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Certificates will be emailed out to you. You will receive the post test link in your email a hour after the webinar.

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# Introduction to Diabetic Retinopathy

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# Learning Objectives

- Recognize the importance of diabetic retinopathy as a public health problem
- Discuss diabetic retinopathy as a leading cause of blindness in developed countries
- Identify the risk factors for diabetic retinopathy
- Describe and distinguish between the stages of diabetic retinopathy
- Understand the role of risk factor control and annual dilated eye exams in the prevention of vision loss

# Diabetes

- \* Vascular disease that affects large and small vessels throughout the body.
- \* The eye is the only organ that allows us to visualize the vascular system easily. A dilating drop is all that is needed!
- \* It is possible that the small vessels in the eye may mirror what is going on in small vessels in other parts of our body, such as the kidneys

# Diabetics - The Numbers

- \* **Total:** 25.8 million children and adults in the United States—8.3% of the population—have diabetes.
- \* **Diagnosed:** 18.8 million people
- \* **Undiagnosed:** 7.0 million people
- \* **Prediabetes:** 79 million people\*
- \* **New Cases:** 1.9 million new cases of diabetes were diagnosed in people aged 20 years and older in 2010.

\* All info from the American Diabetes Association Website

# Diabetic Eye Disease – The Numbers

- \* Diabetes is the leading cause of new cases of blindness among adults aged 20–74 years.
- \* Almost 30% of people with diabetes aged 40 years or older have Diabetic Retinopathy to some degree
- \* 10 k Americans go blind annually
- \* Stats obtained from American Diabetes Association website

# Take Home Nugget

- \* DIABETES IS THE LEADING CAUSE OF NEW CASES OF BLINDNESS AMONG ADULTS AGED 20-74

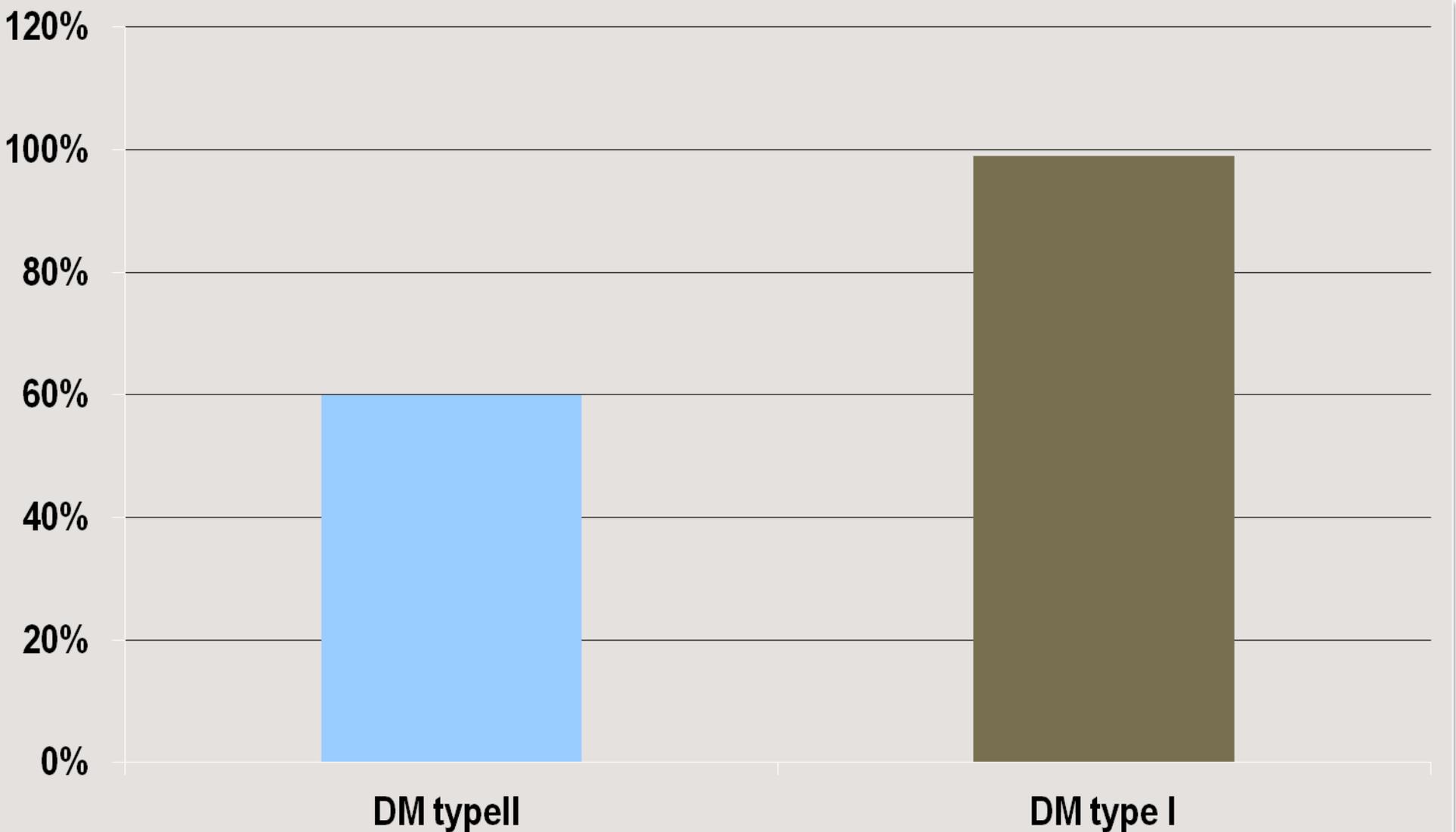
# Diabetic Retinopathy Epidemiology

- \* The total number of people with diabetes is projected to rise from 285 million in 2010 to 439 million in 2030 worldwide.
- \* Diabetic retinopathy is responsible for 1.8 million of the 37 million cases of blindness throughout the world .
- \* Diabetic retinopathy (DR) is the leading cause of blindness in people of working age in industrialized countries and #5 overall

# Diabetic Retinopathy Epidemiology

- The best predictor of diabetic retinopathy is the duration of the disease and control of the disease
- After 20 years of diabetes, nearly 99% of patients with type 1 diabetes and 60% with type 2 have some degree of diabetic retinopathy
- 33% of patients with diabetes have signs of diabetic retinopathy
- People with diabetes are 25 times more likely to become blind than the general population.

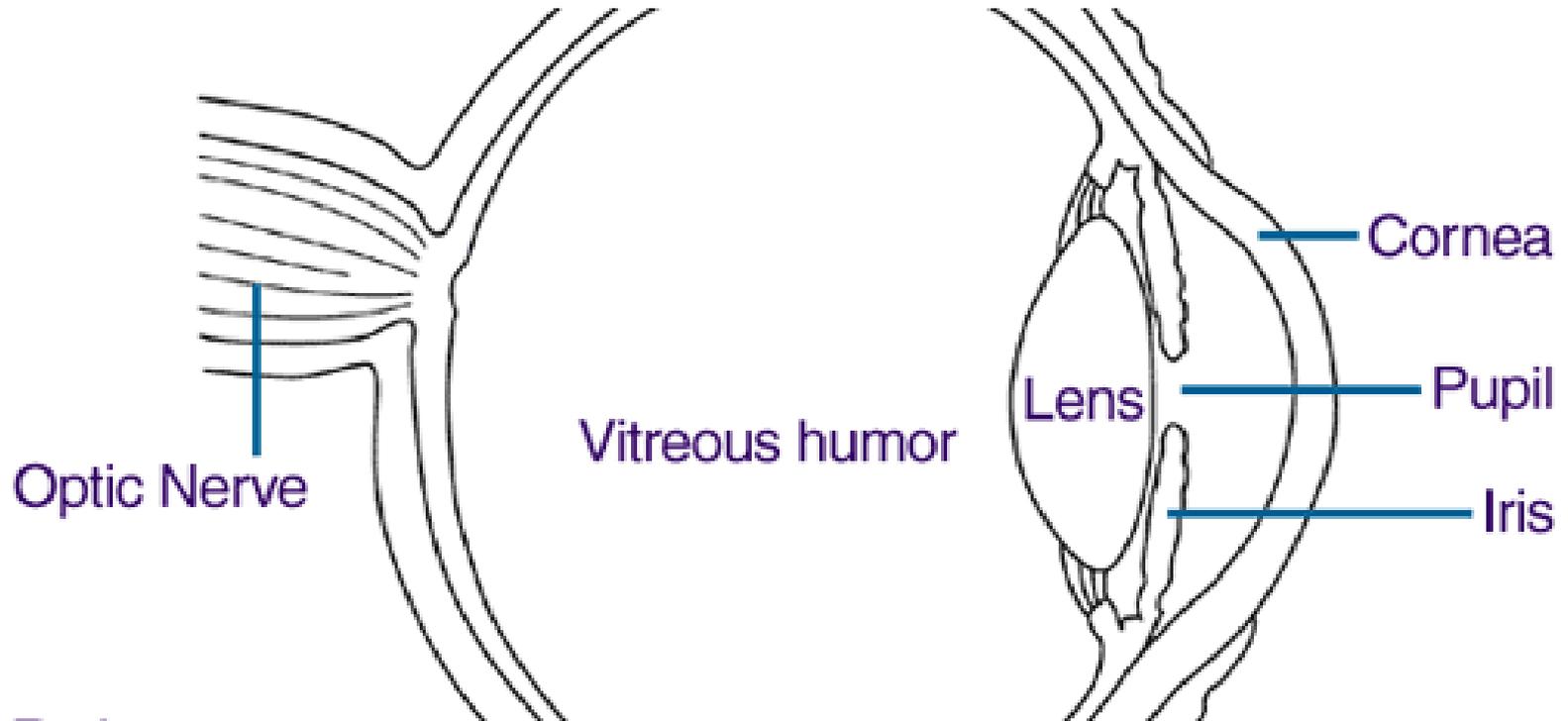
# Prevalence of Diabetic Retinopathy after 20 Years



# Cost to American Society

- \* Diabetes-related blindness is a personal catastrophe to the individual.
- \* The cost to the United States approximately \$500 million annually, and the cost of diabetes is approximately 245 billion.
- \* Javitt JC, Aiello LP, Chiang Y, Ferris FL III, Canner JK, Greenfield S. Preventive eye care in people with diabetes is cost-saving to the federal government: implications for health-care reform. *Diabetes Care*. 1994;17(8):909-917

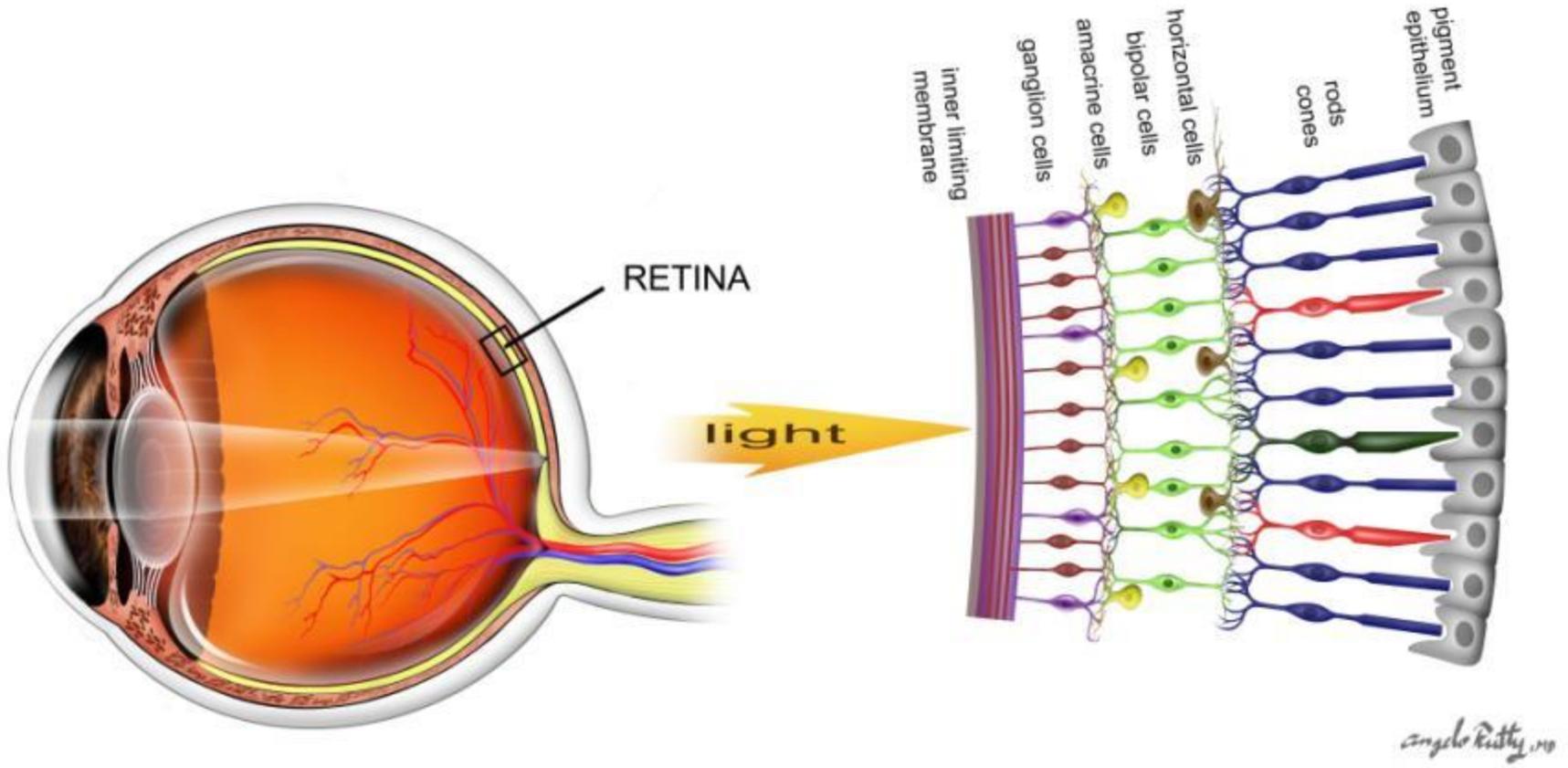
# Basic Eyeball Anatomy



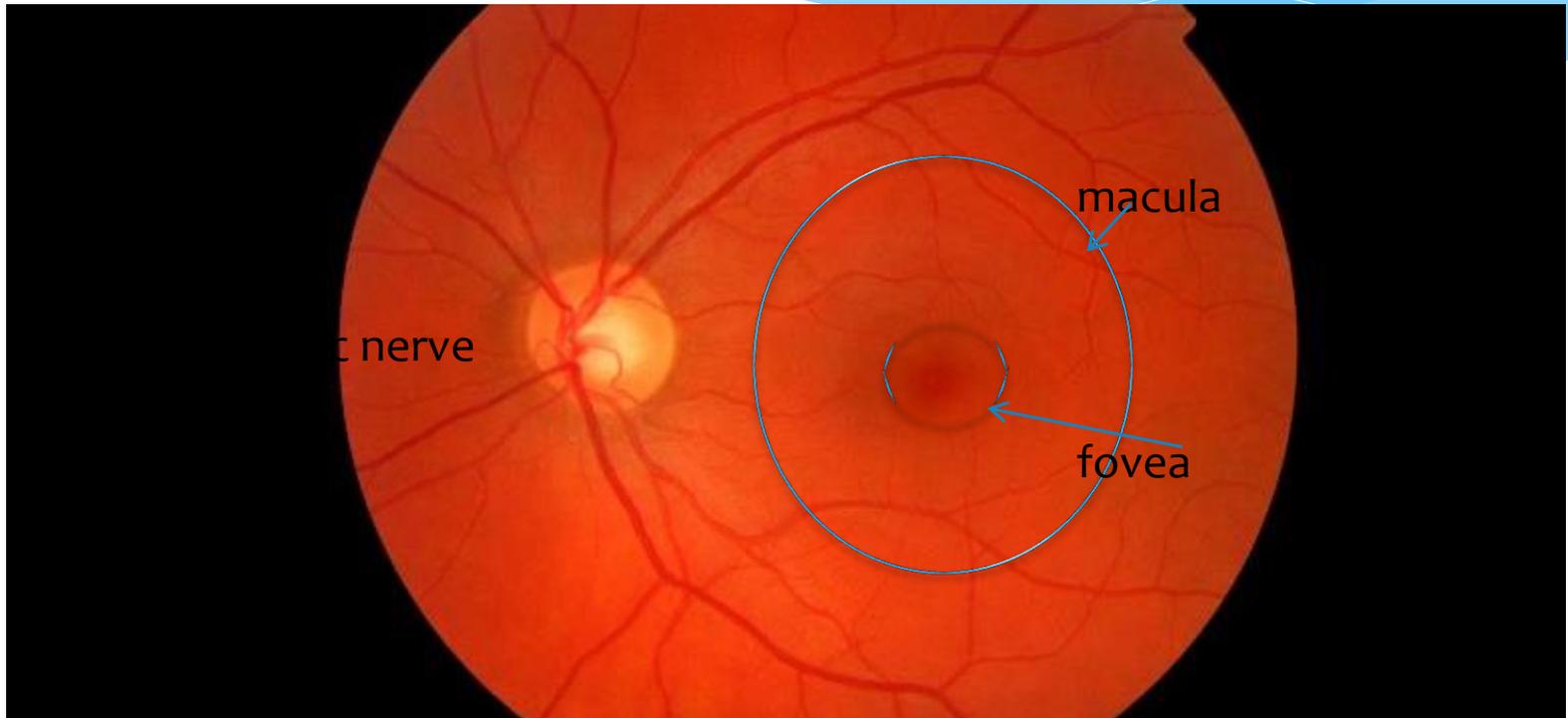
# What is the retina?

- \* The light sensitive and vision essential region at the back of the eye.
- \* Remember your rods and cones?
- \* Film of the camera
- \* The retina is a layer of nerve cells that line the back of the eye and are called photoreceptors – NO PAIN receptors; therefore, PAIN is not a symptom of retinopathy.

# RETINA



# Normal Retina



# Eye Symptoms of Diabetes

- \* Common symptom is blurred vision
- \* Caused by the swelling of the lens
- \* Significant shift in glasses Rx
- \* Can take up to three months to normalize
- \* This is common and may be the symptom that gets the patient initially diagnosed.
- \* The change in vision can be profound and typically reversible

# Diabetic Retinopathy – What is it?

- \* Diabetic Retinopathy is a generic term meaning pathology of the retina related to diabetes.
- \* Two types of D.R.
  - \* Non-Proliferative – most common type
    - \* Mild
    - \* Moderate
    - \* Severe
    - \* Very Severe
  - \* Proliferative – most severe type

# Symptoms of Diabetic Retinopathy

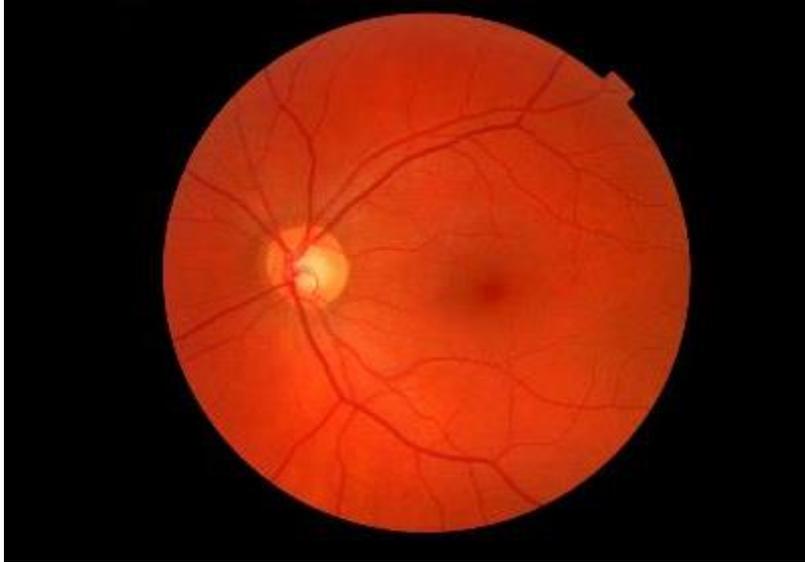
- \* Floaters/spots, blurriness, and lines in the vision could be.
- \* It is common to be *ASYMPTOMATIC*.
- \* Remember – Lots of bad things happen in our retinas without us experiencing physical discomfort

# Take Home Nugget!

- \* PAIN IS NOT A USUAL SYMPTOM OF DIABETIC RETINOPATHY.

# Retinopathy is Bad News

Your EYE



Your Eye on diabetes

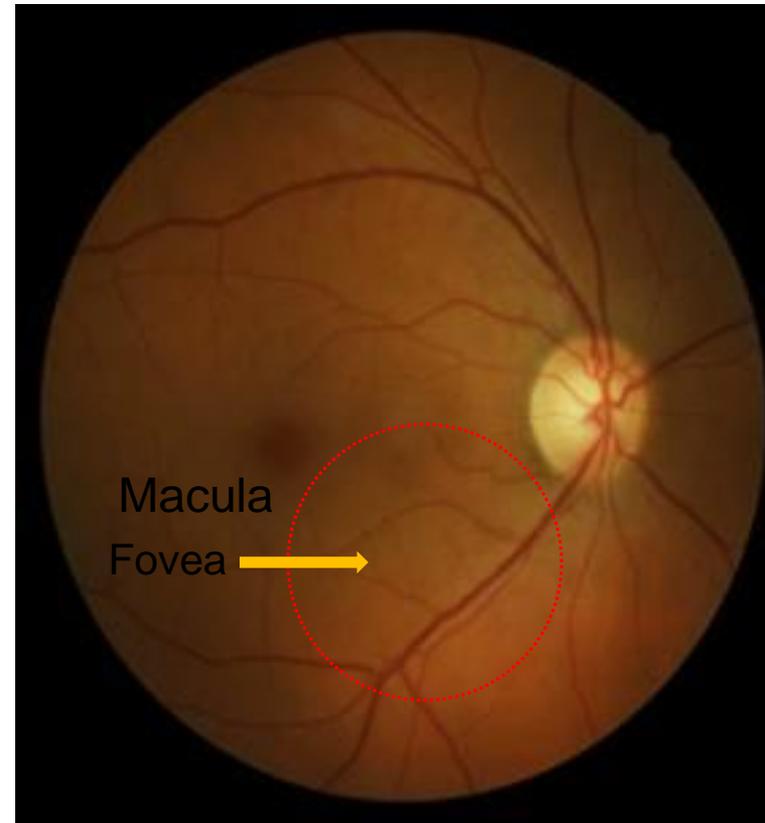


# Diabetic Macular Edema

- Diabetic macular edema is the leading cause of legal blindness in diabetics.
- Diabetic macular edema can be present at any stage of the disease, but is more common in patients with proliferative diabetic retinopathy.

# Why is Diabetic macular edema so important?

- \* The macula is responsible for central vision.
- \* Diabetic macular edema may be asymptomatic at first. As the edema moves in to the fovea (the center of the macula) the patient will notice blurry central vision. The ability to read and recognize faces will be compromised.

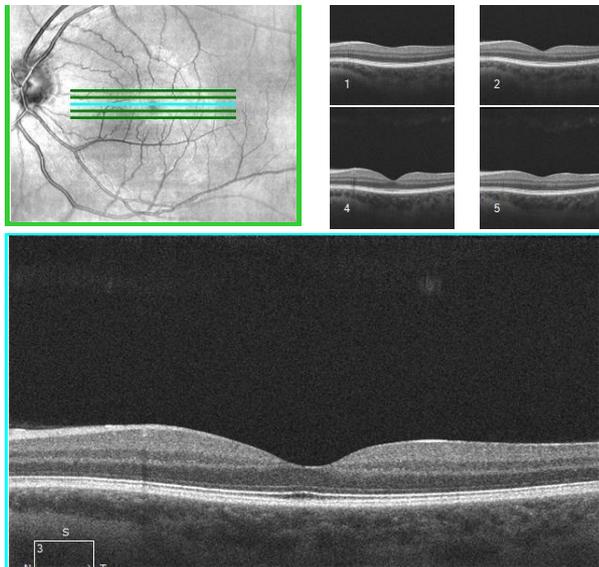


# Non-Proliferative Diabetic Retinopathy with DME

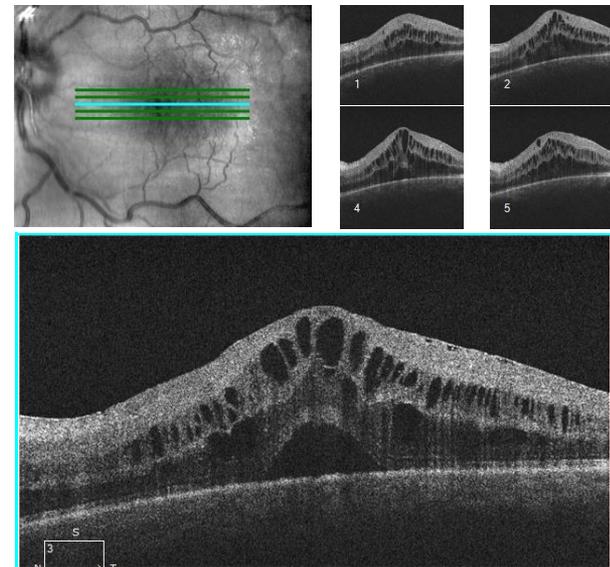


# OCT – reflected light to look at retina in greater detail

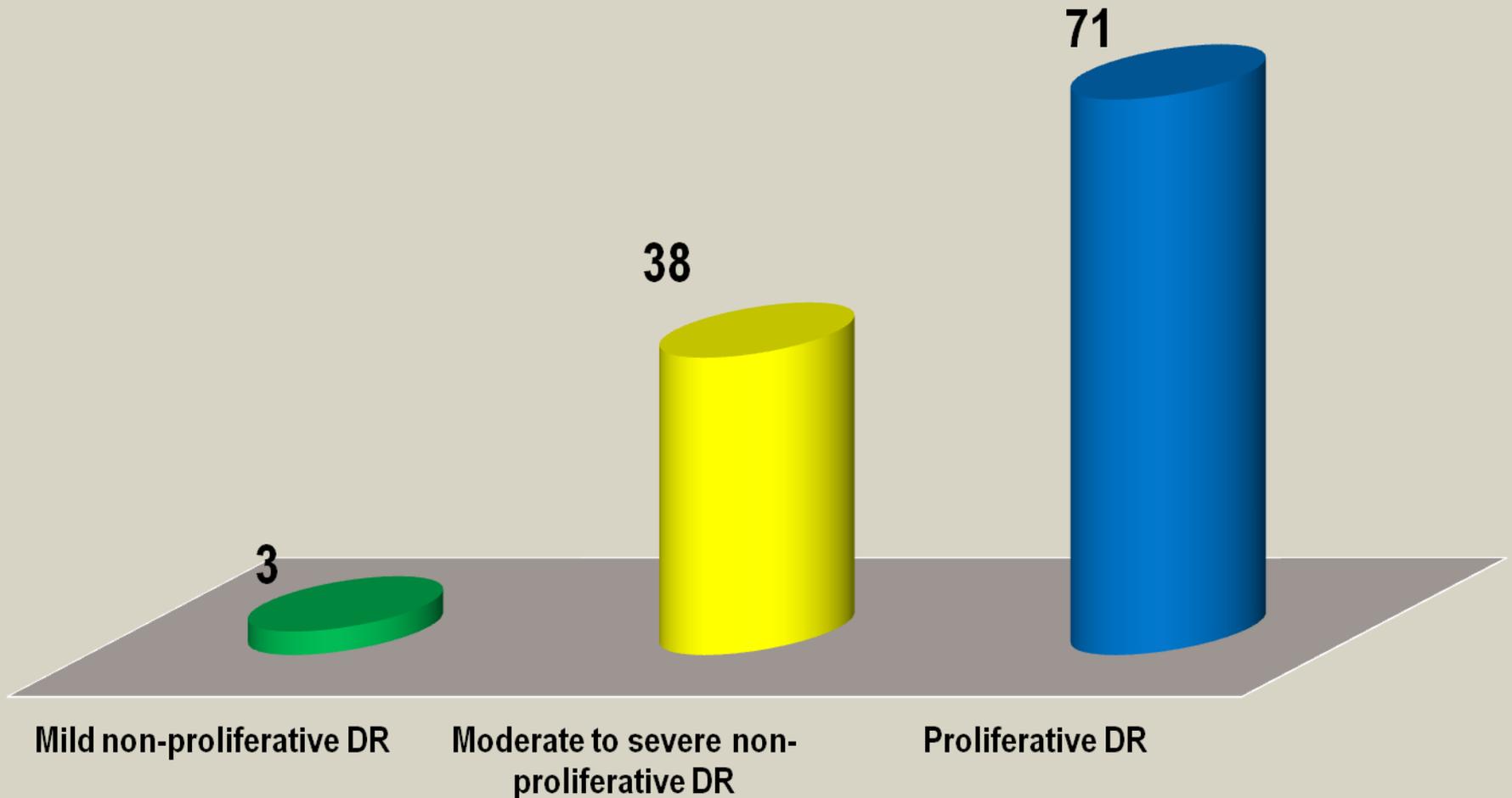
## Normal OCT



## OCT WITH DME



# Diabetic Macular Edema Prevalence



# What Causes Diabetic Retinopathy?

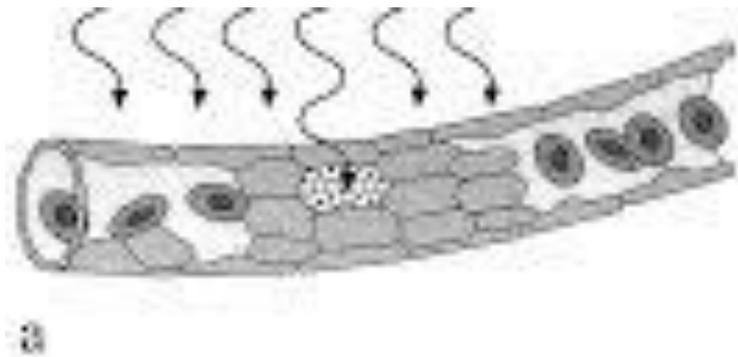
- \* Chronic hyperglycemia results in alterations and altered hemodynamics of the retinal vasculature which leads to hypoxia
- \* The retina is a highly metabolic tissue dependent on oxygenation.

\* Source: Diabetic Retinopathy by Elia Duh MD, page 9

# Signs of Diabetic Retinopathy

- \* Microaneurysms – They look like little red dots but are really outpouchings of the capillary wall
- \* Mechanism is not entirely known
- \* Weakness in the capillary wall which leads to edema
- \* Macular edema is the primary cause of vision loss related to diabetic retinopathy

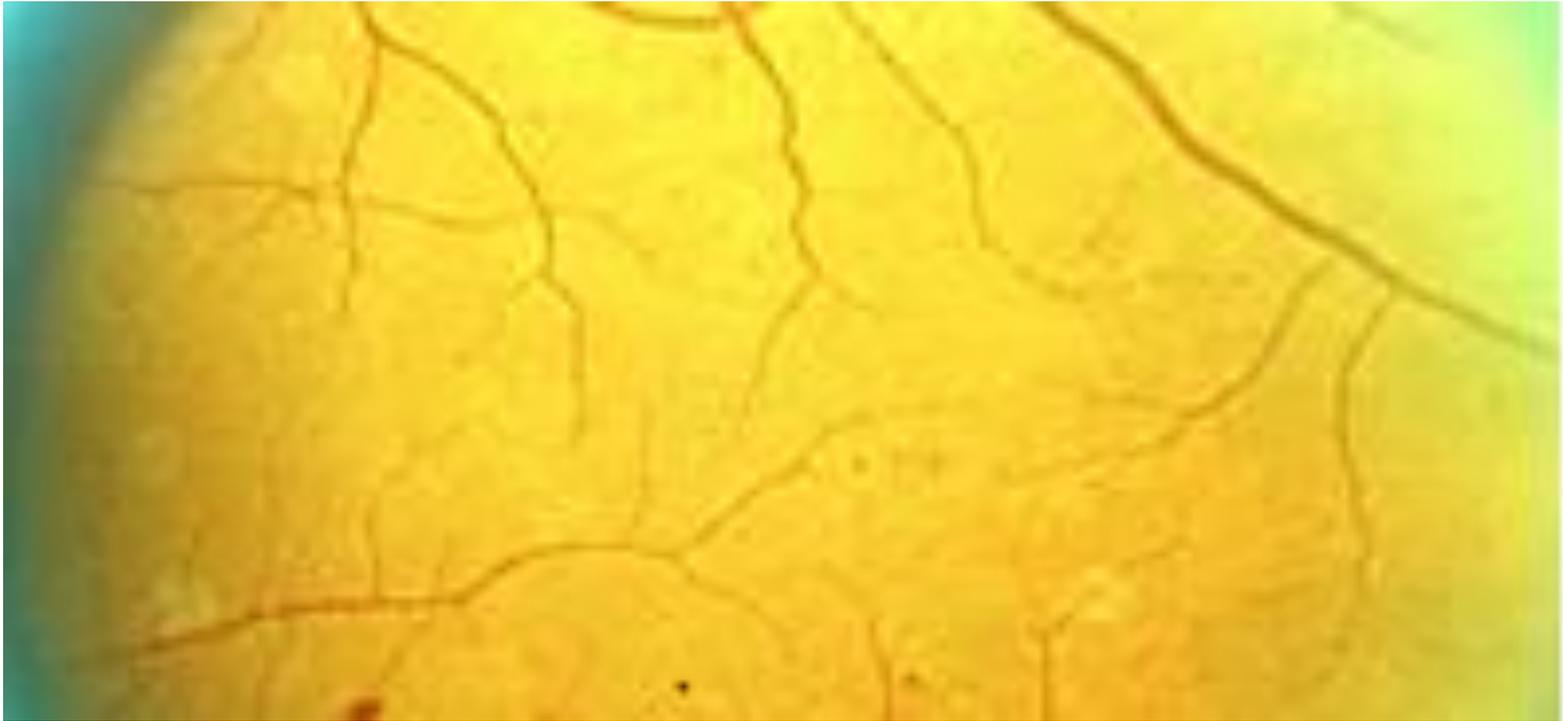
# Microaneurysms - Retinopathy



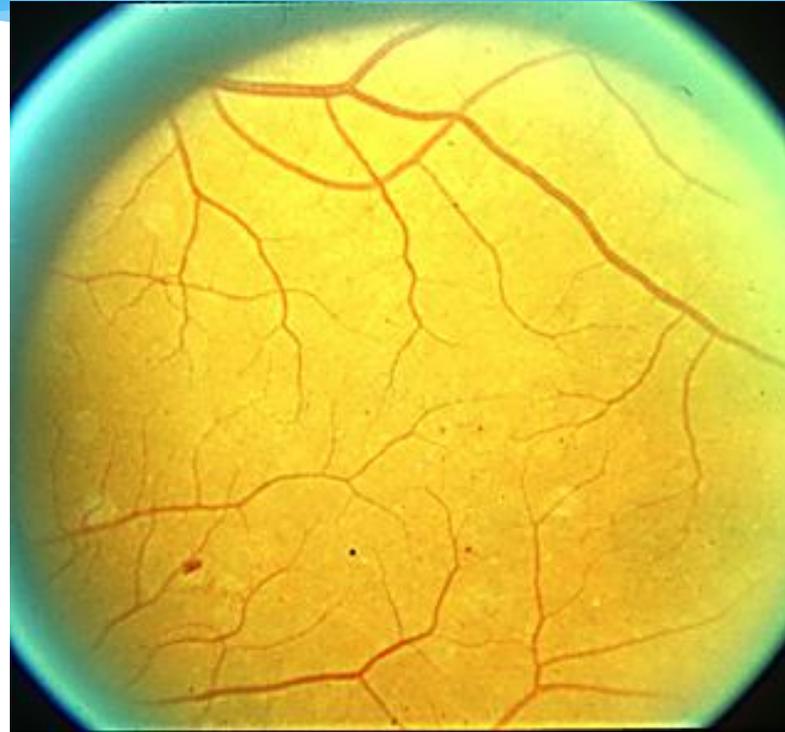
# Microaneurysm – cross section



# Microaneurysm



# Mild NPDR



- \* Microaneurysms
- \* Small hemorrhage

# Moderate NPDR



- \* More microaneurysm
- \* More Hemorrhages

# Severe NPDR

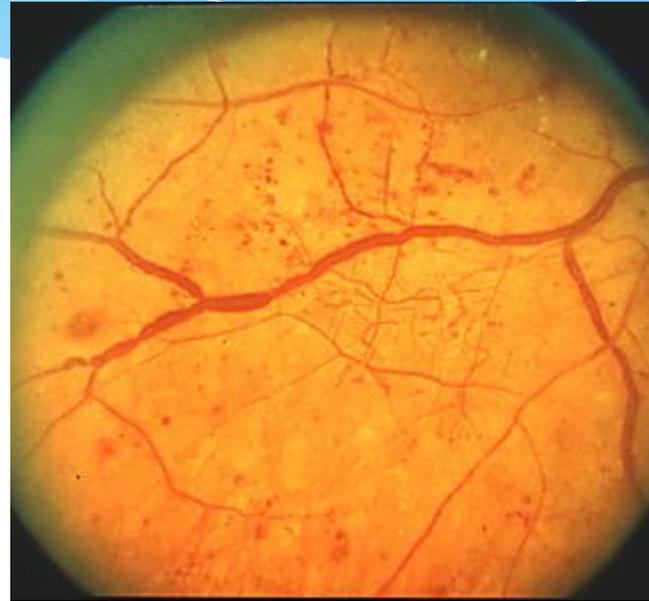


\* Standard Photo 5

# Proliferative Diabetic Retinopathy

- \* Blood vessels in the retina close preventing enough blood flow.
- \* Neovascularization
- \* Scar tissue
- \* Dense hemorrhage and retina detachment
- \* Loss of peripheral and central vision

# Early Proliferative Diabetic Retinopathy



# High Risk Proliferative Diabetic Retinopathy



# Treatment

- \* Prevention – early intervention and better control
- \* Laser
- \* Injections
- \* Surgery/vitreotomy

# Prevention Prevention Prevention

- \* Every 1-point increase in A1C, average blood glucose over the previous two to three months, was associated with a 14 percent greater risk for developing proliferative retinopathy.
- \* Foot ulcers, poor wound healing, or kidney disease is a greater risk for developing proliferative retinopathy
- \* [Predicting Development of Proliferative Diabetic Retinopathy. By Kristen Harris Nwanyanwu and colleagues. Diabetes Care, June 2013, pages 1562–1568](#)

# PREVENTION

**90 percent of diabetic eye disease can be prevented simply by proper regular examinations, treatment and by controlling blood sugar.**

<http://www.aao.org/newsroom/release/20091030.cfm>

# More Prevention of DR!!

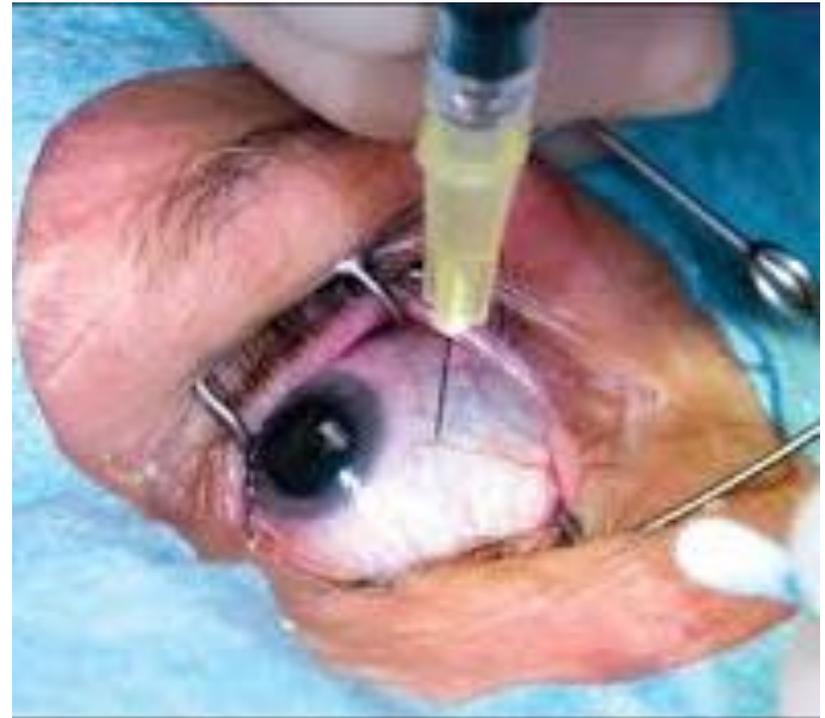
- \* Primary
  - \* Strict Glycemic Control
  - \* Blood Pressure Control
  - \* Cholesterol
- \* Secondary
  - \* Routine Eye Care
- \* Tertiary – Retinal Specialist
  - \* Anti-VEGF
  - \* Laser Photocoagulation
  - \* Vitrectomy

# Diabetic Retinopathy Treatments

- \* DME
  - \* Focal laser photocoagulation
  - \* Anti-VEGF treatments
  
- \* PDR
  - \* Scatter Laser Photocoagulation
  - \* Vitrectomy

# Anti-VEGF Treatments for DME

- \* Becoming a first line treatment. Patient may have both Anti-VEGF and laser
- \* Injections given weeks apart
- \* Typically painless
- \* Risks
  - \* Infection
  - \* Elevated eye pressure
  - \* Transient sterile inflammatory reactions

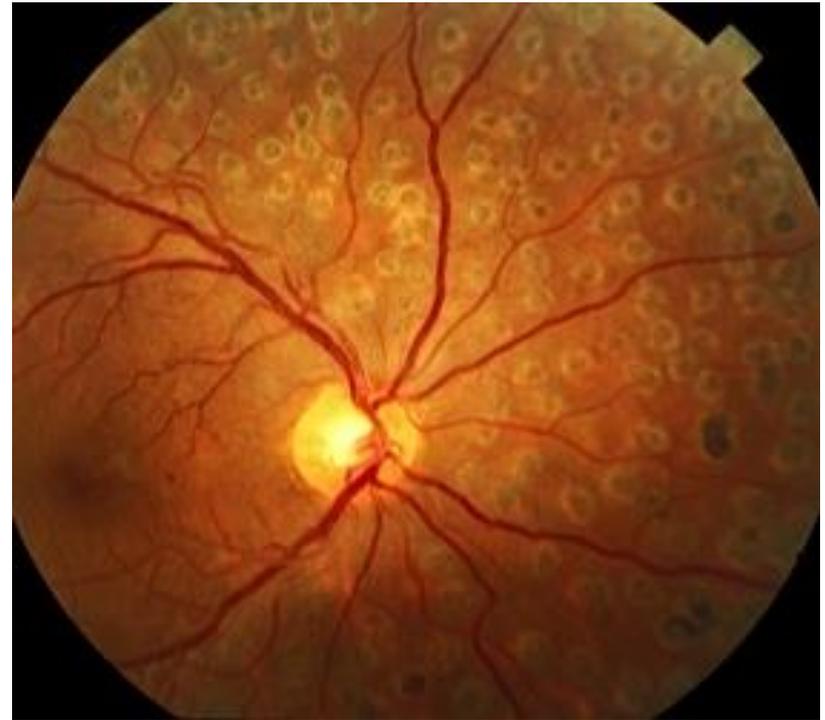


# Focal Laser Photocoagulation

- \* Pioneered in late '60s
- \* Reduces risk of vision loss from macular edema by 50% or more
- \* Laser seals the leaking vessels. Edema is eventually reabsorbed by retina

# Scatter Laser or PRP (pan retinal photocoagulation)

- \* For PDR
- \* Prior to bleeding or RD
- \* Hundreds of peripheral retinal burns
- \* Risks include:
  - \* Central vision loss
  - \* Peripheral visual field constrictions
  - \* poor dark adaptation
  - \* Vitreous hemorrhage
  - \* Loss of accommodation<sup>1</sup>



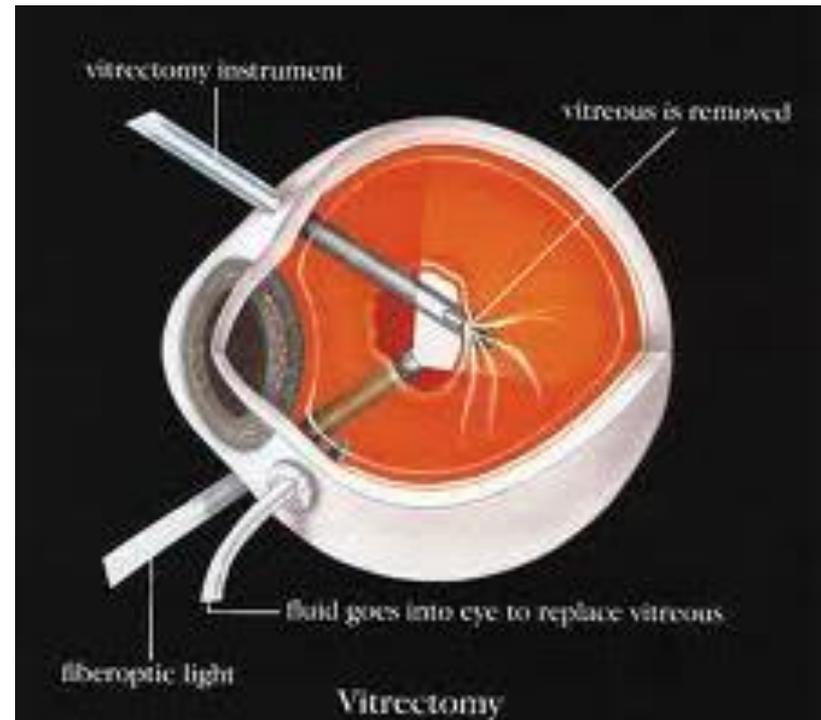
# PRP

- \* Reduces overall reduction rate of severe vision loss (5/200 or less) by approximately 50% in treated vs. untreated eyes.
- \* Combination of Anti-VEGF and PRP may be used

# Vitrectomy

- \* Surgical Procedure
- \* For bleeding and retina detachment
- \* Risks include:
  - \* Recurrent vitreous hemorrhage
  - \* Severe visual loss
  - \* Microbial endophthalmitis
  - \* Cataract

TABLE.7 Treatment Side Effect/Complication **Focal laser ...** [one.aao.org/asset.axd?id=8c5e92f5...](http://one.aao.org/asset.axd?id=8c5e92f5...)

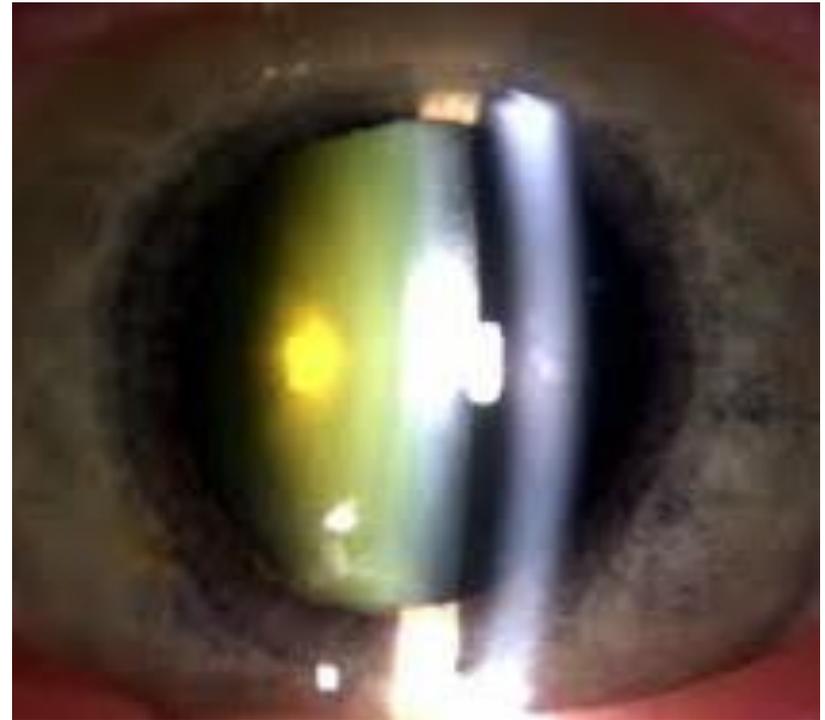


# How Diabetes Damages the Eye other than DR

- \* Cataracts
- \* Glaucoma
- \* Dry Eye – Keratopathy
- \* Diabetic Papillopathy
- \* Cranial Nerve Palsies
- \* Stroke Induced Vision Loss

# Cataracts

- \* Clouding of the natural lens
- \* Diabetics get cataracts more frequently and earlier than non-diabetics



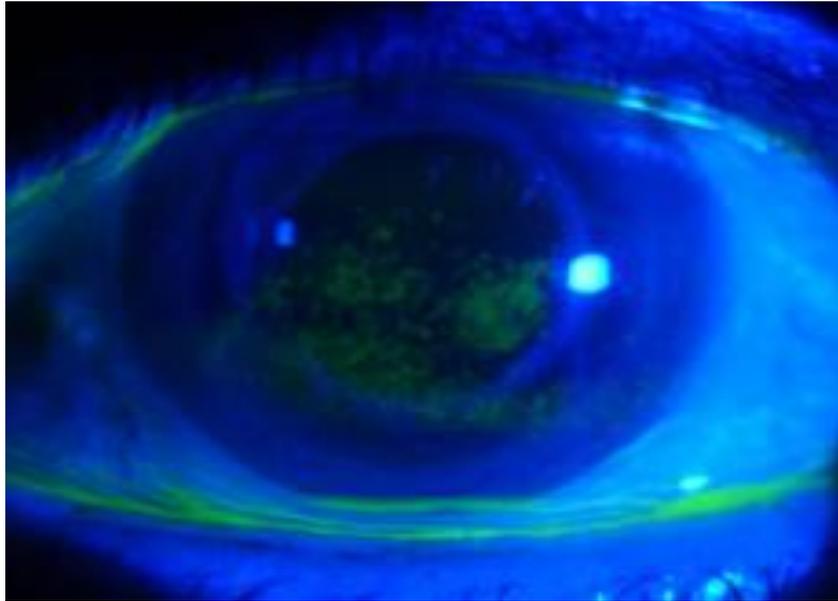
# Neo-Vascular Glaucoma

- \* New blood vessels grow inside the iris causing restriction of outflow of aqueous
- \* Can be challenging to treat
- \* Elevated eye pressure caused damage to Optic Nerve leads to loss of vision – peripheral first then central



# Dry Eye

- \* CORNEA - One of two clear tissues in the body



# Diabetic Papillopathy



Courtesy American Optometric Association

# Eye Muscle Problems



# Cranial Nerve III Palsy



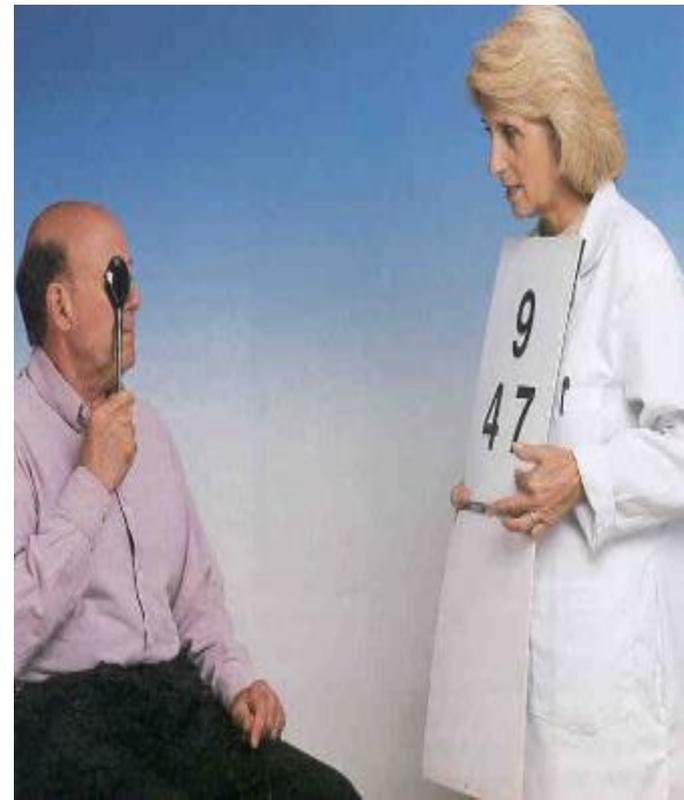
# What else...

- \* Low Vision Services
- \* Specialty Practitioners
- \* State Services for the Blind and Visually Handicapped.

# Low vision exams

## Low Vision exams

- evaluate functional vision and
- assesses individual needs (especially important for those with vision loss due to diabetes)



# LCD video magnification

- \* Sharper image than TV
- \* Up to 50X magnification
- \* Takes up less space
- \* Around 2200.00
- \* Enables patient to read or look at pictures
- \* *And* write checks and letters

\* Photo Courtesy American Optometric Association



# Lighted Magnifiers Reduce Glare and Provide Contrast

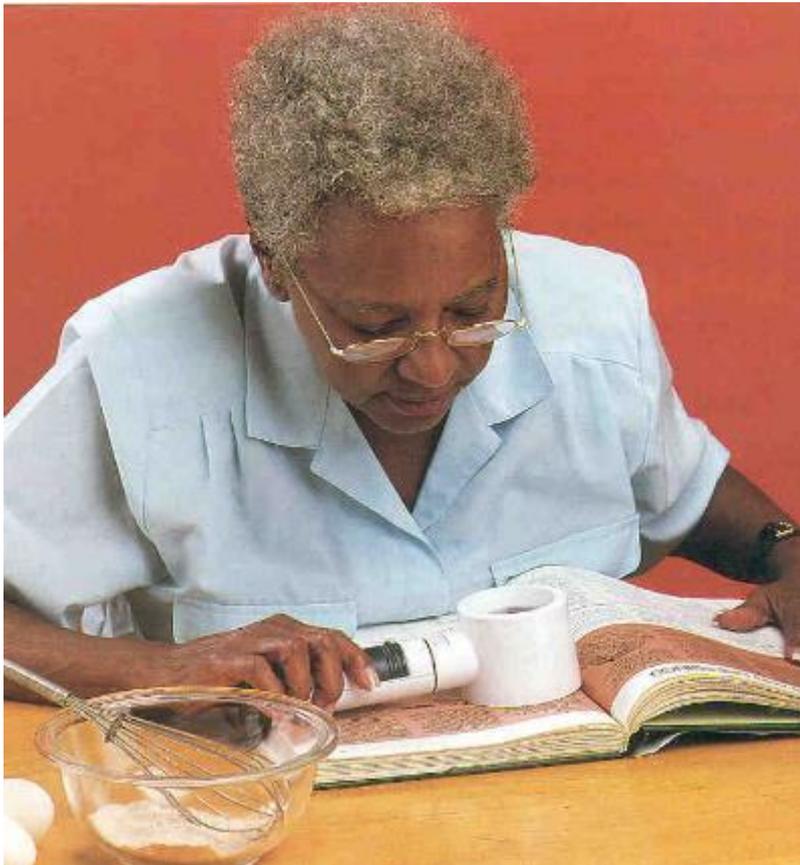


Photo Courtesy American Optometric Association

# Spectacle mounted telescopes can improve distance vision dramatically

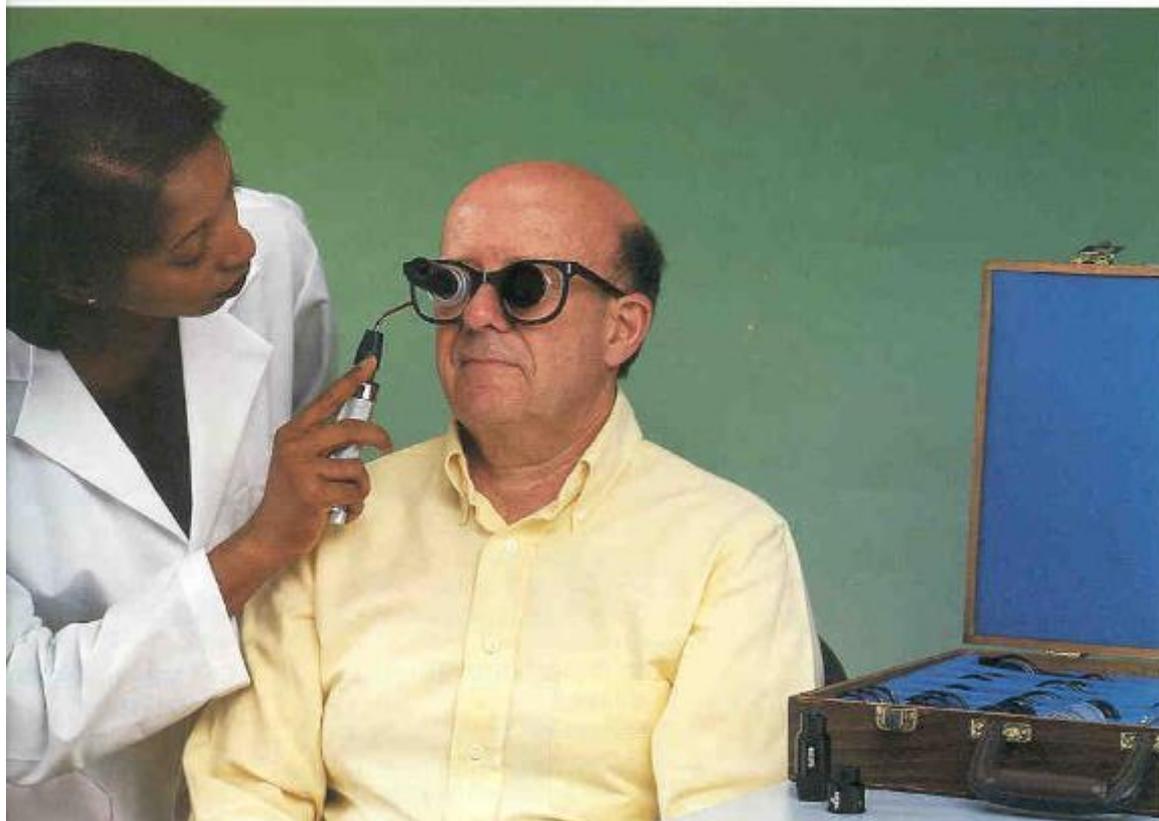


Photo Courtesy American Optometric Association

# Team Approach

- \* Working together as medical professionals for patient compliance through education
- \* Sharing information as needed to manage and reduce complications from diabetes

# Routine Eye Exams of Persons with Diabetes

- \* Frequency of Exams
  - \* After Diagnosis: Every Year Dilated Pupil Exam (Should be pre-scheduled)
  - \* After First Diagnosis of Diabetic Eye Changes: Every year or six months
  - \* At Pre-Proliferative Stage with DME
    - \* Should be referred to retinal specialist
- \* Less than 50% of persons with diabetes get dilated eye exams yearly
  - \* You must preschedule!!

# Summary:

- \* Very Serious Disease
- \* Early Detection Essential
- \* Education Essential
- \* Good Control = Less Complications
- \* Intervention/Treatments = Less Blindness
- \* Low Vision Services May Help to Rehabilitate Patients Who Have Lost Vision

# Thank You

