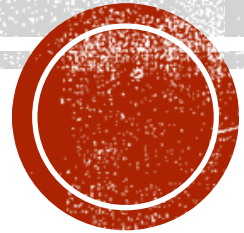
DIABETES PREVENTION

Kellee Glaus

University of Washington School of Medicine MS2



WHAT IS DIABETES?

- Type 1 Diabetes
  - Insulin is not produced, islet cells in the pancreas are damaged
  - Dependent on exogenous insulin
- Type 2 Diabetes (90% of diabetics in the U.S.)
  - Insulin Resistance in the peripheral tissues, may have islet cell lesions and decreased production
  - Non-insulin dependent
- Gestational Diabetes:
  - Diabetes during pregnancy[4]

	Type 1 Diabetes	Type 2 Diabetes
Onset	Abrupt	Gradual
Symptoms	Symptomatic	Often asymptomatic
Insulin requiring	Always	Sometimes
Insulitis	Yes	No
Obesity	Usually no	Usually yes (85%)
Insulin resistance	No	Yes
Familial	Unusual	Common
HLA associated	Yes	No
Identical twin concordance	30-40%	95+%
IAA*, IA-2, GAD**	Yes	No

WHAT INCREASES THE RISK OF DIABETES?

- Genetics:
- Type 1 diabetes:
  - Finnish
  - Autoimmune attack on beta cells of the pancreas
  - Environmental factors: viral infections
  - Younger patients
- Type 2 Diabetes:
  - Pima Indians, African Americans,
  - US Hispanics, and Japanese Americans
  - Rarely seen before the age of 10.[4]
- Obesity

Smoking

Age 45 or older

Sedentary Lifestyle

Excessive abdominal fat

High blood pressure

Pre-diabetes

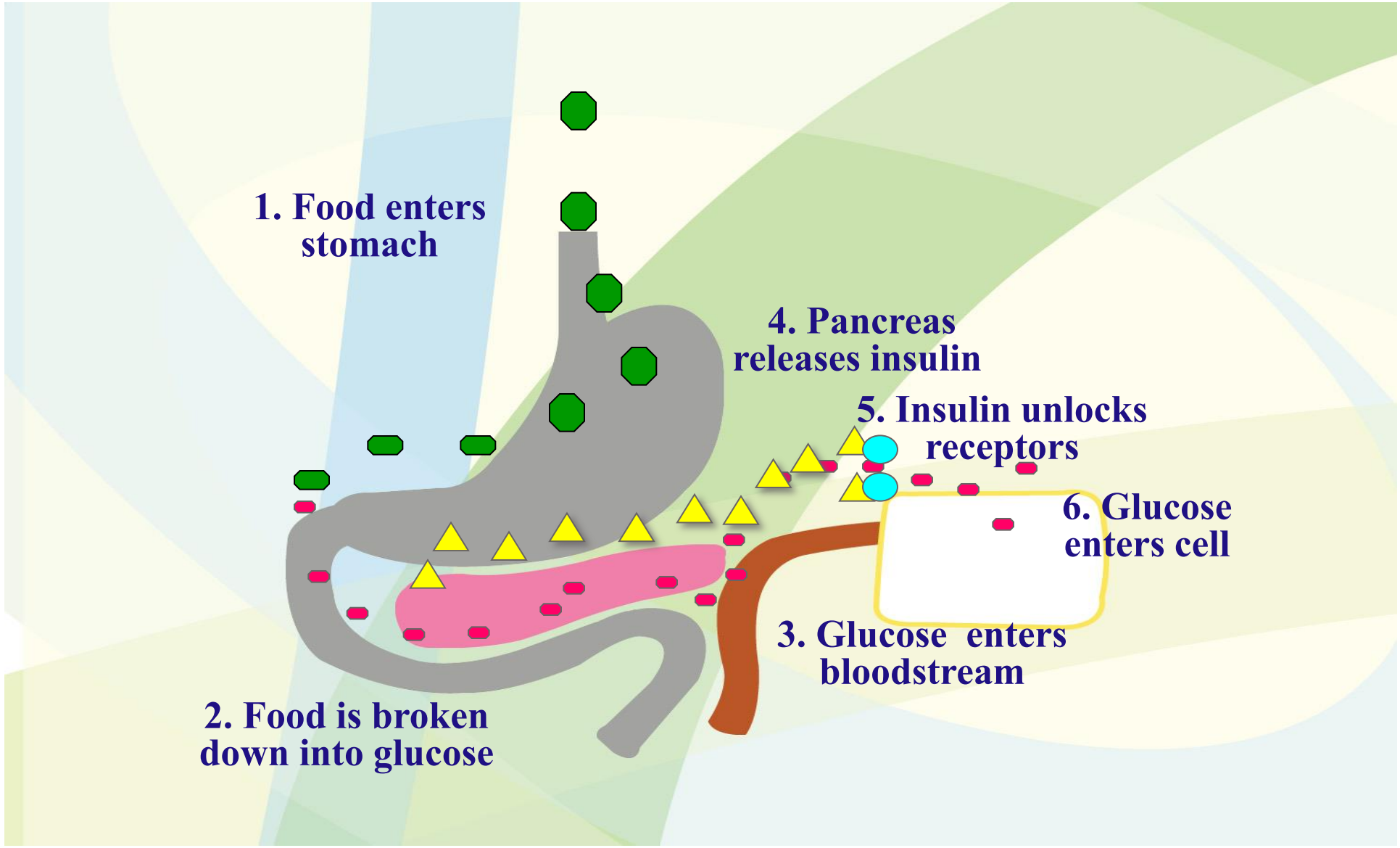
High lipids

Unnatural darkening of the skin

Polycystic ovary syndrome

History of Gestational Diabetes or large baby[1]

HOW FOOD IS DIGESTED ...

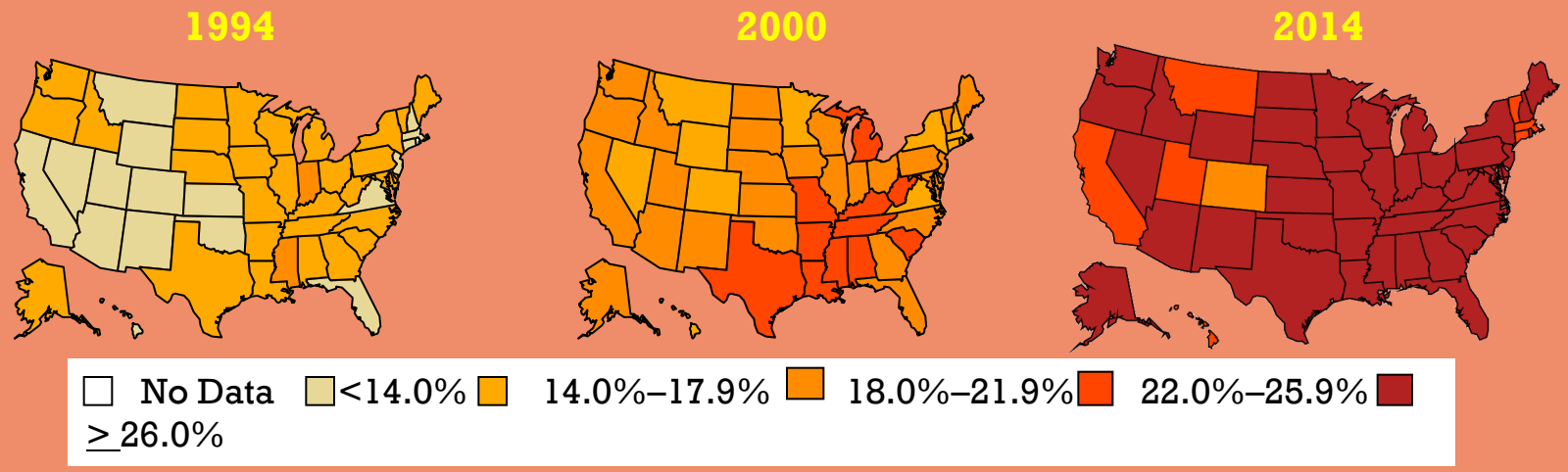


HOW PREVALENT IS DIABETES IN THE U.S.?

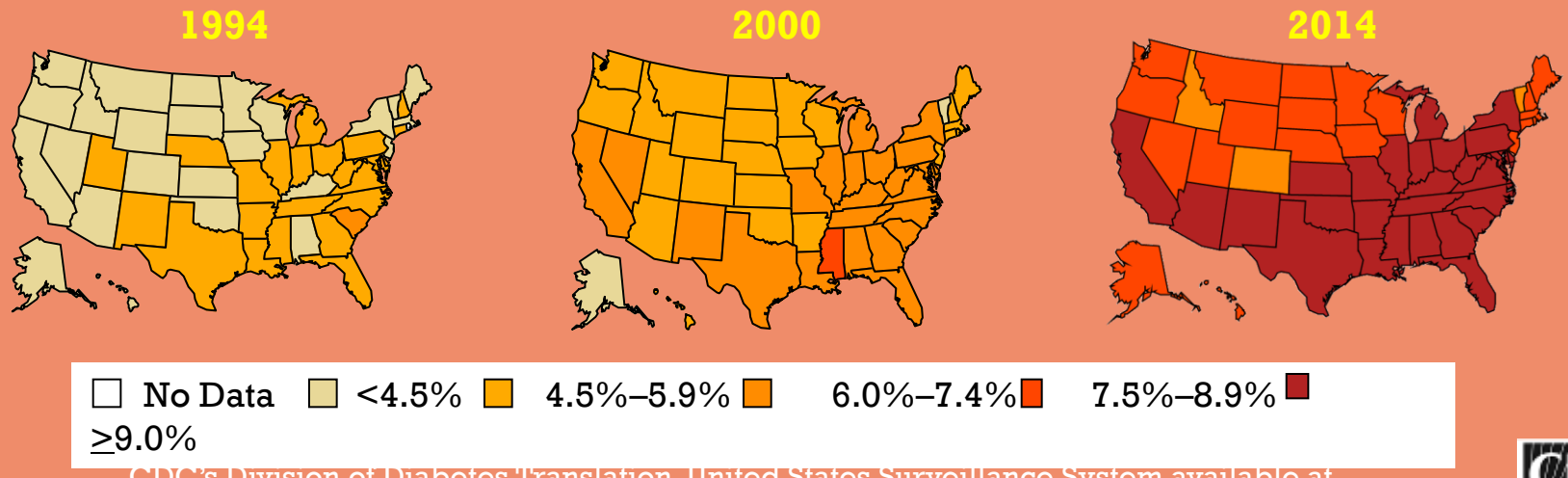
- The rate of diabetes in the United States has tripled in the last 30 years.
- There are 26 million diabetics in this country.
- 11.3% of adults over the age of 20 and 27% of adults of the age of 65 have diabetes
- 19% of African Americans and 12% of Mexican Americans over the age of 20 have diabetes
- 7 million people in the U.S. have undiagnosed diabetes.
- It's estimated that one in three babies born in the year 2000 will develop diabetes in their lifetime. [4]

Age-adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

Obesity (BMI ≥30 kg/m^2)



Diabetes



CDC's Division of Diabetes Translation. United States Surveillance System available at http://www.cdc.gov/diabetes/data

HOW PREVALENT IS DIABETES IN RAVALLI COUNTY?

- Ravalli County, Montana
  - Population: 40,617
  - Obesity rate: 20.3%
  - Diabetes rate: 6.1%
  - Age adjusted diabetes death rate: 15.3 per 100,000
  - Coronary heart disease death rate: 80.5 per 100,000
- Gallatin County Montana:
  - Population: 92, 614
  - Obesity rate: 17.2%
  - Diabetes rate: 3.8%
  - Age adjusted diabetes death rate: 12.6 per 100,000
  - Coronary heart disease death rate: 73.2 per 100,000[3]

WHAT HAS CAUSED THIS INCREASE IN PREVALENCE?

- Aging population
- Ethnically diverse population
- Baby boomers
- Decreased activity
- More fast food
- Larger meal portions[1]

WHO IS AT RISK FOR DEVELOPING DIABETES?

- http://www.diabetes.org/are-you-at-risk/diabetes-risk-test/to find risk

SYMPTOMS OF DIABETES

- Frequent urination
- Excessive thirst
- Extreme hunger or constant eating
- Unexplained weight loss
- Presence of glucose in the urine
- Tiredness or fatigue
- Changes in vision
- Numbness or tingling in the extremities
- Slow-healing wounds or sores
- Abnormally high frequency of infection
- ***Many people have no symptoms***[1]

HOW IS DIABETES DIAGNOSED?

- Elevated blood glucose >250 mg/dL is a definite diagnosis
- One of the following present on two occasions:
  - Fasting plasma glucose: >126 mg/dL
    - Between 100-125 mg/dL is prediabetes
    - Casual plasma glucose: >200 mg/dL
  - Abnormal Oral Glucose Tolerance Test
    - Drink 75 grams of glucose
    - Measure at baseline and 2 hours
    - >200 mg/dL means diabetes
    - 140-200 mg/dL is prediabetes
- Hemoglobin A1C >6.5
  - Average of blood glucoses over 120 days[4]

WHAT ARE THE SIDE EFFECTS OF DIABETES

- Acute:
- Ketoacidosis
  - hyperglycemia and low volume, metabolic acidosis due to ketones
  - Could lead to diagnosis of diabetes
- Hypoglycemia
  - Usually in patients receiving insulin
  - Severe conditions: confusion, blurred vision, seizure, coma
- Hyperosmolar nonketotic syndrome
  - Dehydration
  - Hyperglycemia
  - Insulin deficiency less frequent[4]

- Chronic
  - Peripheral neuropathy
    - Small vessels in extremities, usually the legs first
    - Sensory: can't feel, more likely to have trauma and ulcers
      - Can lead to leg amputation
    - Motor: weakness
  - Diabetic retinopathy
    - Hemorrhage of small vessels of the eyes
    - Can lead to blindness
    - Lasers can be used to treat
    - Yearly dilated eye exams recommended for most patients
  - Erectile dysfunction
    - Autonomic neuropathy[4]

WHAT OTHER DISEASES ARE ASSOCIATED WITH DIABETES?

- Cardiovascular disease: due to damage of large vessels of the heart
- Major cause of mortality in diabetic patients
  - 75% of diabetic deaths are due to atherosclerosis
  - Heart disease
    - 55% of mortality with diabetes
    - Present in 20% of diabetic patients over the age of 45
  - Stroke
    - 10% of mortality with diabetes
  - Coronary Artery Disease
    - 2-4 times more likely than general population[4]

- Leading cause of new blindness
- Kidney Failure:
  - See proteinuria
  - Hypertension can cause this damage
    - Try to treat hypertension to reduce nephropathy
    - Life expectancy: 3-4 years
- Non-traumatic amputations
  - Life expectancy: 3-4 years[4]

WHY CARE ABOUT DIABETES PREVENTION?

- Mortality rates in diabetics 45 or older are 2 to 4 times higher than non-diabetic patients of the same age.
- Diabetes accounts for 20% of all deaths in the age range of 45-75.
- In 2012, it was estimated that diabetes cost over $245 billion/year
  - 10-15% of all healthcare costs
  - 25% of Medicare costs[4]

HOW IS TYPE 1 DIABETES TREATED?

- Type 1 Diabetes
  - Treated with insulin
  - Reduces risk of Heart Disease
  - Must occur early on
- Types of insulin: want to maintain a HbA1C of about 7
  - Insulin lispro: rapid acting (minutes), injected
  - Insulin receptor agonist: short acting, can be delivered many ways
  - Insulin glargine: long acting (20 hours), injected
  - Insulin detemir: similar to glargine, but a shorter duration
- Amylin: naturally secreted with insulin,
  - Retards gastric emptying, suppresses glucagon, and appetite, injected[4]

HOW IS TYPE 2 DIABETES TREATED?

- Sulfonylureas: stimulate insulin secretion
  - Lowers HBA1c 1.5-2%
  - Causes weight gain and hypoglycemia
- Metformin: improves insulin resistance
  - In the liver more than muscles
  - Lowers HbA1c 1.5-2%
  - GI side effects and lactic acidosis
- GLP-1 Agonists: stimulate insulin secretions
  - suppress glucagon, slow gastric emptying
  - reduces food intake, minor weight loss
  - Maintains beta cell mass and efficiency
  - Reduces A1C by 1-1.5%
- Dipeptidyl peptidase IV inhibitors:
  - Key enzyme that breaks down GLP-1
  - Reduces A1C 0.5-1%
- Alpha glucosidase inhibitors:
  - Reversibly and competitively inhibit
  - Delay digestion of carbs
  - Lower A1C 0.5-1%
  - GI side effects
- Thiazolidinediones: increase sensitivity to target tissues, especially muscle
  - Heart issues
- Meglitides: promote insulin secretion
  - Take prior to meals
  - Block reabsorption of glucose in the kidney
  - Lowers weight and glucose levels
  - Decreases heart attack and stroke risks

Eventually Type 2 diabetics may will need insulin!![4]

COMBINATION THERAPIES FOR TYPE II DIABETES

- Metformin and sulfonylureas
- Alpha glucosidase inhibitors with sulfonylureas
- Thiazolidinediones work well with sulfonylureas or insulin
  - With insulin lowers A1C about 1.5%
- Meglitinides and metformin[4]

HOW CAN DIABETES BE PREVENTED?

- ABCS:
  - A1c: Glucose control
    - Prevents or delays retinopathy, and neuropathy by 50-60%
  - Blood Pressure control
    - Smoking cessation
  - Cholesterol (lipid) control
    - Statins[1]
- Daily aspirin for prevention of stroke or heart issues
- Exercise
- Weight loss
- Diet alterations

EXERCISE

- Get at least 150 minutes of exercise per week
- This amounts to only a little over twenty minutes a day
- 7% weight loss
  - Try to lose only 1-2lbs/week during this process[4]
- Get a pedometer and log steps
- Find something you enjoy
- Get a workout buddy
- Join a gym
- Log your progress

BENEFITS OF EXERCISE

- Lowers blood glucose and blood pressure
- Controls cholesterol
- Strengthens heart, lung and circulatory systems
- Stimulates weight loss
- Strengthens bones, muscles and stamina
- Improves sleep
- Decreases stress, improves mood
- Improves brain circulation
- **Improves self confidence![5]**

DIET

- Limit saturated fats (butter, cheese, fatty meats)
- Decrease total amount of fat (less oils, salad dressing, fried foods)
- Eat more daily fiber
- Eat fruits and/or vegetables at each meal
- Eat at smaller meals at regular times
- Balance caloric input and output
- Try to cut 500 calories/day[5]
- Log meals
- Shop in the outer isles at the grocery store
- Avoid junk food and emotional eating

CALORIES

- McDonald's Large Chocolate Shake: 850 calories
- McDonald's Cheeseburger: 360 calories
- McDonald's Large Fry: 510 calories[6]
- Starbuck's Large Mocha Frappuccino: 410 calories[7]
- 1 Slice of pizza: 180 calories
- 1 cup of lettuce: 7 calories
- 2 ounces of fish: 80 calories
- 1 small apple: 80 calories[2]

- Based on a normal caloric intake of 2,000 calories

LINKS TO WEBSITES

- Healthy Recipes for Diabetics: American Diabetes Association
  http://www.diabetes.org/mfa-recipes/recipes/
- Diabetic Friendly Recipes: The Food Network Channel

http://www.foodnetwork.com/topics/diabetes-friendly.html

- Diabetic Meal Plan Recipes: The Mayo Clinic

http://www.mayoclinic.org/healthy-lifestyle/recipes/diabetes-meal-plan-recipes/rcs-20077150

Diabetes Tips Sheet: American Association of Diabetes Educators

https://www.diabeteseducator.org/patient-resources/tip-sheets-and-handouts

- Questions?

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