



## Preventing & Treating Diabetes-Related Blindness

Justin Kanoff, MD

Eye Care Center of Northern Colorado

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## Outline

- Introduction to Eye Care Center of Northern Colorado
- How the eye works
- Eye problems that can arise with diabetes
- Latest treatments to reduce vision loss
- Questions

## Eye Care Center of Northern Colorado

- 35 year-old practice
- Region's Leading Sub-Specialty Eye Care Group
- Diagnosis, Management, & Medical and Surgical care of all eye care problems including:
  - Cataracts
  - Glaucoma
  - Diabetes
  - Macular Degeneration
  - LASIK / Refractive
  - Eyelid and facial surgery
  - Dry Eye Management
  - Comprehensive Eye Evaluations

## Eye Care Center Doctors

<b>William Benedict, M.D.</b> <b>Elisha Tilton, M.D.</b> <b>Justin Kanoff, MD</b>	Vitreoretinal Surgery and Diseases
<b>Joel Meyers, M.D.</b>	Oculoplastics and Aesthetic Surgery & Cataract Surgery
<b>Micah Rothstein, M.D.</b> <b>Anjali Sheth, M.D.</b>	Glaucoma Specialist, Cataract Surgery
<b>Peter Andrews, M.D.</b>	Cataract surgery, Cornea transplants, & LASIK/Refractive Surgery Specialist
<b>Irene Olijnyk, M.D.</b>	Comprehensive and Pediatric Ophthalmology
<b>Robert Krone, O.D.</b> <b>Jane Wolford, O.D.</b>	Comprehensive Optometry & Specialty Contact Lens fitting

## Justin Kanoff, MD

- B.A. from University of Pennsylvania
- M.D. from University of Texas Southwestern Medical School
- Internship, Residency, Chief Residency and Retina Fellowship at Harvard Medical School

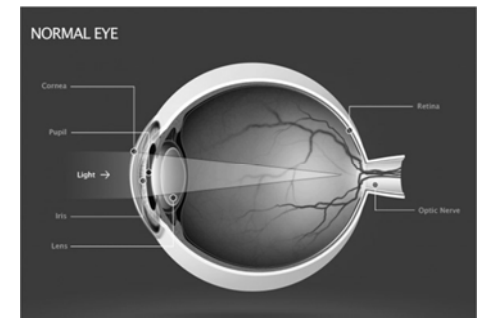
## Justin Kanoff, MD

- Originally from Dallas, Texas
- Lived in Boston, MA, for 7 years
- Wife, Jocelyn, is from Boulder so we moved our family back

## How The Eye Works

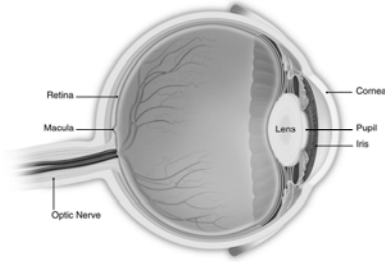
## The healthy eye

- Light rays enter the eye through the clear cornea, pupil and lens.
- These light rays are focused directly onto the retina, the light-sensitive tissue lining the back of the eye.



## The healthy eye

- The retina converts light rays into impulses sent through the optic nerve to your brain, where they are recognized as images.

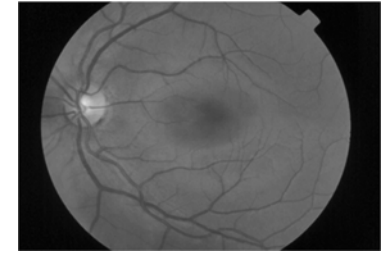


## The healthy eye

The retina, made of many layers sandwiched together into a smooth surface, consists of two areas, the *macula* and *peripheral retina*.

### Macula

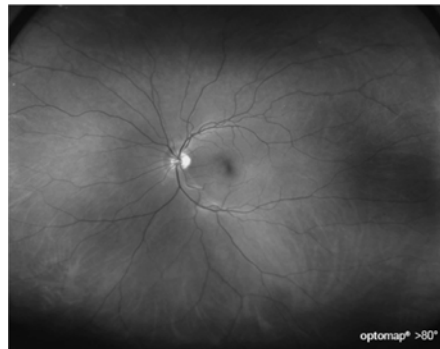
- Small area in center of retina that allows you to see fine details clearly.
- Allows activities like reading small print and recognizing a face.



## The healthy eye

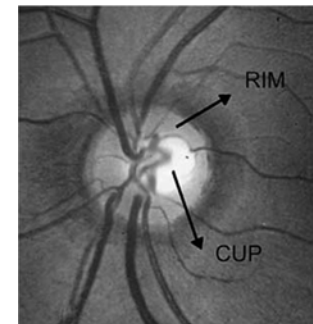
### Peripheral retina

- Gives you side-or peripheral-vision (not detail vision).
- Helps you see someone standing off to your side, but you won't see who the person is.



## The Healthy Eye

- Optic Nerve – connects eye to brain and carries information to visual cortex
- Damaged in Glaucoma



## The Camera

- Cornea is the clear window in the front of the eye that you look through
- Lens is in the middle of the eye and focuses the light
- Retina is a thin tissue that lines the back of the eye like wallpaper and functions like film in a camera
- Optic nerve carries information to the brain like a cable links a digital camera to a computer

## Common causes of vision loss

- Many kinds of eye disease can affect your sight; vision changes are not always evident right away.
- Cataracts
- Diabetic Eye Disease
- Macular Degeneration
- Glaucoma

## • Diabetic Retinopathy

## Diagnosis

- Fasting plasma glucose > 126
- 2 hour glucose tolerance test >200
- Random sugar > 200 with either symptoms or HbA1C > 6.5

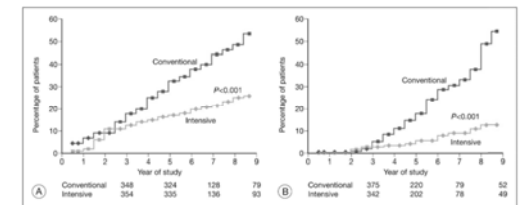
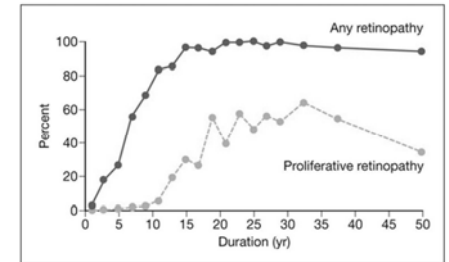


## Diabetes

- Diabetes Mellitus is the inability of the body to use and store sugar properly, resulting in high blood sugar levels.
- Macrovascular complications
  - Heart attacks and stroke
- Microvascular complications
  - Kidney failure, damage to peripheral nerves and damage to the retina

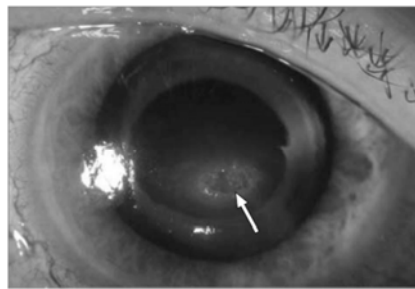
## Diabetic Retinopathy

- Estimated that 40% of diabetics have some eye disease and 8% have vision threatening manifestations
- Prevalence of complications increases with duration of disease
- Poor control of blood sugar increases complications
- Severity of eye disease correlates to risk of heart attack, stroke and kidney failure



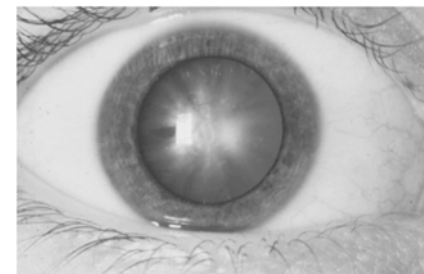
## Causes of Vision Loss

- Cornea
  - Damage to nerves impairs the cornea's ability to regenerate the healthy surface
  - Neurotrophic corneal ulcers



## Causes of Vision Loss

- Lens
  - Fluctuations in blood sugar change the focusing strength of the lens
  - Diabetes causes acceleration of cataracts

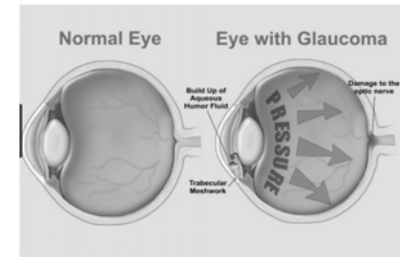


## Causes of Vision Loss

- Diabetic Retinopathy affecting the retina
  - More later in the talk

## Causes of Vision loss

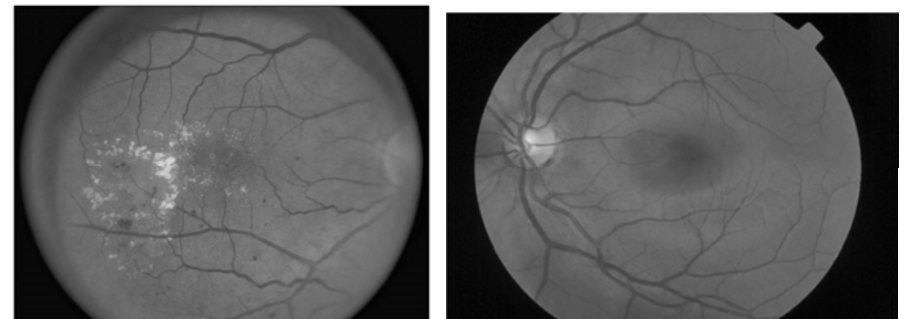
- Optic Nerve
  - Glaucoma
  - Controversy about extra risk of glaucoma from diabetes



## Diabetic Retinopathy

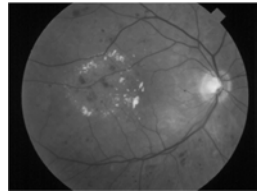
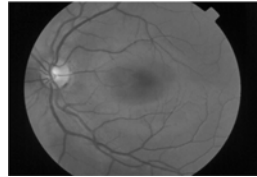
- Non-proliferative
  - Retinal hemorrhages, cotton wool spots, macular edema (main cause of vision loss)
- Proliferative
  - Vitreous hemorrhages and retinal detachments (both causes of severe vision loss)

## Non-Proliferative Disease



## Nonproliferative diabetic retinopathy (NPDR)

- Also called background diabetic retinopathy.
- Earliest stage of diabetic retinopathy.
- Damaged blood vessels in the retina leak extra fluid and small amounts of blood into the eye.
- Cholesterol or other fat deposits from blood, called hard exudates, may leak into retina.



Top: Healthy retina  
Bottom: Retina with NPDR, containing hard exudates

## Nonproliferative diabetic retinopathy

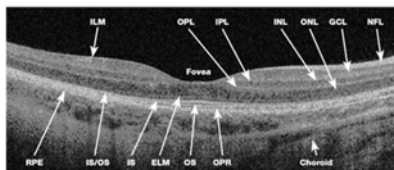
With NPDR, your central vision is affected by any of the following:

- Hard exudates on the central retina (macula).
- Microaneurysms (small bulges in blood vessels of the retina that often leak fluid).
- Retinal hemorrhages (tiny spots of blood that leak into the retina).
- Macular edema (swelling/thickening of macula).
- Macular ischemia (closing of small blood vessels/capillaries).

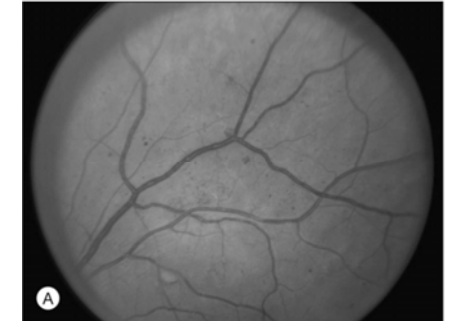
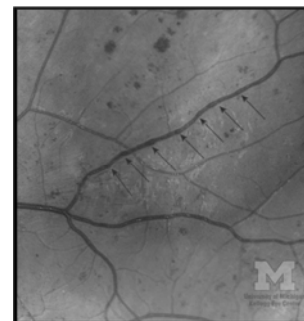
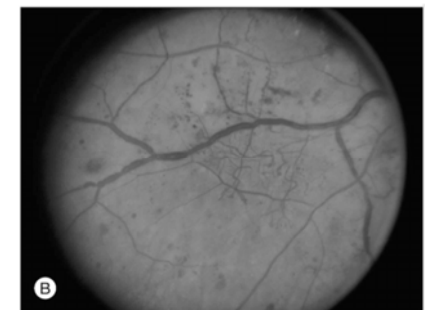
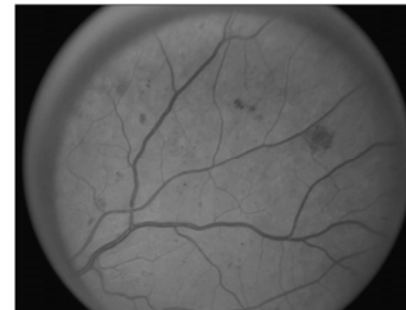
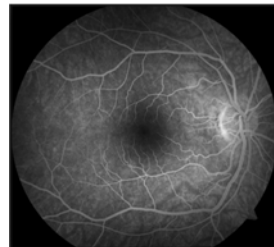
## Testing

- Vision
- Eye Pressure
- Dilation and examine the back of the eye

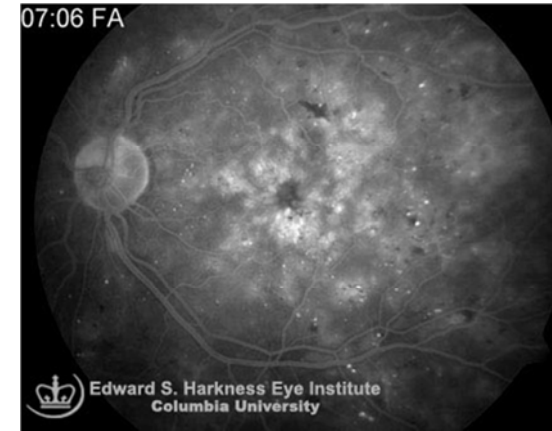
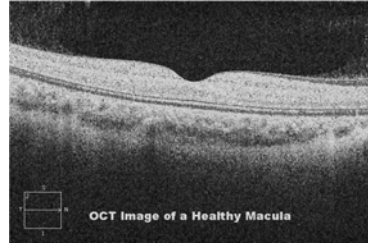
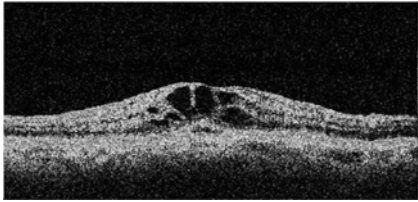
• OCT



• Fluorescein Angiogram



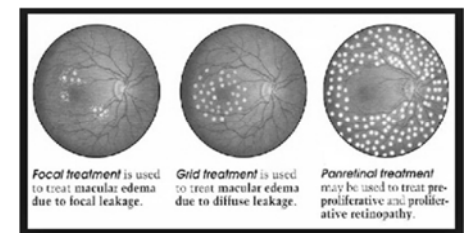
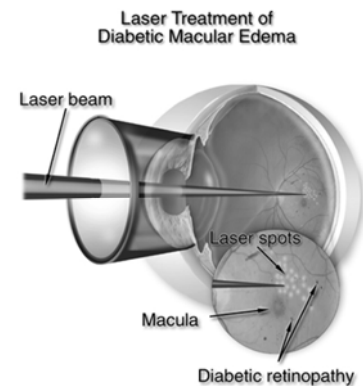
# Diabetic Macular Edema



## Treatment

- Control Blood Sugars!
- Non-Proliferative Disease
  - Focal/Grid laser therapy (micropulse laser)
  - Injections of Lucentis, Avastin or Eylea into the eye
  - Injections of steroids
  - Surgery

## Laser Treatment

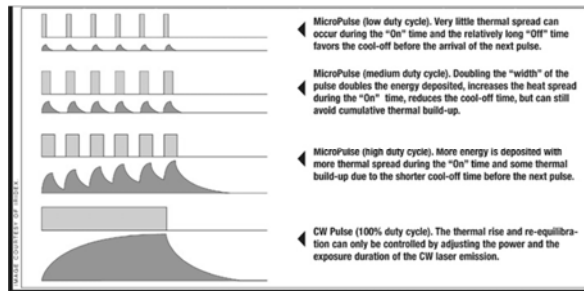


Treatment gives a 50% reduction in moderate vision loss (loss of 3 or more lines) at 3 years



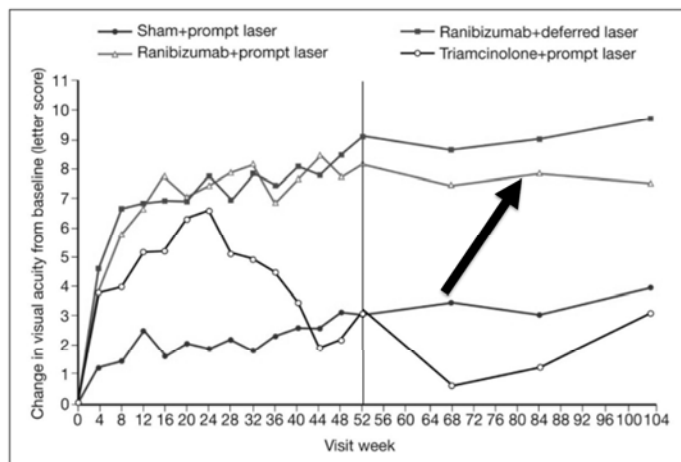
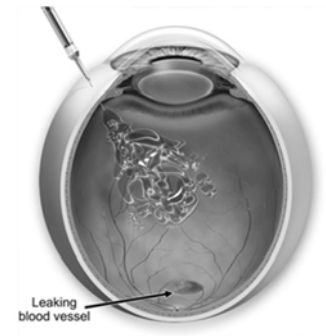
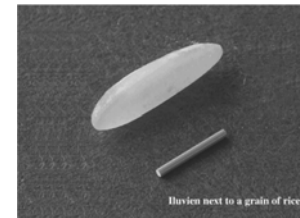
## Micropulse Laser

- Thought to be safer
- Unknown efficacy
  - No large randomized trials
  - Case reports and Case series



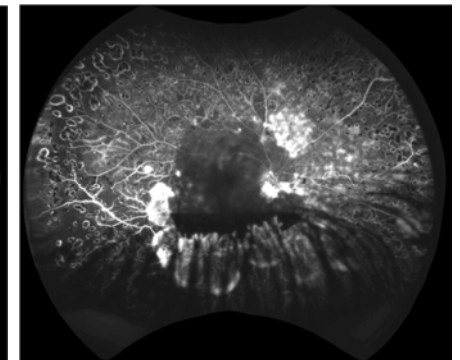
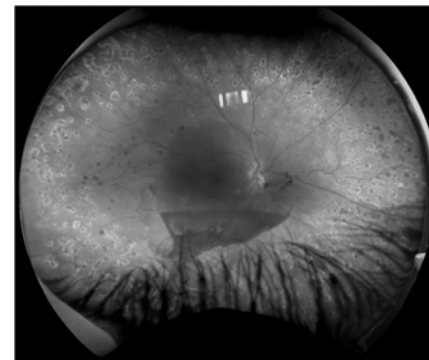
## Injections

- Avastin
- Lucentis
- Eylea
- Kenalog
- Ozurdex
- Iluvien

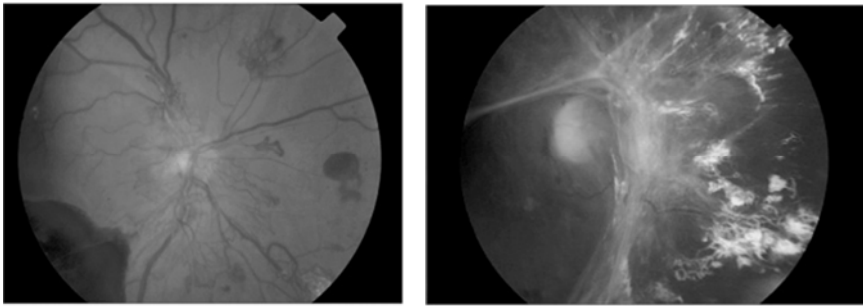


## Diabetes and Pregnancy

- Possible rapid progression of diabetes during pregnancy, especially for Type 1



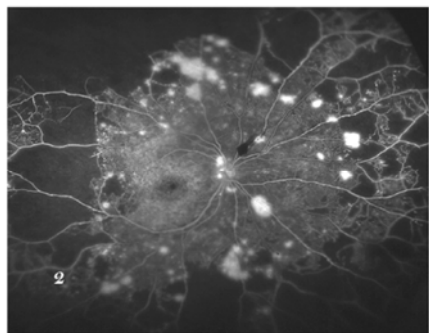
## Proliferative Disease



## Grades

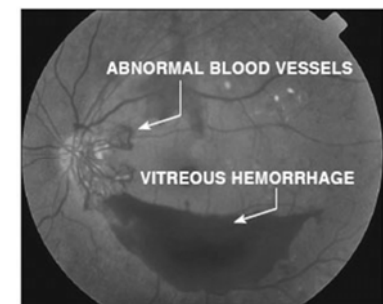
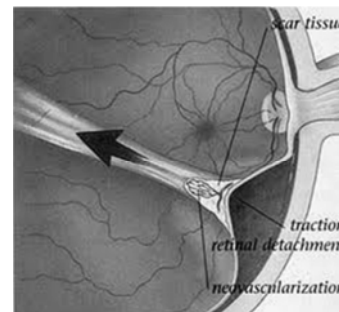
- Neovascularization of the disc
- Neovascularization elsewhere
- PDR
- High risk PDR

## Proliferative Disease



COURTESY: JOHN W. KITCHEL, MD

## Proliferative Disease

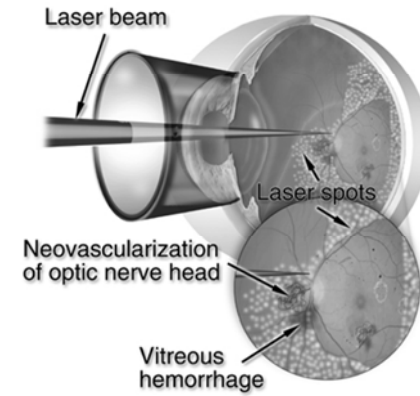


## Treatment

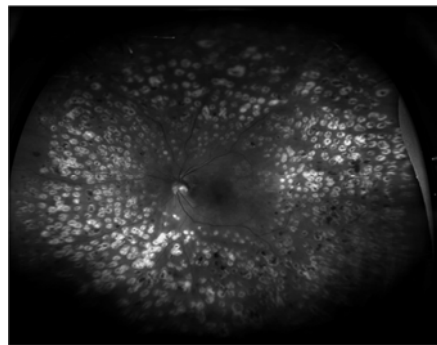
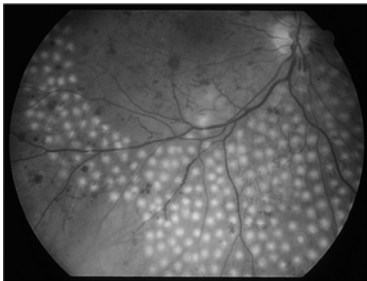
- Pan Retinal Photocoagulation
- Injection of Avastin
- Surgery

## Treatment

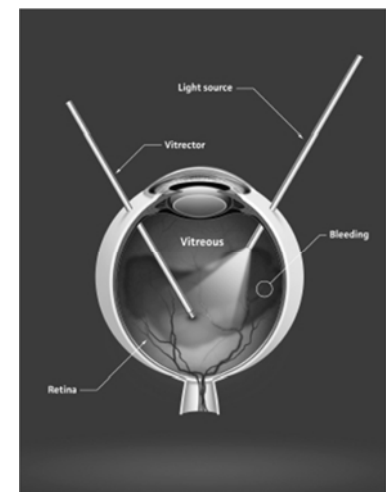
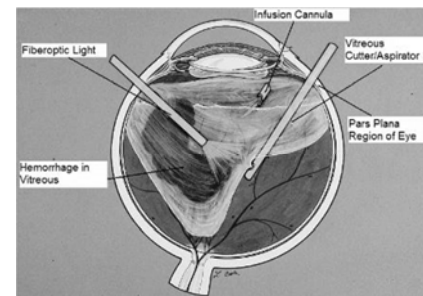
### Laser Treatment of Proliferative Diabetic Retinopathy



## Treatment



## Surgery



## Diagnosing diabetic retinopathy

- People with diabetes should see their ophthalmologist immediately if they have visual changes that:
  - Affect only one eye
  - Last more than a few days
  - Are not associated with a change in blood sugar
- It is important that your blood sugar be consistently controlled for several days prior to seeing your ophthalmologist for an exam.
  - Uneven blood sugar causes a change in your eye's focusing power, interfering with your ophthalmologist's measurements.

## Diabetic retinopathy is controllable

- You can significantly lower your risk of vision loss by maintaining strict control of your blood sugar level.
- Treatment does not cure diabetic retinopathy but it is effective in preventing further vision loss.
- Most people with diabetes retain normal eyesight; total blindness is very uncommon if retinopathy is treated.
- Regular visits to your ophthalmologist (Eye M.D.) will help prevent vision loss.



## Questions?

- Thanks for your attention