Disclosure to Participants

• Notice of Requirements For Successful Completion
  – Please refer to learning goals and objectives
  – Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours
• Conflict of Interest (COI) and Financial Relationship Disclosures:
  – Presenter: Louis B. Cantor, MD – No COI/Financial Relationship to disclose
• Non-Endorsement of Products:
  – Accredited status does not imply endorsement by AADE, ANCC, ACEP or CDR of any commercial products displayed in conjunction with this educational activity
• Off-Label Use:
  – Participants will be notified by speakers to any product used for a purpose other than for which it was approved by the Food and Drug Administration

Diabetes and the Eye

The healthy eye

• Light rays enter the eye through the cornea, pupil and lens
• These light rays are focused directly onto the retina, the light-sensitive tissue lining the back of the eye
• The retina converts light rays into impulses; sent through the optic nerve to your brain, where they are recognized as images

What is diabetes?

• Diabetes Mellitus is the inability of the body to use and store sugar properly, resulting in high blood sugar levels
• Results in changes in veins, arteries and capillaries in the body
How does diabetes affect vision?

• Could develop cataracts (clouding of the naturally clear lens in the eye)
• May develop glaucoma (a disease of the optic nerve)
• Risk of developing diabetic retinopathy: damage occurs to the fragile blood vessels inside the retina

Prevent Blindness America (2012)
Diabetic Retinopathy
• Prevalence %: 5.4%
• 7.7 million adults age 40 and over
• Population > age 40: 143 million

Diabetic retinopathy
Two types of diabetic retinopathy:
• Nonproliferative diabetic retinopathy (NPDR)
  — Early stage diabetic retinopathy
• Proliferative diabetic retinopathy (PDR)
  — Later stage diabetic retinopathy

Nonproliferative diabetic retinopathy (NPDR)
• Also called background diabetic retinopathy
• Earliest stage of diabetic retinopathy
• Damaged blood vessels in the retina leak fluid and small amounts of blood into the eye
• Cholesterol or other fat deposits from blood, called hard exudates, may leak into retina

Nonproliferative diabetic retinopathy
Central vision may be affected by:
• 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)

Nonproliferative diabetic retinopathy
Central vision may be affected by:
• 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)

Macular edema
• Macula thickens or swells, affecting vision
• Most common cause of vision loss in diabetes
• Vision loss may be mild to severe
• Peripheral (side) vision remains
• Laser treatment or injections may help to stabilize vision
Nonproliferative diabetic retinopathy

Macular ischemia
- Small blood vessels, or capillaries, close, blurring vision
- Macula no longer receives enough blood to work properly
- Currently no effective treatment for macular ischemia

Proliferative diabetic retinopathy (PDR)
- Later stages of diabetic retinopathy
- Abnormal blood vessels begin to grow on surface of retina or optic nerve; can’t provide retina with normal blood flow (neovascularization)
- PDR can cause severe visual loss and other serious complications, such as neovascular glaucoma and loss of the eye

Proliferative diabetic retinopathy

- Vitreous hemorrhage (new, abnormal blood vessels bleed into vitreous gel in center of eye)
- Traction retinal detachment (new, abnormal blood vessels begin to shrink and tug on retina)
- Neovascular glaucoma (neovascularization occurs in the iris, causing pressure to build up in the eye, damaging the optic nerve)

Diagnosing diabetic retinopathy

- Diabetes can cause vision in both eyes to change, even without retinopathy
- Rapid changes in blood sugar alter the shape of the eye’s lens, and the image on the retina will become out of focus
- Episodes of blurred vision decreased by maintaining good control of the blood sugar

When to schedule an eye exam

- If 30 years old or younger when diabetes was first detected, have an eye exam within five years after that diagnosis
- If 30 years old or older, first exam should be within a few months of the diabetes diagnosis, then annually
- If pregnant, should have an exam within the first trimester
- If there is a high-risk condition, such as kidney failure or amputation related to diabetes, schedule an eye exam immediately
What happens during an eye exam

- The ophthalmologist will dilate the pupils and examine the retina with special instruments using bright lights.
- Fluorescein angiography/OCT: diagnostic procedures to help visualize the retina and retinal circulation.
- The testing will help identify:
  - Which blood vessels are leaking fluid
  - How much fluid is leaking
  - How many blood vessels are closed
  - Whether neovascularization is beginning

Ultrasound

- If the ophthalmologist cannot see the retina because of vitreous hemorrhage, an ultrasound test may be done in the office.
- The ultrasound “sees” through the blood to determine if your retina has detached.
- If there is detachment prompt surgery may be necessary.

Treating diabetic retinopathy

- Best treatment is to **prevent** development of retinopathy as much as possible.
- **Strict control** of blood sugar will significantly reduce the long-term risk of vision loss from diabetic retinopathy (HbA1c of 7.0%, or 6.5% in some studies).
- Laser surgery or injections are often recommended for macular edema, PDR, and neovascular glaucoma.

ACCORD/ACCORDION

- NIH supported, ACCORDION reported in 2016.
- Landmark ACCORD study (2003-2009): Type 2 diabetics randomized to intensive or standard treatment for glycemia (<6.0%), SBP (<120), and dyslipidemia (finofibrate or placebo + simvastatin).
- Retinopathy progression reduced by 1/3rd!
- Failed to reduce CVD risk however (seemed to increase).

ACCORDION

- Action to Control Cardiovascular Risk in Diabetes Trial Eye Study.
- Re-assessed DR 4 years after the intensive glycemic control arm had ended.
- Risk of DR reduced by 50%!
- Well controlled glycemia had a measurable long term positive impact.....metabolic memory or legacy effect.....
Treating diabetic retinopathy

Laser surgery for macular edema

- Laser is focused on the damaged retina near the macula to decrease fluid leakage
- Some may see laser spots near the center of their vision following treatment; usually fade with time, but may not disappear
- Uncommon for people who have blurred vision from macular edema to recover normal vision, although some may experience partial improvement
- Main goal of treatment: prevent further loss of vision

Laser panretinal photocoagulation treatment (arrows show laser spots on the retina)

Treating diabetic retinopathy

Laser surgery for PDR

- Laser to the retina except the macula
- This “panretinal” laser treatment causes abnormal new vessels to shrink
- Treatment decreases the chance of vitreous bleeding and retinal problems
- Multiple laser treatments over time are sometimes necessary

Diabetic retinopathy is controllable

- Strict control of blood sugar level critical
- Treatment does not cure diabetic retinopathy but it is effective in preventing further vision loss or restoring vision
- Most people with diabetes can retain good eyesight; total blindness is very uncommon if retinopathy is treated