

Diabetic Retinopathy

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RETINA & MACULA
SPECIALISTS



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I Jay M. Haynie, OD, FAAO have received honoraria from the following companies:

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Diabetic Retinopathy



Diabetic Retinopathy

Jan. 28, 2008 -- The number of older Americans diagnosed with diabetes grew by nearly a quarter in the last decade, a rate that experts say threatens not only the health of the elderly but the viability of the nation's health care system.

Type 2 diabetes is the most prevalent form of the disease, accounting for 90 to 95% of all diabetes cases in America.

Diabetic Retinopathy

Although the vast majority of individuals with type 2 diabetes are adults, children and adolescents are increasingly at risk for the disease due to growing childhood weight problems and sedentary lifestyles.

There are 23.6 million children and adults in the United States, or 7.8% of the population, who have diabetes. While an estimated 17.9 million have been diagnosed with diabetes, unfortunately, 5.7 million people (or nearly one quarter) are unaware that they have the disease.

Diabetic Retinopathy

It is calculated that worldwide there are now 150 million people with diabetes, and that this number will rise to 300 million by 2025.

Either you have it or you don't.

That's the message that the American Diabetes Association (ADA) is driving home to millions of people who believe they may be "borderline diabetic," or that their "sugar is just a bit high."

Diabetic Retinopathy

What is our role??

Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

- ◆ Non Proliferative Diabetic Retinopathy
 - ◆ Mild
 - ◆ Moderate
 - ◆ Severe
 - ◆ Very Severe

- ◆ Proliferative Diabetic Retinopathy

Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

H/MA – hemorrhage or
microaneurysm

VB – venous beading

IRMA – intraretinal microvascular
abnormalities

NEO - neovascularization

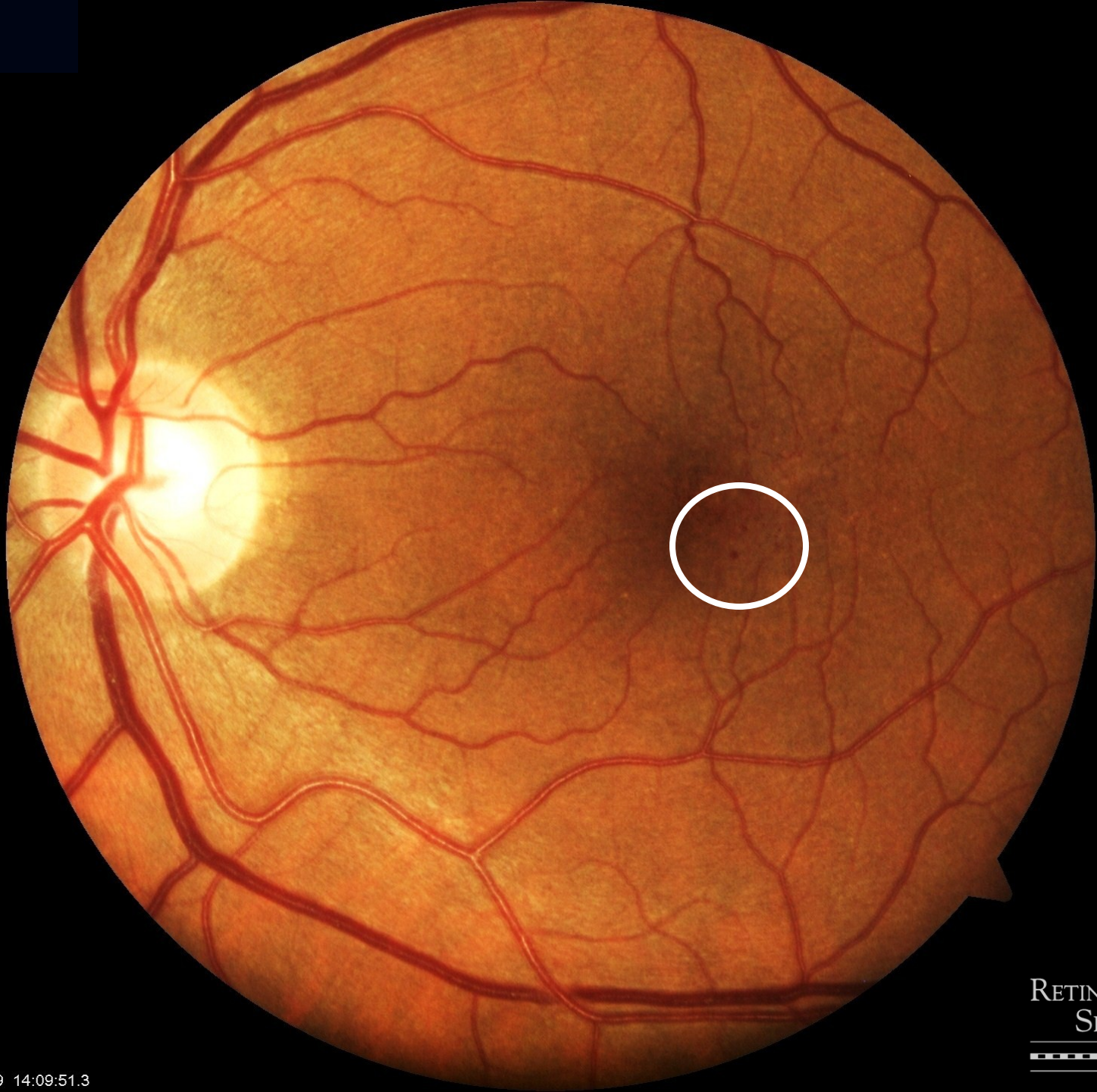
Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

◆ **Mild** Non Proliferative Diabetic Retinopathy

At least one microaneurysm

Characteristics not met for more severe retinopathy



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Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

◆ **Moderate** Non Proliferative Diabetic Retinopathy

H/MA greater than standard photograph
No. 2A **and/or**

Cotton wool spots, VB, or IRMA present

Characteristics not met for more severe
retinopathy



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Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

◆ **Severe** Non Proliferative Diabetic Retinopathy

H/MA greater than standard photograph No. 2A in 4
quadrants **or**

VB in 2 or more quadrants **or**

IRMA greater than standard photograph No. 8A in at least 1
quadrant

4 – 2 – 1 RULE

Characteristics not met for more severe retinopathy



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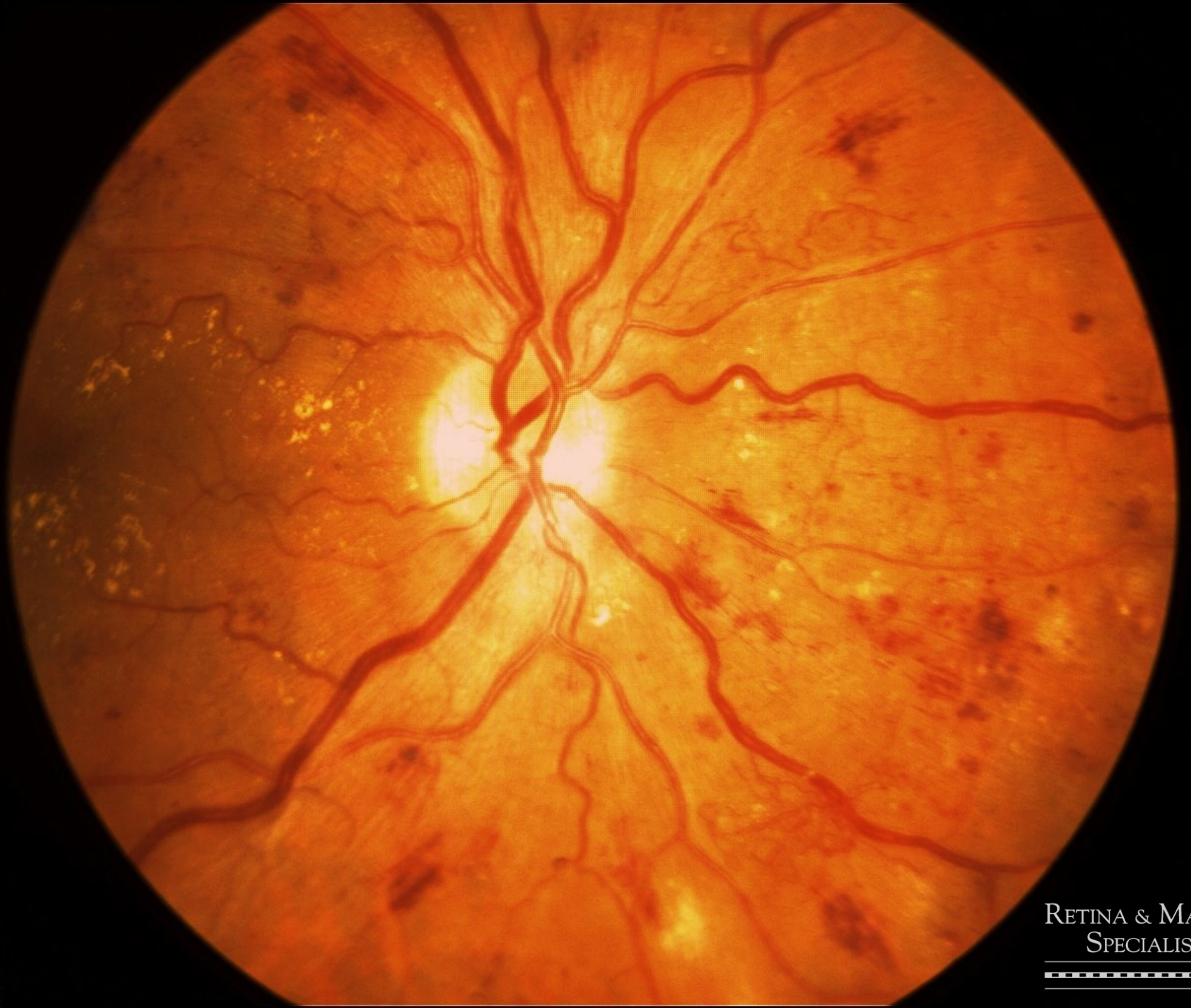
Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

◆ **Very Severe** Non Proliferative Diabetic Retinopathy

Two or more criteria of Severe NPDR

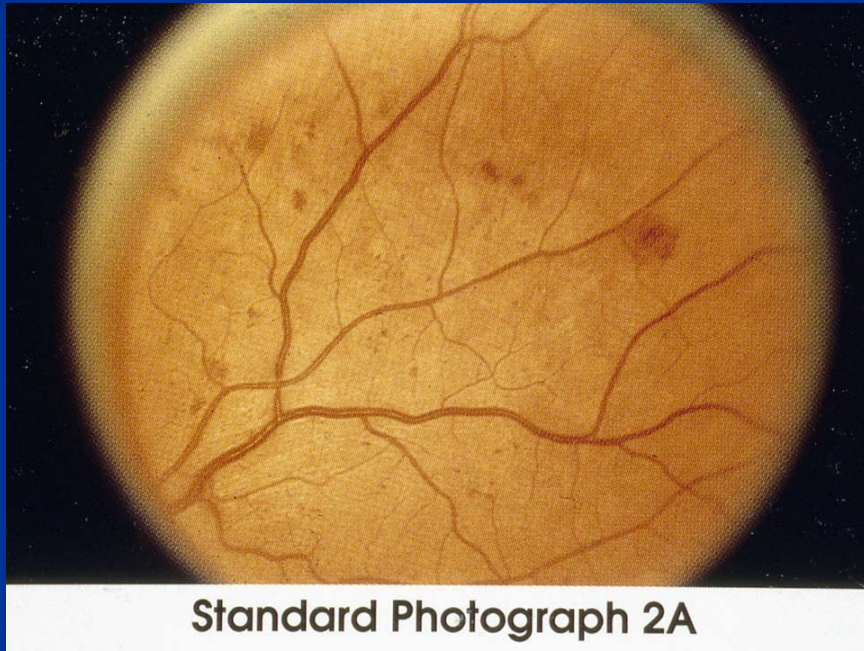
No frank neovascularization



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Diabetic Retinopathy

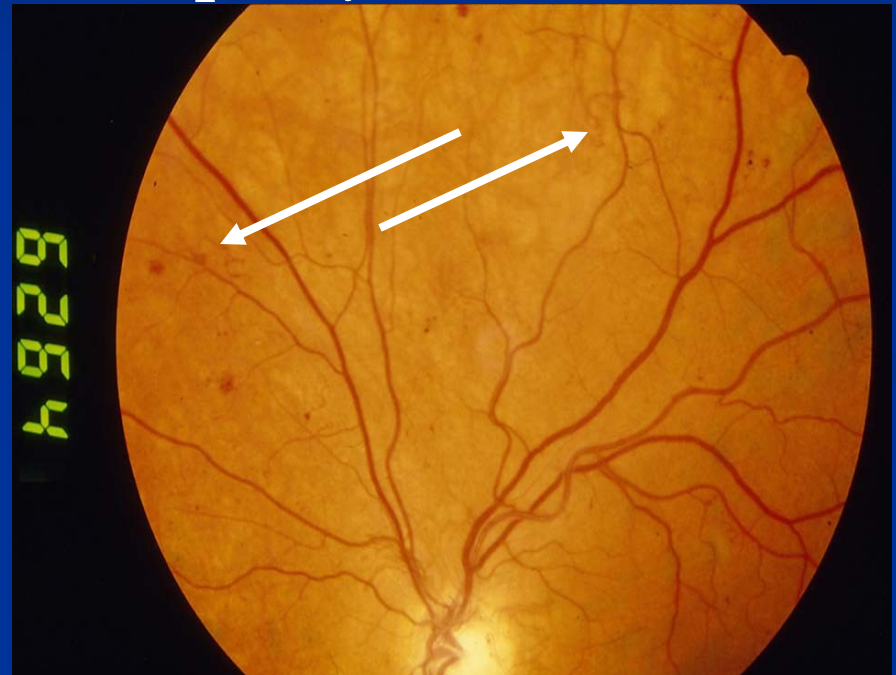
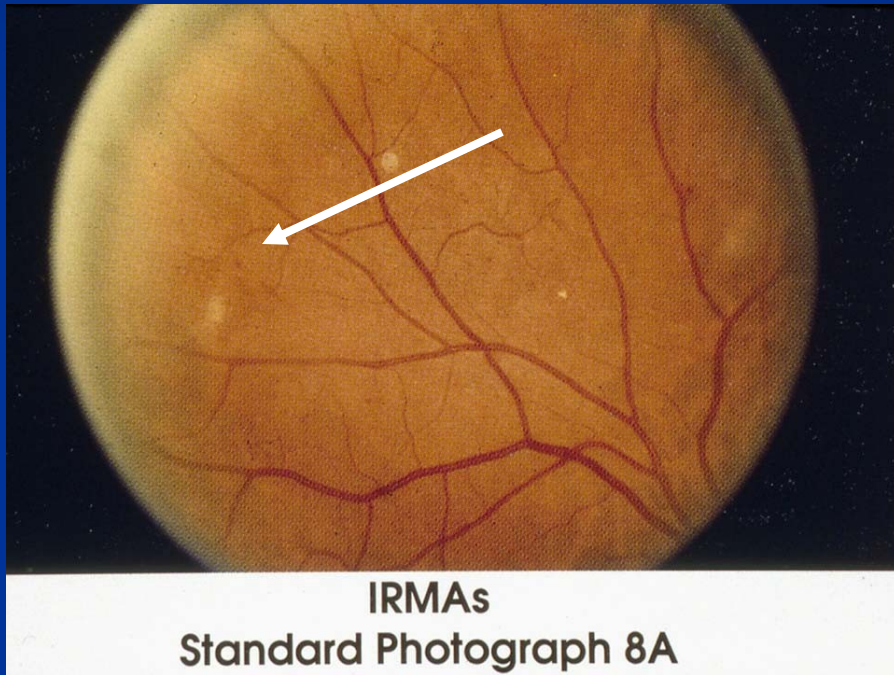
- Classification of Diabetic Retinopathy:



H/MA's in 4 quadrants = Severe Non PDR

Diabetic Retinopathy

- Classification of Diabetic Retinopathy:



IRMA in 2 quadrants = Severe Non PDR

Diabetic Retinopathy

- Classification of Diabetic Retinopathy:



H/MA's in 4 quadrants = Severe Non PDR

IRMA in 2 quadrants = Severe Non PDR

Diabetic Retinopathy

Rate of Progression to PDR

	<u>1 year</u>	<u>3 years</u>
Mild NPDR	5 %	14%
Moderate NPDR	12-26	30-48
Severe NPDR	52	71

Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

◆ Proliferative Diabetic Retinopathy

Neovascularization of the disc (NVD)

< Standard photo 10A (<0.25 – 0.33 disc area)

Neovascularization elsewhere in the retina (NVE)

without associated vitreous or pre-retinal
hemorrhage

Diabetic Retinopathy

- Classification of Diabetic Retinopathy:

- ◆ Proliferative Diabetic Retinopathy associated with “High Risk Characteristics” (HRC)

Neovascularization of the optic disc (NVD) greater than standard photo No. 10A

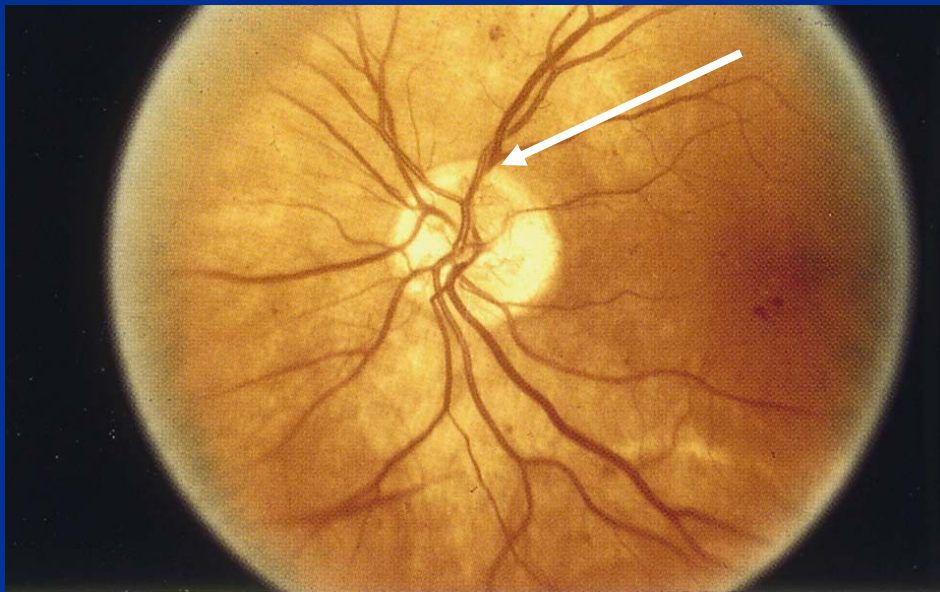
Any NVD + vitreous or pre-retinal hemorrhage

Neovascularization Elsewhere (NVE) $\geq \frac{1}{2}$ disc area + vitreous or pre-retinal hemorrhage

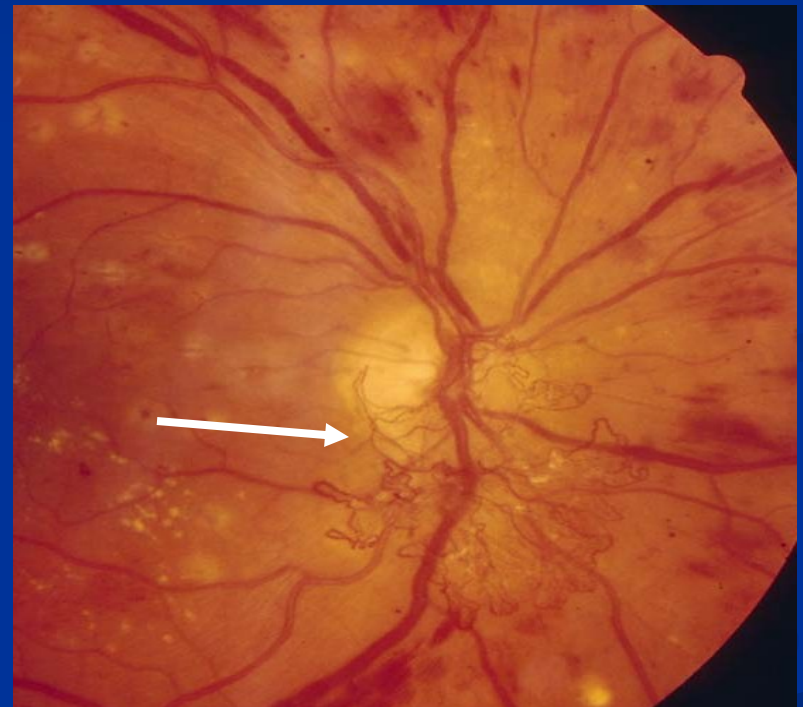
Vitreous hemorrhage or pre-retinal hemorrhage obscuring > 1 disc area

Diabetic Retinopathy

◆ Proliferative Diabetic Retinopathy



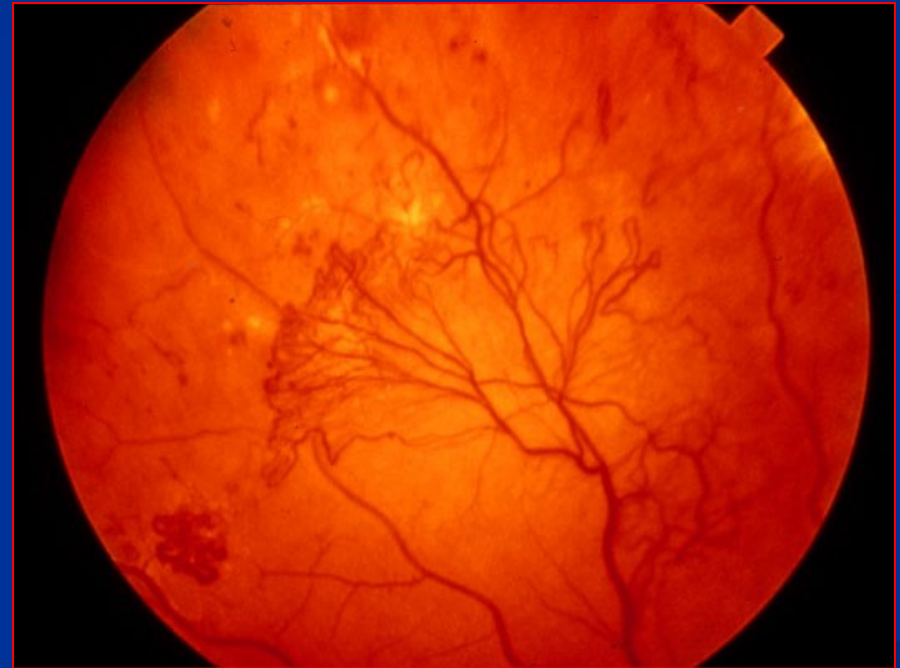
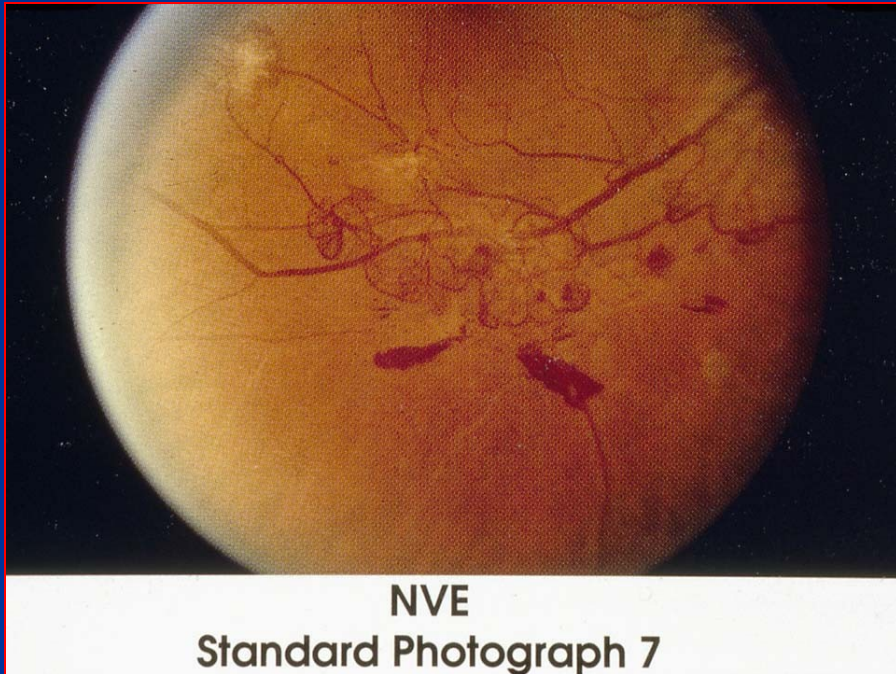
NVD
Standard Photograph 10A



Neovascularization > Standard Photo 10A

Diabetic Retinopathy

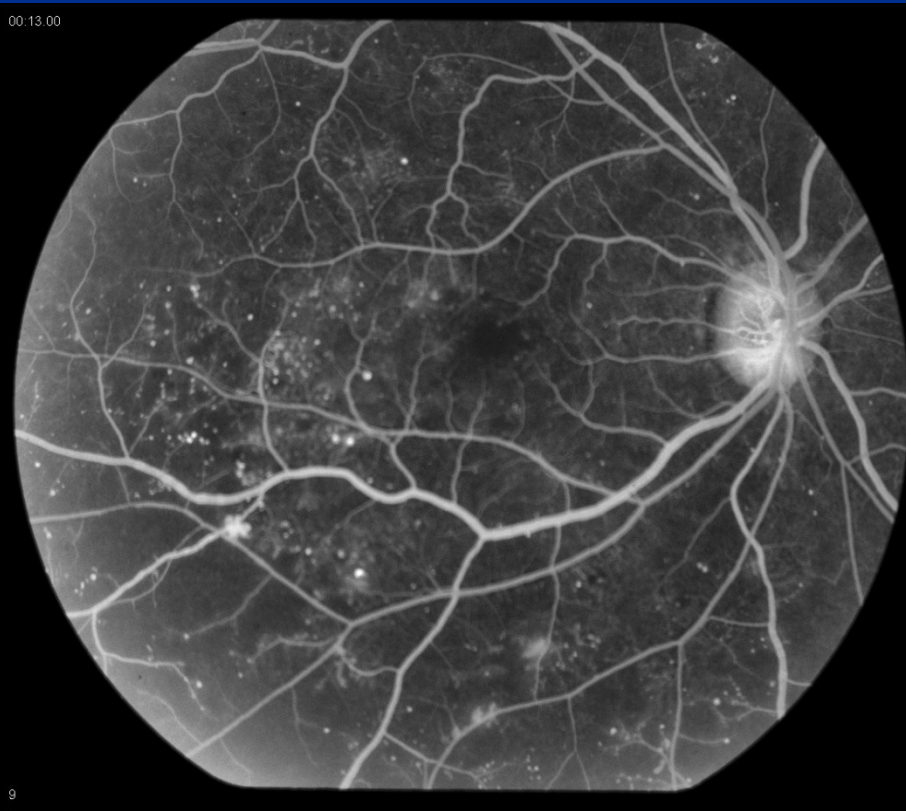
◆ Proliferative Diabetic Retinopathy



Neovascularization Elsewhere > Standard Photo 7

Diabetic Retinopathy

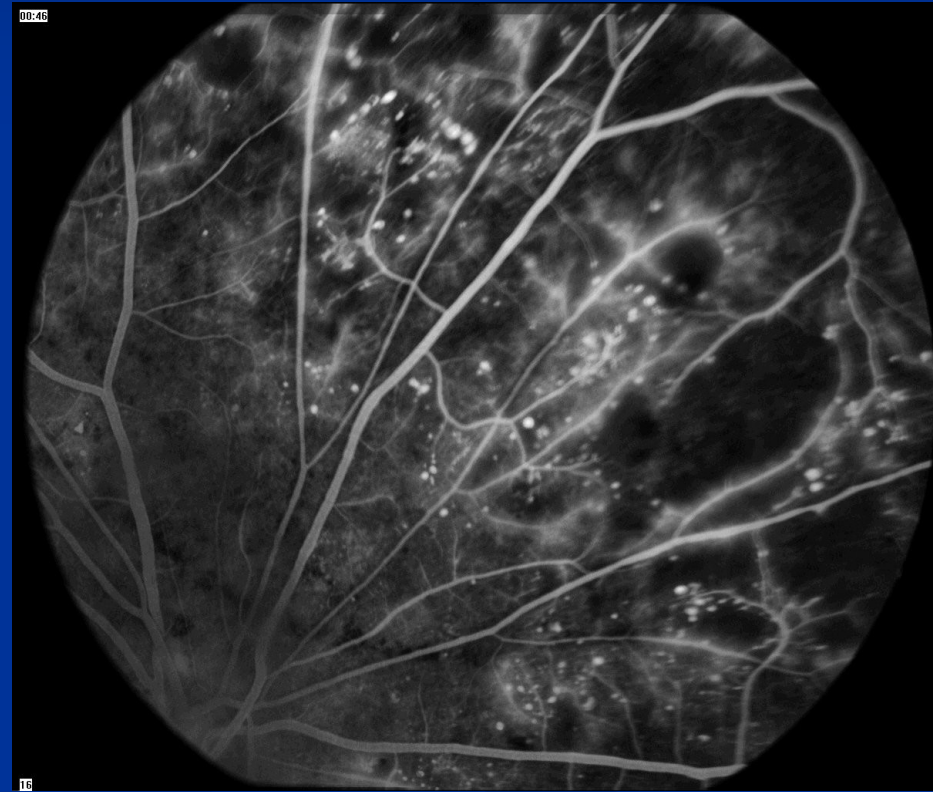
◆ Proliferative Diabetic Retinopathy



Neovascularization of disc with non-perfusion

Diabetic Retinopathy

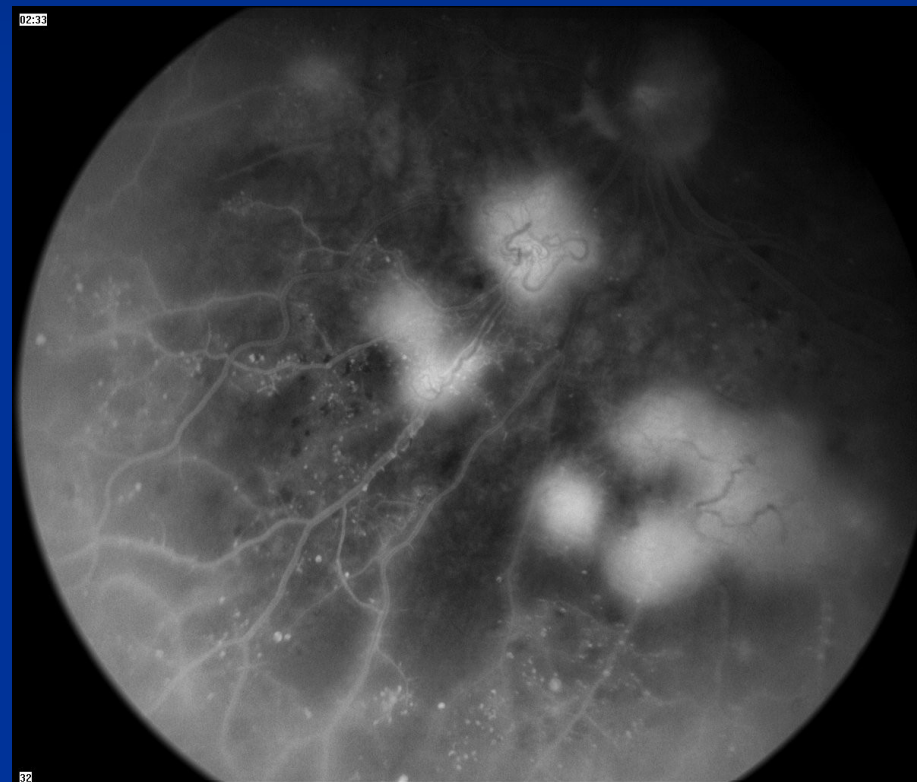
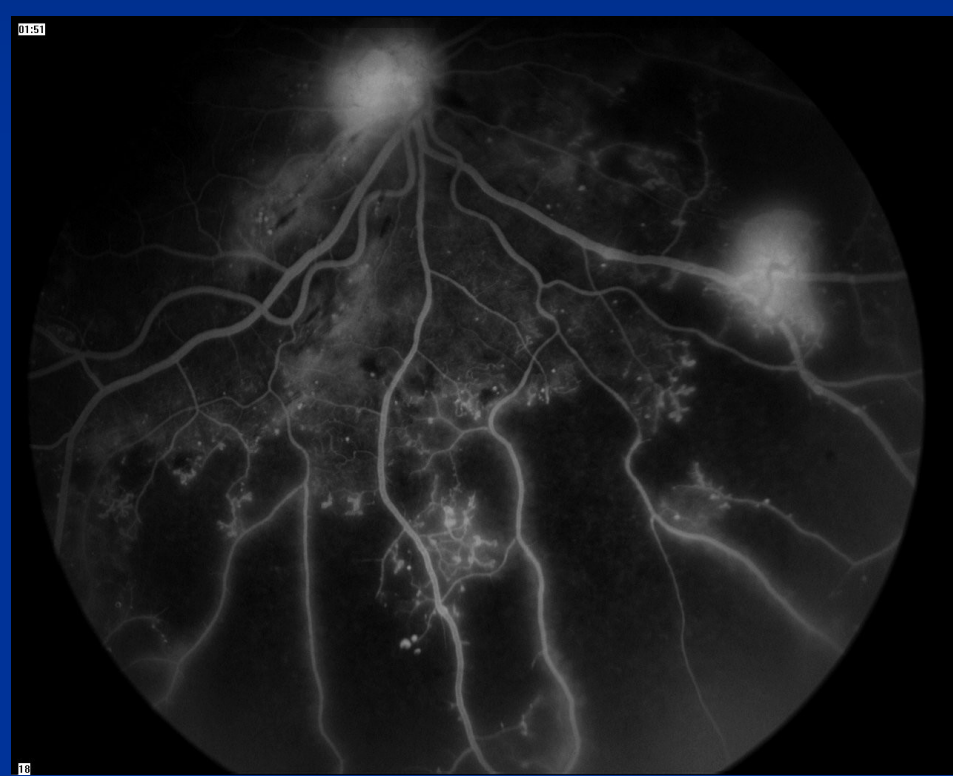
◆ Proliferative Diabetic Retinopathy



Widespread capillary non-perfusion

Diabetic Retinopathy

◆ Proliferative Diabetic Retinopathy



Widespread capillary non-perfusion
with neovascularization

Diabetic Retinopathy

◆ Proliferative Diabetic Retinopathy



Widespread capillary non-perfusion
with neovascularization

50°



4/6/2011
2

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Diabetic Retinopathy

◆ Clinically Significant Macular Edema

Defined as:

- Retinal thickening at or within 500 microns of the foveal center
- Hard exudates at or within 500 microns of the foveal center with adjacent retinal thickening
- An area of retinal thickening one disc diameter in size within one disc area of the foveal center

Diabetic Retinopathy

◆ Clinically Significant Macular Edema



Diabetic Retinopathy

◆ Treatment: Clinically Significant Macular Edema

Laser Photocoagulation is recommended for patients who meet criteria for CSME **regardless** of visual acuity.

Laser Photocoagulation reduces the risk for **moderate vision loss** by 50%.

Moderate vision loss is doubling the visual angle.

Diabetic Macular Edema: Clinical Trials

- ◆ Lucentis (Ranibizumab)
 - ◆ RISE / RIDE phase III trials
 - ◆ Intravitreal injections of 0.3mg and 0.5mg of Lucentis given monthly for DME and followed for 2 years
 - ◆ Rescue laser photocoagulation offered at 90 days

Diabetic Macular Edema: Clinical Trials

◆ Lucentis (Ranibizumab)

RISE / RIDE phase III results after 2 years (3/11)

33.6% of patients receiving 0.3mg dose of Lucentis gained more than 15 letters of acuity

45.7% of patients receiving 0.5mg dose of Lucentis gained more than 15 letters of acuity

12.3% of patients receiving placebo gained more than 15 letters of acuity.

A 3-4 fold increase compared to placebo

Diabetic Macular Edema: Clinical Trials

◆ Flucinolone Acetonide Implant (Iluvien)

FAME study (phase III)

-- Sustained release steroid intravitreal implant with an expected duration of 2-3 years of effectivity

Potential complications:

Glaucoma and Cataract formation

Diabetic Macular Edema: Clinical Trials

- ◆ Flucinolone Acetonide Implant (Iluvien)
FAME study (phase III)

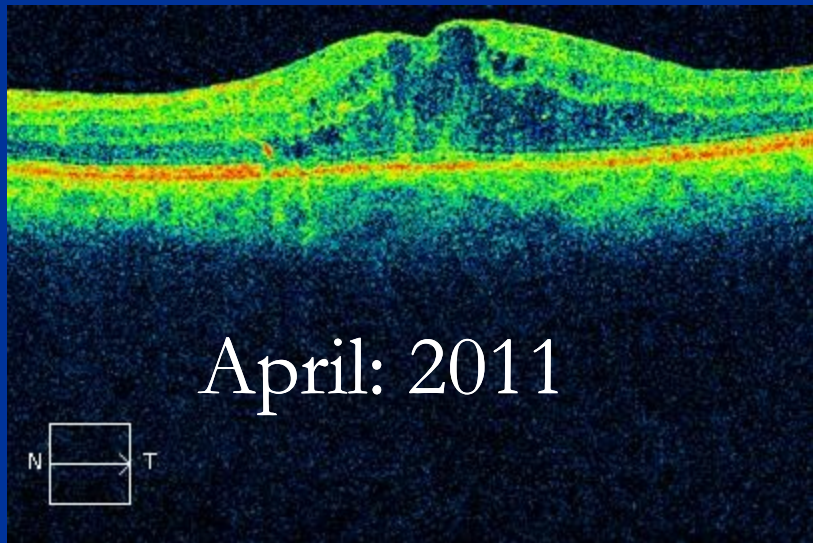
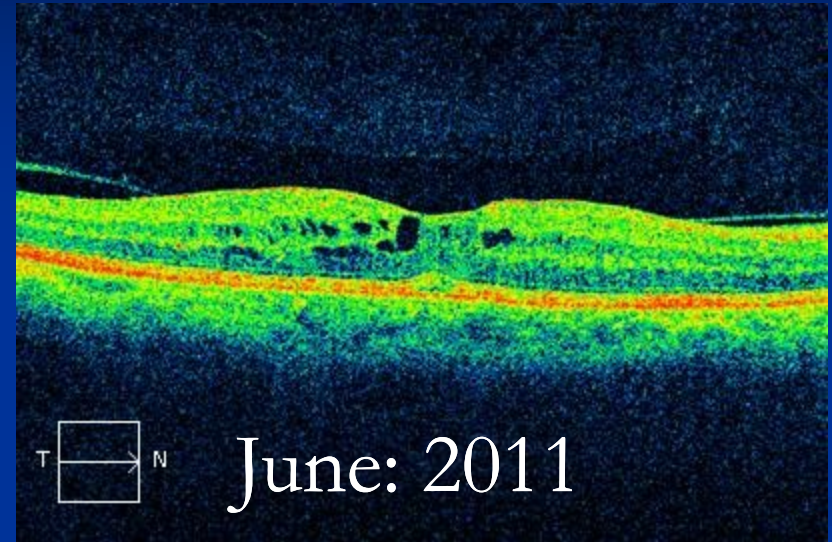
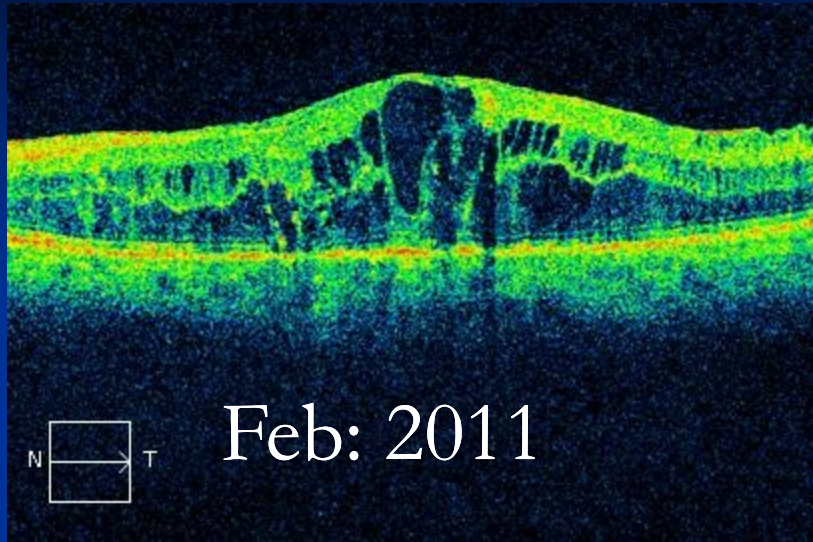
In the FAME (Fluocinolone acetonide in diabetic macular edema) study, 28.7% of patients treated with low-dose Iluvien and 28.6% of patients treated with a high dose gained at least 15 letters, compared with 16.2% of patients in the sham group.

Diabetic Retinopathy

- ◆ Treatment: Diabetic Retinopathy with recurrent macular edema following treatment.
- ◆ Clinical Pearl: Any diabetic patient who continues to struggle with macular edema refractory to treatment or recurrent following treatment should be considered to have a sleep disorder ie.; Sleep Apnea.

We must ask the question!

Diabetic Retinopathy



Following treatment of apnea the edema stabilized

Diabetic Retinopathy

- ◆ Treatment: Diabetic Retinopathy with macular edema refractory to treatment.
- ◆ Clinical Pearl: Any diabetic patient who continues to struggle with macular edema refractory to treatment..... check their medication profile.
- ◆ Are they taking Avandia or Actos?

Diabetic Retinopathy

- ◆ Both drugs are thiazolidinediones (glitazones) and are used as adjuncts to diet and exercise to reduce insulin resistance in nonpregnant, adult patients with type 2 diabetes mellitus.
- ◆ Although rosiglitazone-related macular edema is rare, patients using the drug should be advised to seek immediate medical attention if they begin to experience visual symptoms.

Diabetic Retinopathy

56 year old diabetic previously treated with laser photocoagulation and intravitreal triamcinolone presented with recurrent diffuse diabetic macular edema.

Visual Acuity: 20/100 OD ; 20/400 OS

SLE: Unremarkable except grade 1 NS and PSC OU

DFE: Intraretinal edema with cystic change OU

OCT: As seen

STRATUS OCT
Retinal Thickness Tabular Output Report - 4.0.1 (0056)



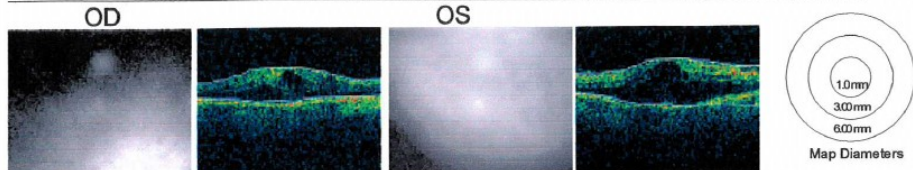
Marconi, Terri L

Scan Type: Fast Macular Thickness Map

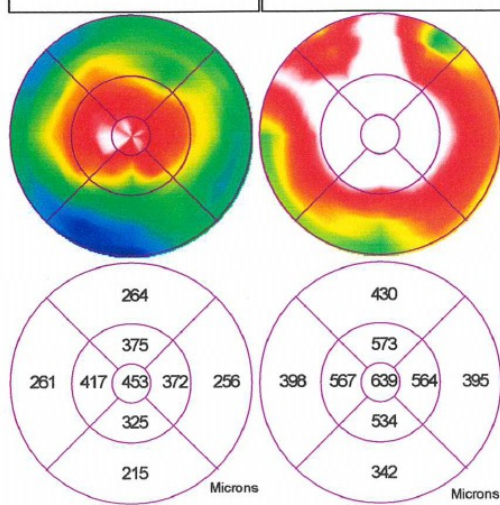
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Scan Date: 2/12/2007

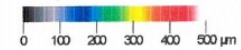
Scan Length: 6.0 mm



Signal Strength (Max 10)		Signal Strength (Max 10)		Parameter		OD	OS	Diff (OD-OS)
3		3		Thickness	Foveal minimum	459	645	-186
					Fovea	453	639	-186
				Average Retinal Thickness (microns)	Temporal inner macula	417	584	-147
					Superior inner macula	375	573	-198
					Nasal inner macula	372	567	-195
					Inferior inner macula	325	634	-200
					Temporal outer macula	261	395	-134
					Superior outer macula	264	430	-166
					Nasal outer macula	250	398	-142
					Inferior outer macula	215	342	-127
					Superior/Inferior outer	1.228	1.257	-0.029
					Temporal/Nasal inner	1.121	0.995	0.126
					Temporal/Nasal outer	1.020	0.902	0.028
				Volume (cubic mm)	Fovea	0.356	0.502	-0.146
					Temporal inner macula	0.656	0.887	-0.231
					Superior inner macula	0.59	0.9	-0.310
					Nasal inner macula	0.594	0.891	-0.307
					Inferior inner macula	0.511	0.839	-0.328
					Temporal outer macula	1.384	2.098	-0.714
					Superior outer macula	1.402	2.283	-0.881
					Nasal outer macula	1.357	2.115	-0.758
				Inferior outer macula	1.139	1.818	-0.679	
				Total macula volume	7.803	12.337	-4.535	



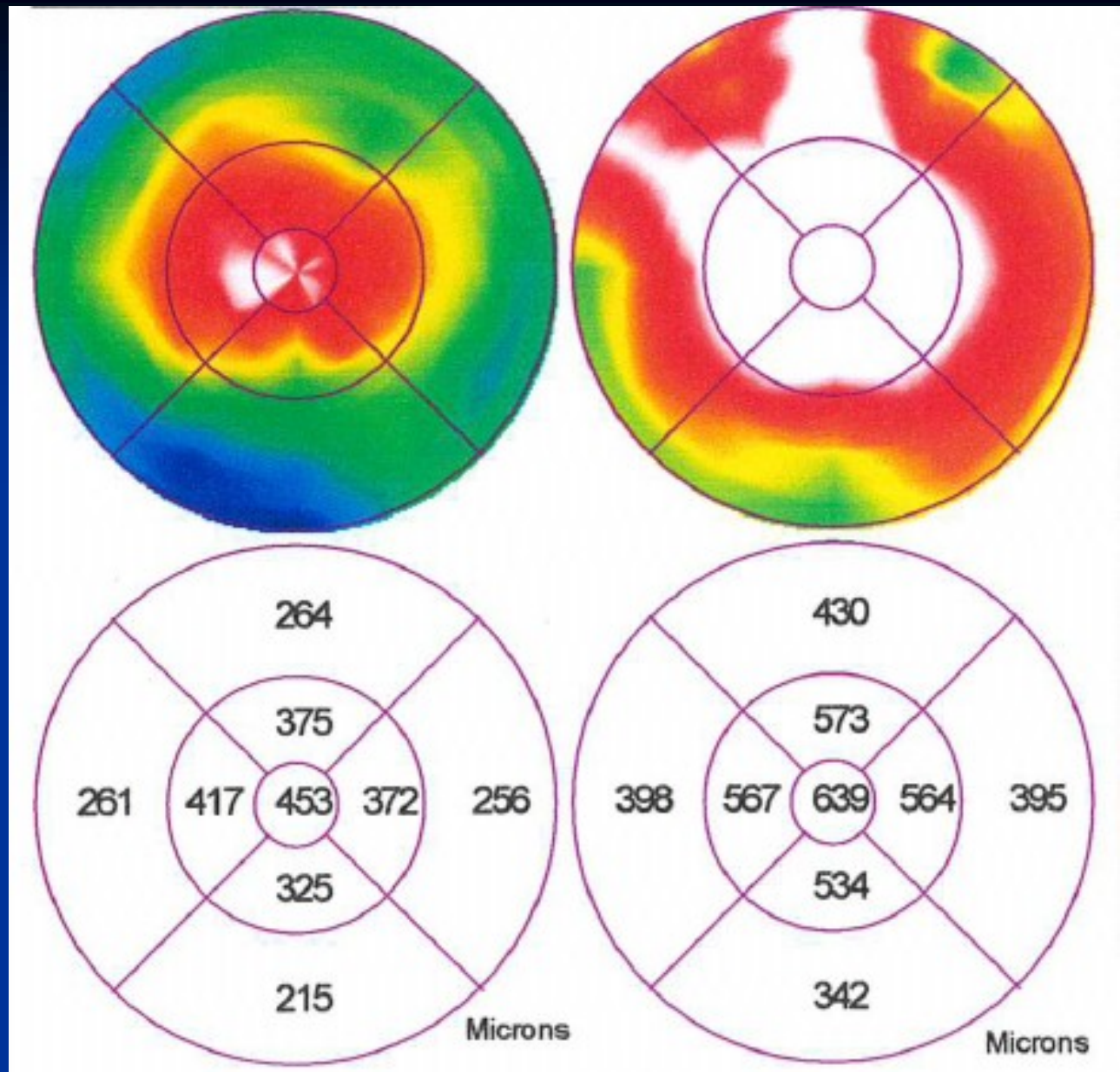
OD	Scans used	1, 2, 3, 4, 5, 6	OS	Scans used	1, 2, 3, 4, 5, 6
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Signature: _____

Physician: _____

The retinal contour shows diffuse intraretinal cystic change with a marked increase in foveal thickness OU.



Normal Foveal Thickness = 180 microns

Diabetic Retinopathy

Treatment options at this time:

Additional Laser ?

Repeat Intravitreal Triamcinolone ?

Consideration of Intravitreal Avastin/Lucentis ?

Review of systemic medications include the use of AVANDIA for glycemic control.

STRATUS OCT
Retinal Thickness Tabular Output Report - 4.0.1 (0056)



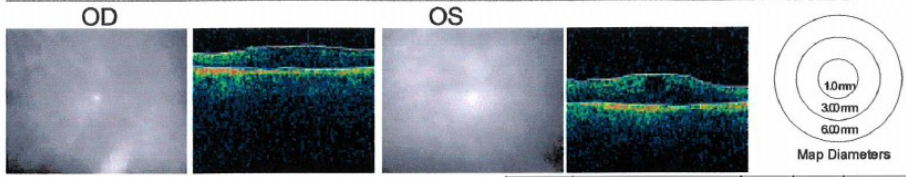
Marconi, Terri L

Scan Type: Fast Macular Thickness Map

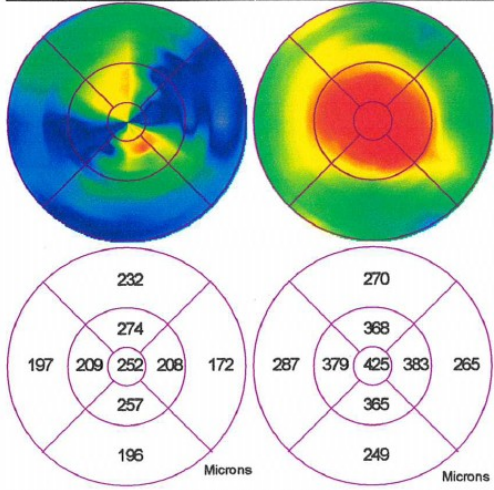
Scan Date: 4/23/2007

DOB: 2/12/1947, ID: NA, Gender unknown

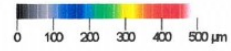
Scan Length: 6.0 mm



Signal Strength (Max 10)	3	Signal Strength (Max 10)	3	Parameter	OD	OS	Diff (OD-OS)
				Thickness			
				Foveal minimum	244	429	-185
				Fovea	252	425	-173
				Temporal inner macula	209	383	-174
				Superior inner macula	274	368	-94
				Nasal inner macula	206	379	-171
				Inferior inner macula	257	365	-108
				Temporal outer macula	197	265	-68
				Superior outer macula	232	270	-38
				Nasal outer macula	172	207	-115
				Inferior outer macula	196	249	-53
				Superior/Inferior outer	1.184	1.084	0.100
				Temporal/Nasal inner	1.005	1.011	-0.006
				Temporal/Nasal outer	1.145	0.929	0.222
				Volume (cubic mm)			
				Fovea	0.198	0.334	-0.136
				Temporal inner macula	0.329	0.602	-0.273
				Superior inner macula	0.431	0.578	-0.146
				Nasal inner macula	0.327	0.596	-0.269
				Inferior inner macula	0.405	0.573	-0.168
				Temporal outer macula	1.046	1.406	-0.356
				Superior outer macula	1.231	1.434	-0.203
				Nasal outer macula	0.915	1.522	-0.607
				Inferior outer macula	1.041	1.324	-0.283
				Total macula volume	9.929	0.374	-2.445



OD	Scans used	1, 2, 3, 4, 5, 6	OS	Scans used	1, 2, 3, 4, 5, 6
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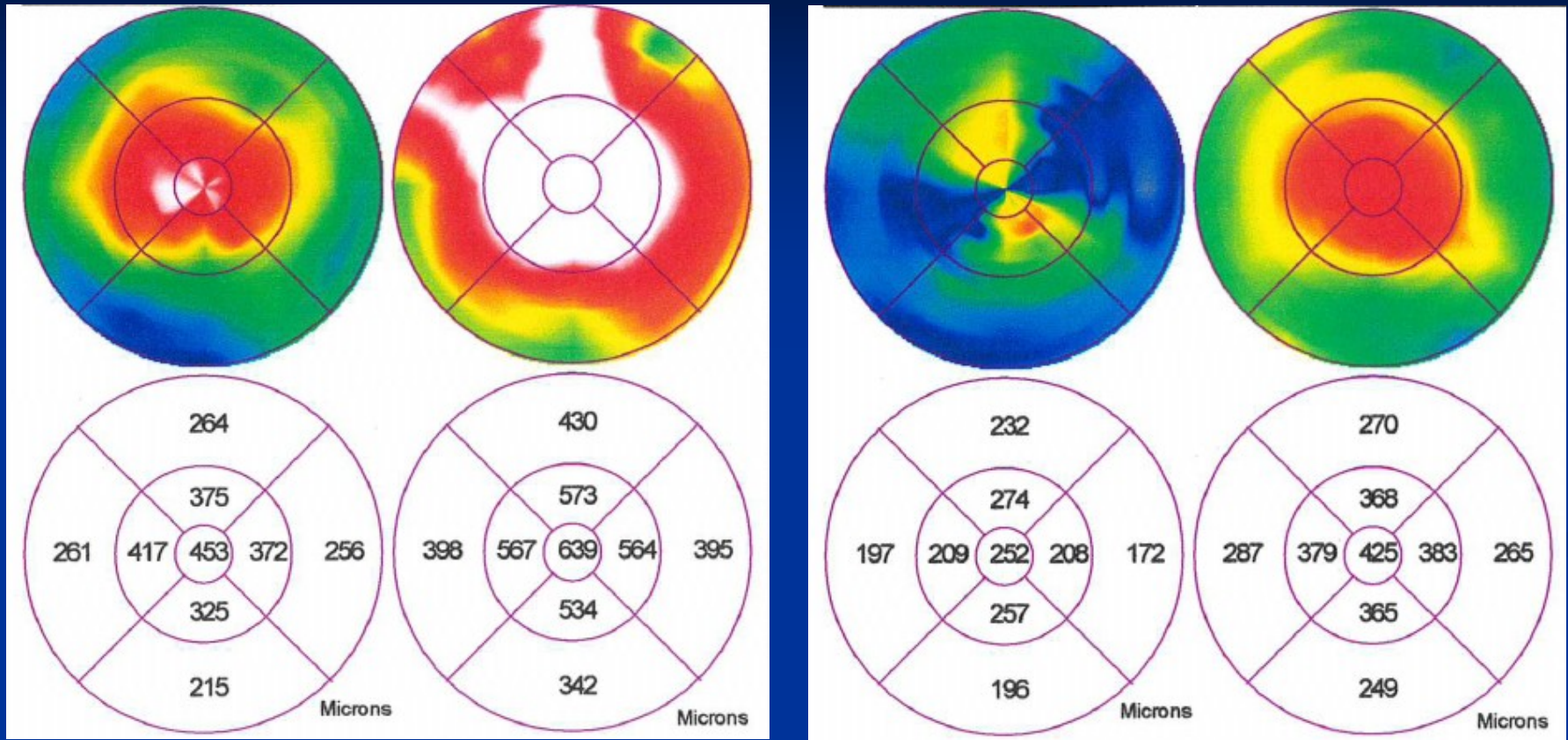
Signature: _____

 Physician: _____

2 months following discontinuation of AVANDIA.

A significant reduction in macular edema is seen.

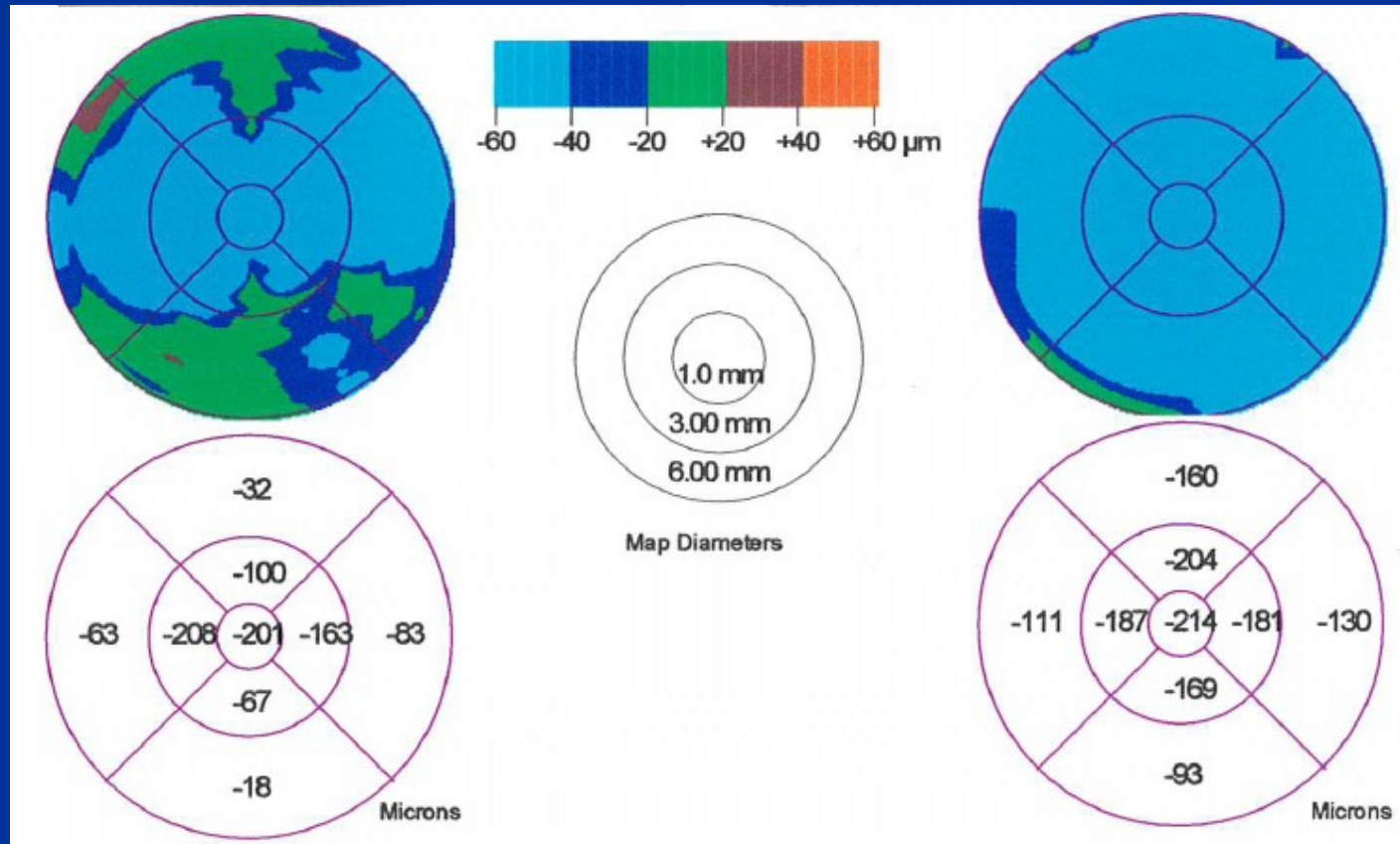
Diabetic Retinopathy



A reduction in foveal thickness by 200+ microns in each eye. A 30 micron reduction = 1 line of acuity.

Diabetic Retinopathy

- ◆ Avandia induced macular edema refractory to laser photocoagulation and intravitreal treatment.



Diabetic Retinopathy

◆ Treatment: Proliferative Diabetic Retinopathy

The Diabetic Retinopathy Study showed that scatter laser PRP reduced the incidence of severe vision loss by up to 50 % in patients with Proliferative Diabetic Retinopathy.

Severe vision loss is $\leq 5/200$

Diabetic Retinopathy

- ◆ Treatment: Proliferative Diabetic Retinopathy



Diabetic Retinopathy

◆ Treatment: Proliferative Diabetic Retinopathy



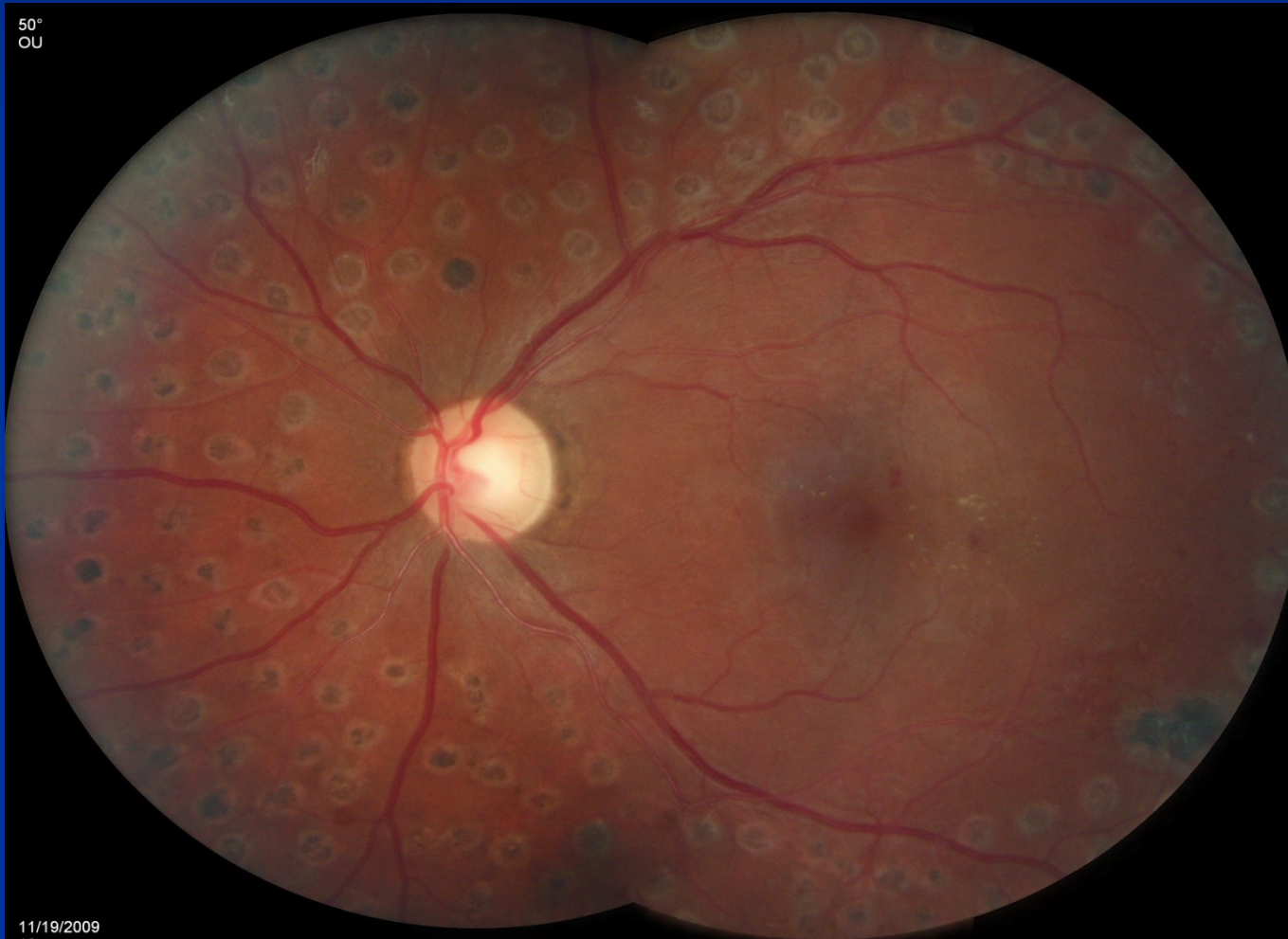
Diabetic Retinopathy

- ◆ Treatment: Proliferative Diabetic Retinopathy



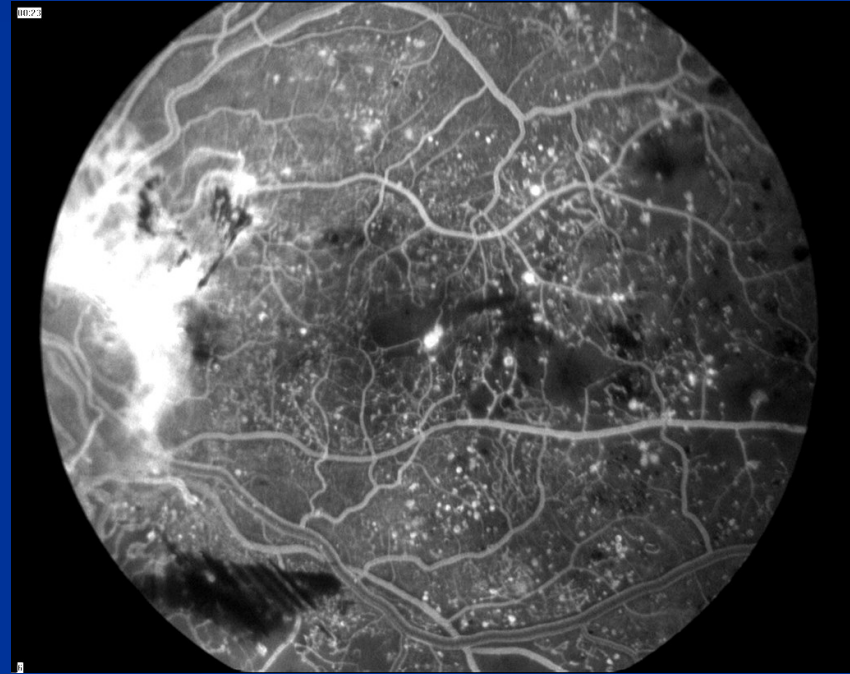
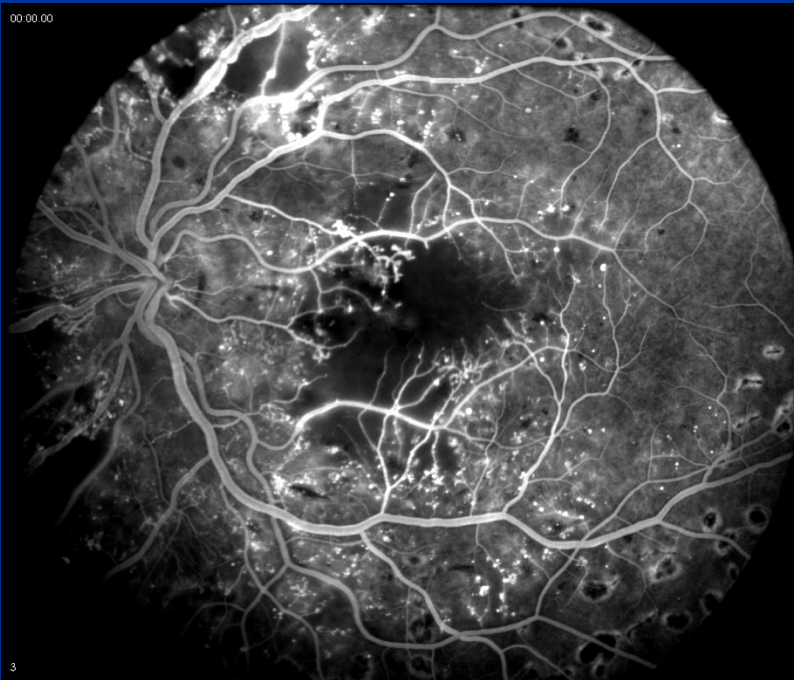
Diabetic Retinopathy

◆ Treatment: Proliferative Diabetic Retinopathy



Diabetic Retinopathy

◆ Even with treatment and resolution of macular edema some patients continue to have severe vision loss..... Driven by ischemia!



Diabetic Retinopathy

◆ Brimonidine for Ischemia (Allergan)

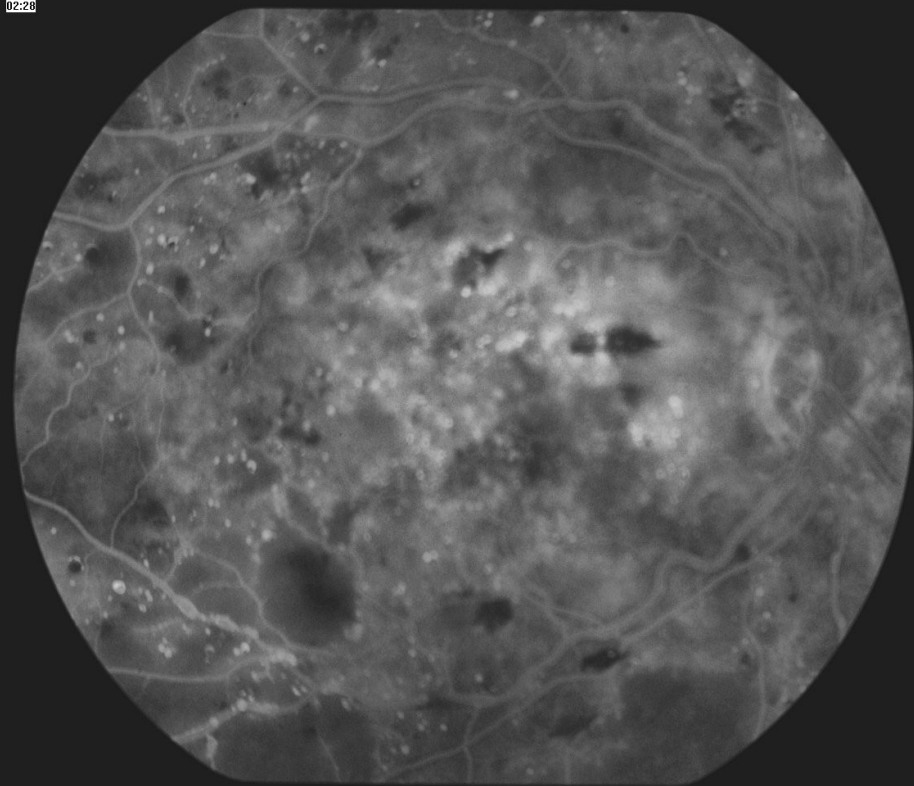
Brimonidine Tartrate Drug Delivery System

Intravitreal Implant for Diabetic Macular
Ischemia

Diabetic Retinopathy

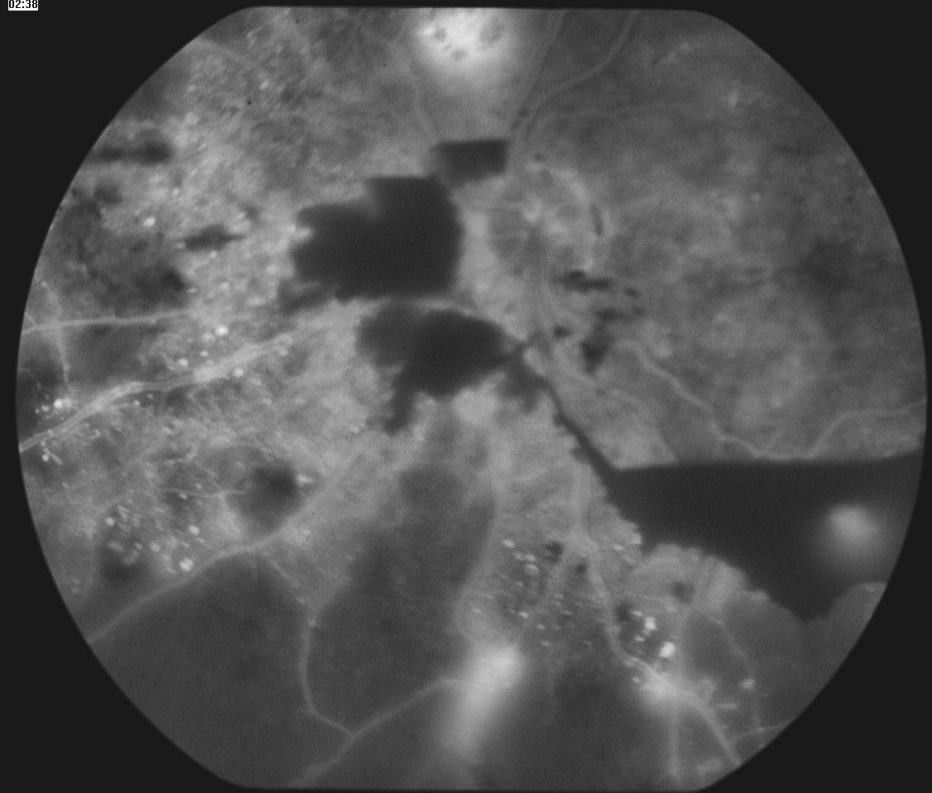
- ◆ Combination therapy has become standard for the treatment of diabetic retinopathy.

02:20



19

02:38



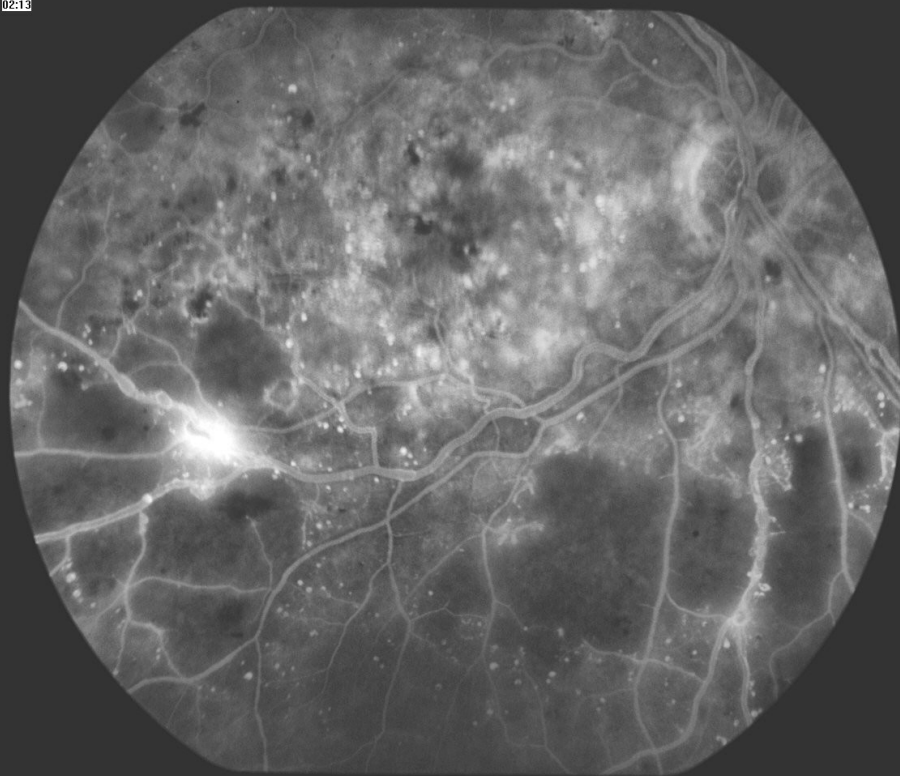
20

Severe PDR with marked diffuse macular edema seen OU

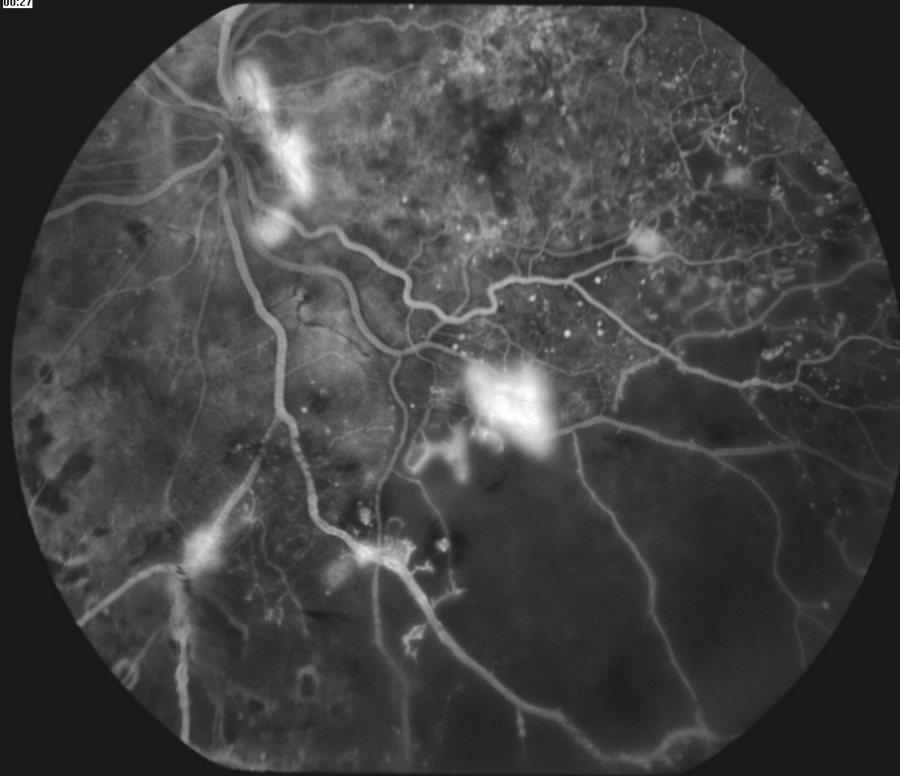
Vision 20/100 OD and 20/400 OS

Patient underwent PRP OS.....lost to follow up

02:13



00:27



Presented 5 months later.....

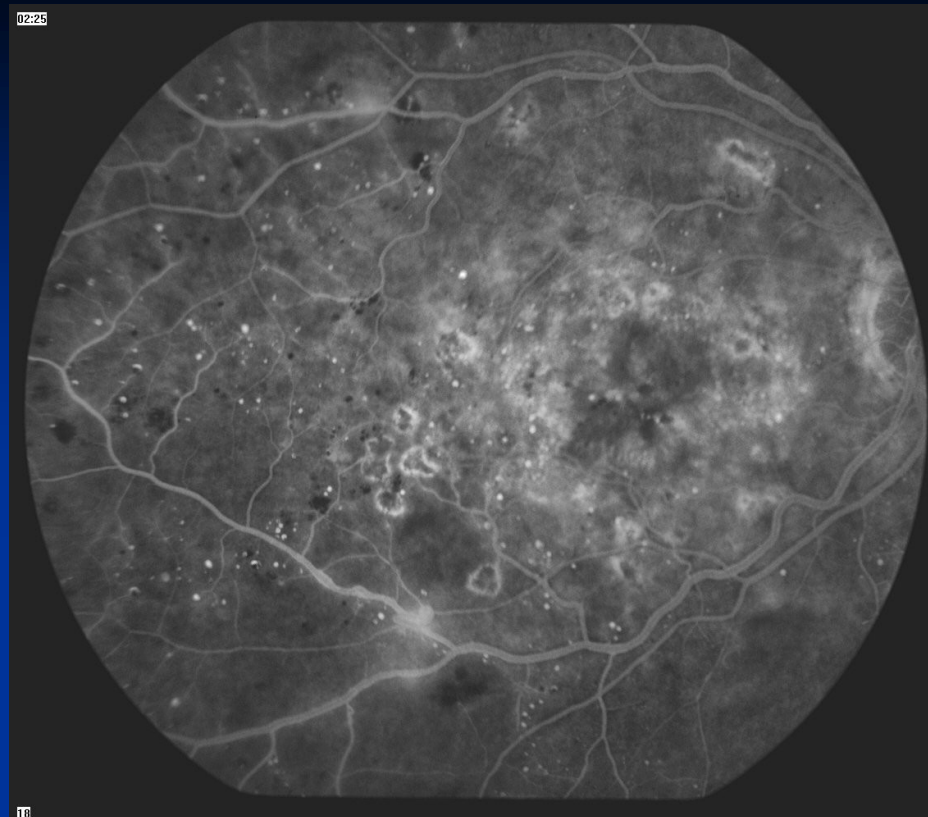
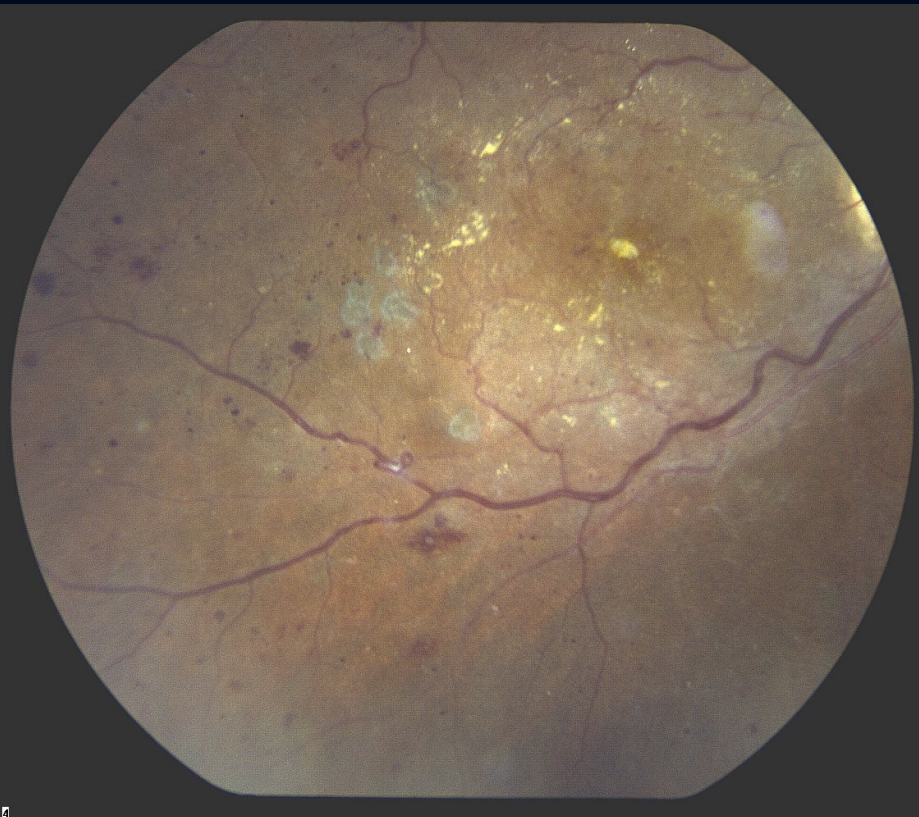
Vision 20/400 OD and 20/400 OS

Active neovascularization OU with macular edema OU...

No \$\$\$

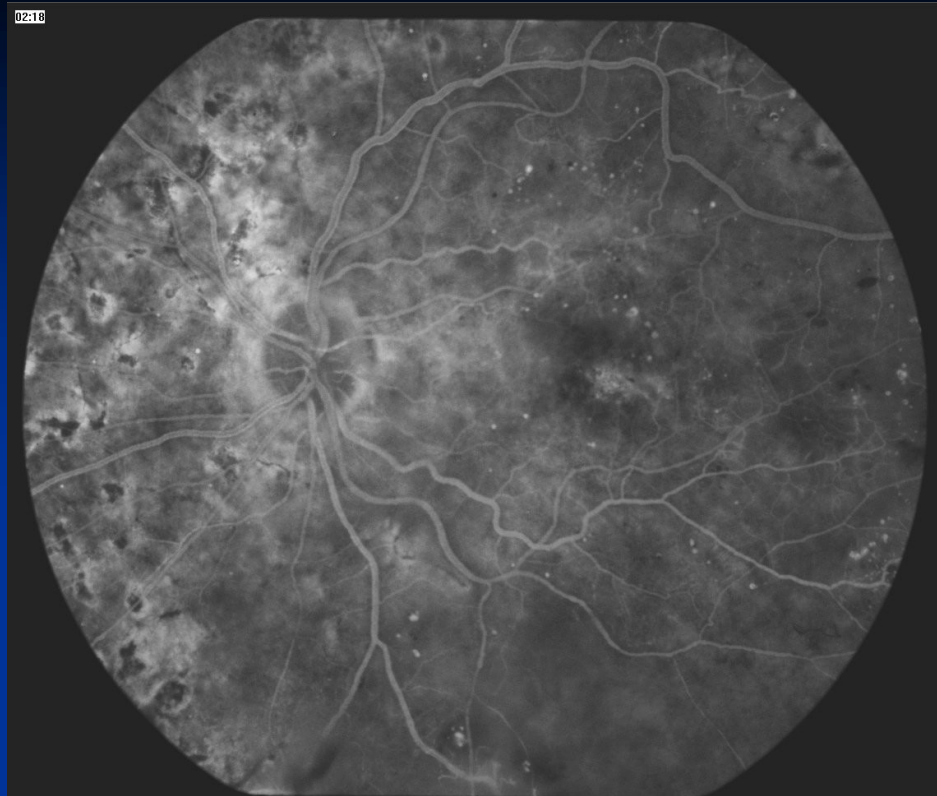
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A marked reduction in retinal neovascularization is seen with resolution in macular edema as seen angiographically OD.

Vision 20/100



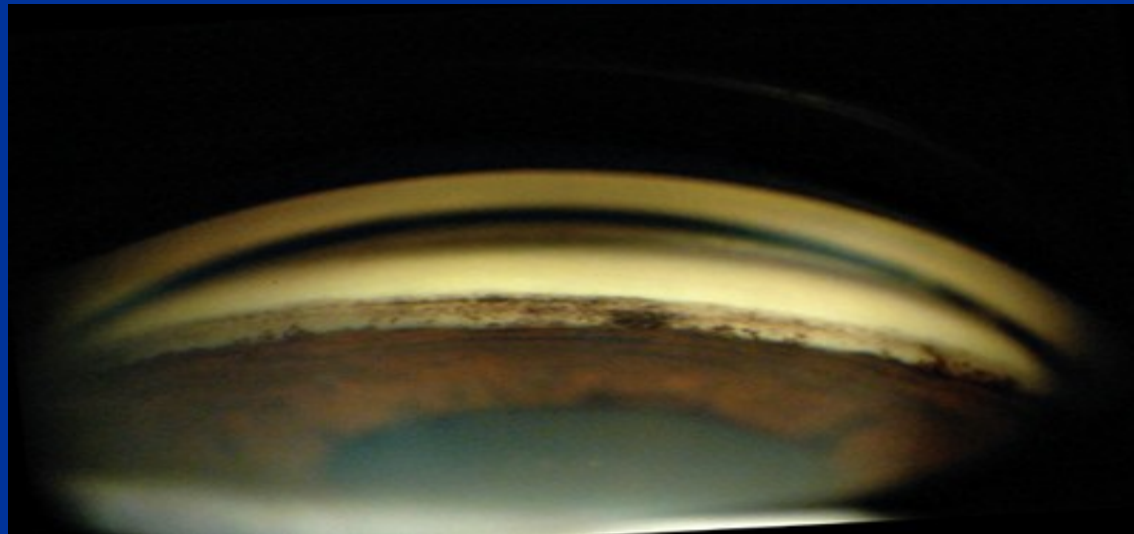
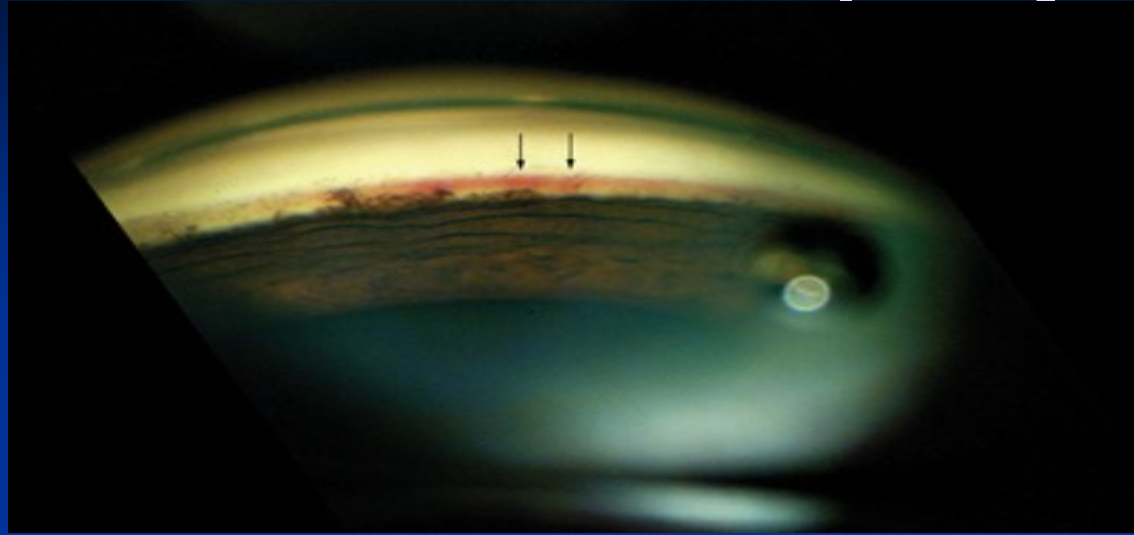
A marked reduction in retinal neovascularization is seen with resolution in macular edema as seen angiographically OS.

Vision 20/70

Diabetic Retinopathy

- ◆ Although clinical trials have defined the standard of care for management of CSME and PDR....intravitreal agents like Avastin/Lucentis and Triamcinolone have rapidly become adjuncts to laser treatments and prior to Vitrectomy.
- ◆ Avastin has also become a crucial component in the management of neovascular glaucoma by inducing regression of rubeosis within a few days.

Diabetic Retinopathy

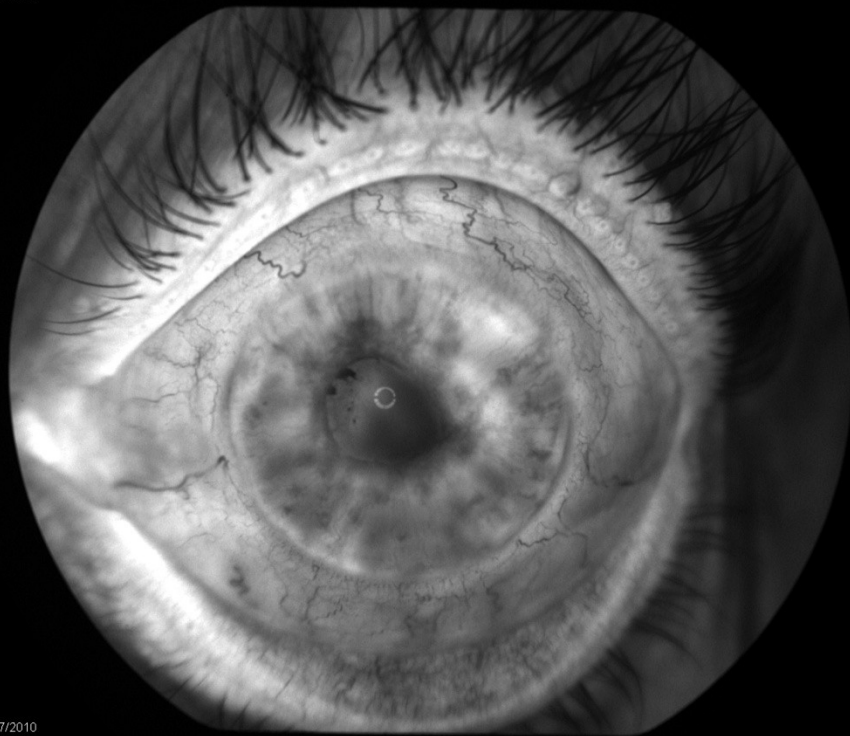


Rubeosis in the anterior chamber angle

7 days after an intravitreal injection of Avastin

Diabetic Retinopathy

06.45.35



03.27.37



4/14/2010
32

Rubeosis as seen with
angiography and 7 days
s/p IVA.

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Diabetic Retinopathy

◆ Referral Criteria:

Non Proliferative Diabetic Retinopathy

Mild NPDR – follow yearly

Moderate NPDR – follow q6 – 12 months

Severe NPDR – follow q4 - 6 months

Very Severe NPDR – follow q3 months

** Consider patient control of diabetes

** Consider risks for progression to PDR

** Consider personal comfort level

Diabetic Retinopathy

◆ Referral Criteria:

Proliferative Diabetic Retinopathy

- Prompt referral for pan retinal photocoagulation based of the guidelines of the DRS.
- If rubeosis is present Avastin + PRP should be initiated within 48 – 72 ours to prevent neovascular glaucoma.

Diabetic Retinopathy

◆ Referral Criteria:

Clinically Significant Macular Edema

- Follow the guidelines of the ETDRS
- Remember that the criteria for CSME does not take into account visual acuity

Diabetic Retinopathy

◆ Referral Criteria:

Clinically Significant Macular Edema



Both of these patients have visual acuity of 20/25 with no real complaints. TREAT?

Diabetic Retinopathy

Any Questions?



Contact me: JayH@retina-macula.com