UNC Mini Medical School: Diabetes

Dr. Deepa Kirk, MD
Halei Benefield and Evans Lodge
Monday, February 10, 2020

Diabetes: An Introduction

Halei Benefield and Evans Lodge

Outline

15-20 minute introduction (Halei)

1. Introductions - who are we, and why are we here?
2. What is diabetes?
3. Epidemiology (Who gets diabetes? Where? When? etc.)

10 minute break

45 minute **interactive** talk (Dr. Kirk)

15-20 minutes for questions

What are our goals for the evening?

We want you to leave knowing:

1. What diabetes is
2. How common diabetes is
3. How diabetes impacts the body
4. How we diagnose and treat diabetes

What are our goals for the evening?

This means that:

1. If you're confused - **tell us!**
2. If we're not being clear - **tell us!**
3. If you have a question - **ask us!**

What is diabetes?

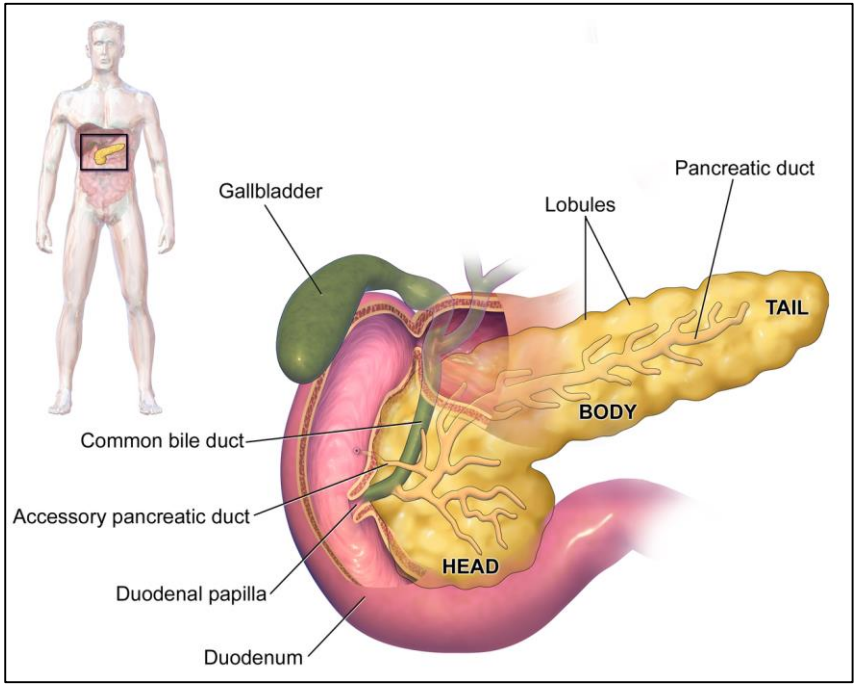
Diabetes is a **condition where there is too much sugar in your blood.**

But why is there too much sugar?

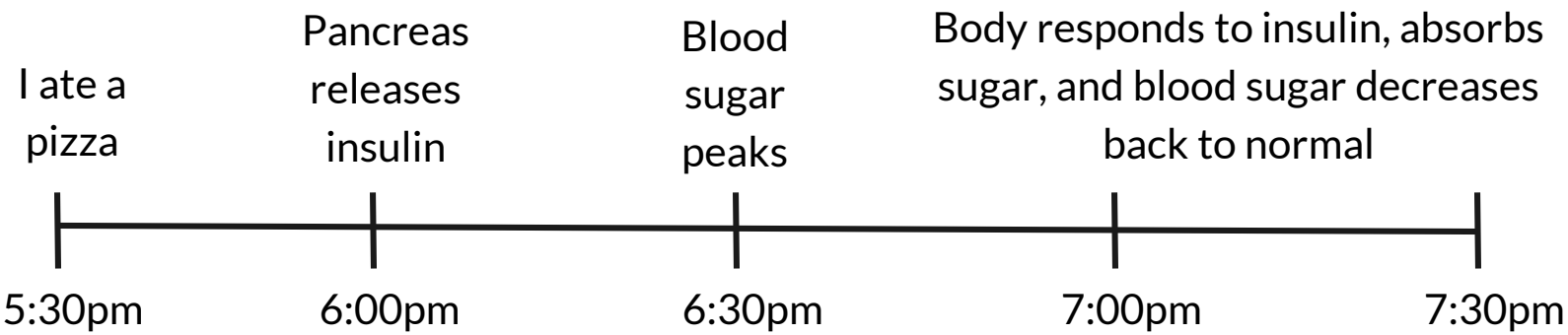
The pancreas and insulin

Pancreas - small organ behind the stomach that releases **insulin** when your blood sugar gets high

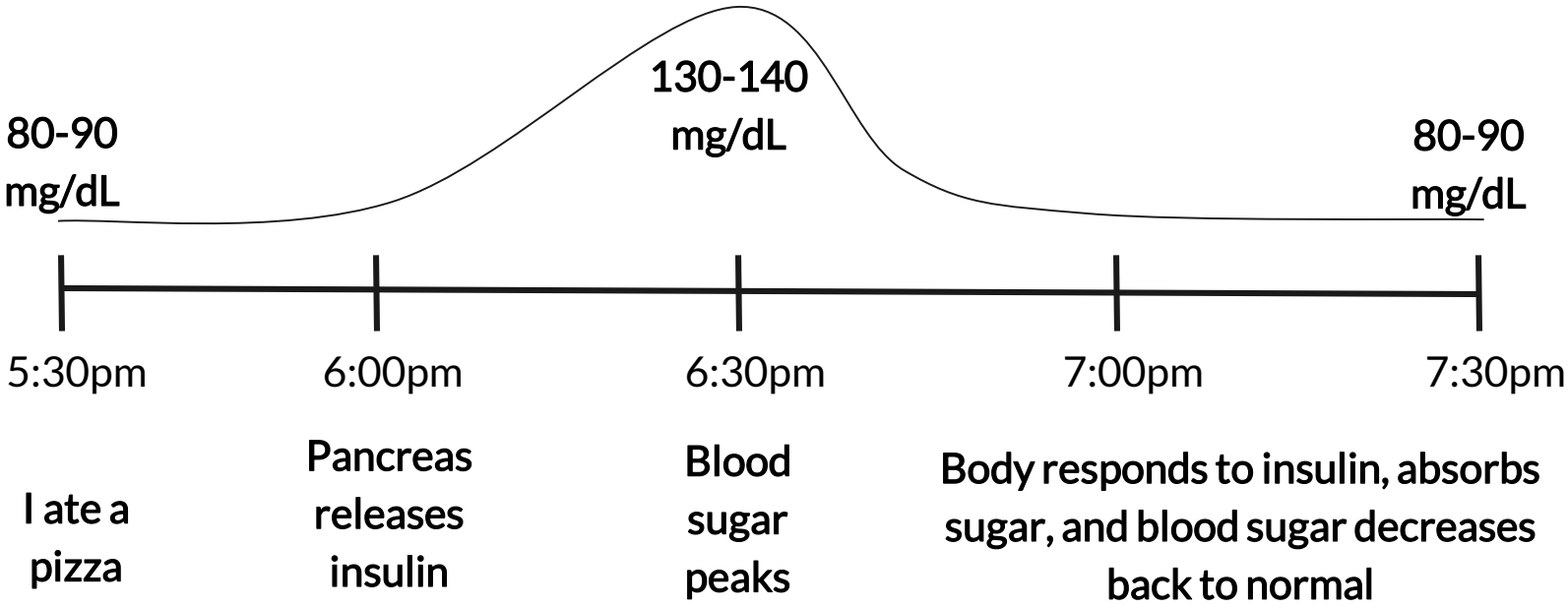
Insulin - a **hormone** that tells your body to absorb sugar out of your blood



The pancreas and insulin



The pancreas and insulin



What is diabetes?

Based on what we just learned about the pancreas and insulin, you should be able to imagine two different ways that you end up with too much sugar in your blood:

1. You don't make enough insulin - **Type 1 Diabetes**
2. Your body doesn't react to the insulin you *do* make - **Type 2 Diabetes**

Dr. Kirk will explain Type 1 and Type 2 Diabetes in detail in her talk this evening

Diabetes Epidemiology

Ep • i • de • mi • ol • o • gy: Epidemiology is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems.[1]

-or-

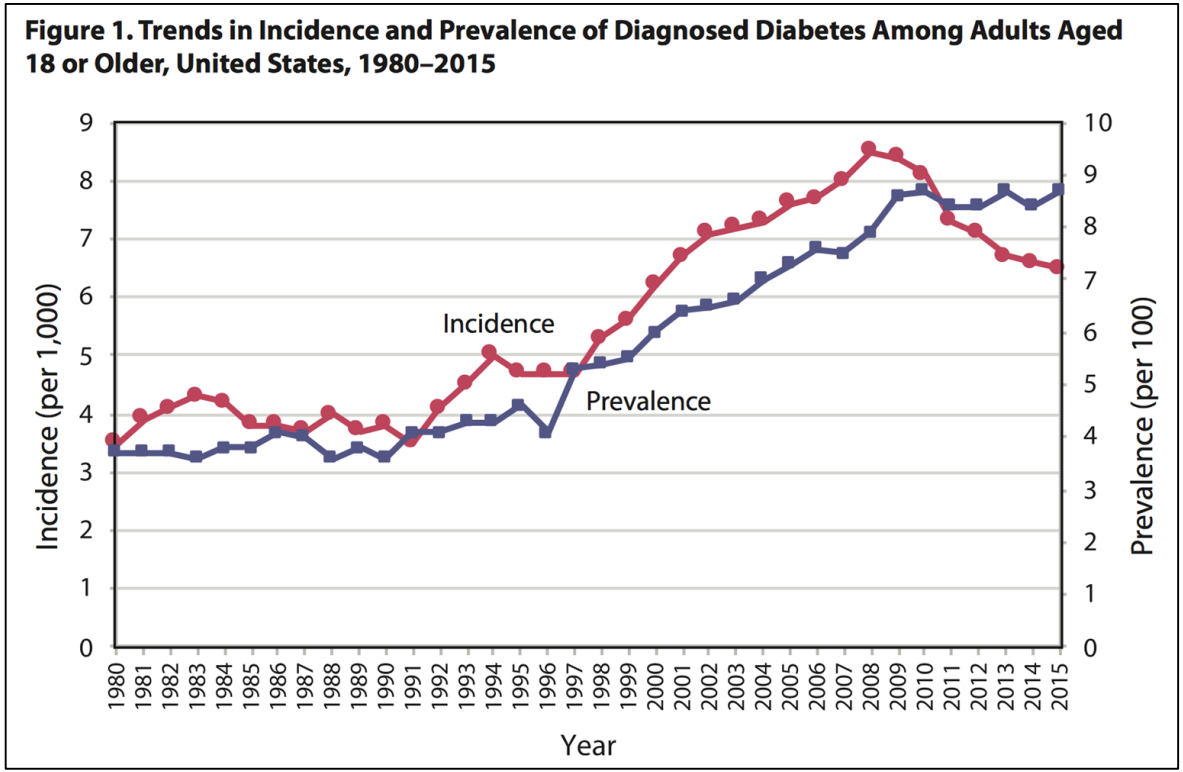
Epidemiology answers the “who,” “what,” “when,” and “where” of disease in the **population**.

[1]World Health Organization, https://www.who.int/topics/epidemiology/en/

In 2015 (last CDC estimates):

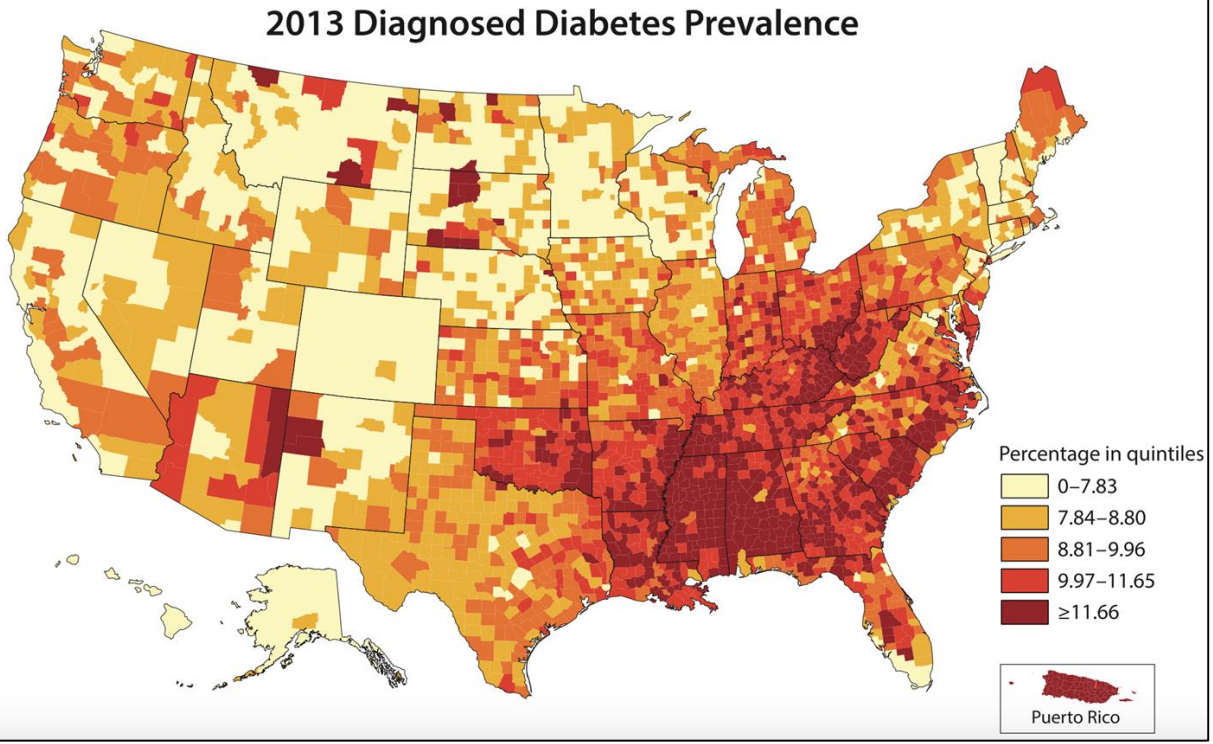
1.4 million new cases of diabetes were diagnosed in adults

About 9.4% (30.3 million) of the US adult population had diabetes



[2]CDC, https://www.cdc.gov/diabetes/library/reports/reportcard.htm

Figure 2. Age-adjusted, county-level prevalence of diagnosed diabetes among adults aged ≥20 years, United States, 2013



[2]CDC, https://www.cdc.gov/diabetes/library/reports/reportcard.htm

Questions?

Take a 10 minute break!

Feel free to step outside, come chat with us, get to know a neighbor, etc.

Diabetes in Detail

Dr. Deepa Kirk, MD

Associate Professor of Medicine, Division of Endocrinology and Metabolism
Medical Director, UNC Hospitals Diabetes and Endocrinology Clinic at Meadowmont

Outline

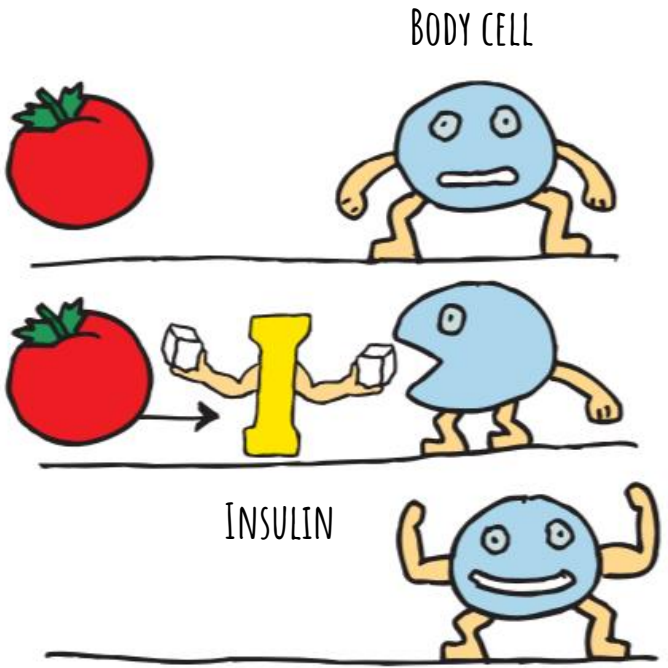
45 minute **interactive** talk (Dr. Kirk)

1. What is diabetes (Type 1, Type 2), and who gets it?
2. Pathophysiology - pancreas, insulin, etc.
3. Diagnosing diabetes
4. Managing diabetes (“a day in the life”) - diet and medication
5. Complications of diabetes (short and long-term)
6. Prevention of diabetes
7. The “cutting edge” - exciting advances in prevention and care

15-20 minutes for questions

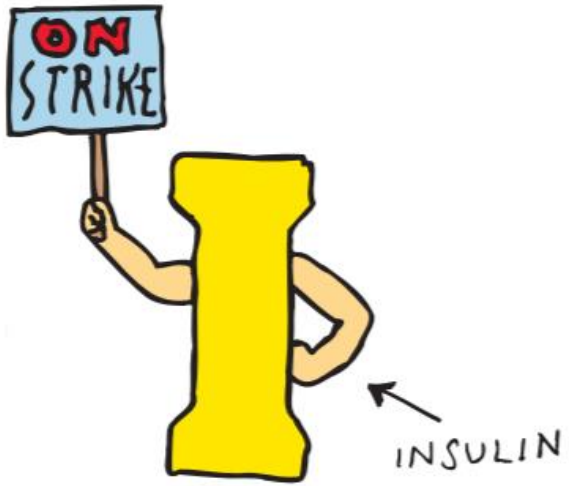
What is diabetes?

- All of the cells in your body need sugar to work normally
- Insulin helps sugar get into cells
- If there isn't enough insulin, or your cells stop responding to insulin, sugar builds up in the blood
- This condition is called **diabetes**



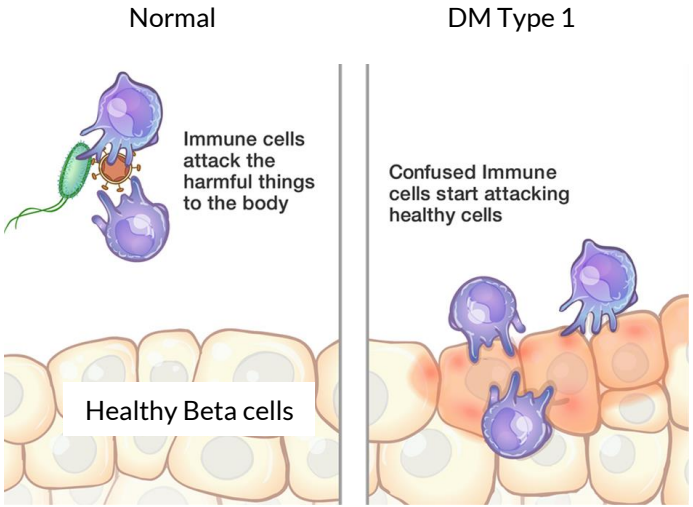
What is Type 1 diabetes?

- The body does not make enough insulin
- Sugar does not move into cells
- Blood sugar becomes very high



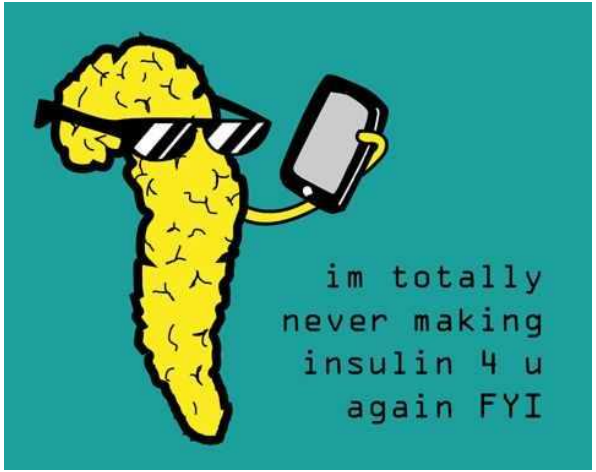
Tell me more

- In DM-I the immune system destroys the insulin-producing cells (beta cells) in the pancreas
- This is called an autoimmune response
- This process occurs over many months or years, and there may be no symptoms of diabetes.
- Symptoms do not usually occur until more than 90 percent of the cells that make insulin have been destroyed



What are the symptoms of Type 1 diabetes?

- Excessive thirst
- Feeling tired
- Needing to urinate frequently
- Losing weight
- Blurred vision
- Feeling hungry
- Unintentional weight loss
- Frequent yeast infections or urinary tract infections
- Slowly healing wounds



Who gets Type 1 diabetes?

- 75% of cases are diagnosed in children
- 25% of cases are diagnosed in adults
- Those with a close relative with DM-I have significantly increased risk

What is Type 2 diabetes?

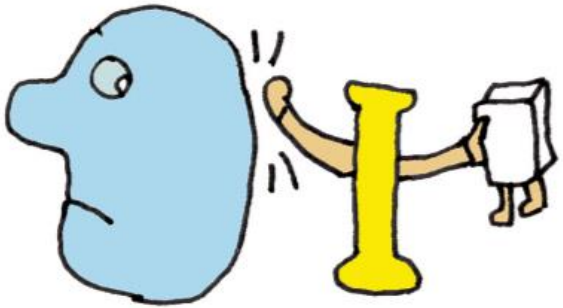
The cells of the body do not respond to insulin

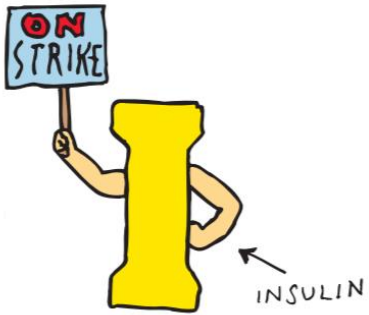
OR

The body does not make enough insulin

OR

Both





Tell me more...

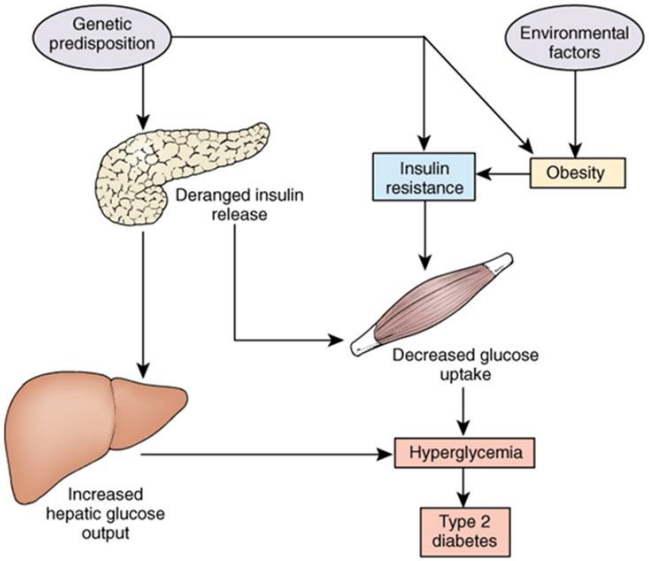


Image via: proprofs.com

What are the symptoms of Type 2 diabetes?

- Type 2 rarely causes symptoms!
- When symptoms do occur, they include:
  - Needing to urinate often
  - Intense thirst
  - Blurry vision

Who gets Type 2 diabetes?

- Mostly adults, but recent increase in childhood cases
- Risk factors
  - Family history
  - Obesity
  - Diet (red and processed meat, sugary beverages)
  - Sedentary lifestyle

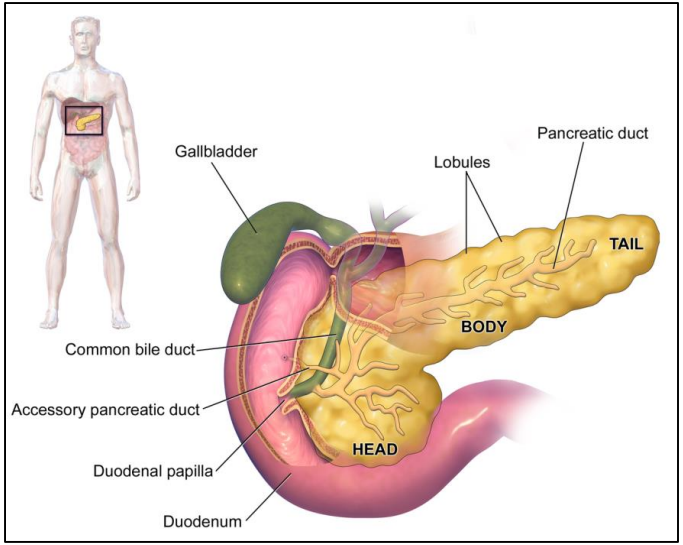
To review:

Pancreas - releases **insulin** when blood sugar goes up

Insulin - tells your body to absorb sugar from your blood

Type 1 Diabetes - your pancreas stops making insulin (about 10% of cases of diabetes)

Type 2 Diabetes - your body stops responding to insulin (about 90% of cases of diabetes)



Questions?

Diagnosing Diabetes

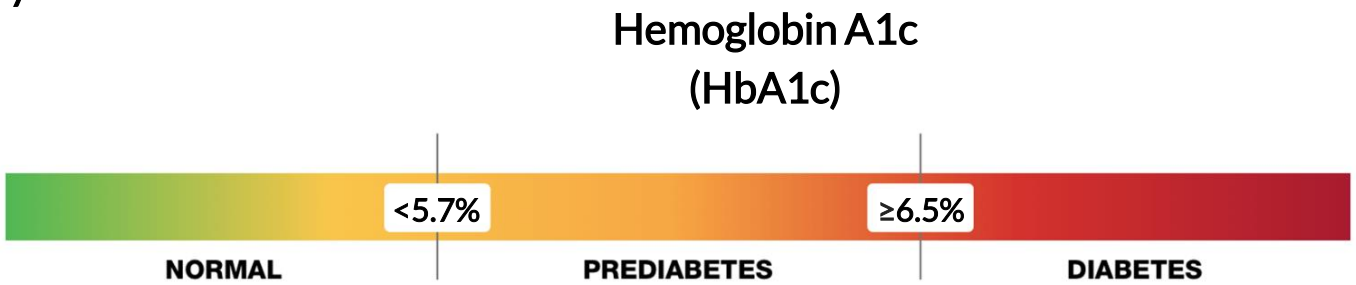
Multiple ways!

Fasting plasma glucose

i.e. when you haven't eaten for at least 8 hours, how much sugar is in your blood?

Diagnosing Diabetes

Multiple ways!



i.e. what has your blood sugar been over the past 3 months?

Managing Diabetes

Slightly different for Type 1 vs. Type 2 diabetes

-and-

note that diabetes is different for everybody, so management is individualized!

Managing Diabetes

Let’s start with Type 1!

Managing Type 1 Diabetes

Medications: Insulin

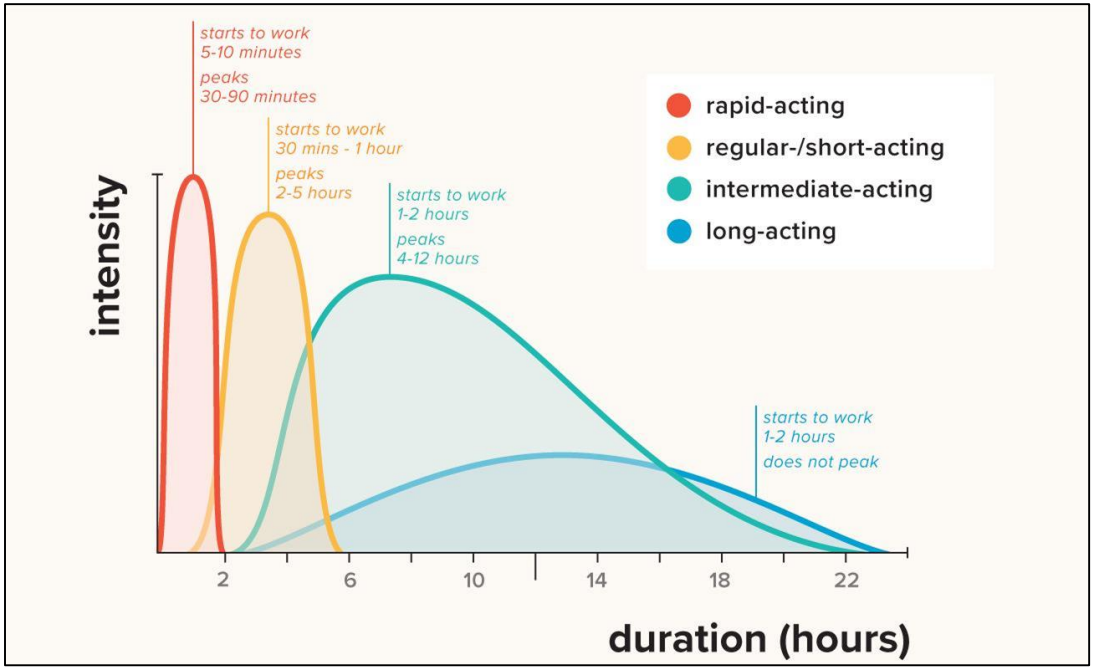
Why?

Because Type 1 diabetes is what happens when your pancreas doesn't make insulin!

Managing Type 1 Diabetes

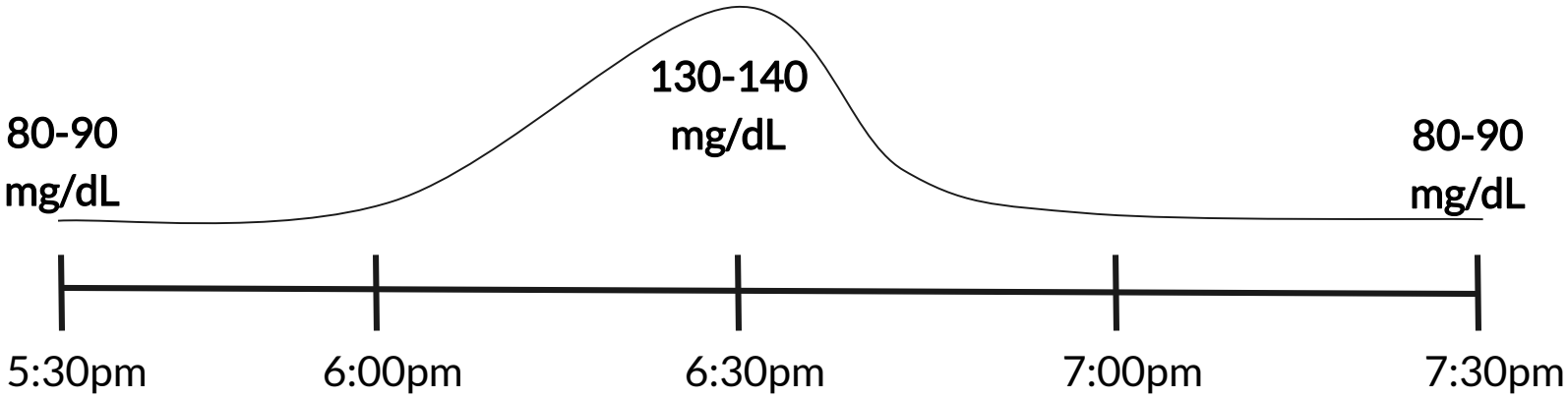
Types of insulin:

For Type 1 diabetes, patients use a daily or twice-daily long-acting insulin and meal-time dosing of a rapid or short-acting insulin



Managing Type 1 Diabetes

This functions as an “artificial pancreas” - you have some low-level insulin always present, and then your pancreas releases insulin in response to food after a meal.



Managing Type 1 Diabetes

insulin pumps: can get closer to an “artificial pancreas” by slowly releasing insulin throughout the day

Managing Type 1 Diabetes

When you're dosing insulin, you need to know your blood sugar

Most people with Type 1 diabetes check their blood sugar at least 4-5 times a day

Managing Type 1 Diabetes

Managing your blood sugar also requires careful attention to diet

Especially estimating the amount of carbohydrates (which are digested into glucose) you eat

Managing Type 1 Diabetes

Exercise!

Questions?

Especially on management of Type 1 diabetes?

Managing Type 2 Diabetes

Medications:

1. **Metformin** - slows production of glucose, increases sensitivity to insulin
2. **Lira-, sema-, dulaglutide** - increases insulin and satiety
3. **Empa-, dapa-, canagliflozin** - blocks kidneys from reabsorbing glucose from urine

Managing Type 2 Diabetes

Medications:

1. **Insulin** - makes tissues absorb sugar from blood
2. **Sulfonylureas** - increase insulin release from the pancreas
3. **Thiazolidinediones** - increases sensitivity to insulin

Managing Type 2 Diabetes

Managing your blood sugar also requires careful attention to diet

Losing weight is a key way to manage blood sugar in Type 2 diabetes

Managing Type 2 Diabetes

Exercise!

Questions?

Especially on management of Type 2 diabetes?

Managing Diabetes

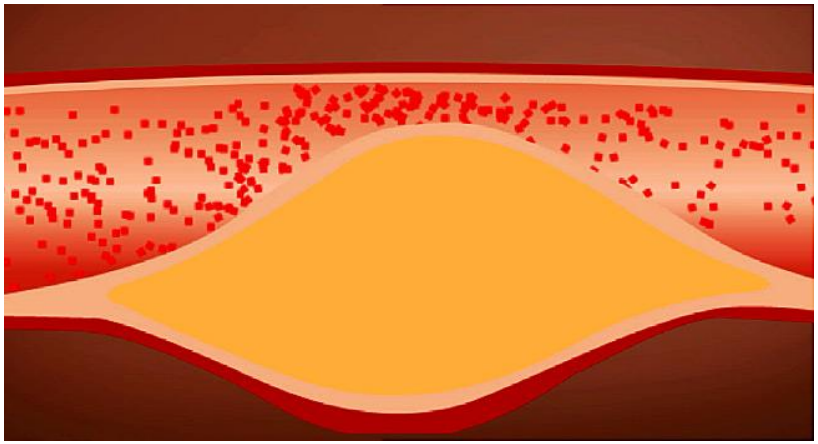
	Type 1 Diabetes	Type 2 Diabetes
Diet	Crucial; focused on managing the amount of carbohydrates in diet	Crucial; often focused on weight loss to increase body's sensitivity to insulin
Exercise	Crucial	Crucial; increases body's sensitivity to insulin
Medications	Insulin, both long and short-acting	Metformin, etc.

diabetes is different for everybody, so management is individualized!

Complications of Diabetes

Cardiovascular complications

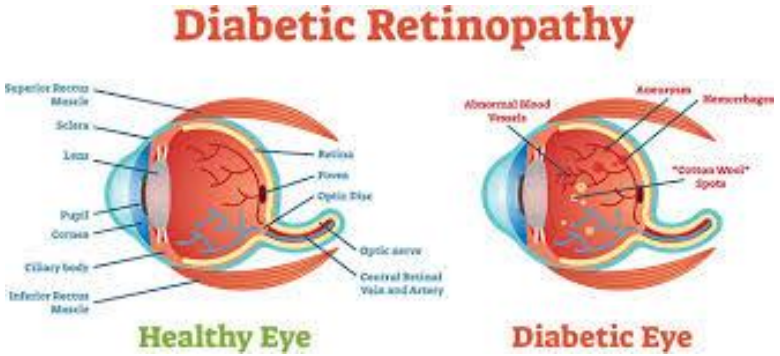
- High blood sugar and high insulin levels damage blood vessels over time
- This can lead to stroke, heart attack, death



Complications of Diabetes

Eye complications

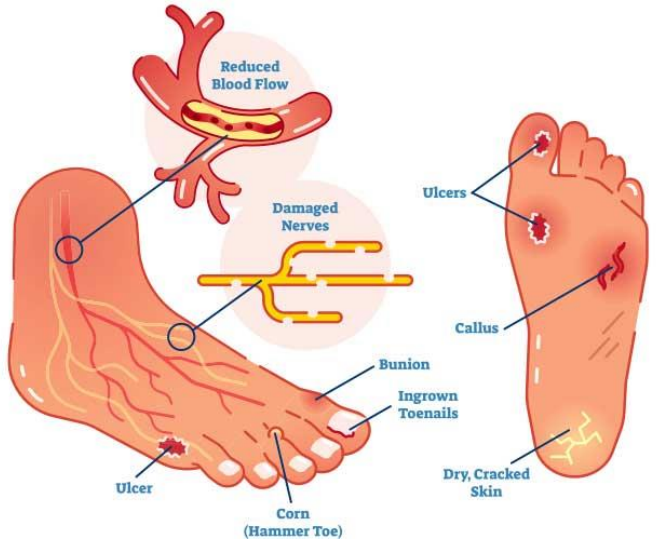
- High blood sugar damages blood vessels in the eye
- This can lead to vision loss and eventually blindness



Complications of Diabetes

Foot complications

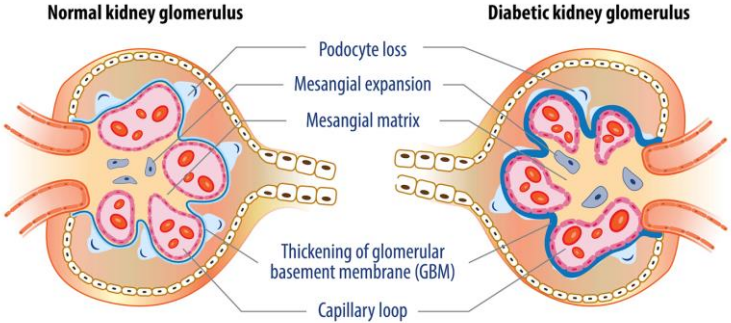
- Diabetes can decrease blood flow to the feet and damage nerves that carry sensation
- This can cause loss of the ability to sense pain, leading to ulcers and skin infections
- Poor blood flow also impairs healing, so wounds can lead to serious infections, amputation, and even death



Complications of Diabetes

Kidney complications

- High blood sugar creates inflammation and fibrosis in the kidneys
- This can cause lead to kidney failure, requiring dialysis or transplant



How can I prevent diabetes?

Type 1 diabetes cannot be prevented

However, there are a number of effective ways to prevent Type 2!

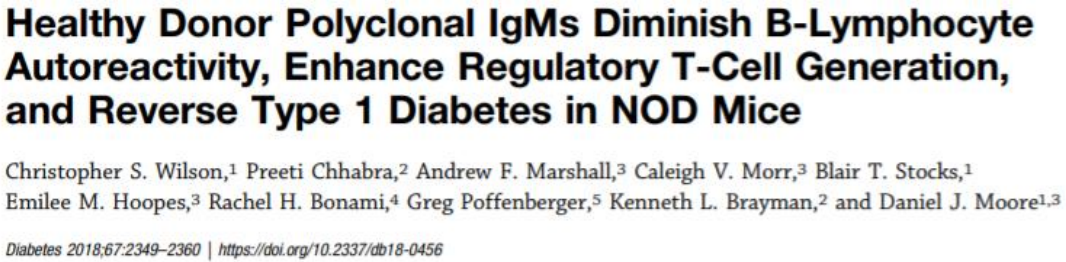
Questions?

Especially on complications and prevention of diabetes?

What are some advances in diabetes research?

A new therapy for Type I diabetes?

Supplementing antibodies obtained from healthy mice into mice with type 1 diabetes reduced the amount of autoreactive immune cells known to target beta-cells for destruction



Healthy Donor Polyclonal IgMs Diminish B-Lymphocyte Autoreactivity, Enhance Regulatory T-Cell Generation, and Reverse Type 1 Diabetes in NOD Mice

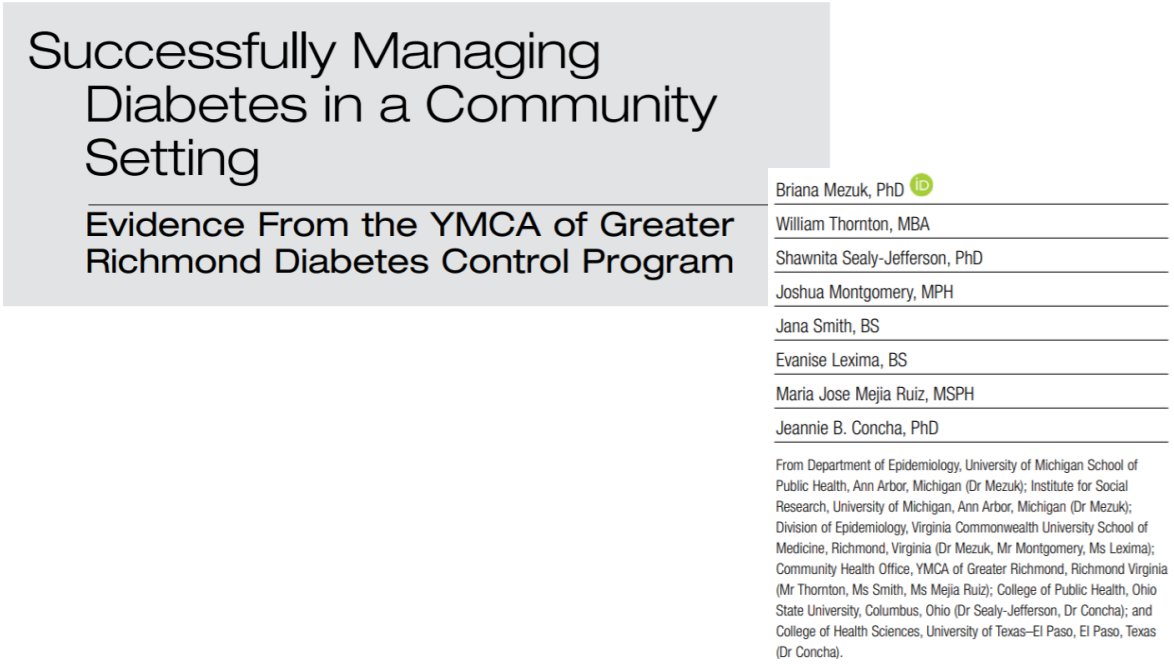
Christopher S. Wilson,[1] Preeti Chhabra,[2] Andrew F. Marshall,[3] Caleigh V. Morr,[3] Blair T. Stocks,[1] Emilee M. Hoopes,[3] Rachel H. Bonami,[4] Greg Poffenberger,[5] Kenneth L. Brayman,[2] and Daniel J. Moore[1,3]

Diabetes 2018;67:2349–2360 | https://doi.org/10.2337/db18-0456

What are some advances in diabetes research?

Community-based diabetes support is effective and powerful

HbA1C, mental health and self-management behaviors all improved in people taking part in the Greater Richmond Diabetes Control Program


Successfully Managing Diabetes in a Community Setting

Evidence From the YMCA of Greater Richmond Diabetes Control Program

Briana Mezuk, PhD
William Thornton, MBA
Shawnita Sealy-Jefferson, PhD
Joshua Montgomery, MPH
Jana Smith, BS
Evanise Lexima, BS
Maria Jose Mejia Ruiz, MSPH
Jeannie B. Concha, PhD

From Department of Epidemiology, University of Michigan School of Public Health, Ann Arbor, Michigan (Dr Mezuk); Institute for Social Research, University of Michigan, Ann Arbor, Michigan (Dr Mezuk); Division of Epidemiology, Virginia Commonwealth University School of Medicine, Richmond, Virginia (Dr Mezuk, Mr Montgomery, Ms Lexima); Community Health Office, YMCA of Greater Richmond, Richmond Virginia (Mr Thornton, Ms Smith, Ms Mejia Ruiz); College of Public Health, Ohio State University, Columbus, Ohio (Dr Sealy-Jefferson, Dr Concha); and College of Health Sciences, University of Texas–El Paso, El Paso, Texas (Dr Concha).

What are some advances in diabetes research?

A diabetes treatment that also prevents heart disease

An insulin-like molecule can exhibit insulin's glucose lowering effects without activating the processes that promote heart disease

A Novel Strategy to Prevent Advanced Atherosclerosis and Lower Blood Glucose in a Mouse Model of Metabolic Syndrome

Jenny E. Kanter[1], Farah Kramer[1], Shelley Barnhart[1], Jeffrey M. Duggan[2,3], Masami Shimizu-Albergine[1], Vishal Kothari[1], Alan Chait[1], Stephan D. Bouman[4], Jessica A. Hamerman[2,3], Bo F. Hansen[5], Grith S. Olsen[5] **and** Karin E. Bornfeldt[1,6]⇑

What are some advances in diabetes research?

Continuous Glucose Monitors (CGM):

Self-explanatory, they constantly monitor blood glucose to allow patients with diabetes to *always* know how their glucose levels are

Interested in Being in a Research Study?
UNC Diabetes Clinical Trials

1. We do studies involving people who:
   - Have type 1 diabetes
   - Have type 2 diabetes
   - Are overweight and want to lose weight

1. Examples:
   - “Artificial pancreas” for type 1 diabetes
   - New insulins and medications to control diabetes
   - Medications to reduce risk of heart attacks or kidney problems
   - Weight loss diets and medications

1. Interested: contact uncdiabetes@med.unc.edu or 984-974-3004

Questions?

Especially on new developments in diabetes prevention and treatment?

Thank you!