



What every tech should know about Diabetes

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News Flash

- Diabetes is a progressive disease. There is no cure
- The best treatment occurs when the patient understands their condition and complies with the doctors instruction

Tech vs Robot

- Are you a robot?
- Do you know how to thoroughly screen a patient?
- Are you informed or educated?
- Are you an instrument monkey?
- Can you educate your patients on their conditions or do you expect your doctor to perform that function?
- Is O.D. chair time valuable?

US Statistics about Diabetes

- 5th leading cause of death in U.S.
- Approximately 2,700 Americans are diagnosed with diabetes each day
- Leading cause of adult blindness, end-stage kidney disease and lower extremity amputations
- 60%-70% of people with diabetes have mild to severe forms of nervous system damage
- \$1 of every \$10 of health care spending is spent on diabetes

Source: American Diabetes Association

Articles

- [Cost of Diabetes Care Keeps Climbing, Report Shows](#)
- 11/20/2014 12:00 PM EST
- Source: HealthDay
- [Diabetes Diagnosis Dilemma](#)
- 11/18/2014 09:47 AM EST
- Source: HealthDay -
- [Study Finds No Added Benefit from Routine Heart Scans for Diabetics](#)
- 11/18/2014 09:00 AM EST
- Source: HealthDay
- [Nearly 3 in 10 Americans with Diabetes Don't Know It](#)
- 11/18/2014 09:00 AM EST

Overview

- Definitions
- What is Diabetes
- Types of Diabetes
- Screening Patients
- Established Patients
- Patient Education
- Test Results
- Diabetic Retinopathy
- Photography
- Return/follow up visits



Definitions

- Insulin – a hormone that controls blood sugar...blood sugar can affect arteries, leading to heart disease
- Plaque – deposits of fat, cholesterol
- Lipids – fat like substance in blood
- Atherosclerosis – hardening of arteries
- Angina – chest tightness and pain
- Blood clot (embolus) – mass of blood cells
- Stroke – damage to arteries to brain

What is Diabetes Mellitus?

- DM is a chronic disease with long term macrovascular and microvascular complications
- **Type 1 (body is not producing enough insulin) with meds**
- **Type 2 (90%) can be controlled without meds**
- Insulin resistant DM...growing concerns
- Approx 26% of pt's with type 1 and 36% of type 2 pt's have never had their eyes checked
- Affects 20.8M Americans (7% of pop)...6M undiagnosed
- Leading cause of death, disability/blindness ages 20-75 in US
- Responsible for 10% of all new cases of blindness annually
- Blood glucose over 250 is called hyperglycemia

Type 1

- Previously called insulin dependent diabetes (IDDM) or juvenile diabetes
 - Insulin...helps to keep Body Mass Index
- Injections are required for insulin
- Body destroys pancreatic beta cells, the only cells that make the hormone insulin
 - Beta cells...are in the pancreas

Definitions

- Insulin is a **hormone** produced by the pancreas that regulates the level of **glucose**
- **glucose, a simple sugar that provides energy, in the blood.**
- **The human body requires a steady amount of glucose throughout the day, and that glucose comes from the foods people eat. Obviously, though, people don't spend the entire day eating a bit of food at a time to maintain a steady stream of glucose. This is where insulin comes into play.**

ADA Definition

- A disease that affects the body's ability to produce or respond to insulin, a hormone that allows blood glucose (blood sugar) to enter the cells of the body and be used for energy.
- Two types: Type 1 and Type 2
- 5th deadliest disease in the United States (2005)

Type 2

- Previously called non-insulin dependent diabetes (NIDDM) or adult on-set diabetes
- Associated with older-age, obesity, family Hx, gestational, physical inactivity
- The pancreas makes insulin, but the body cells have trouble using it properly
- Lifestyle changes can aid in treatment

Continue

- Diabetic eye disease is an **end-organ** response to a systemic medical condition. All structures of the eye and many aspects of visual function are susceptible to the deleterious effects of DM
- End Organ: a place where the blood vessels loop through or terminate

Symptoms

- Urinating more often, especially at night
- Blurred vision
- Fatigue or low energy
- Increased thirst
- Increased hunger
- Dry skin
- Slow healing wounds



Special Report

- [Google working on glucose-sensing contact lens](#)
- **Mountain View, CA**—Google recently announced it is developing a contact lens that monitors glucose levels for diabetics. Could this device mean the end of finger-pricking glucose monitors?

Skin Changes

- Dark, velvety patches in the folds of skin, usually on the back of the neck, elbows, or knuckles, are often an early warning sign of too-high blood sugar levels. Although genetics or hormonal conditions can cause the skin disorder, called acanthosis nigricans, "when I notice the patches, the first thing I do is test my patient's blood sugar," says Sanjiv Saini, MD, a dermatologist in Edgewater, Maryland. "High insulin levels promote the growth of skin cells, and melanin, a pigment in these cells, makes the patches dark



Vision Improves

- Sorry, suddenly being able to ditch your glasses probably isn't good news: "You'll often read that blurry vision is as a diabetes symptom when, in fact, vision can change for better or worse," says Howard Baum, MD. ... "I've had patients tell me that their vision has improved when their blood sugars were elevated, and then after they start treating their diabetes, they needed their glasses again." What gives? Diabetes causes fluid levels in the body to shift around, including inside your eyes, which leads to the erratic eyesight.

Unrelenting Itching

- Think it's silly to mention scratchy skin to your doctor? Not so. Diabetes impairs blood circulation, which can lead to dryness and itchiness. "Some of my newly diagnosed diabetes patients mention they're itchy on their extremities—the hands, lower legs, and feet—so it's something doctors should consider in conjunction with other symptoms," says Baum. If regular use of a moisturizer doesn't fix the itch, bring it up at your next appointment.

Loud Snoring

- "About 1/2 of type 2 diabetics have sleep-disordered breathing," says Osama Hamdy, MD, director of inpatient diabetes management at Joslin Diabetes Center in Boston...diagnosed condition—characterized by loud snoring and daytime sleepiness—...get your blood sugar levels checked, too...recent Canadian study showed 23% of patients dx w mild or moderate obstructive sleep apnea, a common sleep disorder, went on to develop dm within 5½ years...Pts w sleep-disordered breathing tend to release stress hormones during sleep, which can raise blood sugar levels

Technician's Role

- Provide the doctor with information in understanding the patient's current condition
- Identify any recent episodes involving vision or overall health
- Understand and properly administer appropriate test
- Identify patient's sign's and symptoms of DM
- Understand the different modes of intervention
- Education and referrals

Hearing Changes

- If you find yourself cranking the volume on the TV or you can't get through a conversation without asking people to repeat themselves, tell your doctor you need a blood sugar test. One study by the NIH suggested hearing loss could be an early warning sign of diabetes: People with higher than normal blood sugar who didn't yet meet the criteria for diabetes were 30% more likely ...with healthy glucose levels. The researchers believe that diabetes damages the blood vessels and nerves of the inner ear, leading to sub-par hearing.

What role does your office play?

- Optometrist are often the first health care practitioners to examine patient's with undiagnosed diabetes mellitus (DM) or ocular manifestations of DM
- Timely diagnosis and appropriate referral and intervention

Risk Factors

- **Sugar**
 - travels through the blood and attaches to part of red blood cells called hemoglobin (carries oxygen to lung)
- **High blood sugar**
 - High blood sugar can cause damage to the arteries by affecting proteins in the artery walls
 - Insulin resistance can lead to high blood pressure and increased cholesterol levels through a complex metabolic process
- **High blood pressure**
 - Can cause arteries to become less elastic raises blood pressure

Contributors

- Eating too much food or sugary liquids
- Not exercising
- Not taking diabetic meds
- Illness
- Infections
- Stress
- Weight (can contribute,, but not the deciding factor)

Cont...Screening a New Patient

- What should you look for:
 - Is the patient African American (37.3%) or Hispanic (42.9%)? Native Americans...
 - Is the patient at risk for hypertension?
 - Is the patient large waist up?
 - Check blood pressure
 - Systolic – pressure when heart is pumping
 - Diastolic – blood force against artery between heart beats
 - Last cholesterol check (HDL, LDL, and triglycerides)

A1C (glycohemoglobin)

- A1C test gives a perspective on diabetes management
- Lower A1C levels helps to reduce and prevent diabetes complications
- Directly relates to the average glucose concentration (mean blood glucose) in the body over the life span of red circulating red blood cells (RBC)
- Red blood cells live approximately 90-120 days
- 1 percent rise in HbA1c increases retinopathy by 44%
- The A1C test measures your average blood glucose control for the past 2 to 3 months. 4.3 – 5.5 is normal...Under 6% acceptable
- It is determined by measuring the percentage of glycated hemoglobin, or HbA1c, in the blood.
- Check your A1C twice year at a minimum, or more frequently when necessary.
- It does not replace daily self-testing of blood glucose.
- Story of ophthalmic tech

Patient Screening Checklist

- If the patient has diabetes:
 - Ask Case Hx questions specifically about
 - What is your A1C(4.3-5.5), latest BP(120/80), and cholesterol levels (<100)?
 - When was the last time you were tested?
 - What are you using to manage your diabetes?
 - Is your glucose under control?
 - Has your vision been stable since your last visit?
 - How do you feel today?
 - Are you taking your meds and exercising?
 - Is the patient a new or established pt?
 - Is the patient “New” or “Established”?

Cont....DM Established Patients

- Ocular Exam Includes:
 - Significant Case History
 - Vision (BCA)
 - IOP...biomicroscopy
 - Blood Pressure
 - Visual Field (Amsler Grid, HVT, etc...)
 - Ocular motility
 - Fundus Examination (new non-mydiatic technology documentation, retinal imaging)
 - ERG
 - Caution if contraindications are required
 - Color Vision Testing
 - Confrontation Fields
 - Contrast Sensitivity Testing
 - Those items in red should be done prior to seeing doc

Risk Factors Cont...

- Smoking damages the lining of arteries allows build up of plaque and raise blood pressure
- Inactivity make it harder for the heart to do its work...lack of activity aids in the formation of plaque
- Over-weight makes it harder for the body to use insulin and makes the heart work harder
- Low IOP is not good for pts with DM – blood flow is increased into the eye...

Helpful Screening Info

- Foot pain
- Dizziness spells
- Heavy sweating
- Weakness, faintness
- Nausea, vomiting
- Pain or pressure in back, neck, jaw or arm
- Eating habits
- Does patient track blood sugar?
- Supplement use
- Is the patient vision stable?
- Lethargic
- Blurred vision
- Inflamed gums
- Teeth pain
- Clammy/Pale skin
- Thirst
- Hepatitis
- HTN
- Medications are used to treat what defect
- Does the pt know about DM?
- Alcohol use

Risk Factors

- Obesity (120% over desirable body wt or 27% over body mass index)...for every 20lbs over wt...5% higher risk for DM
- First degree relative with diabetes
- African Am, Hispanic, Native Am, Asian
- **Delivered baby over 9lbs**
- Hypertensive (BP over 140/90)
- Cholesterol HDL lvl less than 35 or triglyceride lvl greater than 250mg/dl
- Has had Impaired Glucose Tolerance or Impaired Fasting Glucose on previous testing

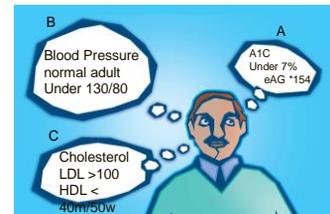
Effects of Smoking

- Vasoconstriction
- Venous dilation
- Oxidation
- Free radicals...Antioxidants are substances in the blood that may protect cells from the damage caused by **unstable molecules** known as **free radicals**
- Slows healing process

ABCs to remember!

Recommended twice a year if controlled

- **A**1C – covers 120 days
- **B**lood Pressure
- **C**holesterol
- Triglycerides
 - Under 150



Normal Body

- When we eat our body breaks down sugars, starches, and other foods into glucose or blood sugar, energy
- Glucose then enters bloodstream where it is transferred into tissue cells in all parts of the body
- Glucose is either for immediate use or for later storage in the **liver**, muscle, or fat for later
- Normal glucose levels are **4.3 – 5.5** (70-108mg/dl)...hypo levels below 4.3...hyper above 6.0
- Insulin is produced in the **pancreas** and regulates blood sugar

Blood Sugar Levels

- For people *without* diabetes, according to experts, blood sugar levels should be: Between 70 and 120 mg/ dL
- For people *with* type 2 diabetes: Fasting (not eating for a period of time): up to 130 mg/dL
- After meals: less than 180 mg/dL
- Krispy Kremes story

Bodily Functions

- Pancreas produces insulin
- Insulin regulates blood sugar which is the energy glands use to produce hormones
- Hormones are the signals that tell glands what to do



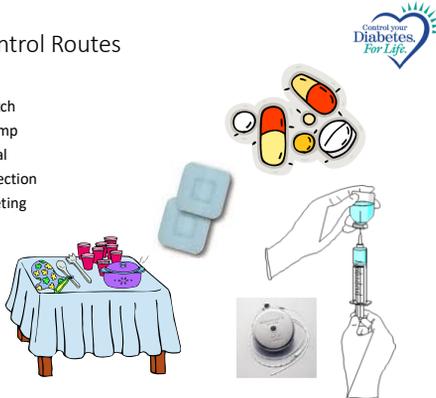
Some Signs in End Organs

- Eyes... vision fluctuations
- Teeth... gum infection/blood sugar
- Heart and Blood Vessels... vascular circulation
- Nervous System
- Kidneys... bladder control
- Gastrointestinal... bowel controls
- Feet... poor peripheral support
- *Ears... ringing sensation



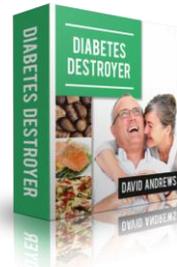
Control Routes

- Patch
- Pump
- Oral
- Injection
- Dieting



New Techniques

- Now there is a difference between being free from diabetes and being cured of it. **Diabetes Destroyer** does not advertise itself as a cure and is in **No Way A Scam**. It simply offers a way to get off diabetes medications and start to live a life that is more natural and healthier.



<http://diabetesdestroyer.com/special/v1no-oi/>

<http://www.foundationforintimacy.com/diabetes-destroyer-reviews-what-theyll-never-tell-you/>

In-office Complications

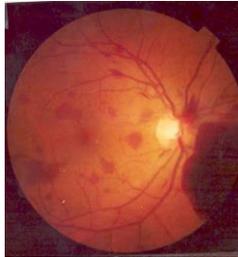
- Dial 911

In-Office Testing

- A1C Now.Com
- Ketone strips – urine activated
- Diabetes alert dogs
- Glucose –15 refrigerate
- Continuous Glucose Monitoring

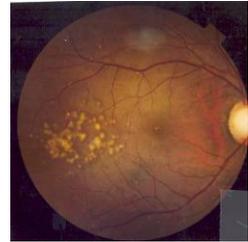
Health Sight Counseling

- Diabetic related ocular complications continues to be the most feared complication of the disease
- Visual impairment occurs in 23.5% of pts over the age of 50
- After 20 years, 40% of all diabetic patients will demonstrate some degree of diabetic retinopathy. 20% vision threatening



Ocular Complications

- Cataracts
- AMD
- Glaucoma
- UVR retina related ocular diseases
- Superoxide formation and lipid peroxidation
- Contrast Sensitivity
- Glare
- Color discrimination



Types of Diabetes

- Type I...(age less than 30) destroys beta cells in pancreas (faster in infants and children), **absolute insulin deficiency, needs drugs**
- Type II...most common, causes vary, 90% of DM patients, most patients are asymptomatic and remain undiagnosed for years,

911 Time...don't panic!

- Prompt treatment... **Louisiana story**
- Distress signs
 - Shortness of breath or trouble breathing
 - Heavy sweating
 - Tiredness, weakness, or faintness
 - Nausea vomiting
 - Dizziness
 - Pain or pressure in your chest, back, neck, jaw, or arm
 - Awareness deprivation
 - Loss of color

Types of Diabetes Cont...

- Impaired Glucose Tolerance...most people have normal HbA1c levels
- IRD (Insulin Resistant Diabetes)
- Gestational Diabetes...during pregnancy...4% of pregnancies...no need to test if all criteria are met: under 25, normal wt, no 1st degree relative, not Hispanic, Native American, African AM, or Asian, during 24-28 wks...9lb indicates
- Other types...juvenile (genetics), age related (growing baby boomers), stiff-man syndrome

Hypo vs Hyper glycemia

Low blood sugar/Hypo

- Sudden onset symptoms
- Poor coordination
 - Difficulty maintaining balance
- Angry, moody temper
- Pale skin, coloration
- Confusion/disorientation
- Sudden hunger
- Unnatural sweating
- Trembling
- May result in unconsciousness
- Eat high sugar foods/ no diet drinks
- Sweet smelling breath

High blood sugar/Hyper

- Gradual onset of symptoms
- Sleepiness
- Excessive thirst
- Frequent urination
- Flushed skin color
- Nausea, vomiting
- Fruity/wine like smelling breath
- Heavy breathing
- May result in unconsciousness
- If you are not sure if hypo or hyper, give a sugar containing drink

Cautions

- Periodontal disease for those with DR
- Timoptic/Timolol can cause low blood sugar
- Hyposthesia – neuropathy of the cornea (dilate w/o anesthesia)
- HCTZ makes DM control harder
- Glyburide makes blood sugar control more
- Metformin can cause digestive issues, go to extended release

Symptoms of DM1

- Polydipsia...abnormal amt of water intake
- Polyphagia...excessive eating...ck emotional status
- Polyuria...release of large amts of urine
- Unexplained weight loss
- Dry mouth...means pt has a dry mouth ☺
- Pruritus...anal itching
- Leg cramps or pain...
- Delayed healing in skin wounds, genitalia, or urinary tract
- Absolute dependency on exogenous insulin to prevent ketoacidosis (key-toe-ass-i-DOE-sis) is a serious condition that can lead to diabetic coma (passing out for a long time) or even death. Ketoacidosis may happen to people with type 1 diabetes)
- Peripheral neuropathy...loss tactile sensation

Ocular Manifestations

- Approx 5% develop glaucoma..
- Pre-mature cataracts are 2-4 times more likely
- Retinopathy...bleeding inside of eye
- Macular defects...central field loss
- Unstable VA's...fluctuating hormones...
- Neovascularization on Iris
- Loss of corneal sensitivity...Descemet's membrane wrinkling and delay healing (contact lens wearers)
- Sluggish pupillary reflexes
- Tear film deficiencies resulting in dry eye
- Iris de-pigmentation
- Tritan color deficiencies (blue)...short wave length/high energy
- 25 times higher incidence of open angle glaucoma

Neovascularization on Iris

- Blood vessels growing places where they don't normally grow



Explain picture!

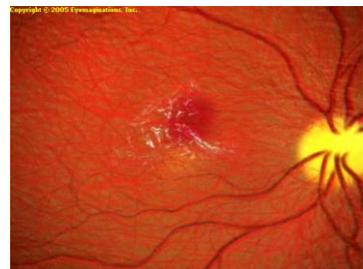
Cystoid Macula Edema

- Documented as "CME"...or swelling of the [macula](#), typically occurs as a result of disease, injury or more rarely, eye surgery. Fluid collects within the layers of the macula, causing blurred, distorted central vision. CME rarely causes a permanent loss of vision, but the recovery is often a slow, gradual process. The majority of patients recover in 2 to 15 months.



Macula Pucker

- Swelling in the macula



Guide for Adults

- Blood Sugar Control
 - A1C less than 6% but if over 7% serious
 - Blood sugar before meals 90-130 mg/dl
 - Peak blood sugar after meals <180mg/dl
- Blood Pressure
 - Normal 120/80 but <130/80 mmHg
- Lipids
 - LDL >100 mg/dl
 - Triglycerides >150 mg/dl
 - HDL greater than 40 mg/dl for men 50mg/dl for women

Co-manage Patient PPOD

- Podiatry
- Pharmacy
- Optometry
- Dentist
- Primary Care Manager
- Endocrinologist

Carbohydrates

- **Everyone has food boundaries**
- All carbs are broken down in to glucose
- Carbs are the body's main source of food
- All carbs provide the same number of calories
- Carbs are stored in the liver and used as fuel reserves
- Extra carbs are stored as fat for later use

Symptoms

- Casual plasma glucose of greater than or equal to **200mg/dl**...no regard to last meal
- Fasting plasma glucose greater than or equal to 126mg/dl...no meal 8 hrs
- Two hour plasma glucose greater than or equal to 200mg/dl during an oral glucose tolerance test using a 75-g glucose challenge (WHO)

What causes low blood sugar

- Blood sugar below 70 is called **hypoglycemia**
- Delayed meals
 - Not eating enough
 - Too much medication
 - Unplanned strenuous activity
 - Drinking alcohol on an empty stomach
 - **If the patient is unconscious call 911**

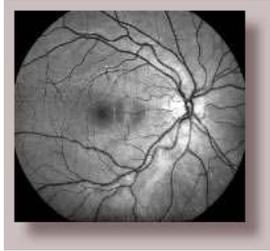
Symptoms of Hypoglycemia

- Weakness
- Fast hear beat
- Shakiness
- Irritability or anxiety
- Blurred vision
- Headache
- Sweating
- Light-headedness



Diabetic Retinopathy

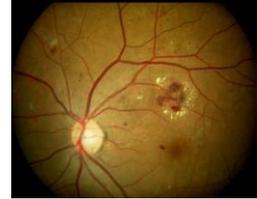
- Ruptured micro-aneurysms
- Inter-retinal hemorrhages
- Hemorrhages in NFL
- New vessel growth
- Venous bleeding
- Lamellar holes
- Exudates



Angiogram

Photography

- Non-proliferative Diabetic Retinopathy
- Proliferative Diabetic Retinopathy
- Macula Edema
- Exudates



Surgery

- Severe irreversible vision loss, peripheral visual field loss
- Laser photocoagulation



Helpful Hints

- Manage blood sugar within recommended range
 - Aids in blood pressure/cholesterol levels
- Manage cholesterol
 - Eat less fat, fried foods, more fish, vegetables, lean meat
- Manage by measuring blood pressure regularly
- Treatment PRN
- Lose weight
- Exercise 10 min per day at least 3 days a wk
- Foot care inspect for cracks, blisters, sores

Caution when you are ill!

- Check blood sugar @ 4hrs
- Keep a diary of food
- Common illnesses that have serious complications in patients with diabetes:
 - The flu
 - Vomiting
 - Diarrhea
- See your HCP if:
 - You have fever <101F
 - Cold or flu last too long
 - Nausea, diarrhea, or vomiting last longer than 4 hrs
 - Shakiness, light-headedness, sweating, or rapid heartbeat last for more than 4 hrs
 - Confusion/cant think

Tell Your Patient

- Drink plenty of non-caloric fluids
- Take your medication as prescribed
- Follow a meal plan
- Exercise per Dr. instructions
- Check blood sugar before meals and bed
- Check your urine for ketones
- Don't do anything that may cause your sugar level to become wacked out

5 categories of DM medications

- **Sulfonylureas** – stimulate the pancreas to produce more insulin
- **Meglitinides** also stimulate the pancreas
- **Biguanides** keep the liver from releasing too much
- **Alpha-glucosidase** inhibitors slow the digestion
- **Thiazolidinediones** makes muscle more sensitive to insulin

Contact Pt's PHCP

•Send ocular findings to the patient's Primary Health Care Provider

Review

- What is Diabetes
- Types of Diabetes
- Screening Patients
- Established Patients
- Diabetic Meds
- Test Results
- Diabetic Retinopathy
- Photography
- Return/follow up visits

ADA Test

1. What are some risk factors for DM?
2. Why is the A1C test important for managing blood sugar?
3. What ethnic groups is more at risk?
4. What is considered a big baby for DM?
5. What is the ideal range for the A1C result

ADA Test Cont...

6. Name ocular complications assoc with DM?
7. Why is BP a concern for DM patients?
8. What is diabetes?
9. What are the two different types of diabetes?
10. How is blood sugar measured?

Helpful Resources

- **Diabetes Education Resources**
- **American Association of Diabetes Educators**
www.diabeteseducator.org
1-800-338-3633
- **American Diabetes Association**
www.diabetes.org
1-800-DIABETES (1-800-342-2383)
- **American Dietetic Association**
www.eatright.org
1-800-877-1600
- **American Heart Association**
www.americanheart.org
1-800-AHA-USA1 (1-800-242-8721)
- **Centers for Disease Control and Prevention**
www.cdc.gov/diabetes
1-800-CDC-INFO (1-800-232-4636)
- **MerckMedicus™**
www.merckmedicus.com
1-800-489-5119
- **National Diabetes Education Program**
www.ndep.nih.gov
1-800-438-5383
- **National Diabetes Information Clearinghouse**
www.diabetes.niddk.nih.gov
1-800-860-8747

Credit for Reference Materials

- Give reference materials
 - Credit for the information in the lecture goes to the AOA's Clinical Practice Guidelines
 - American Diabetes Association
 - National Institute of Eye Health
 - Merck Patient Education on Diabetes
- <http://www.msn.com/en-us/health/medical/5-surprising-symptoms-of-diabetes/ss-AA9jGcV?ocid=IDMD#image=6>

Questions

Thank you
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