
Preventing Blindness in your Patients with Diabetes or Pre-diabetes
Roger H. Phelps, OD, FAAO, CDE

Preventing Blindness in your Patients with Diabetes or Pre-diabetes: Or the “ABC’s and “D” of Diabetes Care”
Roger Phelps OD, FAAO, CDE


October 8, 2011
American Association of Diabetes Educators, California Coordinating Body, “Bridging the Gaps in Diabetes Care” @ Berkeley CA

Conflict of Interest Disclosure

- I have received honorariums when writing, speaking, and even acting on Diabetes and the Eyes from Vision Service Plan, as well as several pharmaceutical companies
- I have not received or asked for any financial support for this course

<http://www.youtube.com/watch?v=K9rpXYc691M>





Learning Objective 1.
State the ABC – D’s of
diabetes care

A B C -D

- A. A1C is the key
- B. Blood pressure fans the flames
- C. Cholesterol for longevity
- D. Dilated eye exams

The Key for Diabetes Treatment

A1C

For every 1% increase - there is a 35% increased risk of ocular complications

Preventing blindness from diabetes

1. Don't get pre diabetes
2. If you have pre diabetes, don't get diabetes
3. If you have diabetes, control the diabetes





Diabetes Prevention Program

60% Risk Reduction for those with pre diabetes over 3 year period

30 minutes moderate intensity movement 5 times per week

5 to 7% weight loss

Evidence from both human and animal studies suggests that Type 2 diabetes is characterized by dysfunctional beta-cells that cannot adapt insulin secretion to compensate for increasing insulin resistance. Beta-cell failure is believed to occur at an early stage in the progression of diabetes, and accumulating evidence suggests that the decline in beta cell function may be slowed or even reversed, particularly if addressed early in the progression from pre-diabetes to diabetes.

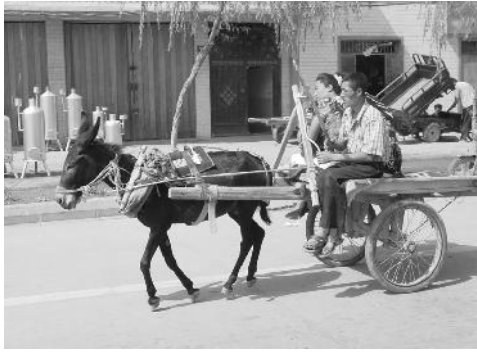
"Another recommendation of the working group is to explore new educational approaches to promote pathophysiology-based clinical practices, and that is why the society has launched the new website, www.BetaCellinDiabetes.org," said Leahy. "It is our hope that the new site will aid primary care physicians in the interpretation of concepts of disease pathogenesis, such as beta cell dysfunction, and improve medical decision-making regarding treatment of Type 2 diabetes. We have made the site practical by synthesizing research, creating case studies, providing a curated list of the published literature, and inviting viewers to comment throughout the site."

In the consensus statement, experts also recommend additional studies to establish the clinical value of pharmacological therapies targeting beta cell function. In addition, future research should aim to determine whether specific genetic subtypes of Type 2 diabetes lend themselves to individualized therapy to slow or reverse beta-cell decline.

"More research is needed to determine whether preserving beta-cell function improves morbidity and mortality rates," said Leahy. "Nonetheless, the increasing recognition that beta-cell failure occurs much earlier and more frequently than commonly believed suggests that regular glycemic monitoring, early identification of patients at metabolic risk and prompt and aggressive intervention deserves greater emphasis."

September, 2019, *The Endocrine Society's Journal of Clinical Endocrinology & Metabolism (JCEM)*

Normal Pancreas Function all in Balance



Pre Diabetes: Pancreas Overloaded and Working as Hard as it Can.



Diabetes: Pancreas Can No Longer Pull the Load



20 Mule Team - Beta Cell Secretion - handling Glucose Load



<http://www.BetaCellsInDiabetes.org>

BetaCells in Diabetes

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Experts Blog

Diabetes and the Pancreas

Dr. R. J. Cella, M.D. is Secretary, Research Department, University of Illinois at Chicago, Chicago, Illinois. He is also a Professor of Medicine, University of Illinois at Chicago, Chicago, Illinois.

Diabetes and the Pancreas

Diabetes is a chronic disease that affects the body's ability to use insulin, a hormone that allows glucose to enter the cells. In people with diabetes, the pancreas does not produce enough insulin or the cells do not respond properly to the insulin that is produced. This leads to high blood sugar levels, which can cause serious complications if not managed properly.

Diabetes and the Pancreas

Diabetes is a chronic disease that affects the body's ability to use insulin, a hormone that allows glucose to enter the cells. In people with diabetes, the pancreas does not produce enough insulin or the cells do not respond properly to the insulin that is produced. This leads to high blood sugar levels, which can cause serious complications if not managed properly.

Pre Diabetes: 1 out of 4 adults (20 yr old +)

100-125 Impaired Fasting Glucose

A1C 5.7-6.4%

Metabolic Syndrome

- 1. As above Impaired glucose function**
- 2. Triglycerides > 150**
- 3. Blood pressure > 130/85**
- 4. Obesity: Waist size: 40 for men, 35 for women**

Diagnosis of Diabetes: 1 out of 10 adults

126 or more Fasting Glucose

A1C 6.5% or more

By 2050 – up to 1 out of 3 adults, CDC 2011

Now for the **Memory** part 😊



Movement

Meal choices

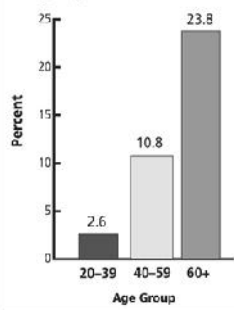
The Bad News

- Diabetic retinopathy is estimated to be the most frequent cause of new cases of blindness among adults aged 20-74
- About 20,000 people/year in the U.S. become legally blind due to diabetic eye disease
- Type 2 diabetics: Up to 20% will have some degree of retinopathy at first diagnosis and after 20 years, 60% will have some degree of retinopathy
- Nearly all patients with Type 1 diabetes will develop some degree of retinopathy within 20 years

The Good News

- Good blood glucose control reduces the risk of retinopathy
 - Risk is reduced 35% by lowering A1C by 1%
- Risk of severe vision loss can be decreased by 50%
 - Timely detection
 - Laser treatment
- We could prevent up to 90% of diabetes-related blindness
 - Preventing conversion from pre diabetes
 - Appropriate screening for those with undetected diabetes
 - Glycemic control for those with diabetes
 - Annual dilated eye exams for diabetic patients

Estimated prevalence of diagnosed and undiagnosed diabetes in people aged 20 years or older, by age group, United States, 2007



USA Population 2007

Total: 300 million

Age under twenty: 80 million

Twenty or older: 220 million

Of these 220 million:

57 million Pre-diabetes (26%)

18 million Dx diabetes (8%)

6 million Un Dx diabetes (2%)

Over 20, at risk = 36%

KISS DIABETES GOODBYE

HELP THE AMERICAN DIABETES ASSOCIATION RAISE \$1,000,000 IN ONE MONTH

Donate Today

AMERICAN DIABETES ASSOCIATION
Care • Cure • Prevention

HOME | SIGNS & SYMPTOMS | SHARE YOUR STORY | SEND A KISS | SUPPORTERS

SHOW YOUR SUPPORT

ONE IN THREE KIDS FACE A FUTURE WITH DIABETES

Diabetes is a chronic condition that can affect anyone. It's a leading cause of blindness, kidney failure, heart disease, and amputation. But there's good news: with the right care, you can live a long, healthy life with diabetes.

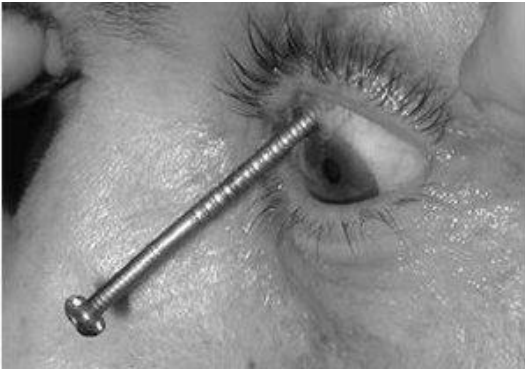
Diabetes is a chronic condition that can affect anyone. It's a leading cause of blindness, kidney failure, heart disease, and amputation. But there's good news: with the right care, you can live a long, healthy life with diabetes.

The patient is the quarterback in chronic diabetes management

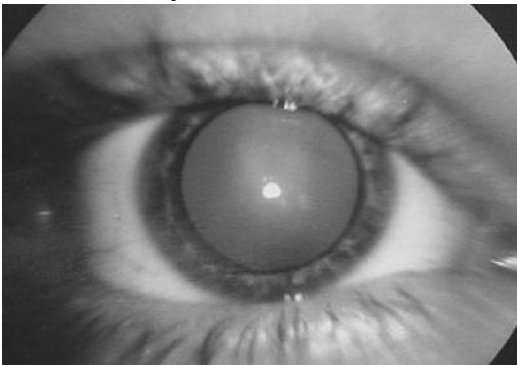


90%

Acute Injury – Do nothing, let the Doctors take care of everything



Dilated Eye Examination

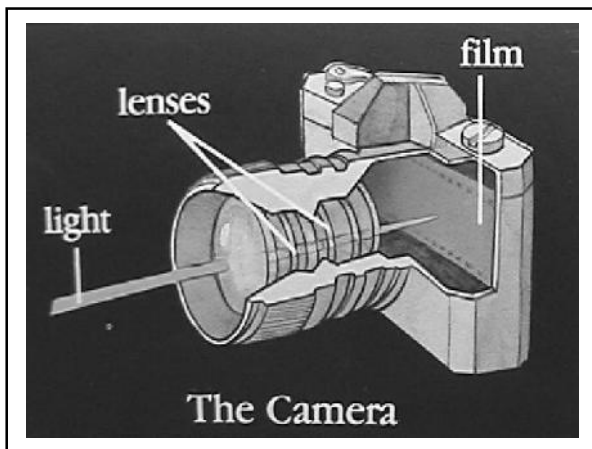


Communication to Eye Doctor

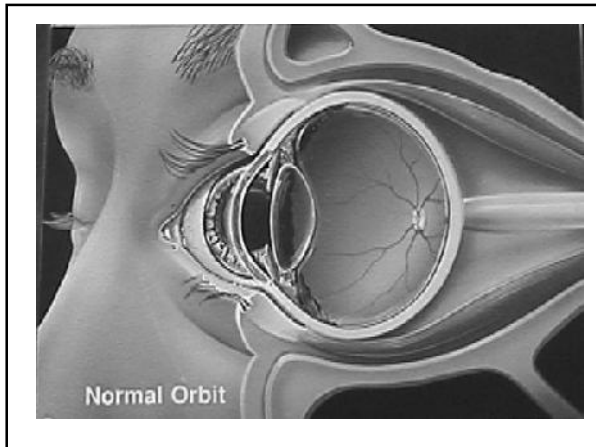
- Patient's Name, DOB and appointment date if known
- Purpose of referral: Annual, Other _____
- Approximate Date of Diabetes Onset
- Type 1 or 2
- Brief A1C history, last reading and date
- List of any know complications from diabetes

Communication From Eye Doctor to Fax Number: (GP, Endo, Diabetic Educator)

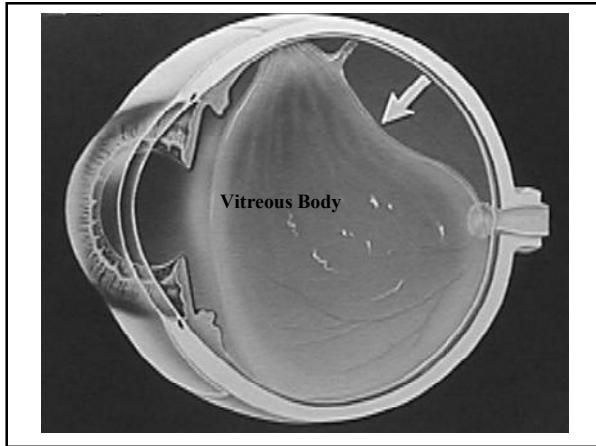
- Patient's Name, DOB and Dilated Eye Exam date:
- Findings:
 - No diabetic retinopathy
 - Mild non proliferative diabetic retinopathy
 - Moderate non proliferative diabetic retinopathy
 - Severe non proliferative diabetic retinopathy
 - Proliferative diabetic retinopathy
 - Diabetic macular edema
 - List of current or prior diabetic ocular treatments
- Next recommended eye examination



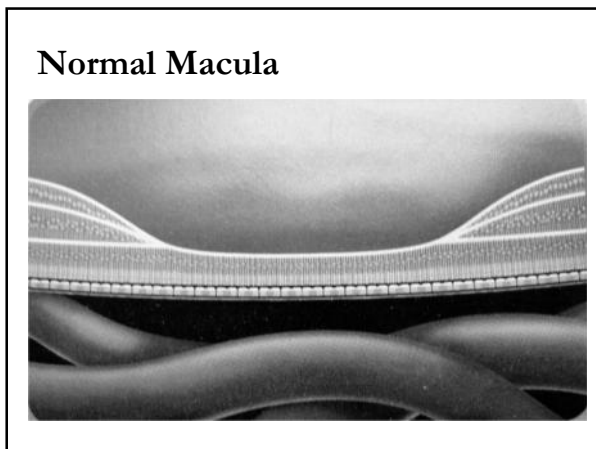










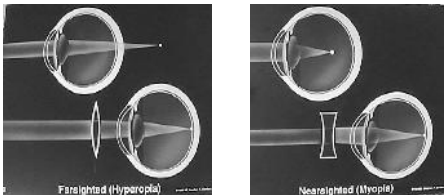


**Learning Objective 2.
Recognize the general
categories of eye problems in
patients with diabetes.**

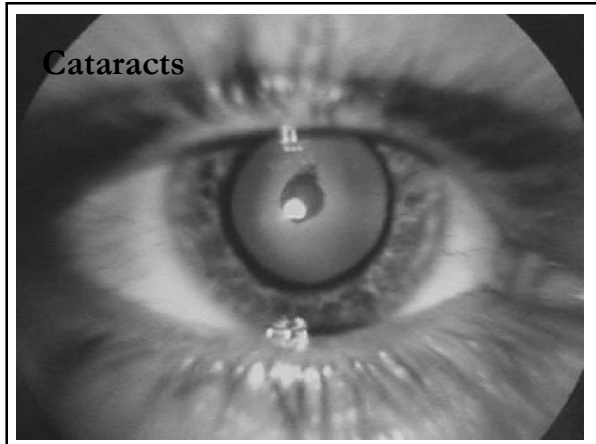
**Common Eye Problems Not
Specific to Diabetic Patients**

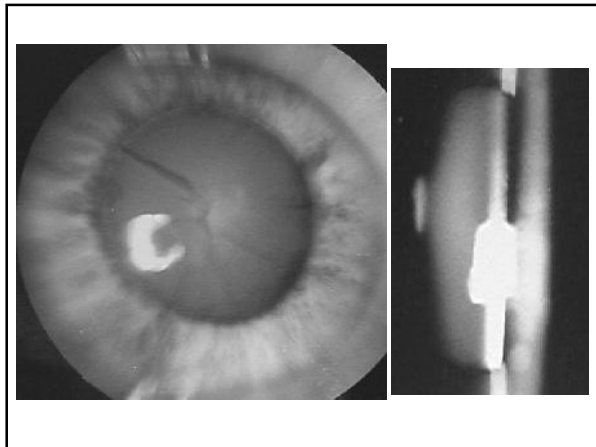
- Refractive error
- Cataracts
- Glaucoma
- Diplopia
- Macular Degeneration (AMD)
- Relationship of AMD to CSME

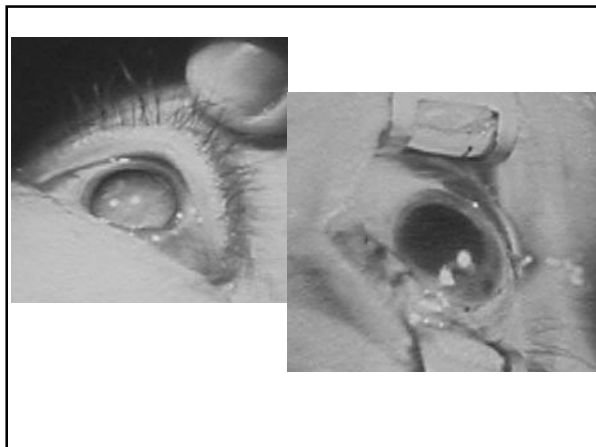
Refractive Error

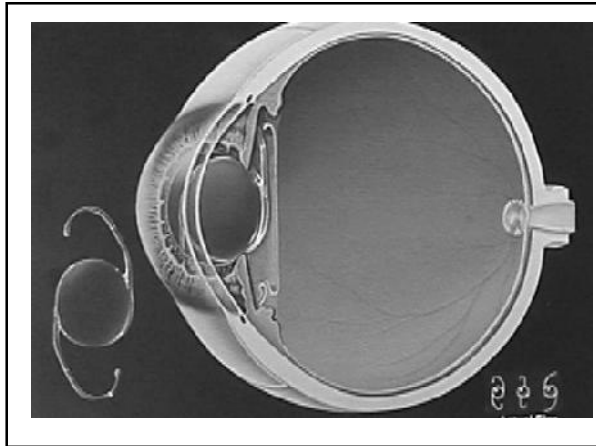


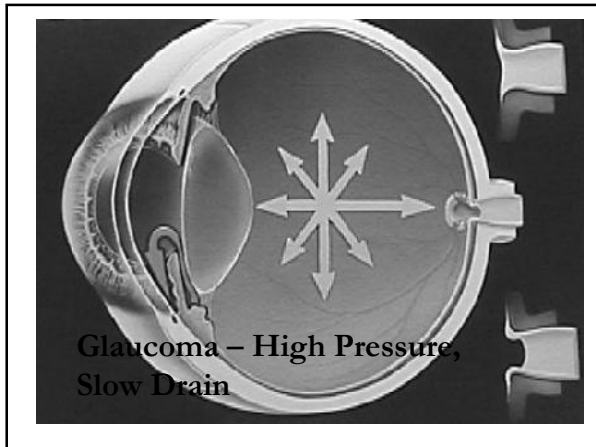
- Astigmatism
- Presbyopia



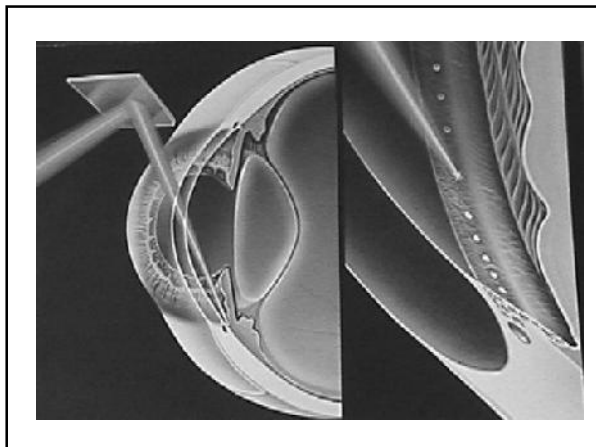




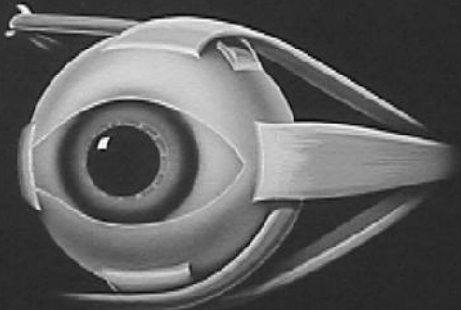




Glaucoma - High Pressure,
Slow Drain



Double Vision, Mono-Neuropathy

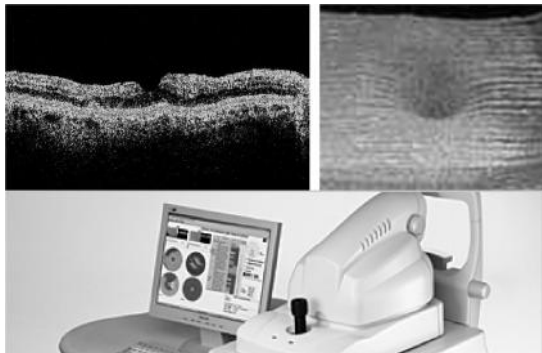


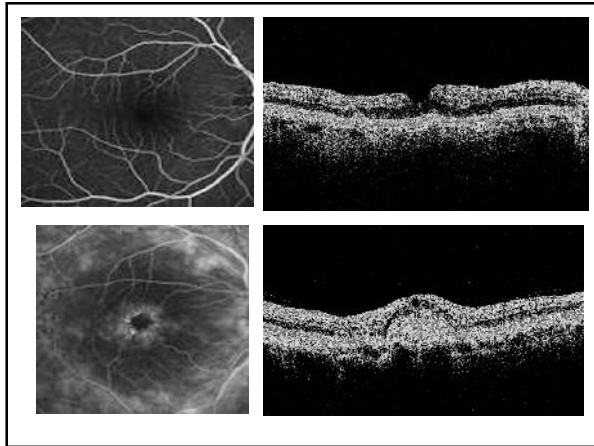
Sparing the pupil, usually OK for 3 months

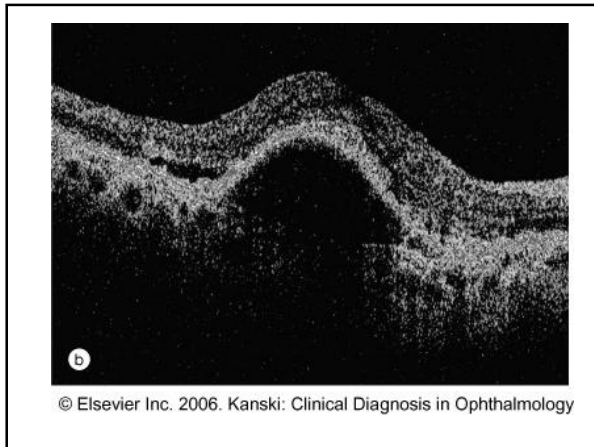
Retinal Specialists (Specialized Ophthalmologists)

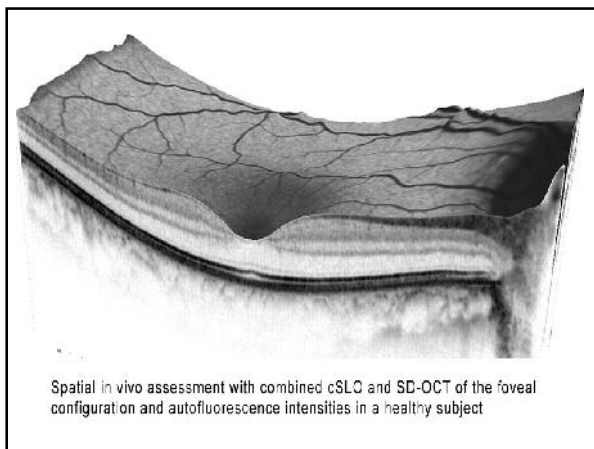
- **Fluorescein Angiography**
- **Optical Coherence Tomography (OCT) - Time Domain, Spectral Domain**
- **Diabetic retinopathy and Age Related Macular Degeneration special treatments**

Optical coherence tomography "OCT"

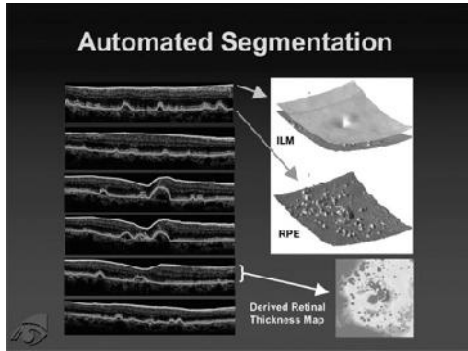




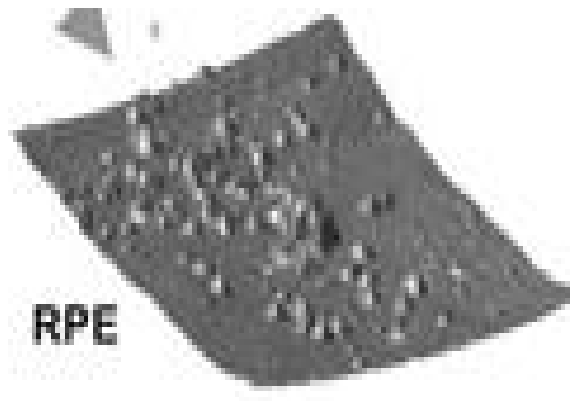




Spectral domain OCT – pathway to new treatments?



Retinal "Drusen" mapping – metabolic waste disposal problem



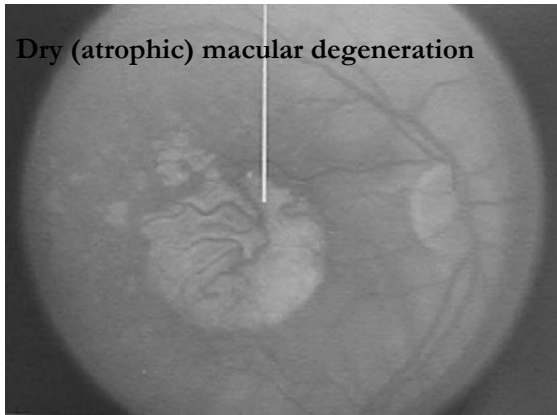
From research to local eye doctor near you?



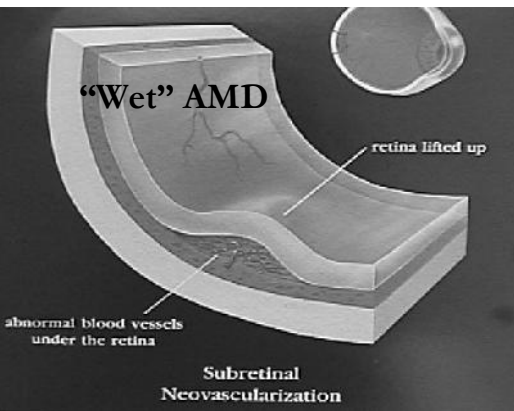
Age-Related Macular Degeneration – What You Can Do

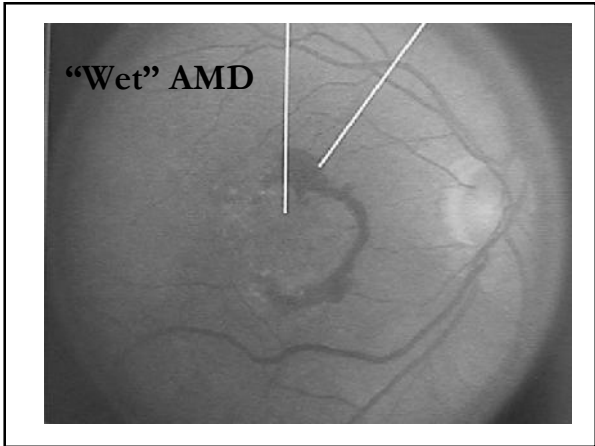
- Stop smoking
- Get an annual dilated eye exam
- Make healthy meal choices
 - “AREDS vitamins” – “AREDS 2” study 2013
- Control blood pressure
- Exercise
- Retinal specialists
 - Exciting new drugs and treatments

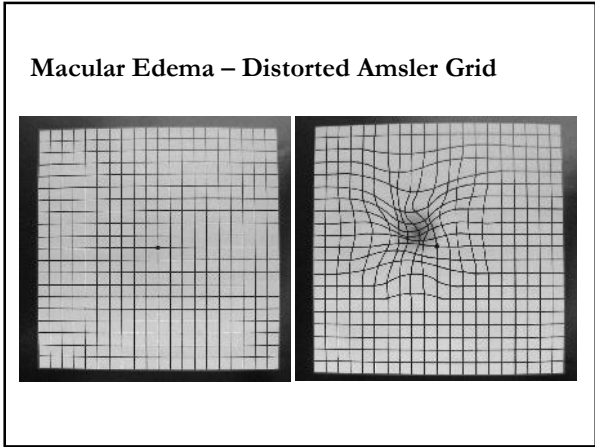
Dry (atrophic) macular degeneration



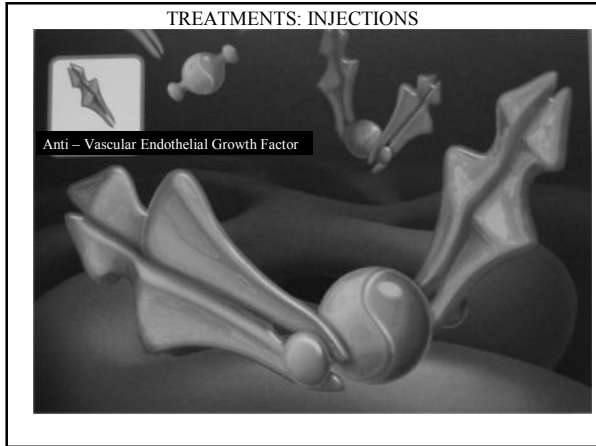
“Wet” AMD

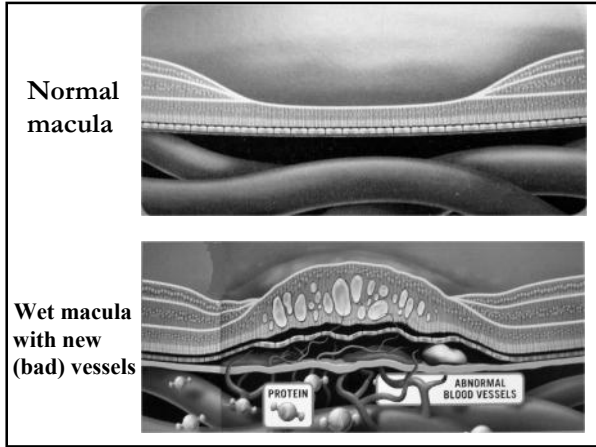






VEGF
Vascular Endothelial Growth Factor
Anti VEGF - intra ocular injections:
Bevacizumab – “*Avastin” \$65
Ranibizumab – “*Lucentis” \$2,000
New: “VEGF Trap”, Dry – oral, drops?
*Genentech





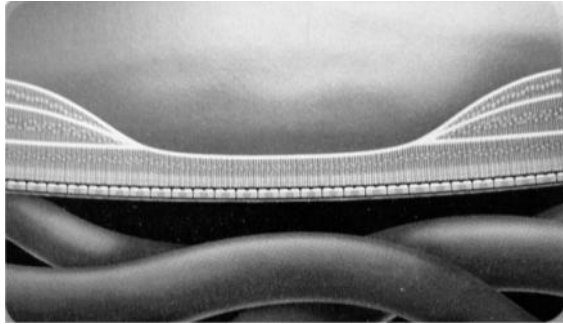
Diabetic Macular Edema

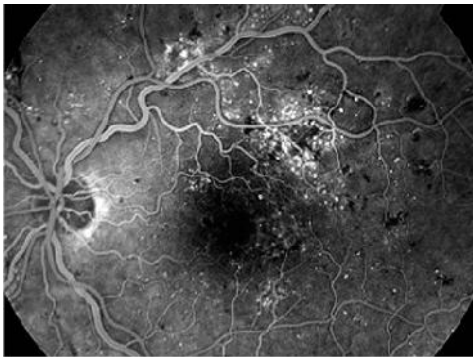
CSME – Clinically Significant Macular Edema

Treatments:

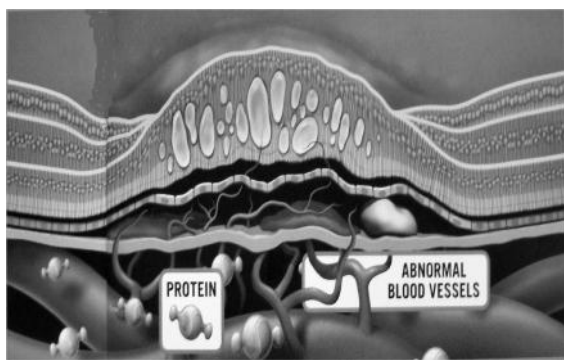
- Grid Laser
- In process: Anti VEGF injections

Normal Macula

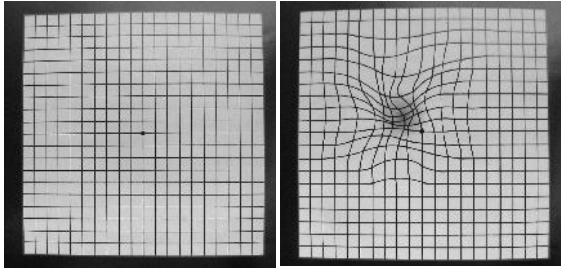




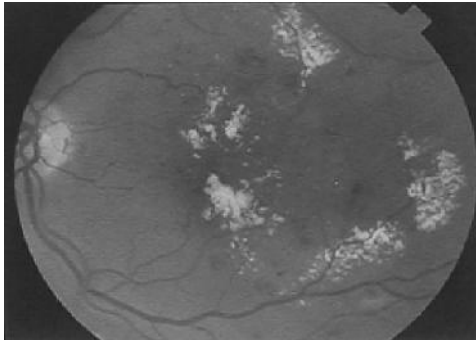
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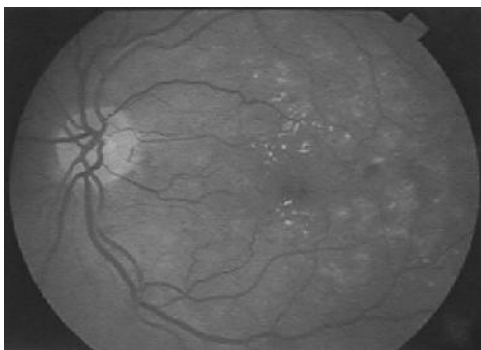
Macular Edema – Distorted Amsler Grid



Before CSME grid laser treatment



After grid laser treatment



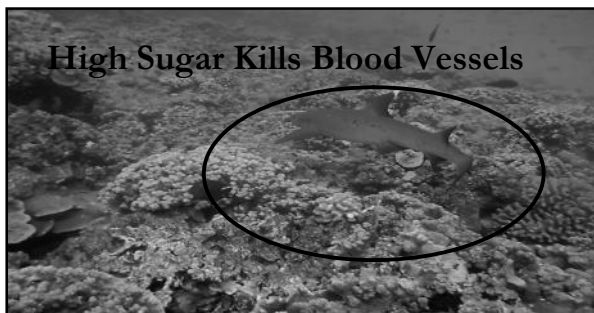


Learning Objective 3. Identify the Stages in the pathophysiology of Diabetic Retinopathy

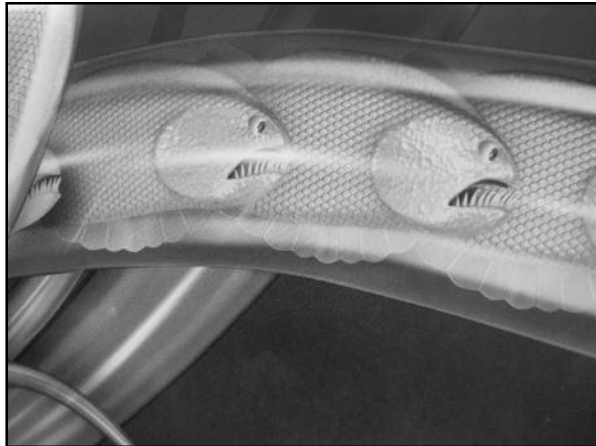
Pathophysiology of Diabetic Retinopathy

- Y = Hyperglycemic capillary damage
- Micro vascular abnormalities
- Chemical mediator release
- Adhesive new capillaries

High Sugar Kills Blood Vessels



The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels.



Classification of Level of Diabetic Retinopathy

- **Y, M: Are there any Diabetic Microvascular Changes?** “Background or Non-Proliferative Retinopathy” NPDR or BDR. If none, chart and communicate.
- **C, A: Are there any Adhesive New Blood Vessels?**- “Proliferative Retinopathy” PDR
- **Any vitreous traction, bleed, retinal Detachment?** “BAD”
- **Is there any Macular Edema?**-”Clinically Significant Macular Edema” “CSME”

Communication to Eye Doctor

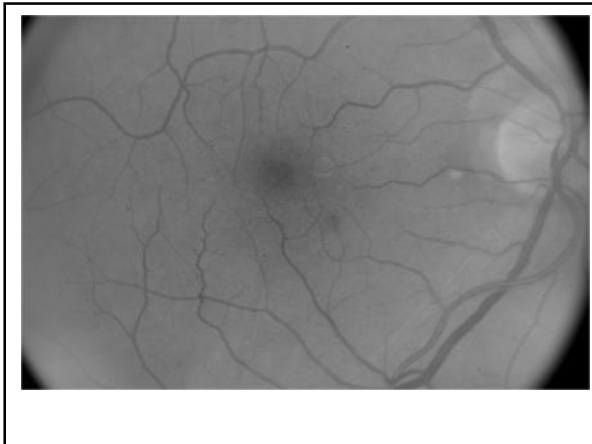
- Patient’s Name, DOB and appointment date if known
- Purpose of referral: Annual, Other _____
- Approximate Date of Diabetes Onset
- Type 1 or 2
- Brief A1C history, last reading and date
- List of any know complications from diabetes

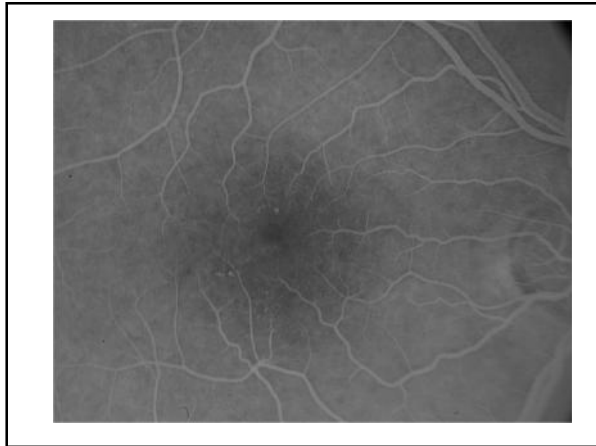
**Communication From Eye Doctor to Fax
Number: (GP, Endo, Diabetic Educator)**

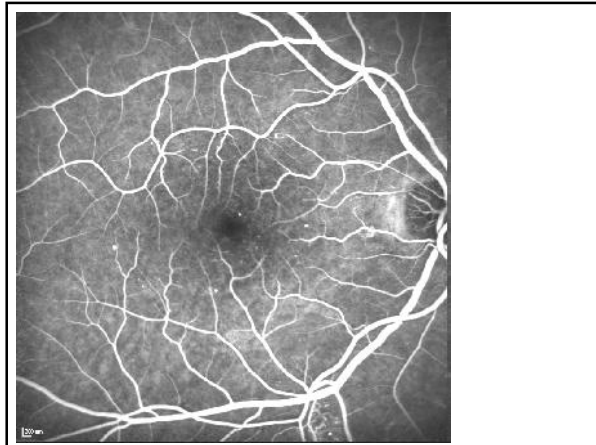
- Patient's Name, DOB and Dilated Eye Exam date:
- Findings:
 - No diabetic retinopathy
 - Mild non proliferative diabetic retinopathy
 - Moderate non proliferative diabetic retinopathy
 - Severe non proliferative diabetic retinopathy
 - Proliferative diabetic retinopathy
 - Diabetic macular edema
 - List of current or prior diabetic ocular treatments

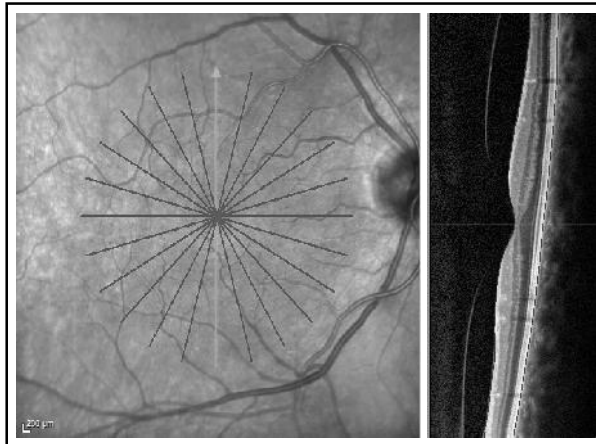
- Next recommended eye examination

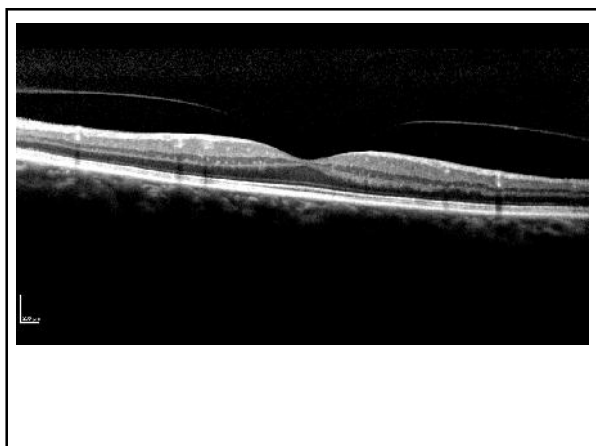




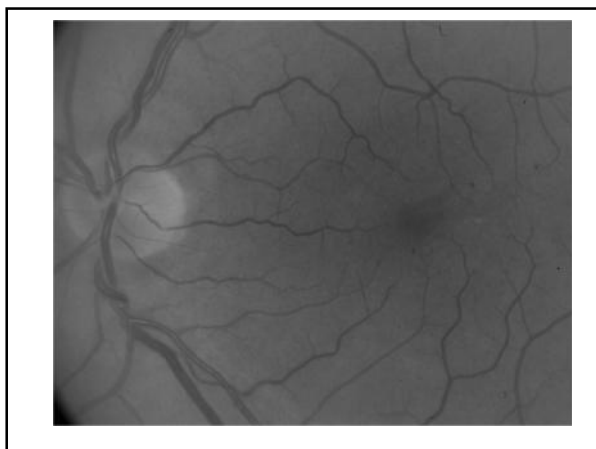


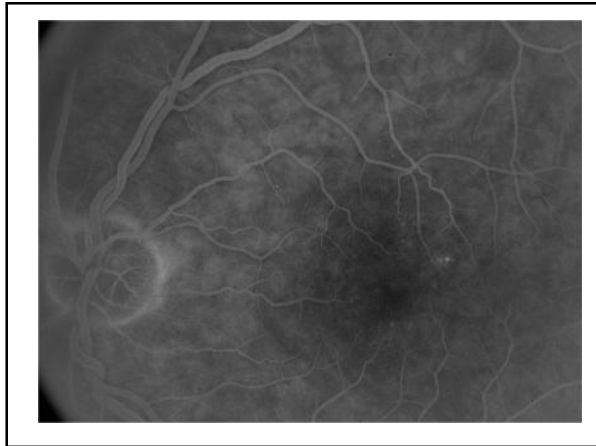


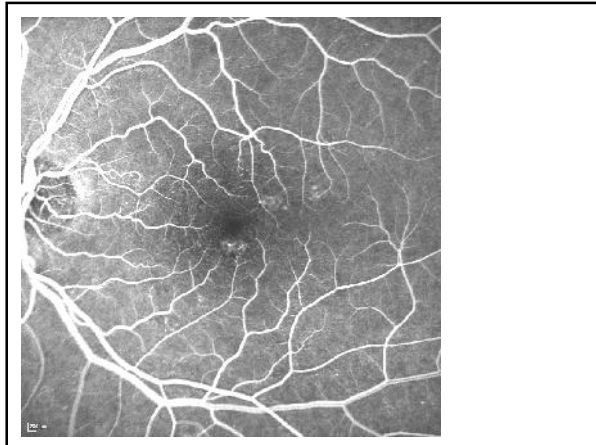


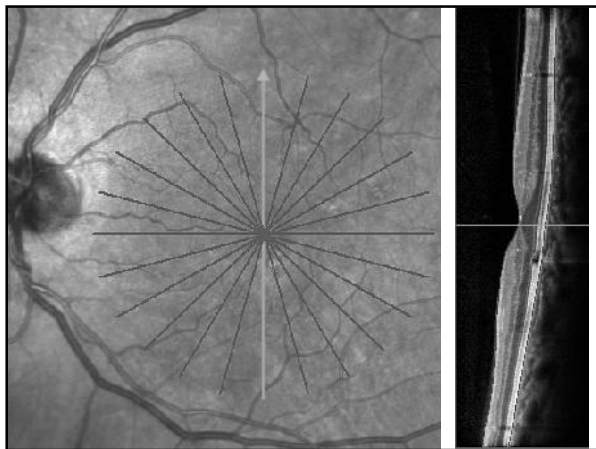


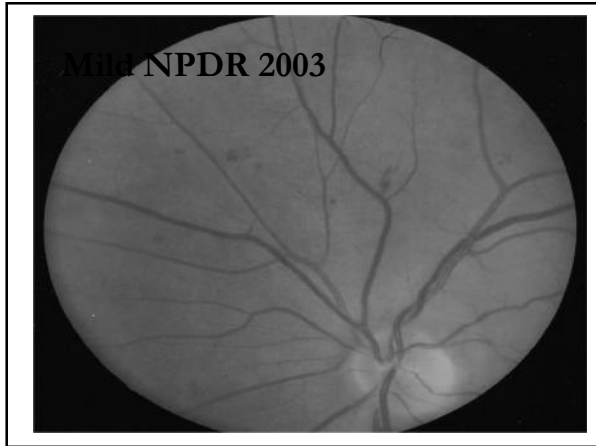


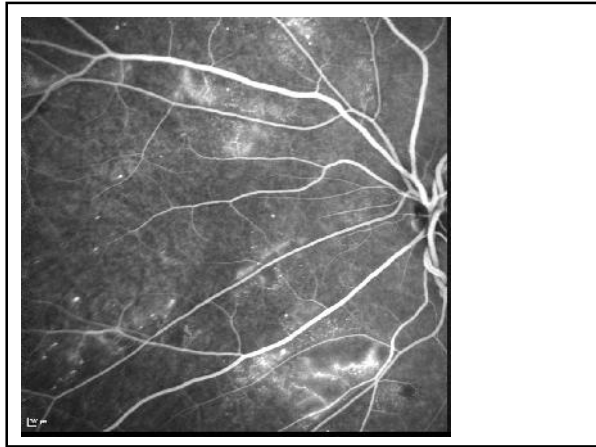


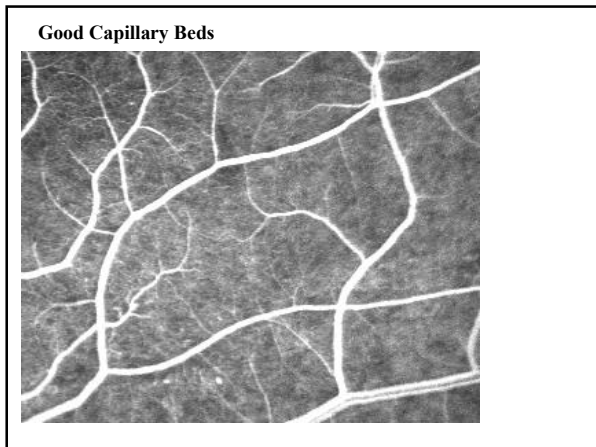








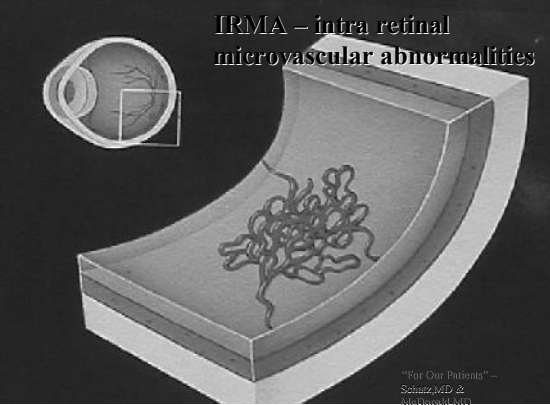




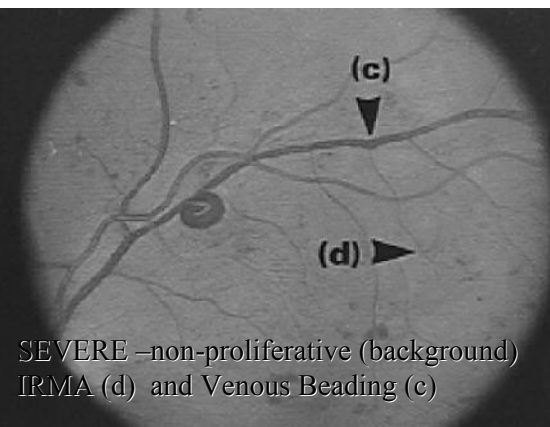
Capillary non-perfusion



IRMA – intra retinal microvascular abnormalities



SEVERE –non-proliferative (background)
IRMA (d) and Venous Beading (c)



Patho-physiology

C. Chemical mediators released

A. Adhesive new vessels

Level of retinopathy

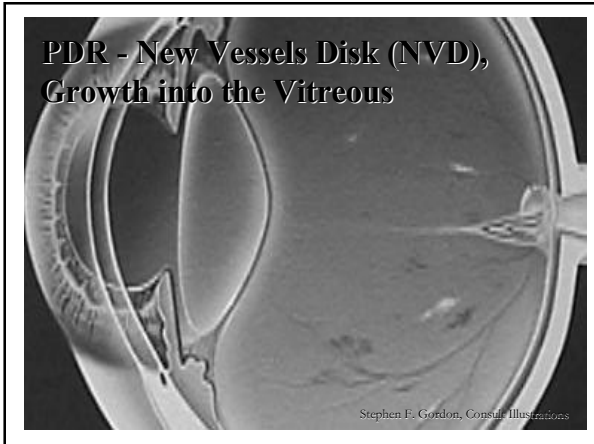
#3. Proliferative Diabetic Retinopathy “PDR”

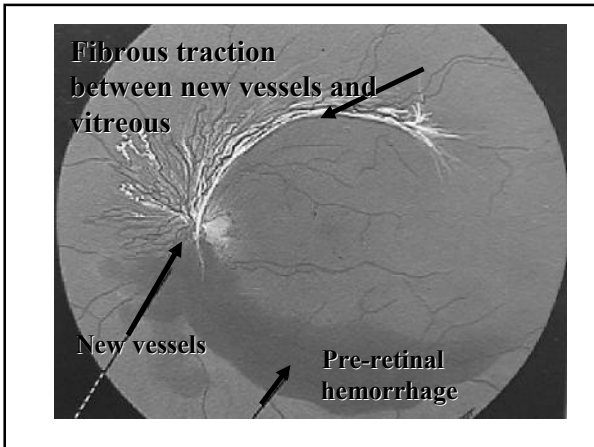


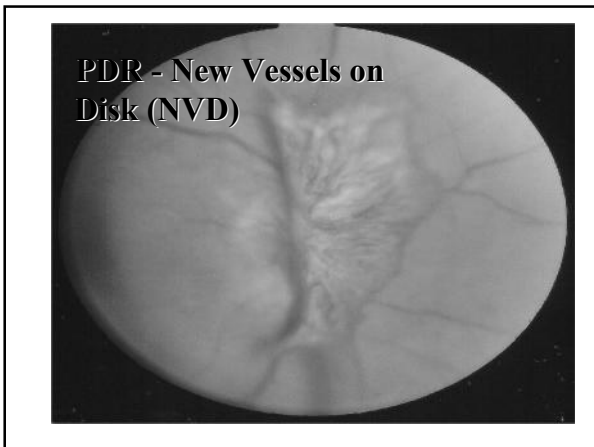
Normal blood vessels stay within the retina. However, with chronic damage to the vessels, VEGF is secreted and stimulates new blood vessels to grow.

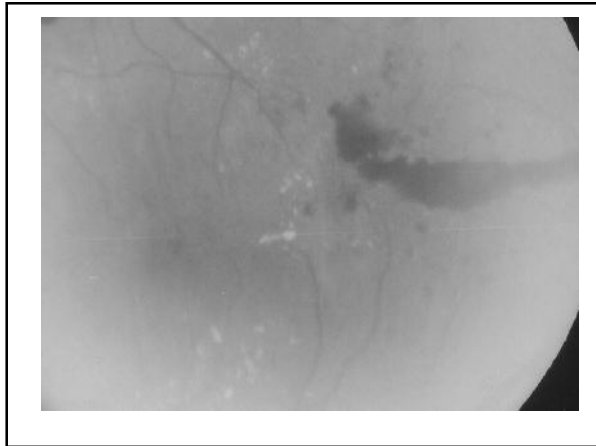


The new blood vessels don't stay within the retina. They grow out into the vitreous, form adhesions causing bleeding in the eye and lead to traction retinal detachment.



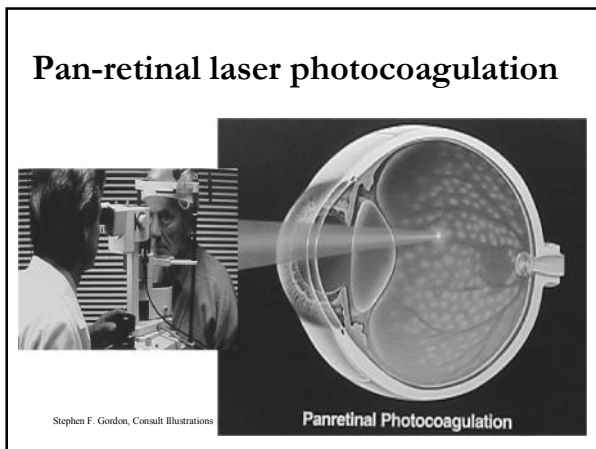




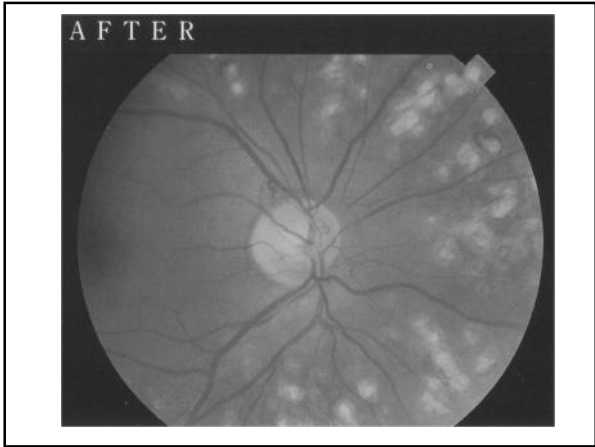




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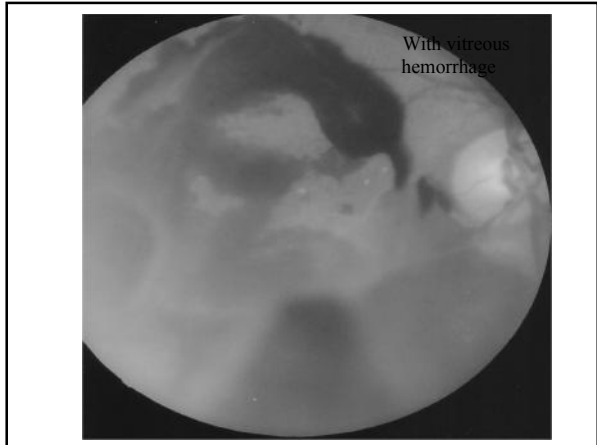


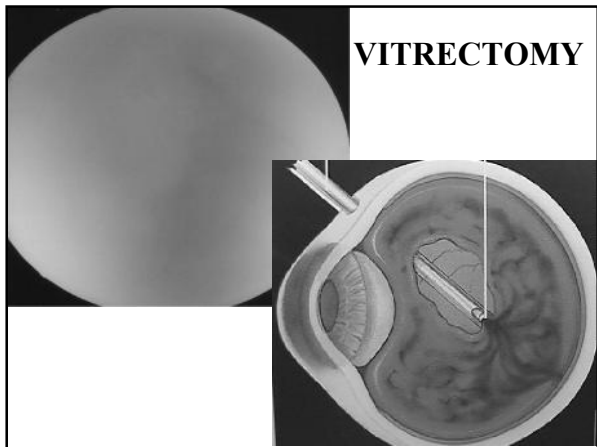


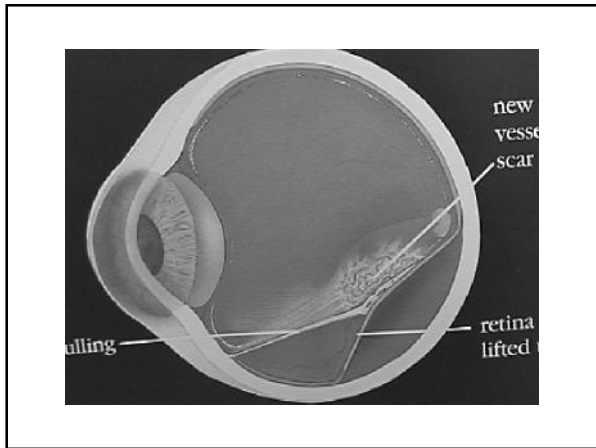


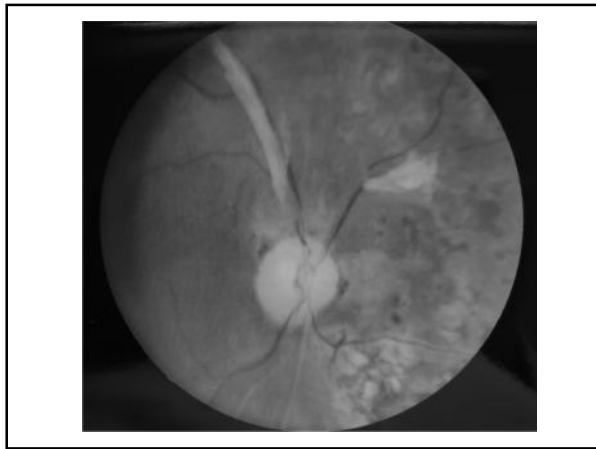












Pathophysiology of Diabetic Retinopathy

- Y = Hyperglycemic capillary damage
- Micro vascular abnormalities
- Chemical mediator release
- Adhesive new capillaries
- **Winner of the Dance Contest?**

 American Association
of Diabetes Educators

Learning Objective 4.
Develop a strategy in
establishing innovative
partnerships with eye
doctors

Establish Innovative
Partnerships with Eye Doctors

- Meeting with Eye Doctors
- Opening Efficient Communication Lines with Eye Doctors
- Applying these Team Relationships to the Benefit of you Individual Patients

CALIFORNIA
OPTOMETRY

MARCH / APRIL 2011 VOLUME 38, NUMBER 2
A Comprehensive View of Professional Optometry in California Today

PUBLIC AWARENESS IN YOUR COMMUNITY
TALKING ABOUT DIABETES
By Dr. Roger Phelps, OD, FAOD, CDE
 The Community Optometric Society

As you see an increasing number* of patients with diabetes, you are one of the primary sources of information to help them **prevent blindness**. When you team up with the diabetes educators in your area, you will get an expanded and practical understanding of diabetes self-management education. This along with your expertise in recognizing diabetic eye disease can make you even more useful to your patients as well as to the diabetic community around you.

"Join the AADE @ www.diabeteseducator.org"

* (10% ⇒ 33% of adult population: CDC 2010 ⇒ 2050)

Communication to Eye Doctor

- Patient's Name, DOB and appointment date if known
- Purpose of referral: Annual, Other _____
- Approximate Date of Diabetes Onset
- Type 1 or 2
- Brief A1C history, last reading and date
- List of any know complications from diabetes

Communication From Eye Doctor to Fax Number: (GP, Endo, Diabetic Educator)

- Patient's Name, DOB and Dilated Eye Exam date:
- Findings:
 - No diabetic retinopathy
 - Mild non proliferative diabetic retinopathy
 - Moderate non proliferative diabetic retinopathy
 - Severe non proliferative diabetic retinopathy
 - Proliferative diabetic retinopathy
 - Diabetic macular edema
 - List of current or prior diabetic ocular treatments
- Next recommended eye examination

Case Studies and Questions

- Questions????????????????????
- Discussion of a Strategic Plan of Partnership Relative to your Job Position

Case #1

- Your next patient, Monday morning
- Last eye exam?
- Generic vs. Specific referral
- Call, fax or give patient two way communication sheets

Case #2

- 60 year old female with one of sons dx with type 1 @ age 16
- Recent physical, recent eye exam, but recent blur
- What next?

Case #3

- 40 yo male with family history of type 1 diabetes in mother and two brothers
- Negative glucose tolerance test 5 years ago.
- Recent blur, going in for blood test

2011 St. George Ironman

(2.4 mile swim, 112 mile bike, 26.2 mile run in less than 17 hrs)



Case #4

- 55 yo hispanic female, recent allergic reaction to bee sting, blurry vision. Normal weight. Fm hx of diabetes
- A1C over 9%, dx type 2 diabetes, just started meds
- Temporary otc reading glasses, then follow up.

Case #5

- 47 yo female Caucasian, just dx type 2 diabetes, normal weight. A1C 7.7%
- Oral meds started. No Diabetic Retinopathy. A1C varied 7.5% - 8.5% over the next 10 years.
- 1 year ago, A1C @ 12.7%... Possible macular edema. What next?

Case #6

- Caucasian female, Dx type 1 at age 14
- Age 35, A1C up to 10%, no diabetic retinopathy
- Age 40, A1C 9 – 11%, first sign of mild background DR.
- Age 41, A1C lowered, no visible DR
- Age 43, A1C up again, CSME – grid laser tx. Maintained 20/25 vision.

Case #7

- 50 yo, male Persian. Dx type 2 diabetes at age 38 years ago. A1C 7.2%. Slightly overweight, oral meds, no diabetic retinopathy
- DSME, and follow up
- Age 60, A1C 6.4%. No diabetic retinopathy
- Age 65, A1C up to 8.4%, no diabetic retinopathy... What now?

Case #8

- Polish 50 yo male, dx type 2. Hx of heart attack. Athletic, normal weight. No diabetic retinopathy. A1C unknown
- At age 60, on oral meds, A1C still unknown. Mild non proliferative retinopathy. Strong discussion about knowing A1C, and communication with GP
- Age 70, after A1C had gotten up to 13%, he agreed to go on insulin after long discussion at age 65. Had CSME grid laser, now on a pump (CSII). BVA 20/30
- Age 78, after cataract surgery, BVA still 20/30, A1C 8%.

Case #9

- Open for last minute addition

Case #10

- Environmental Issues

- Medical resource rich environment
- Medical resource poor environment

- Overall reduction in risk of diabetic related blindness has already occurred since the DCCT - June 13, 1993

CELEBRATE
CELEBRATE
