DIABETES – A DISEASE WITH FAR REACHING IMPLICATIONS

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Financial disclosure

- I Valerie Manso am President of Manso Management Resources, Inc. A consulting company specializing in business and people development in the ophthalmic industry. I currently have ongoing contracts with BluTech Lenses and PECAA

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Objectives

- At the conclusion of this session the participants will:
  1. Have a clear understanding of what diabetes is
  2. Understand the impact diabetes has on our health care systems today and in the future
  3. Comprehend the role the ophthalmic community plays in the early diagnosis of diabetes

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What is diabetes?

- Diabetes is an endocrine disease characterized by deficient insulin production or the failure of body tissues to use insulin properly. When insulin in the blood stream can't get inside our cells:
  - Blood sugar levels go up (hyperglycemia)
    - This causes damage to body tissues, especially blood vessels
    - Leads to eye disease, heart disease, kidney disease, and nerve disease
  - Diabetes-related eye disease often predicts and predates the other diseases

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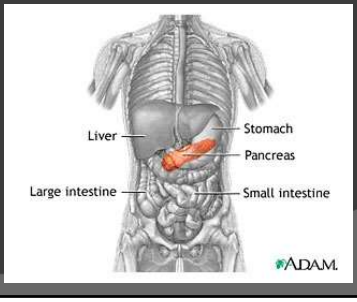
Where is insulin produced?

- Insulin is one of the hormones produced by the Pancreas



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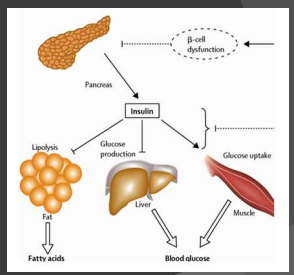
Why do we need insulin?

- Insulin has several broad actions including:
  - It causes the cells in the liver, muscle, and fat tissue to take up glucose from blood and convert it to glycogen that can be stored in the liver and muscles



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Why do we need insulin?

- Insulin also prevents the utilization of fat as an energy source. In the absence of insulin or in conditions where insulin is low in glucose it is not taken up by body cells, and the body begins to use fat as an energy source – lead to "Diabetic Ketoacidosis"
- Insulin also controls other body systems and regulates the amino acid uptake by body cells

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Type 1 Vs. Type 2 Diabetes

- Type 1 diabetes is a disorder of the human immune system that makes it difficult for the body to produce insulin. Without insulin, the body cannot convert sugar from food into nutrients for cells. Excess sugar builds up in the blood stream and may eventually cause severe damage to organs and premature death.

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Type 1 Vs. Type 2 Diabetes

- Type 1 diabetes is generally diagnosed in children, teenagers, or young adults. Scientists do not yet know exactly what causes type 1 diabetes but believe that autoimmune, genetic, and environmental factors are involved.

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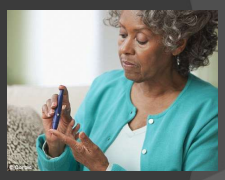
Type 1 Vs. Type 2 Diabetes

- Type 2 diabetes, once called non-insulin-dependent diabetes, is the most common form of diabetes, affecting 90% to 95% of the 26 million Americans with diabetes.



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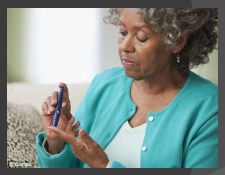
Type 1 Vs. Type 2 Diabetes

- The bodies of people with type 2 diabetes make insulin. But either their pancreas does not make enough insulin or the body cannot use the insulin well enough.



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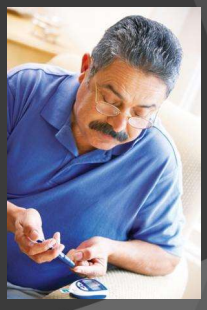
Risk factors – non-modifiable

- Family history
- Race or ethnic background
- Age
- History of gestational diabetes



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Risk factors –modifiable

- Overweight/Obesity
- High Blood Glucose
- Hypertension
- Inflammation
- Physical Inactivity
- Smoking

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Diabetes - statistics

- Globally 285 million diabetic patients
- USA 26 million diabetic patients
  - 79 million at high risk within a decade
  - Type 2 = 90%
  - Almost 3 million new cases a year
  - 1/6 of health care expenditures

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Diabetes - statistics

- Type 2 diabetes has increased by 1100% in the under 20 population since 1970

- According to the 2011 National Diabetes Fact Sheet, about 215,000 young people in the US under age 20 had diabetes in 2010. This represents 26% of all people in this age group

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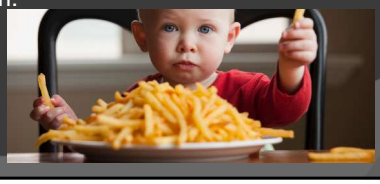
Diabetes - statistics

- The increased incidence of type 2 diabetes in youth is a —first consequence of the obesity epidemic among young people, and is a significant and growing public health problem.



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Diabetes - statistics

- Canada 3 million
  - 20% undetected
  - 6.3% of population
  - 30% of people who died in 2008/09 had diabetes

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Canada – Diabetic disease; economic impact

- In 2008/09, adults aged 20 to 49 years with diabetes saw a family physician twice as often as those without diabetes, and specialists two to three times more often.
- Individuals with diabetes were three times more likely to have been hospitalized at least once during the year than those without diabetes, and had a longer hospital stay.
- Annual per capita health care costs have been estimated to be three to four times greater in a population with diabetes compared to a population without the disease.

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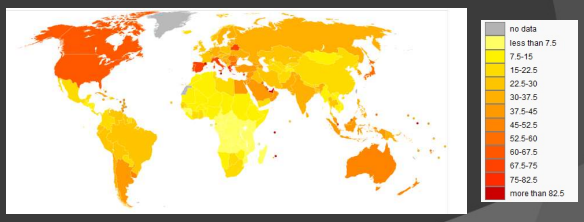
Diabetes World map – Per 1,000



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Why does the data matter?

- It is estimated that by 2020 diabetic care and complications arising from having the disease may cost one of every three health care dollars in the USA
- Canada and the rest of the world are not far behind

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Diabetic Eye Complications

- Diabetic retinopathy
- Glaucoma
- Early onset multifocal use
- Early onset cataracts
- Fluctuating refractive error
- Vascular occlusions
- Dry eye

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Diabetic retinopathy

- Diabetic retinopathy is the most common diabetic eye disease and a leading cause of blindness in American adults. It is caused by changes in the blood vessels of the retina.
- In some people with diabetic retinopathy, blood vessels may swell and leak fluid. In other people, abnormal new blood vessels grow on the surface of the retina.

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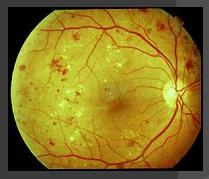
Diabetic retinopathy

- If you have diabetic retinopathy, at first you may not notice changes to your vision. (Silent thief) But over time, diabetic retinopathy can get worse and cause vision loss.
- Diabetic retinopathy usually affects both eyes.



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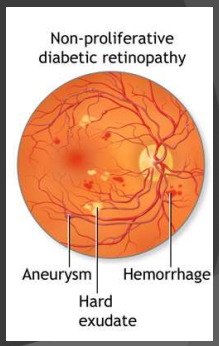
Four stages of Diabetic Retinopathy

1. **Mild Nonproliferative Retinopathy.** At this earliest stage, micro aneurysms occur. They are small areas of balloon-like swelling in the retina's tiny blood vessels.



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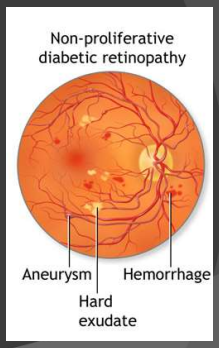
Four stages of Diabetic Retinopathy

2. **Moderate Nonproliferative Retinopathy.** As the disease progresses, some blood vessels that nourish the retina are blocked.



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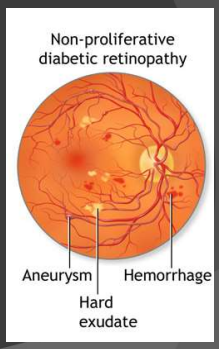
Four stages of Diabetic Retinopathy

3. **Severe Nonproliferative Retinopathy.** Many more blood vessels are blocked, depriving several areas of the retina with their blood supply.

   These areas of the retina send signals to the body to grow new blood vessels for nourishment.



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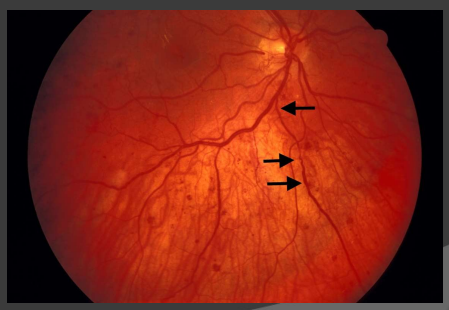
Severe Nonproliferative Retinopathy



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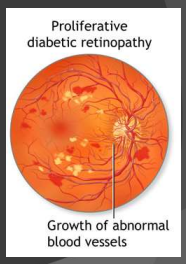
Four stages of Diabetic Retinopathy

4. **Proliferative Retinopathy.** At this advanced stage, the signals sent by the retina for nourishment trigger the growth of new blood vessels. This condition is called proliferative retinopathy.



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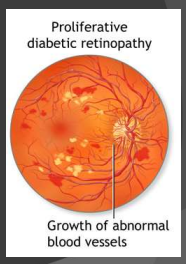
Four stages of Diabetic Retinopathy

4. **Proliferative Retinopathy.** These new blood vessels are abnormal and fragile. They grow along the retina and along the surface of the clear, vitreous gel that fills the inside of the eye



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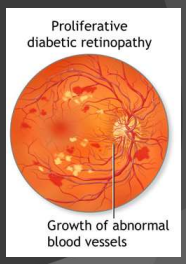
Four stages of Diabetic Retinopathy

4. By themselves, these blood vessels do not cause symptoms or vision loss. However, they have thin, fragile walls. If they leak blood, severe vision loss and even blindness can result.



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Proliferative Retinopathy

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Resultant vision

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Diabetics and Glaucoma

- increase in fluid pressure inside the eye that leads to optic nerve damage and loss of vision.
- A person with diabetes is nearly twice as likely to get glaucoma as other adults.

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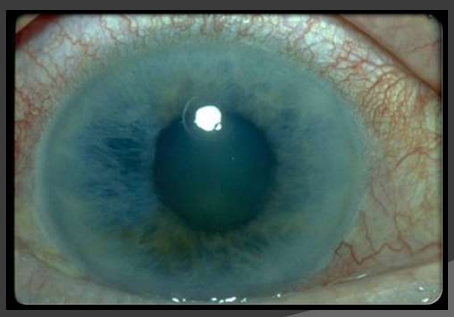
Glaucoma



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Resultant vision

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Early onset multifocal use

- The crystalline lens hardens prematurely in the diabetic patient leading to loss of accommodative ability.

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Early onset Cataracts

- The lens is made of mostly water and protein. The protein is arranged in a precise way that keeps the lens clear and lets light pass through it.
- As we age, some of the protein may clump together and start to cloud a small area of the lens. This is a cataract. Over time, the cataract may grow larger and cloud more of the lens, making it harder to see.
- Researchers suspect there are several non-age related causes of cataracts. The two most prevalent are smoking and diabetes

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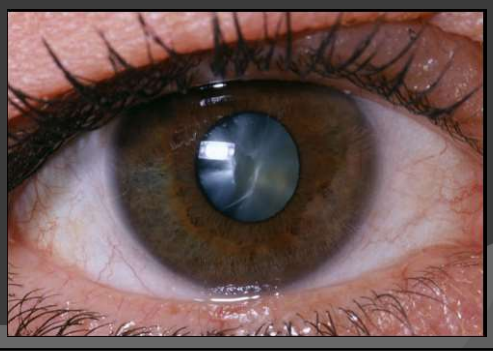
Cataract



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Resultant vision

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Fluctuating refractive error

- High blood sugar in diabetes causes the lens of the eye to swell, which changes your ability to see.
  - To correct this kind of eye problem, you need to get your blood sugar back into the target range (70-130 milligrams per deciliter or mg/dL before meals, and less than 180 mg/dL one to two hours after a meal).
  - It may take as long as three months after your blood sugar is well controlled for your vision to fully get back to normal.

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Vascular occlusions

- An occlusion occurs when one of the veins or arteries carrying blood to or from the retina becomes blocked or contains a blood clot.
- The blockage could occur in the main vein or main artery. Blockages could also occur in the branch of veins and arteries throughout the retina.

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Vascular occlusions

- A blockage in the vein or artery of the retina can cause blood or other fluids to build up and inhibit the retina's ability to filter light properly.
- When light is blocked or fluids are present, sudden loss of vision can occur. The severity of vision loss may be dependent upon where the blockage or clot occurred. Blockages in the main vein or artery are often more serious than blockages in the branch veins or arteries.

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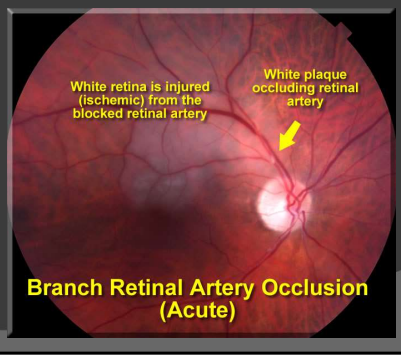
Vascular occlusions



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Dry eye

- Dry Eye Syndrome," is one of the most common conditions diagnosed by eye doctors, and people with diabetes have a significantly increased risk for this disorder.
- In fact, one study shows persons with diabetes have a 50% chance of suffering from dry eye.
- Symptoms include a scratchy sensation – like fine grains of sand are in the eyes, burning, itching, blurred and fluctuating vision, light sensitivity, redness and, paradoxically, increased watering of the eyes. Dry eye is almost always a condition affecting both eyes.

Dr. Paul Chous – Diabetic Life CNBC webcast

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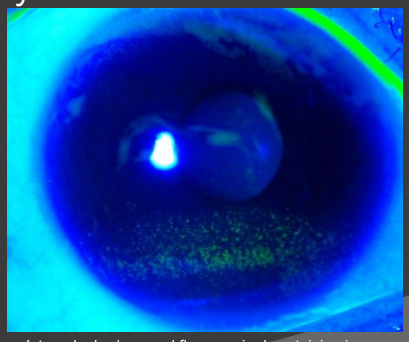
Dry Eye



Interpalpebral corneal fluorescein dye staining in a patient with dry eye

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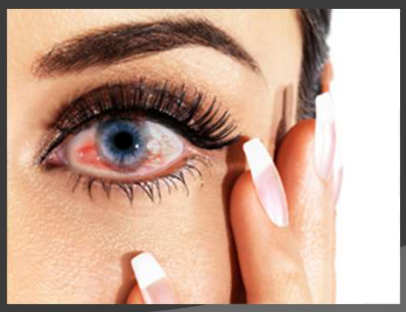
Dry Eye



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Keeping diabetes in check

- An annual dilated eye exam reduces the risk of diabetes related blindness by up to 95% - ensures early detection
- Blood pressure needs to be maintained below 130/80
- Exercising 30 minutes, five times a week, reduces the risk of developing diabetes by up to 60%

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Keeping diabetes in check

- Sleep more than 6 hours a night
- Limit alcohol, caffeine and spicy foods at night
- Establish a good sleep schedule – routine is key

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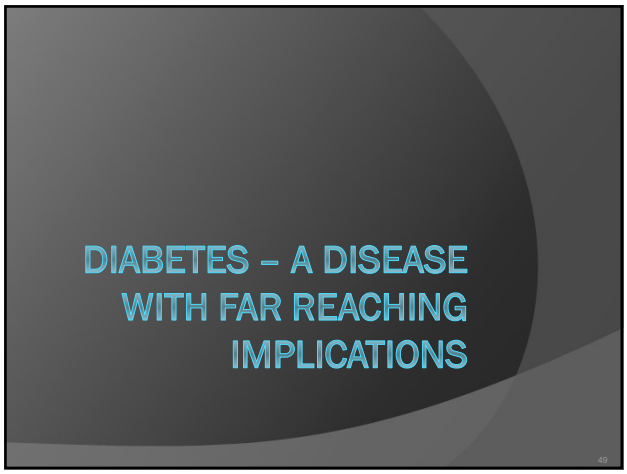

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