ TG} / 50 \text{ HDL} = 2$
 $150 \text{ TG} / 30 \text{ HDL} = 5$ (16% increase of heart heart attack)

Think diabetes in the future !!!!

Total cholesterol, LDL, HDL, Triglyceride, Apo A I, Apo B, Apo B to Apo A ratio, small density LDL and Lp(a)



Diagnosing diabetes – blood tests

Fasting plasma glucose (PG) ≥ 126 mg/dL

2 hr PG during 75 g OGTT ≥ 200 mg/dL

Random PG ≥ 200 mg/dL PLUS symptoms of diabetes
(polyuria, polydipsia, unexplained weight loss)

A1C $\geq 6.5\%$ (5.7% - 6.4% Pre-diabetes)

Epidemiology of DM



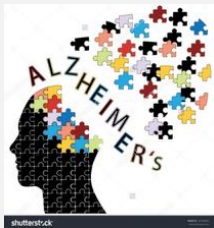
7th leading cause of death in the US

30 million people with diabetes, costing \$132 billion

75 million people have pre-diabetes

Leading cause in the United States of:
blindness, lower limb amputation and renal failure

Diabetes = a 2 to 4 fold increased risk of CV disease



Cancer

The systemic manifestations of the Metabolic Syndrome



Why the eye care professional should be concerned

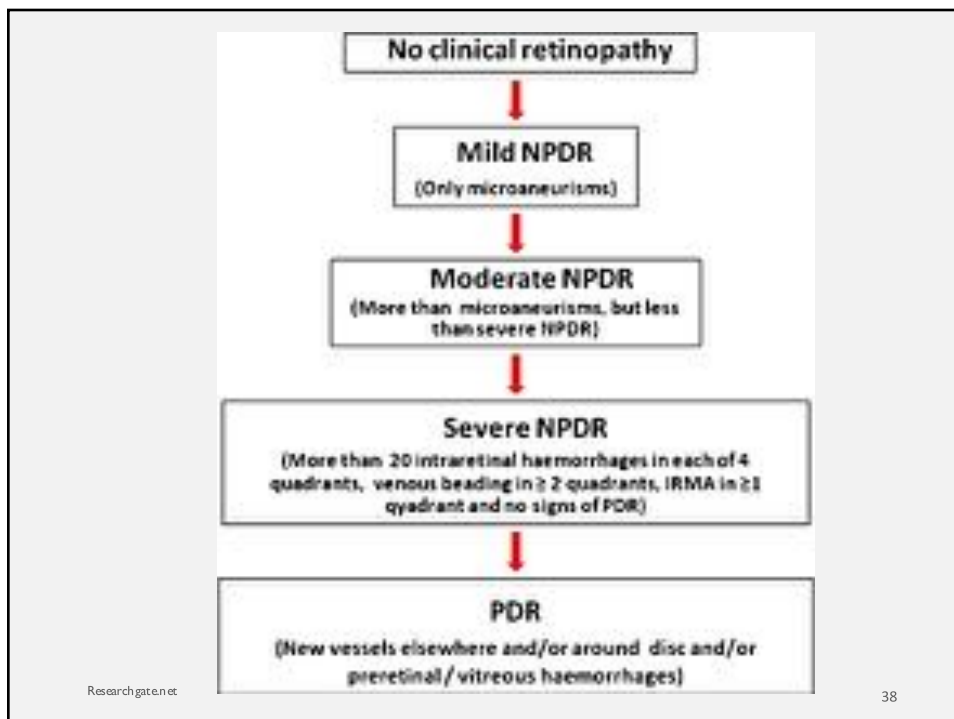
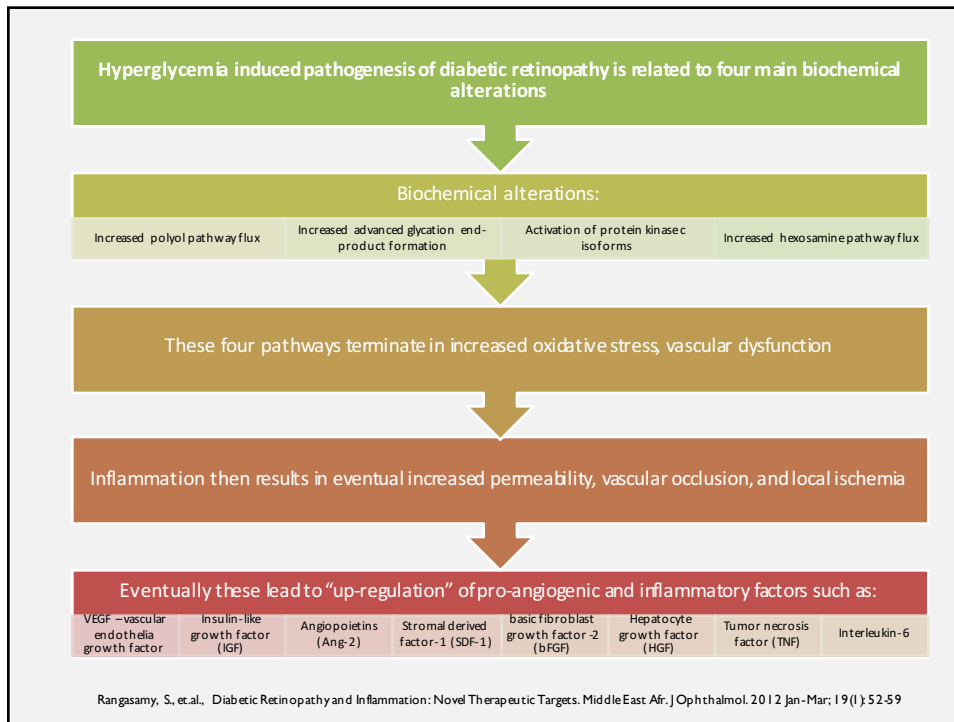
- Heart disease / CV disease
- Cancer
- Neurodegenerative disease

Important Note: Diabetes is Inflammation

Leukocytes, once inside the retinal tissue, then secrete a variety of inflammatory substances such as TNF and VEGF

These released mediators then increase vascular permeability and stimulate more mediators to enhance the inflammatory reaction







What stage of diabetic retinopathy is found in this patient?

What is the retinal treatment for this patient if there is no CSME?

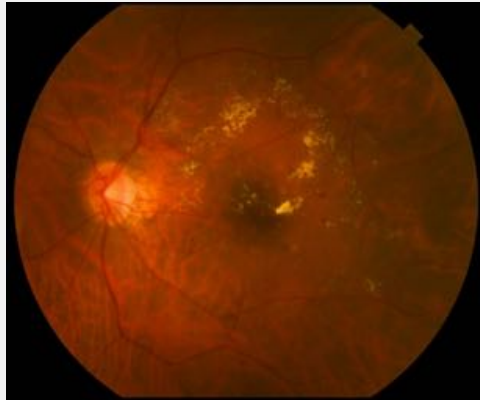
What is the follow-up for this patient?

What questions would you want to know about the patient's overall systemic health?

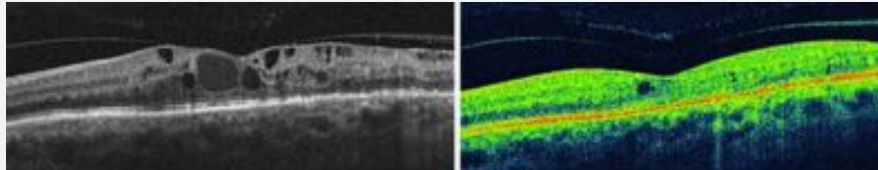


Non- Proliferative Diabetic Retinopathy

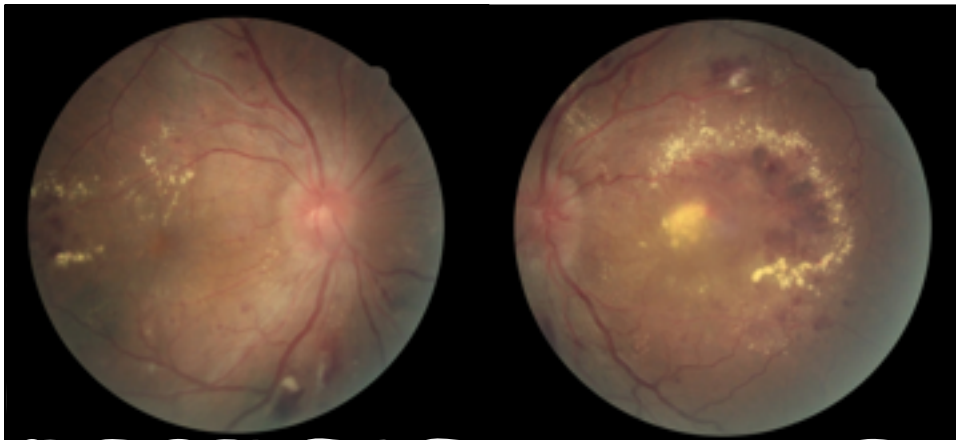
Two fundus photographs illustrating Non-Proliferative Diabetic Retinopathy. The top image shows microaneurysms and small hemorrhages. The bottom image shows more extensive retinal changes, including larger hemorrhages and cotton wool spots.



Clinically Significant Macular Edema

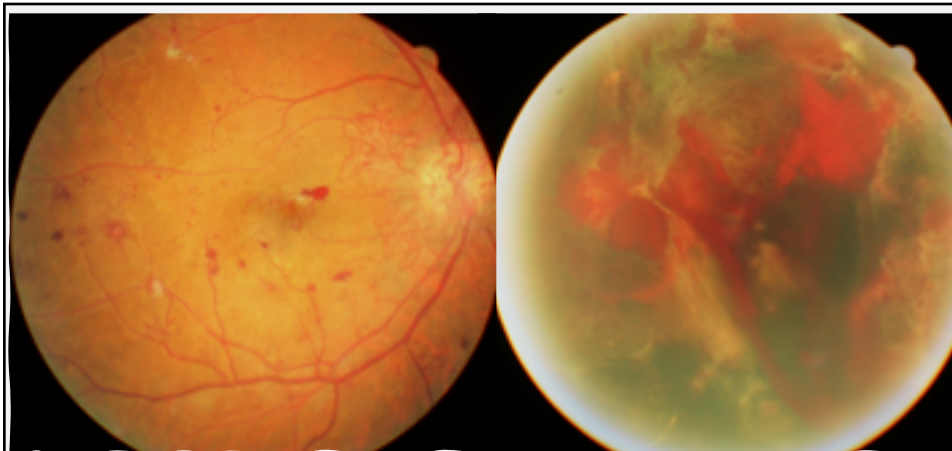
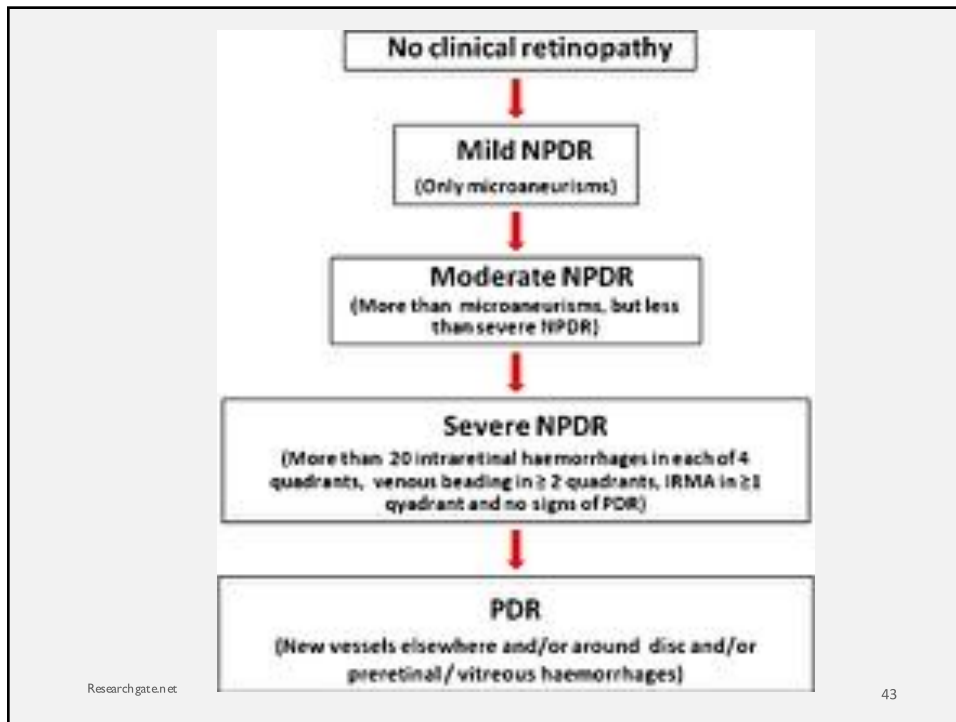


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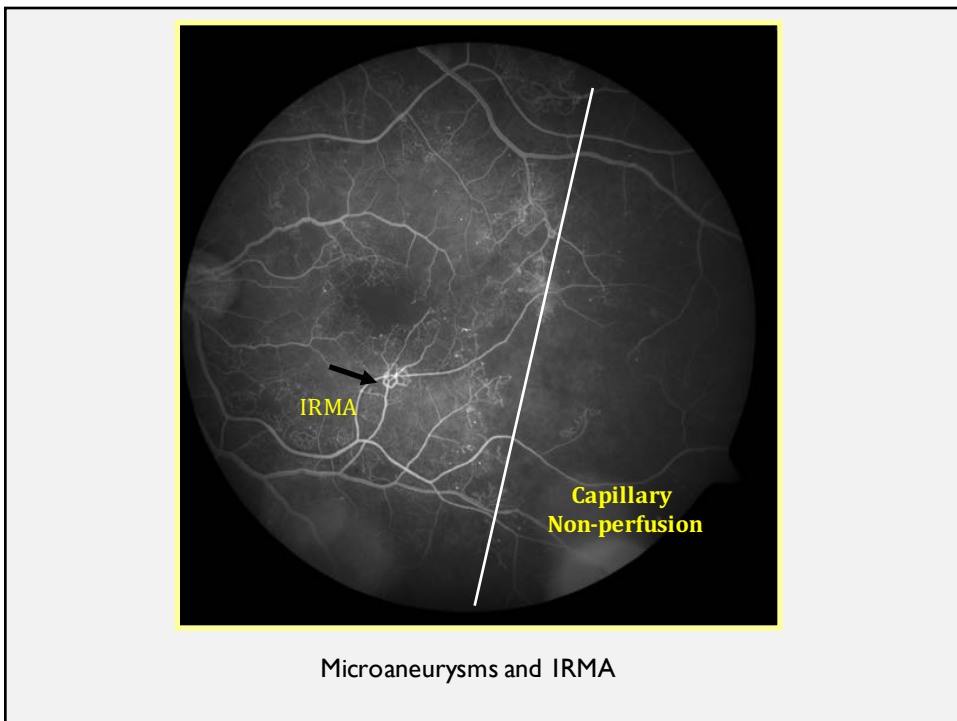
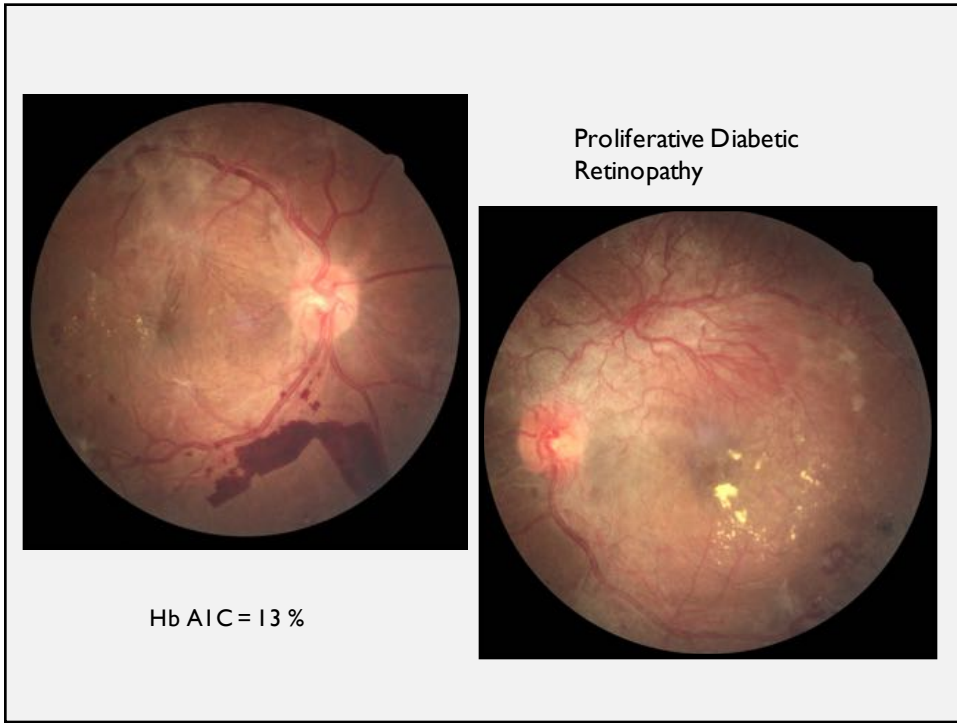


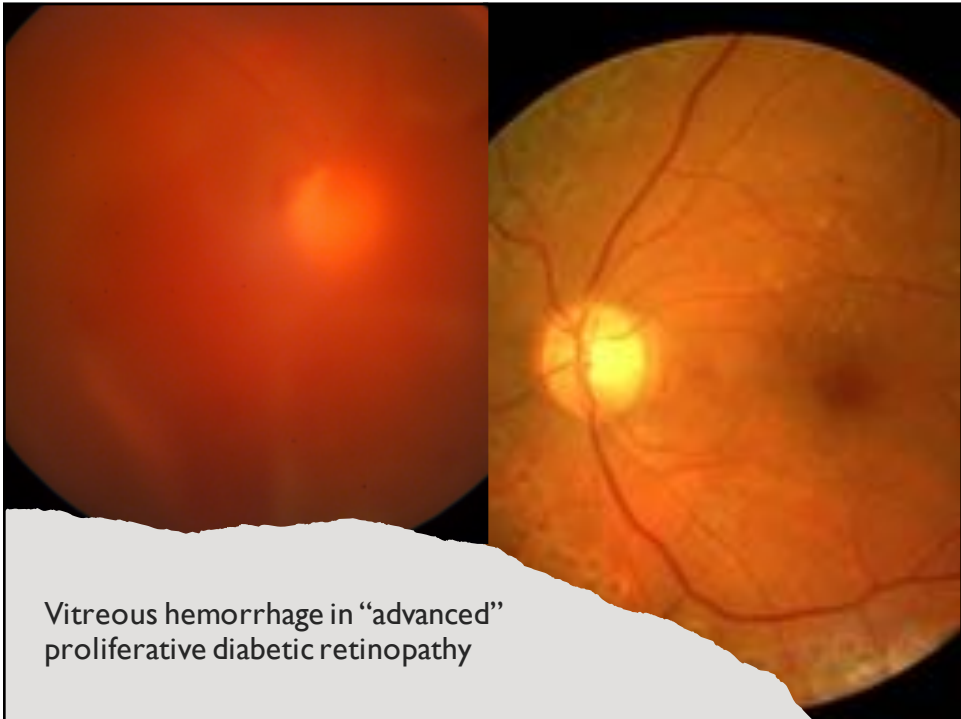
Diabetic Macular Edema

Diabetic Papillopathy



Proliferative Diabetic Vitreo-Retinopathy

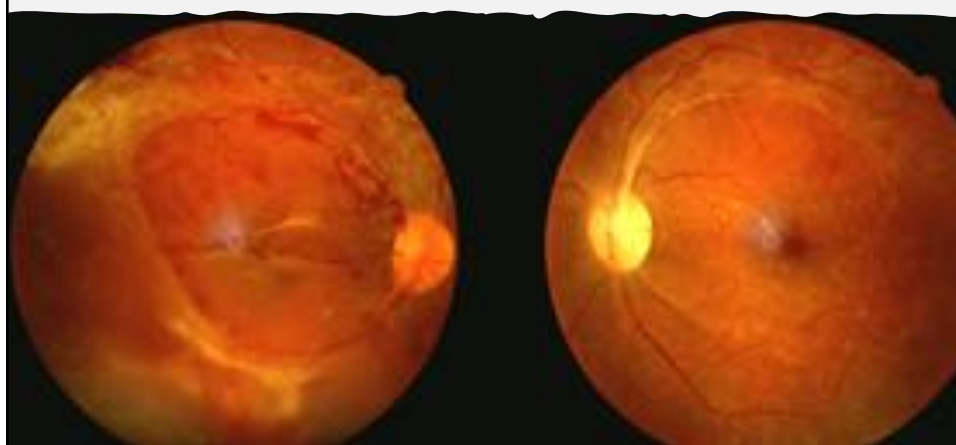




Questions & Answers



Beyond Retinopathy: 10 Key Factors in Diabetes Wellness



Diabetes Medications

Biguanides – these drugs slow glucose production in the liver to lower glucose (metformin)

Sulphonylureas – cause the pancreas to increase production of insulin to lower glucose (glyburide, glipizide, glidazide, Glimepiride)

Glucosidase inhibitors – block the alpha - glucosidase enzyme in the intestine to control blood – glucose levels (Acarbose, Miglitol)

Thiazolidinediones – activate insulin to lower glucose in the blood (Rosiglitazone, Pioglitazone)

GLP- 1 Receptor Agonist – act on the glucagon-like peptide1 in the small intestine to reduce glucose in the blood (Exenatide, Liraglutide)

DPP-4 Inhibitors – inhibit the dipeptidyl peptidase-4 to block the breakdown of GLP1 to reduce glucose in the blood (Sitagliptin, Vildagliptin)

SGIT2 Inhibitors – inhibit the subtype 2 sodium-glucose transporter protein from producing glucose (Canaglifozin). Cause the kidneys to remove sugar

#1. HbA1C under 7% ADA, AACE <6.5%

Can be higher in patients with CVD, hypoglycemia, shorter life expectancy and children (7%- 8%)
ACCORD vs. ADVANCE studies

Elevated glycosylated hemoglobin (HbA1C) is a strong risk factor associated with the development and progression of DR. The Diabetes Control and Complications Trial, which included patients with insulin-dependent diabetes, and the United Kingdom Prospective Diabetes Study, which included patients with noninsulin-dependent diabetes, both showed that tight control of blood sugar can reduce the incidence of retinopathy. The studies found that for every 1 absolute percentage point decrease in HbA1C the incidences of DR onset and significant progression decreased by approximately 35%.

#2. Hypertensive patients with diabetes need a BP of 120/80 or better

Studies show that hypertension is associated with higher rates of the onset and progression of DR and macular edema in both type 1 and type 2 diabetes. A patient with modest elevations of either systolic or diastolic blood pressure may be at an increased risk for the progression of retinopathy compared with a patient with diabetes who has lower blood pressures.

#3. Cholesterol

In patients with type 2 diabetes, hyperlipidemia concomitant with hypertension is associated with worse stages of retinopathy and increased accumulation of intraretinal exudation. Both the Early Treatment Diabetic Retinopathy Study (ETDRS) and the Wisconsin Epidemiologic Study of Diabetic Retinopathy showed a relationship between total and low-density lipoproteins and the frequency of hard exudates found in the retina. (It can be both an early or late sign of DR, depending on the patient's >systemic> profile.)



Estimated that the traditional Pima diet, although seasonably variable, was ~ 80% carbohydrate, 8–12% fat, and 12–18% protein. A diet analogous to the traditional Pima diet is reproducible with the foods available today.

One-half of adult Pima Indians have diabetes and 95% of those with diabetes are overweight

Pima Indians have lived in the Sonoran Desert near the Gila River in what is now southern Arizona for at least 2,000 years.



The *Tarahumara* inhabit the Copper Canyon, as it is known in the U.S., or the Sierra Tarahumara in northwest Mexico.

#4. Sleep Apnea needs to be ruled out

CPAP - reduce nocturnal hypertension, increase oxygen, decrease FBS

The recurrent nocturnal hypoxemia and the hypercapnia and hypertension associated with obstructive sleep apnea may aggravate DR and may be a driving factor for more diffuse macular edema. Sleep apnea is also an independent risk factor for several systemic conditions, such as systemic arterial and pulmonary hypertension, nocturnal stroke, and myocardial infarction. In patients with diabetes it is also a risk factor for renal disease and eventual renal failure. Most patients with obstructive sleep apnea are treated with continuous positive airway pressure (CPAP) or bi-level positive airway pressure (bi-PAP).

#5. Anemia needs to be ruled out = hemoglobin needs to be above 11

Procrit (Epoetin alfa) needs to be considered if hemoglobin below 9.

Starts early and has a negative impact on CV morbidity and mortality

Diabetic kidney disease, along with anemia, is thought to exacerbate the ischemic aspect of DR.

When glomerular filtration rates reach less than 60 mL/minute, the most common cause of anemia is a relative erythropoietin deficiency.

Anemia frequently occurs when hemoglobin levels are depressed below 10 g/dL or 11 g/dL (hematocrit less than 30% to 33%).

The ETDRS evaluated the effect of anemia and found that low hematocrit (< 40% in men and < 34% in women) was an independent risk factor for high-risk proliferative retinopathy and severe vision loss.

Vitamin B₁₂ deficiency in diabetics taking metformin



Vitamin B₁₂ deficiency is estimated to be present in up to **30%** of patients with diabetes taking metformin. The risk for vitamin B₁₂ deficiency increases with patient age and the dose and duration of metformin use.

The combination of metformin with proton pump inhibitors has been reported to have an additive effect on risk for vitamin B₁₂ deficiency.

A meta-analysis showed that metformin use can, in some patients, decrease vitamin B₁₂ levels, which can put a person with type 2 diabetes at risk for developing borderline to complete deficiency. Metformin may also cause a deficiency in folic acid in patients with type 2 diabetes. Any form of anemia can worsen retinopathy because it exacerbates the ischemic retinal process.

#6. Proteinuria (albuminuria) – Starlings Law (hydrostatic vs. osmotic)

30-299 mg = microalbuminuria

300 mg or more = albuminuria

ADA recommends yearly urinalysis followed by GFR

Start ACE inhibitors or ARB = renal protective

A high prevalence of patients with insulin-dependent diabetes have high amounts of protein in their urine, known as *proteinuria*. This condition signals imminent renal failure. In addition to this complication, the presence of microalbuminuria has a direct relationship with kidney function and is often the first sign that the kidneys are becoming negatively affected by diabetes.

For these patients, physicians should ensure they have tight blood pressure control and recommend that they decrease their dietary intake of protein to reduce proteinuria and slow the progression to renal failure.

#7. Stop smoking

Increases proteinuria, blood vessel wall damage, and vasoconstriction

Nicotine is known to cause severe retinal vasoconstriction, and smoking can cause an increase in circulating activated leukocytes along with platelet activation. Carboxyhemoglobin in the blood eventually displaces oxygen and further contributes to an ischemic and hypoxic environment in the retinal tissue. Patients who smoke tend to have elevated low-density lipoprotein levels and decreased high-density lipoprotein levels.



#8. Vasculitis (R/O gum disease, leg ulcers, gastritis, urinary tract infections)

Daily aspirin decreases CVD in Type 1 and Type 2
 ADA 81 - 325 mg /day
 Not studied extensively for patients under the age of 30

CRP of 3.0 mg / L or higher can triple your risk of heart disease
 CRP of 0.5 mg / L or less rarely experience heart attacks

This subacute inflammatory process plays an important role in the pathogenesis of DR, including increased retinal vascular permeability, vascular occlusion, neovascularization, and retinal neurodegeneration.

Aspirin use in diabetic patients is not associated with an increased risk of hemorrhage or progression of retinopathy or macular edema !!!

Aspirin use may actually slow the progression of diabetic retinopathy ???

Aspirin Therapy (enteric coated 81-325 mg/day):ADA recommendations

- Family History of coronary heart disease
- Cigarette smoking
- Hypertension
- Obesity
- Albuminuria
- Elevated lipid levels
- Age > 30 years



#9. Obesity - BMI (body mass index) less than 30 ... better around 25

AACE recommends communication about bariatric surgery Type 2 patients with BMI > to 35 kg/m².

Surgery is stressed if other conditions are present such as , psuedotumor cerebri, obstructive sleep apnea, hypertension, heart disease, polycystic ovarian syndrome

The American Medical Association voted in 2013 to classify obesity as a disease.

Approximately 90% of patients with type 2 diabetes are either obese or overweight. Obese patients tend to have an increase in chemical factors that lead to increased insulin resistance that, coupled with decreased insulin production, facilitate the presence of an increase in blood glucose levels. The specific mechanism by which insulin resistance is created stems from the release of cytokines, glycerol, and other fatty acids.

This is particularly concerning because the prevalence of type 2 diabetes is shifting more toward a younger obese population.

Visceral vs. Subcutaneous Fat (TOFI)



Visceral fat increases risk of diabetes, heart disease, dementia



10. Vitamin D



Get some sun !

Not too much though !

Recent research suggests an association between patients with type 2 diabetes who also have a vitamin D deficiency and an increased risk of DR. Animal studies have reported an inhibitory effect of vitamin D administration on endothelial cell inflammation and proliferation—a major cause of severe retinopathy. Further studies are required to better understand the causal relationship between vitamin D deficiency and DR in patients with type 2 diabetes.

Current literature would suggest to take or get at least 2,000 IU/day. Some research will suggest up to 4,000 IU/day. It appears that 4,000 IU/day is the upper limit.

Many PCP or internal medicine doctors are happy if blood work shows 20-30 ng/ml.

What is more advantageous through some of the current literature is a reading of 30-40 ng/ml. One current literature citation recommended a blood reading of 40-60 to reduce immunerelated diseases.

Although these serum ranges are still unclear it appears that it is most significant if > 35.

Overdose, acute or chronic, can cause nausea, vomiting, loss of appetite, headache and confusion.



Vitamin D

Vitamin D is a steroid hormone (**UV B radiation**) – it is a nuclear transcription factor that regulates up to 2,000 genes (“epigenetics” at work). It is needed for bone mineralization and calcium homeostasis

Vitamin D fortified in milk (100 IU / serving) and orange juice – in order to eliminate rickets or osteomalacia

Vitamin D deficiency still occurs today globally without rickets and can lead to or enhance the following:

- Cancer (breast and melanoma)**
- Muscle pain, fatigue, weakness (fibromyalgia)**
- Respiratory (COPD, asthma, OSA, rhinitis)**
- Autoimmune (MS, RA)**
- Psychiatric (dementia and depression)**
- Cardiovascular (MI and stroke)**
- Dermatological (eczema)**

Vitamin D stops inflammatory cytokines IL-2, IL-17 and interferon gamma

Vitamin D is important in **cathelicidin** and **defensin** production to kill bacteria, virus and fungi

Every cell in the body has a Vitamin D receptor

Vitamin D deficiency is a global problem and can happen in the southern part of the United States.

“**Vita**” Study Vitamin D (2,000 IU / day and Omega 3 1,000 mg / day) decrease cancer, MI, stroke

VITAMIN D LEVELS

25 Hydroxy D Test, or 25 (OH)D

Less than 30 ng/mL	Deficient
30 to 39 ng/mL	Adequate
40 to 59 ng/mL	Optimal
60 to 100 ng/mL	Therapeutic
Greater than 100	Excess

ng/mL: nanograms per milliliter

Note: There is no consensus standard for vitamin D levels.


UniversityHealthNews.com

< 20 ng/ml – deficient

21 - 29 ng/ml – insufficient

30 - 40 ng/ml – sufficient

40 – 60 ng/ml - preferred




Telomeres

We need up to **4,000 IU daily** – to maintain “optimal” ranges to reduce diseases like cancer.

Vitamin D increases telomere length = longevity

70% of the United States population is insufficient (20 years ago it was 50%)

Breast milk is now deficient in Vitamin D (need 4,000 to 5,000 IU per day)



SALUS
UNIVERSITY

Take home thoughts about diabetic retinopathy

Diabetic retinopathy is exacerbated by many concomitant conditions

Control of the systemic aspects of the disease improves the systemic and ocular health

Understand how diabetic retinopathy relates to the overall systemic health

Questions & Answers



59 Y/O Male

Medical HX:

HTN, COPD, Arthritis, Kidney Failure

Peripheral Vascular Disease, Anemia

Carotid Artery Stenosis, Hyperlipidemia

Amputee – Bilateral

Medications:

HCTZ

Norvasc

Metoprolol

Lisinopril

Simvastatin

Warfarin

Examination

Blur for 1 month

BCVA: 20/40 OD, 20/100 OS

+ APD OS

IOP 6/10

Anterior Segment:

Mild Cataract OS>OD

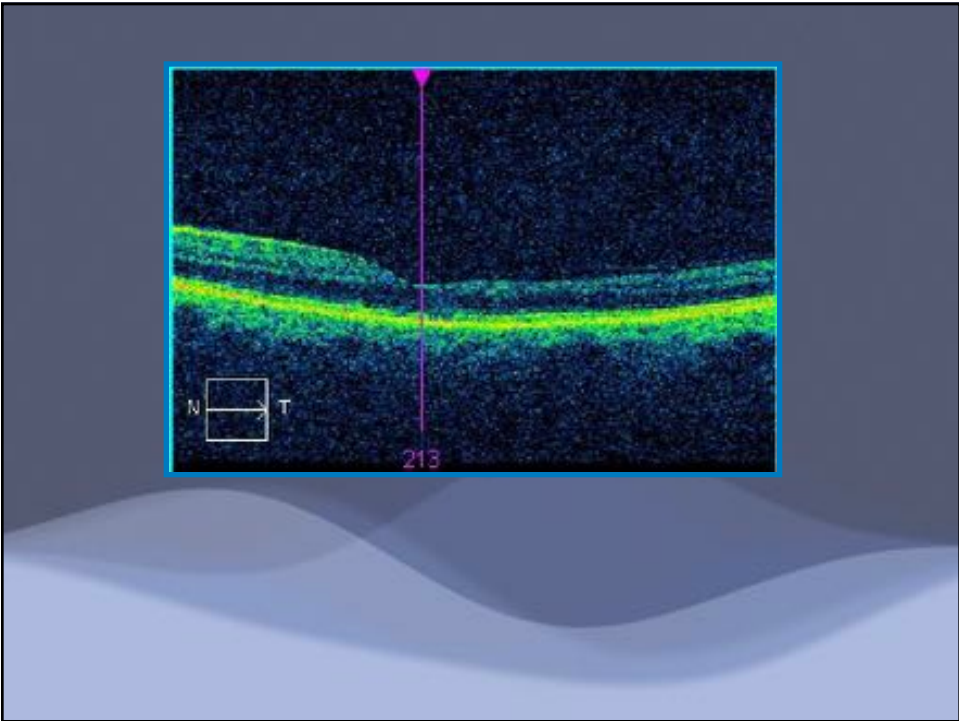
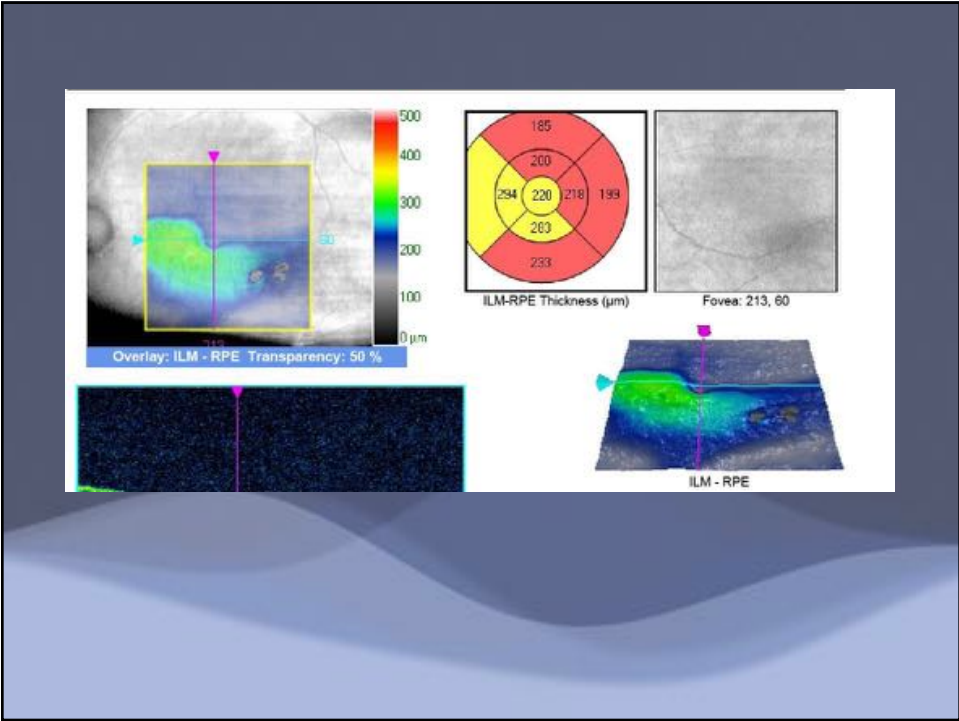
Posterior Segment

Mild artery attenuation

Mild ONH nerve pallor

Retina appears perfused





Lessons Learned

“Classic” Presentation of CRAO

Giant Cell Arteritis

Consider Ophthalmic Artery

Neovascularization

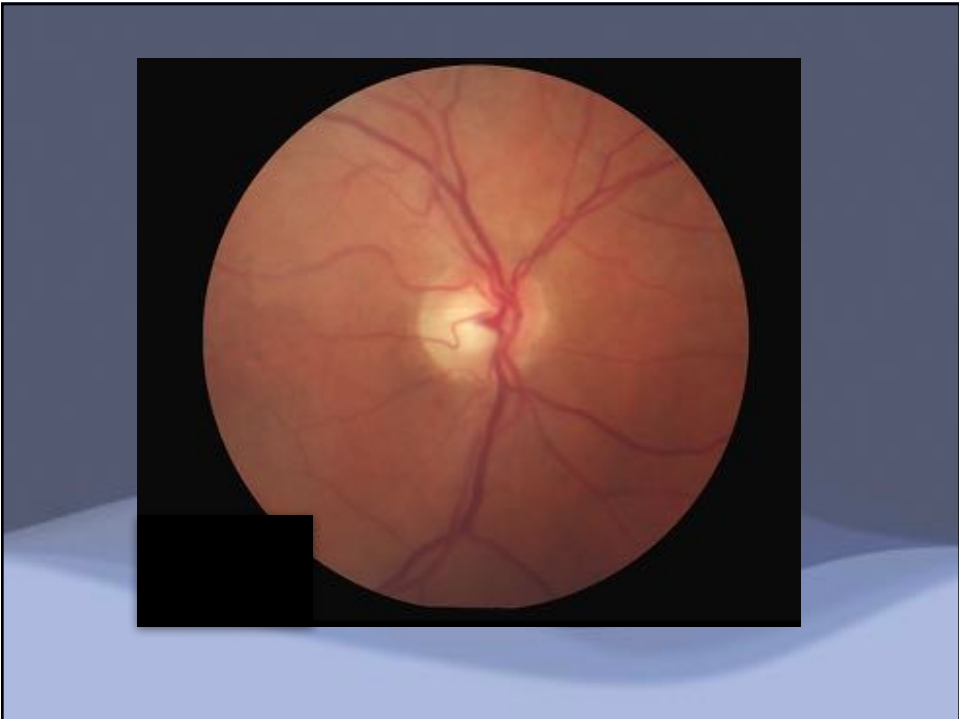
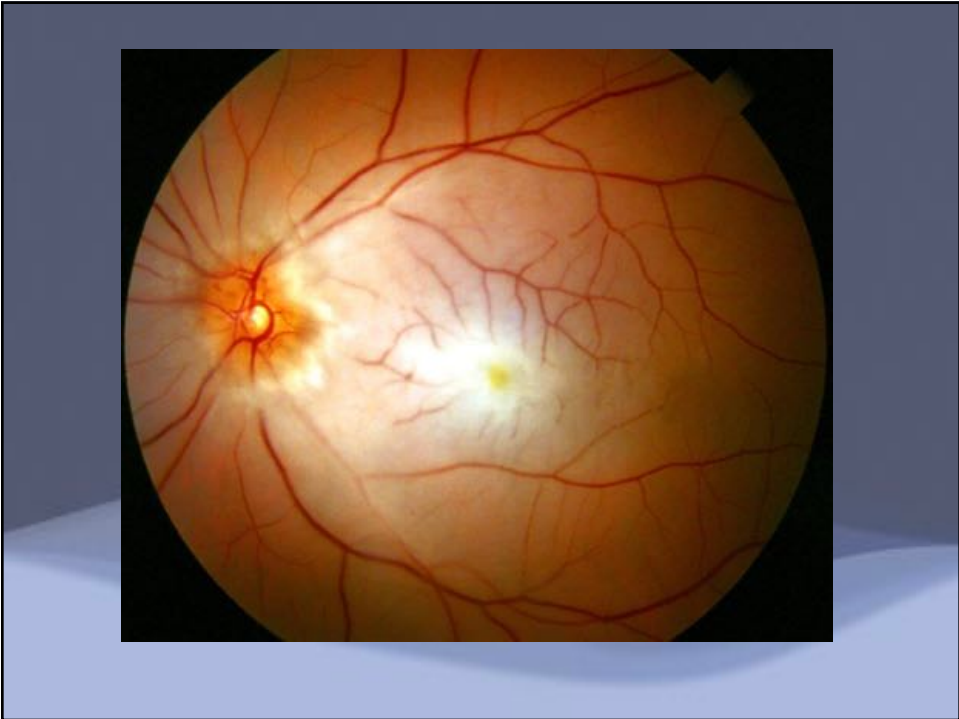
Risk to Brain and Heart

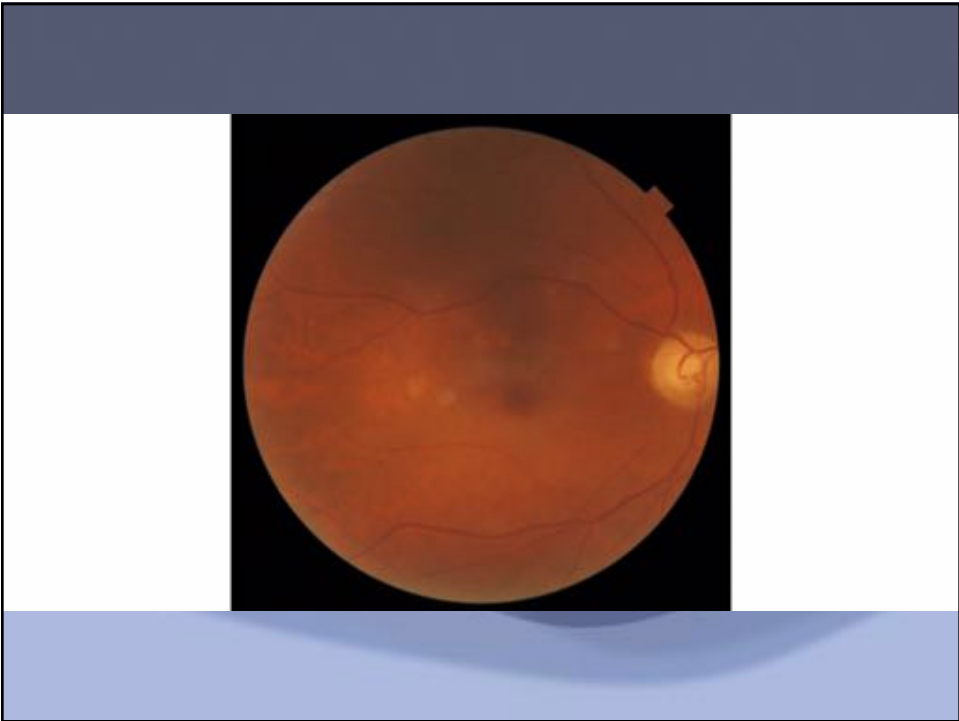
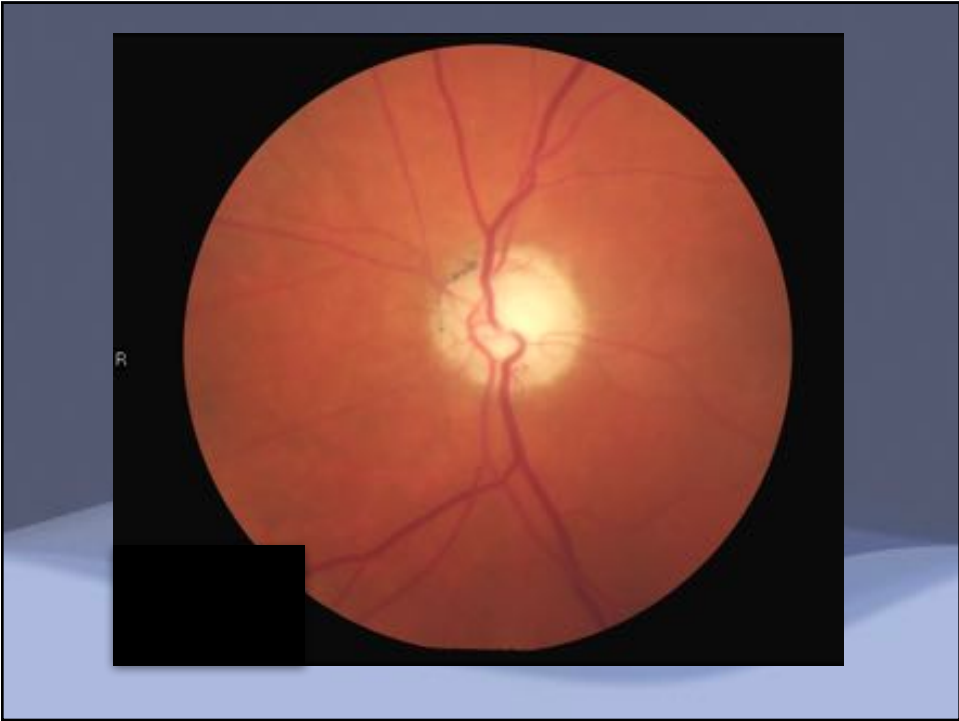
Have a Heart

Lesson #1

“Classic” Presentation of CRAO

Presentation of CRAO after
reperfusion







Differential Diagnosis

- Central Retinal Artery Occlusion
- Ophthalmic Artery Occlusion
- Ocular Ischemic Syndrome
- Giant Cell Arteritis

Lesson #2

5-15% of CRAOs are from
Temporal Arteritis (GCA)

Additional Tests

ESR = 31 (slightly elevated)**

CRP = 0.5 (normal)

CBC = Abnormal RBC, HCT, HGB
(Anemic)**

Carotid Doppler

Carotid Angiography

Carotid Doppler Results

Stent in the right distal common carotid artery

Interval occlusion of the common carotid artery

Degree of stenosis in the right internal carotid artery cannot be measured

Low flow to internal carotid

Questions & Answers



Follow – Up

1 month later (2 months after start of blur)

Very sluggish pupil and VA Hand Motion

Follow – Up

5 month follow-up:

Dense, hypermature cataract

Neovascularization of the Iris

Neovascularization of the Angle 360 degrees



Lesson #3

Consider an Ophthalmic Artery
Occlusion/OIS

Lesson #4

CRAO can develop anterior
segment NV

Treatment

Avastin for Neovascularization

Didn't help regress NV

Otherwise, monitor only

Goal of this eye is no pain

Still weighing Risk/Benefit of Cataract
Extraction

Lesson #5

Increased risk for CVA/MI

Risk for Heart Attack is greater



Plan

AHA and ASA recommend urgent referral

CRAO/BRAO requires ER visit

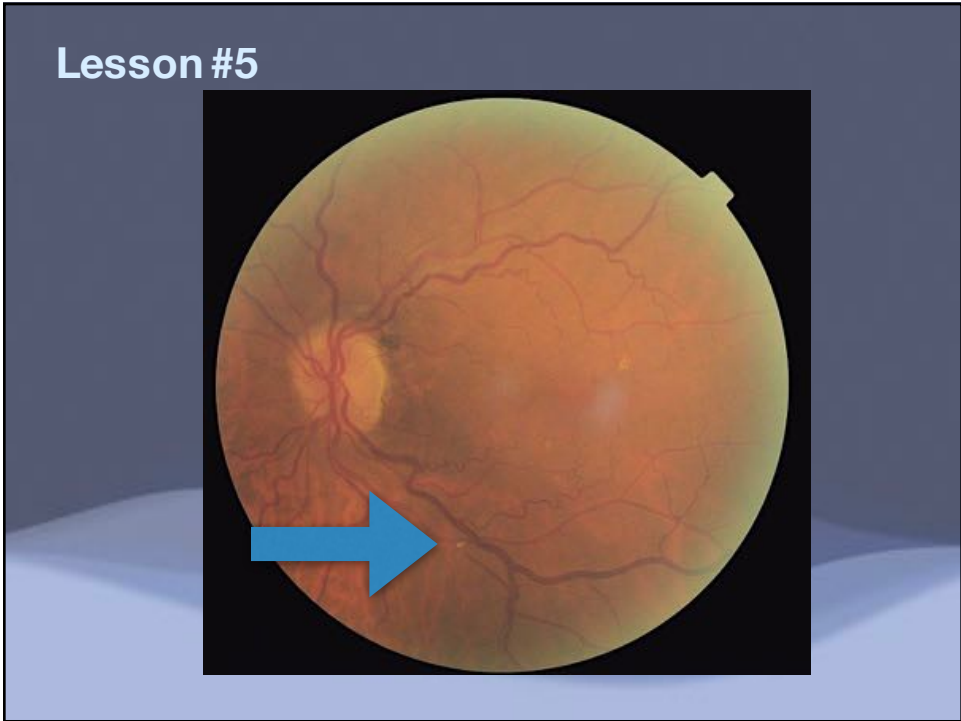


79% OF CRAO HAD ACUTE SYSTEMIC CHANGE

MEDICATION CHANGE	92%
CAROTID DISEASE	37%
CVA	37%
ECHOCARDIO	20%

Am J Ophthalmol 2018;196:96-100

Amaurosis Fugax requires an ER visit



Asymptomatic retinal emboli??

TIA used to mean timing

TIA now means location

Eye is part of the Central Nervous System

Lesson #6

Compassion



Referral

Labs

Primary Care notification

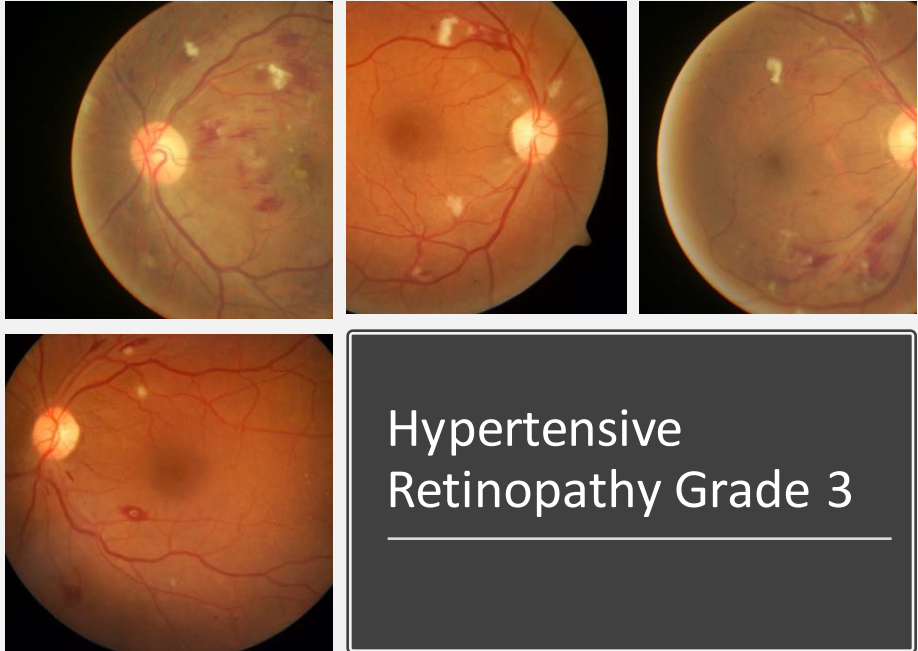
Emergency Room

Hypertension -
The most common reason for an office visit in the United States.

30 % of adults in the United States have hypertension
90 million people

Grading of Hypertensive Retinopathy

Grade 1	Retinal vessels narrowed > 90 and < 110 Diastolic BP
Grade 2	Nicking of retinal vessels > 90 and < 110 Diastolic BP
Grade 3	CWS, Hemes, Lipid exudates > 110 – 115 Diastolic BP
Grade 4	Grade 3 + Nerve swelling > 120 Diastolic BP



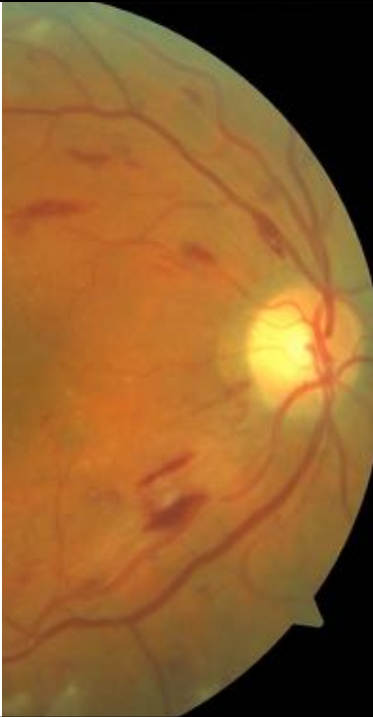
Hypertensive Retinopathy Grade 3

102

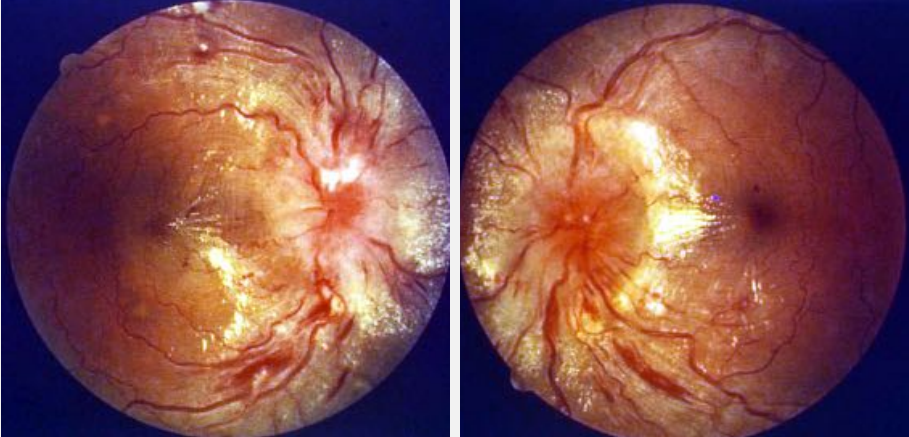
What stage of hypertensive retinopathy?

What is the retinal treatment for this patient?

Control the blood pressure



Malignant Hypertension



Immediate attention also if chest pain, cognitive impairment, hematuria, sensory or motor problems

"Malignant hypertension" defined as blood pressure > 180/120

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Stages of Chronic Kidney Disease

Stage	Description	GFR (mL/min per 1.73 m ² body surface area)
1	Kidney damage* with normal or increased GFR	≥90
2	Kidney damage* with mildly decreased GFR	60–89
3	Moderately decreased GFR	30–59
4	Severely decreased GFR	15–29
5	Kidney failure	<15 or dialysis

GFR = glomerular filtration rate

*Kidney damage defined as abnormalities on pathologic, urine, blood, or imaging tests



ADA. VI. Prevention, Management of Complications. *Diabetes Care* 2013;36(suppl 1):S35-S36; Table 12.

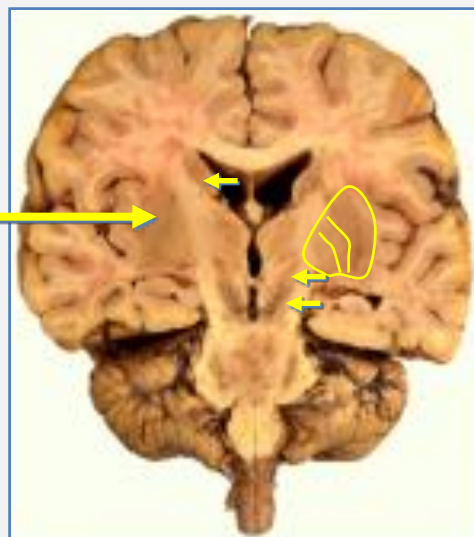
The Basal Ganglia

Hypertensive hemorrhages typically occur in areas where arteriosclerosis is most severe:

Basal ganglia embedded in white matter

Much (not all) of basal ganglia are lateral to internal capsule

- Caudate
- Putamen
- Globus Pallidus
- Substantia nigra
- Subthalamic nucleus



107

Updated cholesterol guideline released November 13th 2013 by the **American Heart Association and American College of Cardiology** aim to prevent more heart attacks and strokes than ever. How? By increasing the number of Americans who take a cholesterol-lowering statin.

The new guidelines recommend a statin for:

- Anyone who has cardiovascular disease, including angina (chest pain with exercise or stress), a previous heart attack or stroke, or other related conditions
- Anyone with a very high level of harmful LDL cholesterol (generally an LDL above greater than 190 milligrams per deciliter of blood [mg/dL])
- Anyone with diabetes between the ages of 40 and 75 years
- Anyone with a greater than 7.5% chance of having a MI or stroke or other form of cardiovascular disease in the next 10 years.

HMG CoA Reductase Inhibitors – lower LDL

Statins - Muscle problems and liver abnormalities are rare

Order regular liver function tests. Patients who are pregnant or who have active or chronic liver disease should not take statins

Atorvastatin (Lipitor®)**
 Fluvastatin (Lescol®)**
 Lovastatin (Mevacor®, Altoprev™)**
 Pravastatin (Pravachol®)**
 Rosuvastatin Calcium (Crestor®)**
 Simvastatin (Zocor®)**

Statins are also found in the combination medications

Advicor®** (lovastatin + niacin), Caduet®** (atorvastatin + amlodipine), and Vytorin™** (simvastatin + ezetimibe).

49 year old woman – no medications and retinopathy

Total cholesterol	250 mg/dl	< 200
Triglycerides	200 mg/dl	<150
HDL-C	50 mg/dl	>50
LDL-C	140 mg/dl	<100
Non HDL-C	200 mg/dl	<130
Glucose	100 mg/dl	
HbA1C	5.8%	
Blood pressure	128/90	
BMI	28	
IR score	59	<45/100
HS CRP	3.0	
LDL-P	2272	<1000
Small LDL-P	1580	<850

Advanced Lipid Testing – MESA/Framingham

Oxidation/Inflammation Aspirin Works Omega 3 Index Hypercoaguable

Cardiac Stress:

- Myeloperoxidase
- LP-PLA 2
- HS - CRP
- Fibrinogen

25% of Americans who are resistant to the beneficial effects of aspirin

Cardiac Stress

NT-pro BNP
Galectin 3

APO B / A ratio.

Factor 5 leiden
Prothrombin
Homocysteine



Kidney function

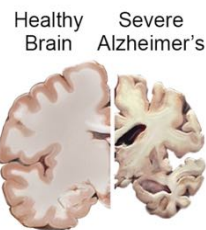
- E GFR
- Microalbuminuria
- BUN
- Creatinine

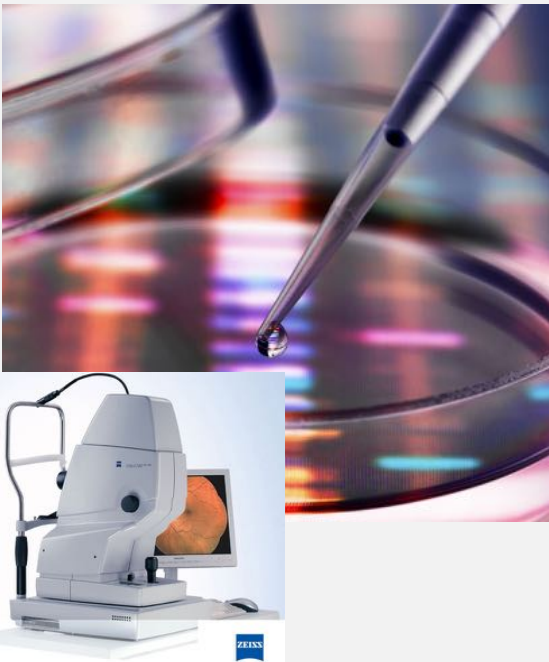


So when you see this:



Think this:





Screening for HR/DR

Screening of a patient for retinopathy outside of the eye doctor's office.

Because of their ease of use and associated patient comfort, non-mydratic cameras have facilitated retinal imaging for patients with diabetes/HTN in primary care settings, including family practice, internal medicine, and endocrinology offices.

Artificial Intelligence / Deep learning

Do we place these items into an algorithm for artificial intelligence / deep learning?

<https://laserlocators.com/ophthalmic/zeiss-visucam-pro-non-mydratic-fundus-camera>

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- 
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 9. Sinclair SH, Malamut R, DeVecchio C, Li W. Diabetic retinopathy: treating systemic conditions aggressively can save sight. *Cleve Clin J Med*. 2005;72(5):447-454.
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Questions & Answers



30 year old female
CC: Headache and vision loss
H/O vision loss OD, diplopia
Improved now

Meds

Currently on

Diamox
Butalbital

BCVA 20/40 OD, CF OS
APD OS
Confrontation VF Full OD, Limited OS
Color Vision: 10/10 OD, 1/10 OS
Anterior Segment Unremarkable





Differential Dx:

Papilledema

Intracranial Hypertension

Malignant Hypertension

Space Occupying Lesion

Cerebral Venous Thrombosis

Inflammatory
Infectious vs Non-infectious
ONH Drusen
Uveitis
Optic Neuritis??

62 inches (157 cm)
462 lbs (210 kg)
BMI 85
BP: 110/80

MRI Normal

LP – 490 then 310

Normal opening pressure up to 250
mm H₂O

in obese patients

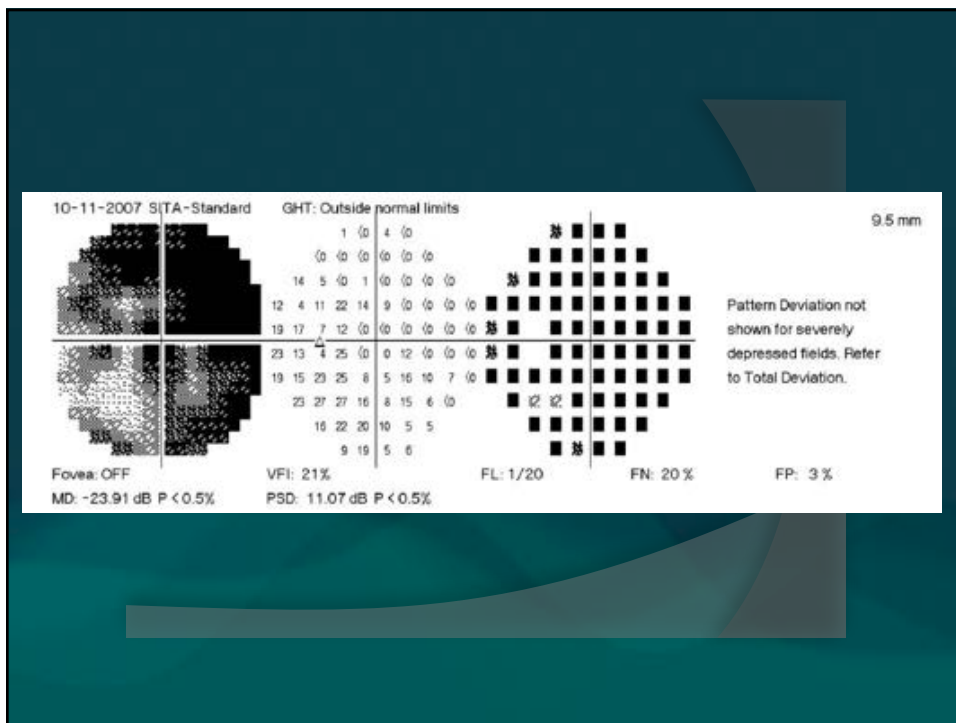
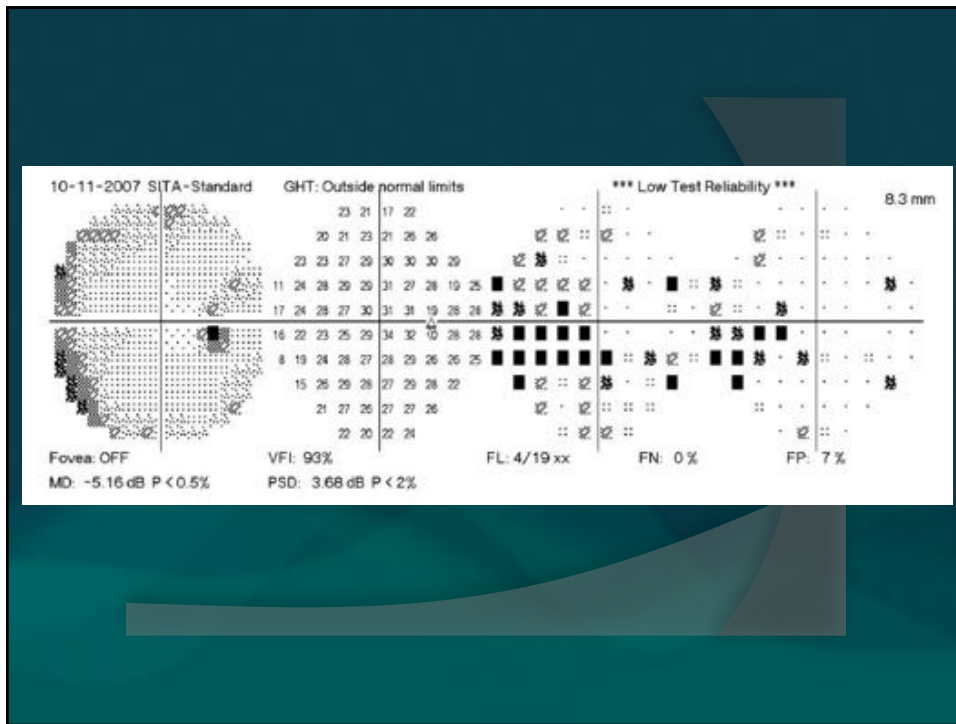
1 Month Later...

BCVA 20/20 OD, 20/200 OS

S/P VP shunt x 1 month

On Diamox still

OD swollen, OS swollen and
atrophic



Questions & Answers

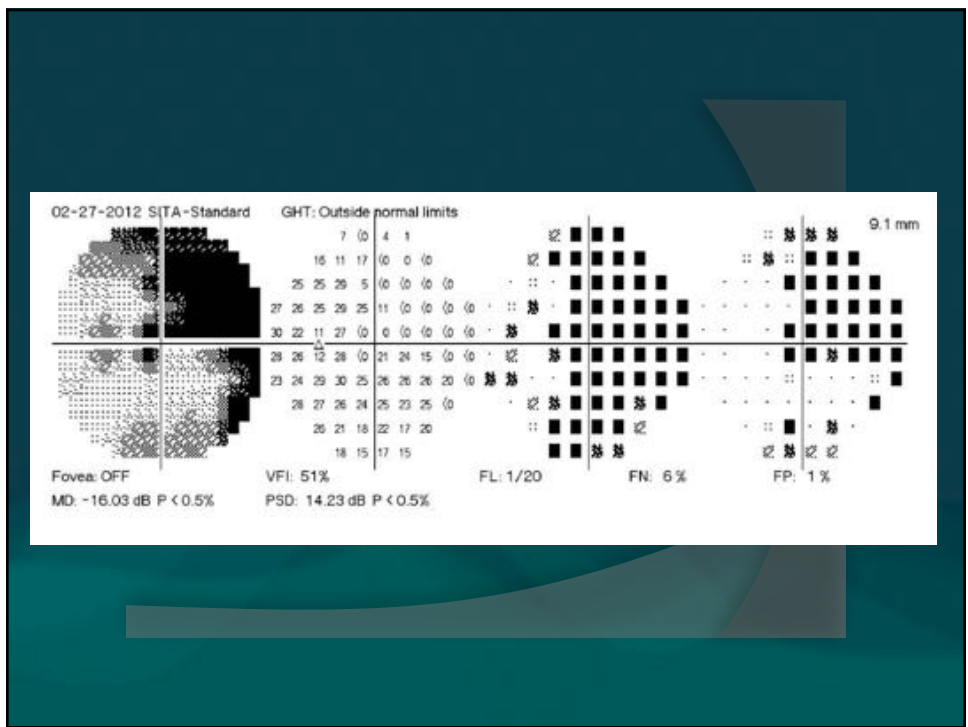
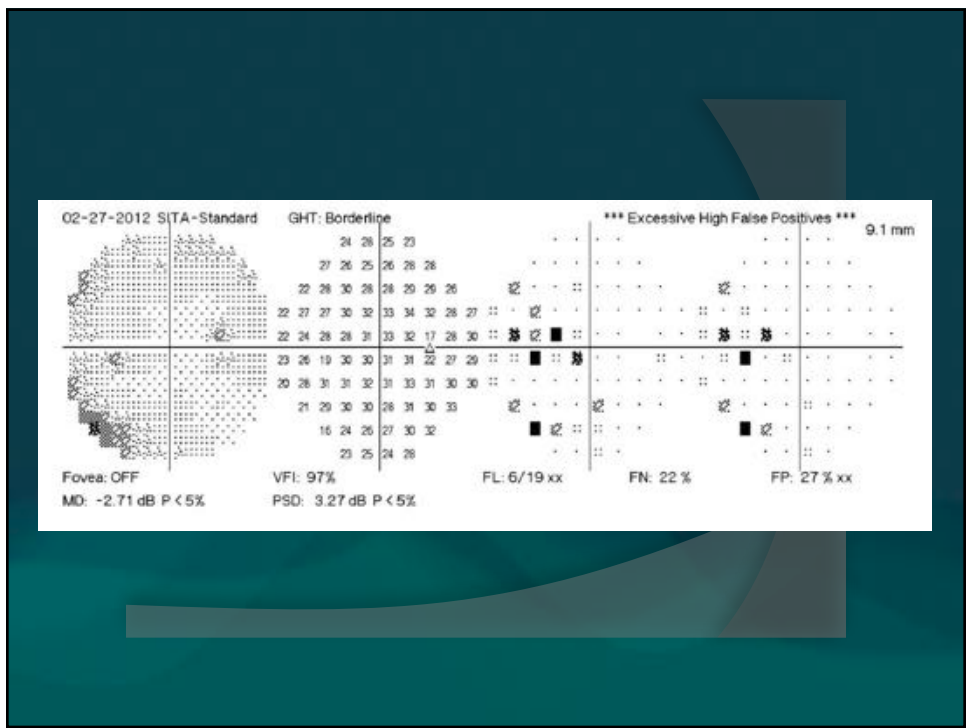


8 years later...

no Diamox

20/20 OD - minimal VF loss

20/200 OS - stable VF loss



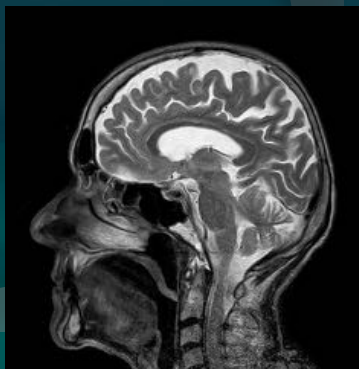
**Why is one eye 20/20 and
the other 20/200?**

Idiopathic Intracranial Hypertension

Old names:

'Benign' Intracranial Hypertension

Pseudotumor Cerebri



Idiopathic Intracranial Hypertension

1 in 100,000 people

Young women

10% overweight = 13x more likely

Idiopathic Intracranial Hypertension

Causes are unknown

Idiopathic Intracranial Hypertension

Symptoms are varied

Asymptomatic

Headache

Blurred vision

Diplopia

Nausea



Idiopathic Intracranial Hypertension

Diagnosis of Exclusion

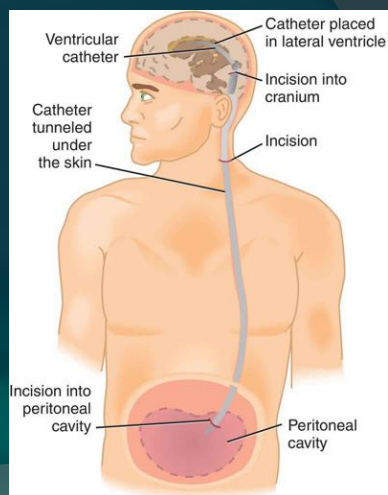
MRI/MRA/MRV

Lumbar Puncture

Blood Pressure

Idiopathic Intracranial Hypertension

Treatment
Weight loss
Diamox
VP shunt



Idiopathic Intracranial Hypertension

Over 90% are obese per BMI
10% weight reduction can “cure”

Idiopathic Intracranial Hypertension

Bariatric surgery

Medication

Semaglutide (15-20% loss over a year)

Tirzepatide



Idiopathic Intracranial Hypertension

Referral to:

Neurology

Neurosurgery

Weight management

Questions & Answers



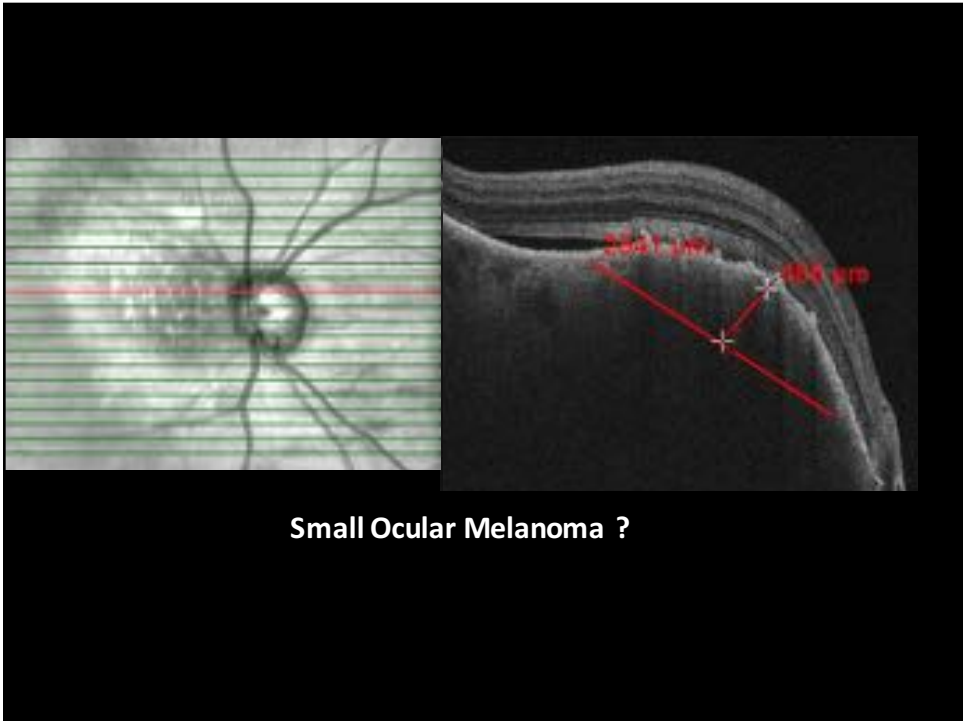
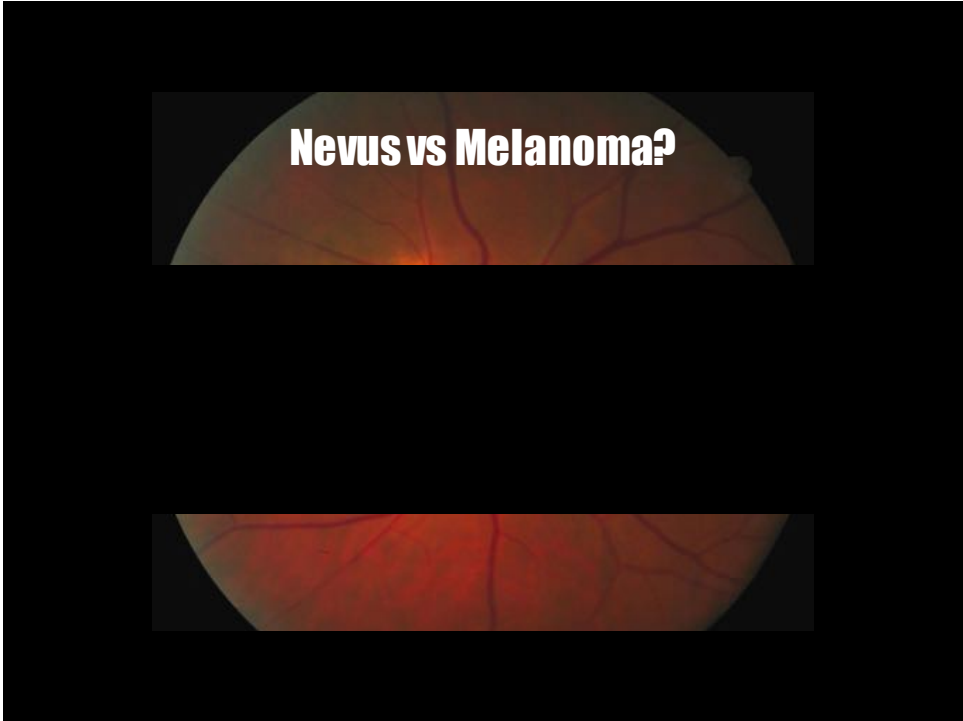
CASE

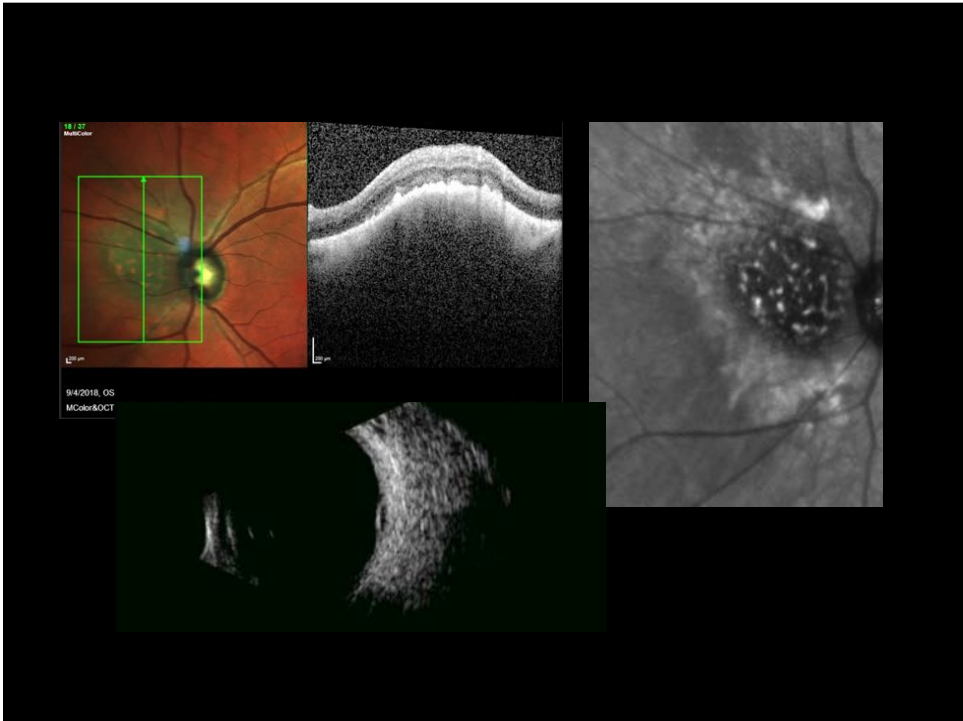
69 YO WM

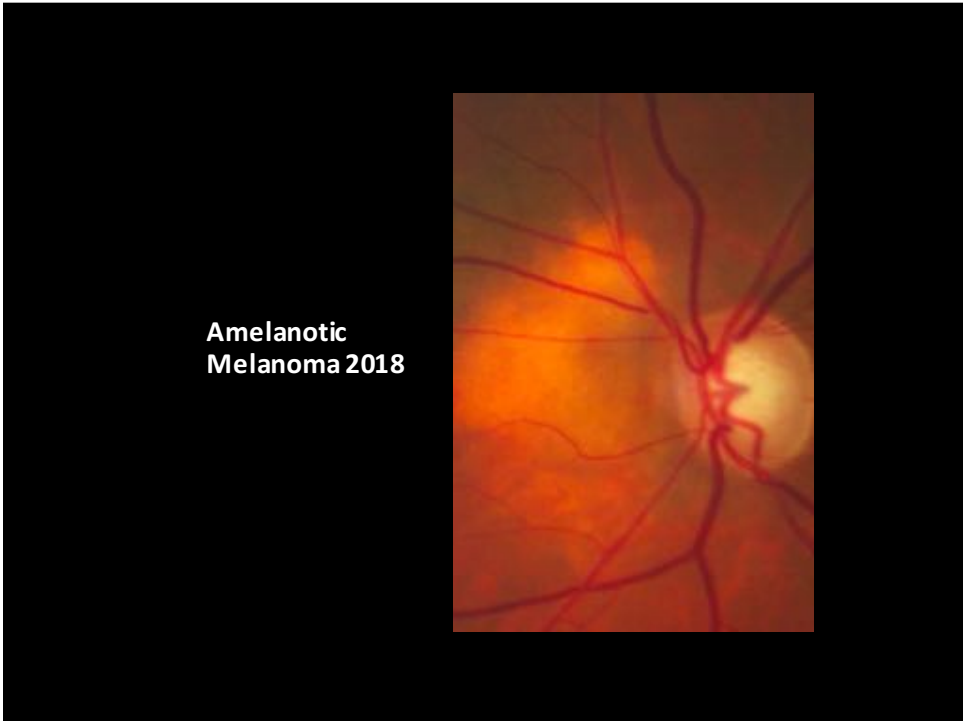
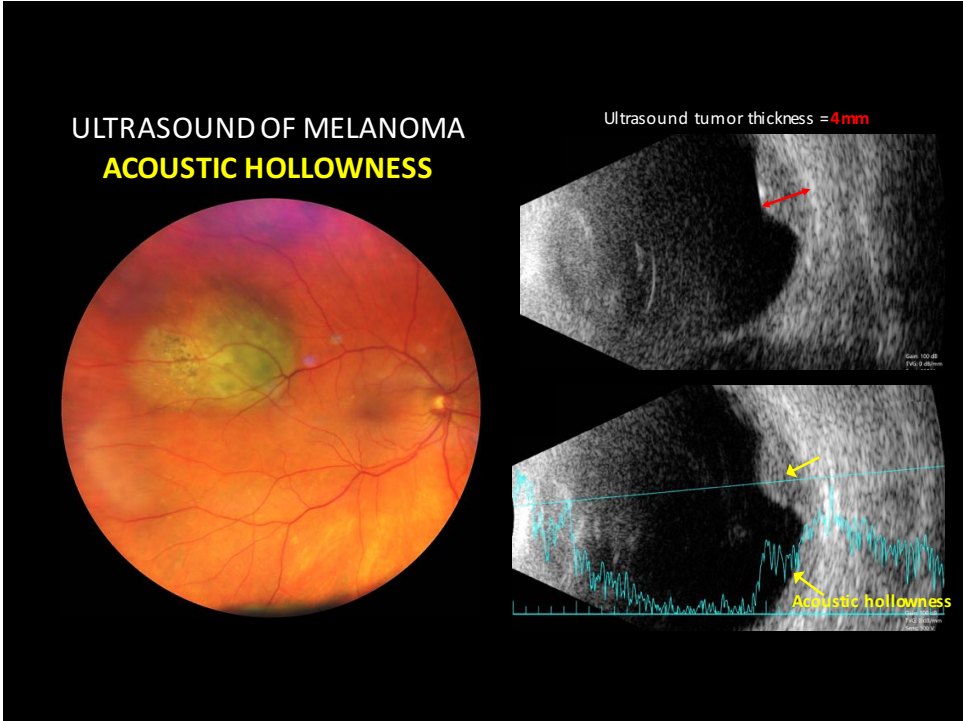
No complaints

Moving to Miami in 3 weeks*

OD 20/25 OS 20/20







To Find Small Ocular Melanoma Doing IMaging (TFSOM-DIM)

Variable	Letter	Mnemonic
Thickness tumor >2 mm	T	To
Fluid subretinal	F	Find
Symptoms visual acuity $\leq 20/50$	S	Small
Orange pigment	O	Ocular
Melanoma acoustic hollowness	M	Melanoma
Diameter tumor >5 mm	DIM	Doing IMaging

Shields C, Lim L, Dalvin L. Small choroidal melanoma: detection with multimodal imaging and management with plaque radiotherapy or AU-011 nanoparticle therapy. *Curr Opin Ophthalmol.* 2019;30(3):206-14.

Predictive 5-year risk for transformation of Choroidal Nevus to Melanoma

No Risk Factor	1%
One Risk Factor	11%
Two Risk Factors	22%
Three Risk Factors	34%
Four Risk Factors	51%
Five Risk Factors	55%

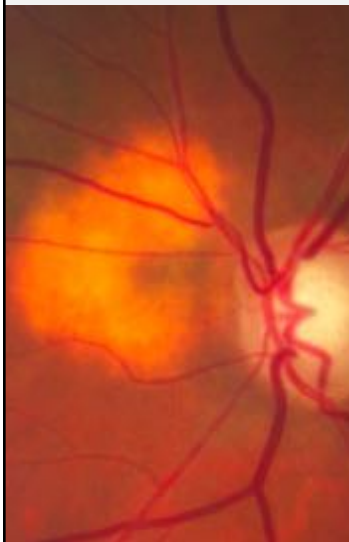
Shields C, Lim L, Dalvin L. Small choroidal melanoma: detection with multimodal imaging and management with plaque radiotherapy or AU-011 nanoparticle therapy. *Curr Opin Ophthalmol.* 2019;30(3):206-14.

Genetics and Choroidal Melanoma Gene Expression Profiling (GEP)

Prognosis Based on Gene Expression Profile Class

Gene Expression Profile Class	Percent Metastasis-Free at 3 Years	Percent Metastasis-Free at 5 Years
Class 1A	98%	98%
Class 1B	93%	79%
Class 2	50%	28%

SOURCE: Castle Biosciences Inc. [DecisionDx-UM Summary](#). Accessed March 22, 2017.



Gene expression profiling (GEP)

Prognosis Based on Gene Expression Profile Class

Gene Expression Profile Class	Percent Metastasis-Free at 3 Years	Percent Metastasis-Free at 5 Years
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SOURCE: Castle Biosciences Inc. [DecisionDx-UM Summary](#). Accessed May 22, 2021

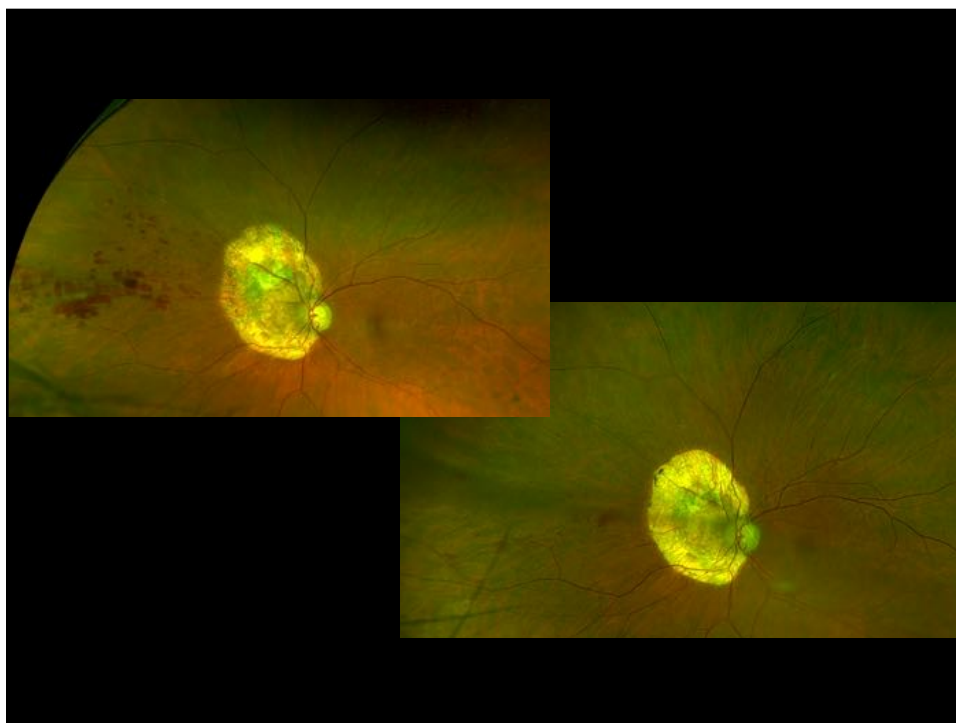
DecisionDx-UM Result

Class
1A
Discriminant Value: 0.94

Class 1 molecular signature is associated with a low risk of near term (within 5 years) clinical metastasis. Subanalysis indicates a Class 1A tumor which carries the lowest metastatic risk. A discriminant value ≥ 0.100 is reported with normal confidence.

Treatment for small choroidal melanoma

- Conservative
- **Laser photocoagulation/** transpupillary thermotherapy
- Most often, plaque radiotherapy.
- Plaque radiotherapy
 - 10-year rate of tumor control is 89%
 - Visual acuity loss at least three Snellen lines is 49%
 - Metastasis is 9%



Melanoma Metastasis

Risk factors for metastasis from the choroid:

- Thickness > 2 mm
- Symptoms – Flashes, floaters, loss of vision
- Proximity to the optic nerve
- Documented growth



Shields CI Shields JA. Risk factors for metastasis of small choroidal melanocytic Lesions. Ophthalmology 1995

METASTASIS

BOX 48.1 Sites for Metastatic Uveal Melanoma

- Liver 93%
- Lungs 24%
- Bone 16%
- Skin 11%
- Lymph nodes 10%
- Brain 5%
- Fellow eye 0%

Multiple sites involved in about half the cases.
In an atypical case consider a second primary tumor.

Metastatic Tumors to the Choroid

- Breast CA is the **most common CA** type to metastasize to the eye, followed by lung CA.
- 85% of patients with breast CA metastases will have a known history of breast CA.
- Breast CA metastases tend to be bilateral and multifocal (multiple).
- 40% of these patients have a brain metastasis.



Metastasis from lung to choroid

Questions & Answers



Conclusion

The eye does not exist in isolation, but is a mirror of systemic health.

Thank You!

Safe travels home everyone!

Anthony, Carlo, Joe