Diabetes 101:
An Overview for Medical Translators and Interpreters

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Introduction
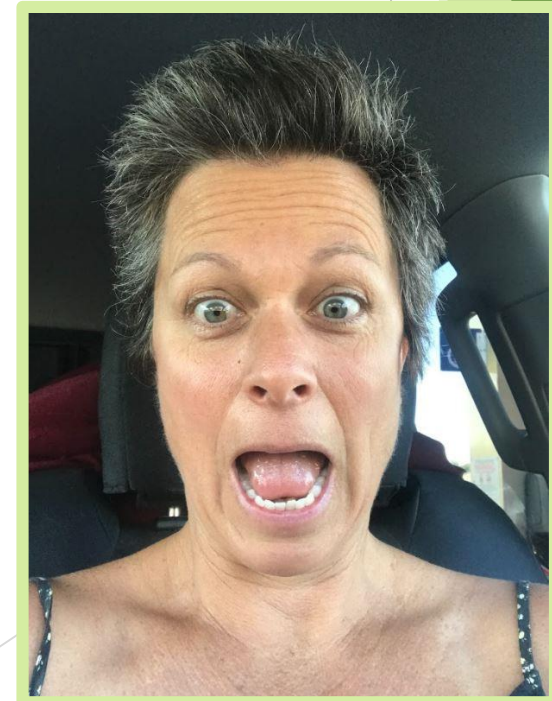
Pre-assessment/Poll question #1

1. True or False: There are only three types of diabetes.

Pre-assessment/Poll question #2

2. True or False: Globally, the number of people with diabetes rose from 108 million in 1980 to 422 million in 2014 (290% increase).

What we will cover

- Types and definitions of diabetes mellitus
- Epidemiology of diabetes mellitus (causes and risks)
- Cultural implications
- State-of-the-art and controversial treatments

Adults with diabetes (2018 data)

➢ 32.1 million of all ages – 13% of US population has diabetes

➢ Percentage increases with age, those over 65 = 26.8%

➢ Diabetes and race: American Indian, Hispanic, Blacks, Asians, and Whites

https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.Pdf

Race and education related to diabetes

Appendix Table 3. Age-adjusted prevalence of diagnosed diabetes by detailed race/ethnicity, education level, and sex among adults aged 18 years or older, United States, 2017–2018.

| Characteristic	Total Percentage (95% CI)	Men Percentage (95% CI)	Women Percentage (95% CI)
Race/ethnicity			
American Indian/Alaska Native	14.7 (14.6–14.7)	14.5 (14.4–14.6)	14.8 (14.7–14.9)
Asian, non-Hispanic, overall	9.2 (8.0–10.5)	10.0 (8.3–12.0)	8.5 (7.0–10.5)
Asian Indian	12.6 (9.3–16.7)	13.9 (10.3–18.6)	11.1 (6.6–18.0)
Chinese	5.6 (3.9–8.1)	5.9 (3.5–9.8)	5.3 (3.2–8.8)
Filipino	10.4 (8.1–13.4)	10.9 (7.6–15.4)	10.0 (6.8–14.6)
Other Asian	9.9 (8.1–12.2)	11.5 (8.5–15.3)	8.7 (6.2–11.9)
Black, non-Hispanic	11.7 (10.8–12.7)	11.4 (10.0–12.9)	12.0 (10.9–13.1)
Hispanic, overall	12.5 (11.5–13.5)	13.7 (12.3–15.2)	11.6 (10.2–13.0)
Central/South American	8.3 (8.0–8.6)	9.2 (8.8–9.6)	7.6 (7.2–8.0)
Cuban	6.5 (4.6–9.2)	7.3 (4.2–12.5)	6.0 (3.6–9.8)
Mexican	14.4 (13.1–15.8)	16.2 (14.2–18.3)	12.8 (11.1–14.8)
Puerto Rican	12.4 (10.1–15.1)	13.0 (9.5–17.6)	11.9 (9.0–15.5)
White, non-Hispanic	7.5 (7.2–7.8)	8.6 (8.1–9.0)	6.6 (6.2–7.0)
Education			
Less than high school	13.3 (12.4–14.2)	13.0 (11.8–14.4)	13.6 (12.3–15.1)
High school	9.7 (9.1–10.4)	11.2 (10.4–12.1)	8.6 (7.9–9.4)
More than high school	7.5 (7.2–7.9)	8.3 (7.8–8.8)	6.8 (6.4–7.3)

Note: CI = confidence interval.

Data sources: 2017–2018 National Health Interview Survey, except American Indian/Alaska Native data, which were from the Indian Health Service National Data Warehouse (2017 data only).

The many faces of diabetes in American youth

Diabetes epidemic

Figure 3. Age-adjusted, county-level prevalence of diagnosed diabetes among adults aged 20 years or older, United States, 2004, 2008, and 2016

2004

2008

2016

| % | 1.5–6.9 | 7.0–8.4 | 8.5–9.8 | 9.9–12.1 | 12.2–33.0 |
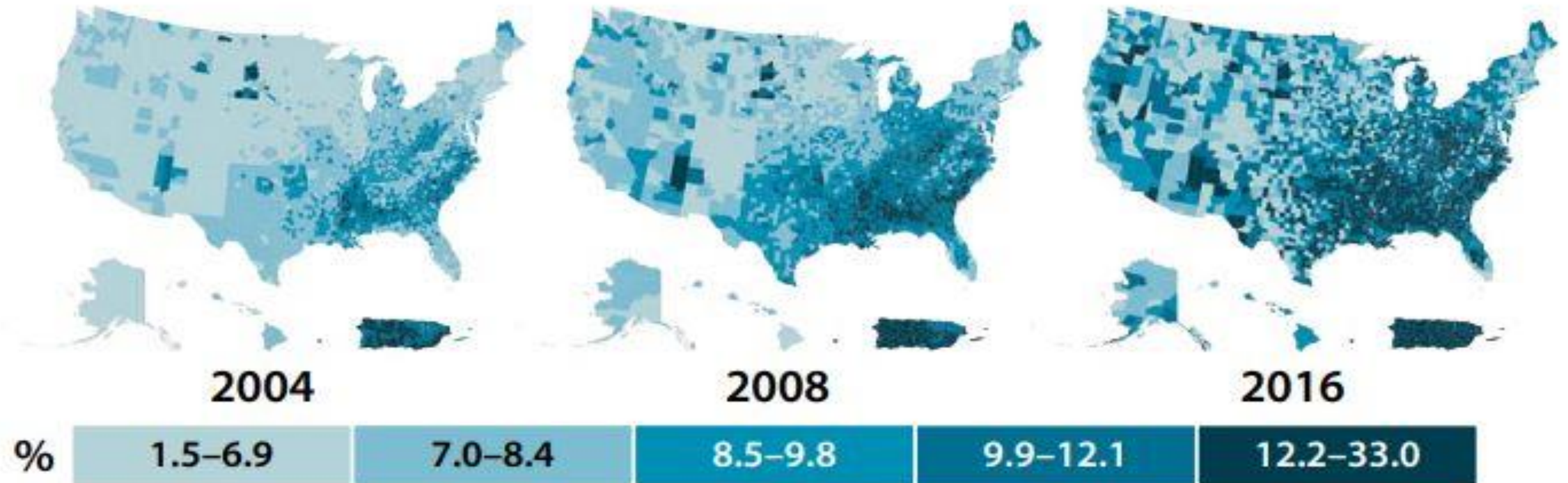
Note: Data were unavailable for some US territories.

Data sources: US Diabetes Surveillance System; Behavioral Risk Factor Surveillance System.

Abbreviations

- ▶ <u>ADA</u>- American Diabetes Association *AND* Autoimmune Diabetes in Adults

- ▶ <u>BG</u> – Blood Glucose

- ▶ <u>CGM</u>- Continuous Glucose Monitor

- ▶ <u>DM-</u> Diabetes Mellitus

- ▶ <u>FBS</u>- Fasting Blood Sugar

- ▶ <u>GDM</u>- Gestational Diabetes Mellitus

- ▶ <u>LADA</u>- Latent Autoimmune Diabetes in Adults

- ▶ <u>MODY</u>-Maturity-Onset Diabetes of the Young
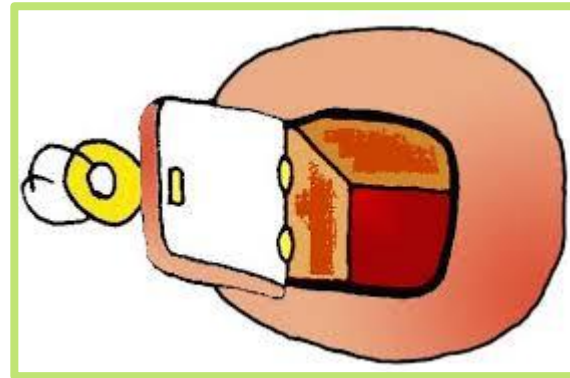
Basic anatomy
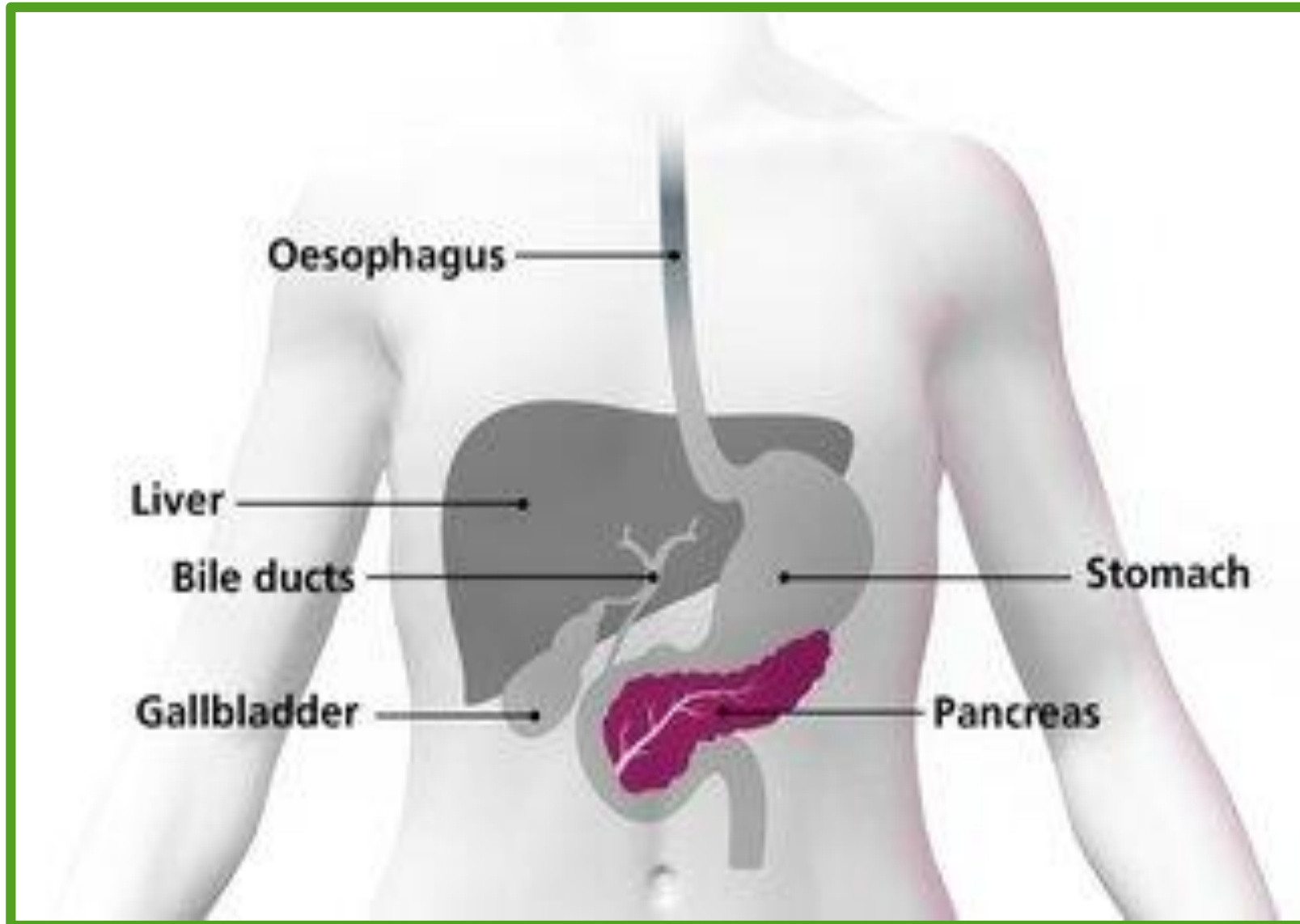
NORMAL closed loop pancreas

Glucose in blood stream → Pancreas produces insulin hormone into blood stream → Insulin "unlocks" cell for glucose to enter → Insulin hormone maintains glucose homeostasis

Five types of diabetes mellitus

1. Diabetes type I
2. Diabetes type I.5
3. Diabetes type II
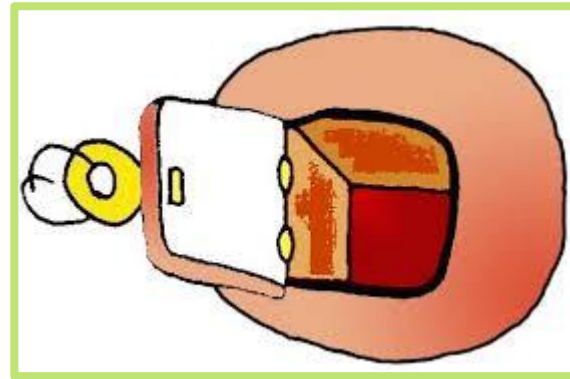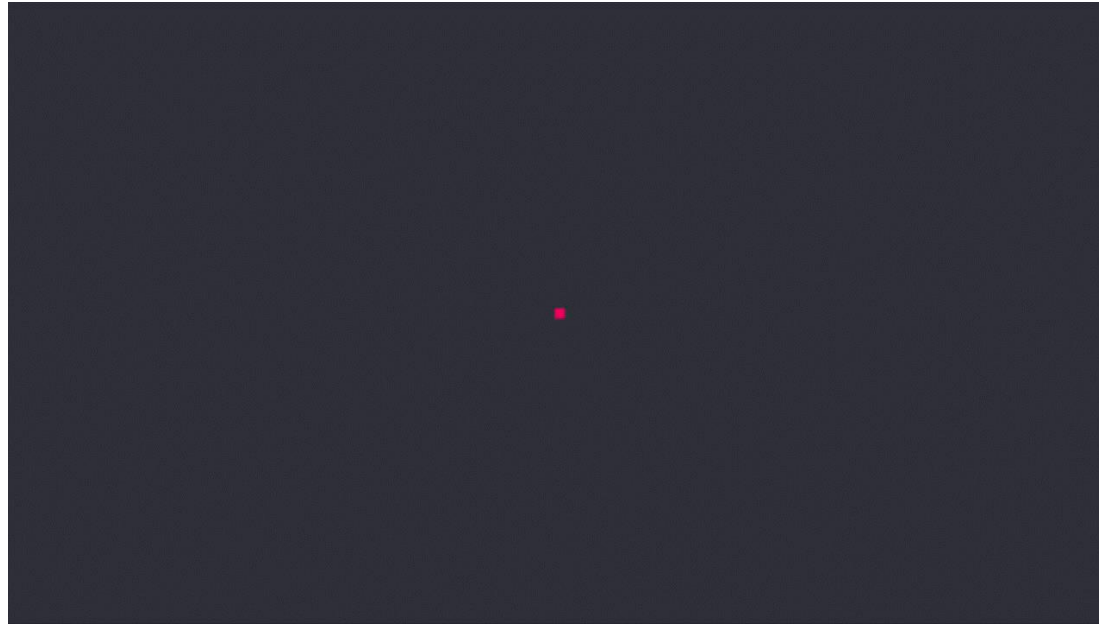4. MODY
5. Gestational diabetes

DM type I

Glucose in blood stream

Pancreas produces insulin hormone into blood stream

Insulin hormone maintains glucose homeostasis

Insulin "unlocks" cell for glucose to enter

DM type I:
Frequency, causes, risk factors

▶ CDC estimates 1.6 million Americans have DM type I:

www.diabetes.org

▶ >85% of all cases are youth <20 years old (= affected gender)

▶ Etiology(cause): autoimmune destruction of pancreatic beta cells. Body makes an antibody against beta cells and eventually body destroys own beta cells

▶ Risk factors: family history, genetics, geography, age, race

▶ *Source: Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2020. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2020.*
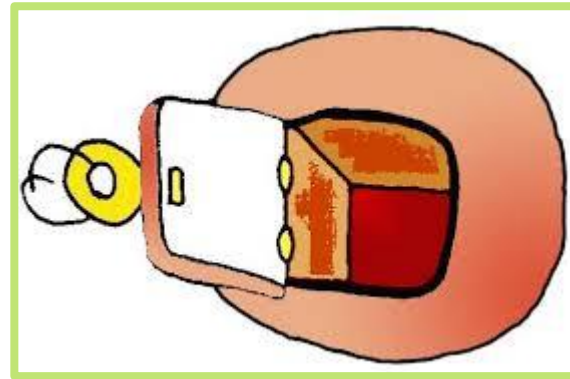
Cultural considerations

LADA Latent Autoimmune Diabetes in Adults

Glucose in blood stream →

Pancreas produces insulin hormone into blood stream

Insulin hormone maintains glucose homeostasis

Insulin "unlocks" cell for glucose to enter

LADA- Diabetes 1.5:
Frequency, causes, risk factors

▶ Latent = hidden

▶ Accounts for 2-12% of all diabetes cases

▶ ADA-Autoimmune Diabetes in Adults

▶ Both type I and 1.5 have antibodies which make it autoimmune (antibodies slightly different)

▶ Major difference between LADA and DM type I = no insulin needed for several months up to years after diagnosis

▶ Slow progression beta cell failure

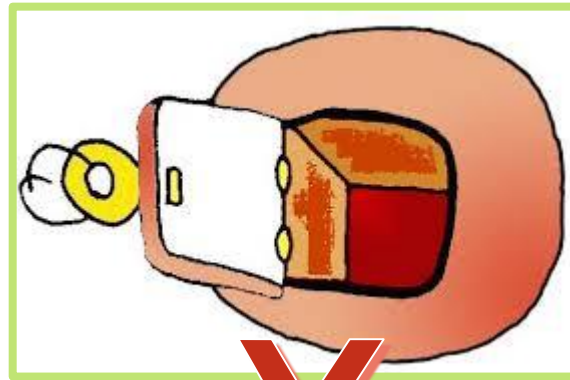▶ Risk factors: obesity, insulin resistance, diabetes type II

https://diabetes.diabetesjournals.org/content/54/suppl_2/S68

DM type II

Glucose in blood stream

Pancreas produces insulin hormone into blood stream

Insulin hormone maintains glucose homeostasis

Insulin "unlocks" cell for glucose to enter

DM type II:
Frequency, causes, risk factors

- ▶ 90% of all diabetes is type II

- ▶ Otherwise known as "insulin resistance"

- ▶ Simply can't get the glucose into the cells

- ▶ Sugar and insulin toxicity

- ▶ Not autoimmune

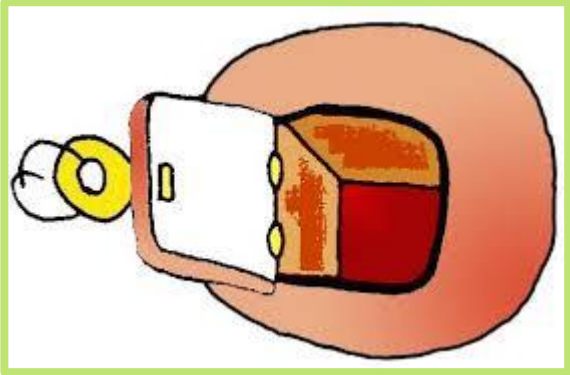- ▶ Risk factors: obesity, inactivity, gestational diabetes

MODY (Mature Onset Diabetes of the Young)

Glucose in blood stream

Pancreas produces insulin hormone into blood stream

Insulin hormone maintains glucose homeostasis

Insulin "unlocks" cell for glucose to enter

MODY:
Frequency, causes, risk factors

- ▶ Up to 5% of all diabetes cases may be due to MODY
- ▶ Inherited genetic mutation
- ▶ Not autoimmune
- ▶ 50% chance of passing along the gene mutation to their children
- ▶ Negatively affects beta cells- interrupts insulin production process
- ▶ There are 11 different types of MODY caused by changes in 11 different genes
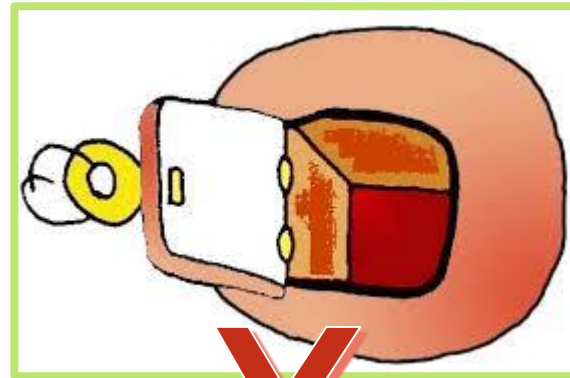- ▶ Risk factor: genetics

Gestational diabetes

Glucose in blood stream →

Pancreas produces insulin hormone into blood stream
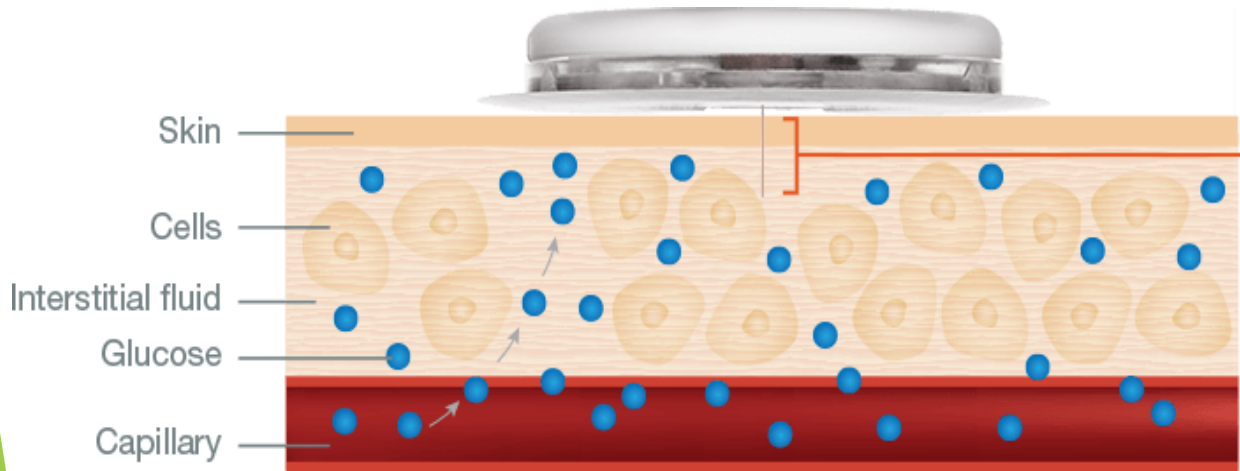
Insulin hormone maintains glucose homeostasis

Insulin "unlocks" cell for glucose to enter

Gestational Diabetes:
Frequency, causes, risk factors

➢ 1-12% of pregnant women suffer from GDM

➢ Usually starts to develop around 6 months gestation

➢ Caused by pregnancy hormones

➢ Temporary form of diabetes

➢ Risk factors: more than 35 yrs. old, obesity, family history, previous history of GDM, poly cystic ovarian syndrome.

➢ Risk of developing regular DM within 5 years

Health.Harvard.edu
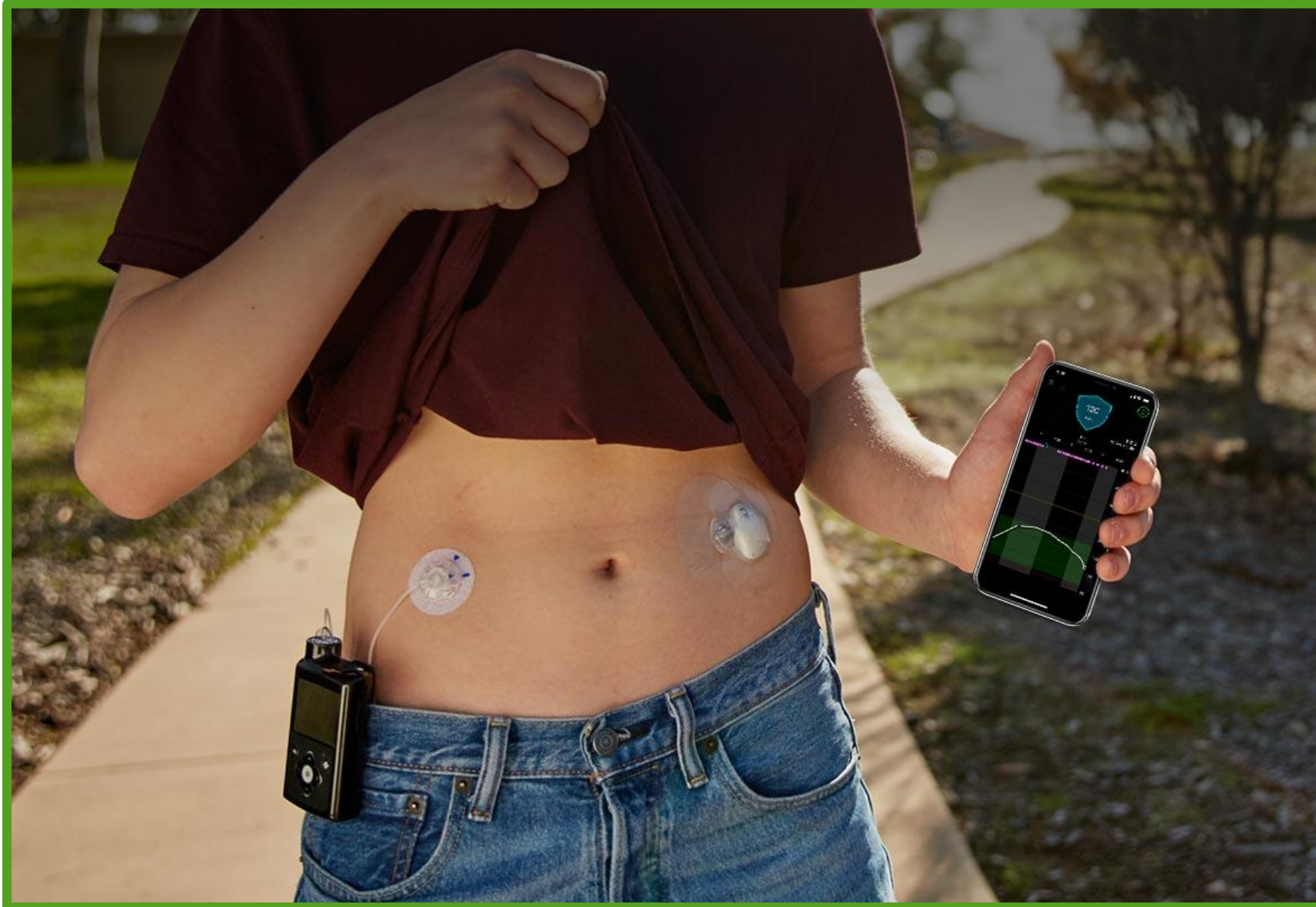
State-of-the-art treatments: CGM

Skin

Cells

Interstitial fluid

Glucose

Capillary

The sensor filament is less than 0.4 mm thick

For illustrative purposes only. Image not drawn to scale.

Daily Patterns (mg/dL)

OK

350
250
150
50

12 am | 6 am | 12 pm | 6 pm | 12 am

◀ Last 7 Days

FreeStyle *Libre* 14 day

Closed loop artificial pancreas

State-of-the-art treatment: Insulin pods/patches

On-demand Dosing

Bolus

Basal

**Continuous Dosing**
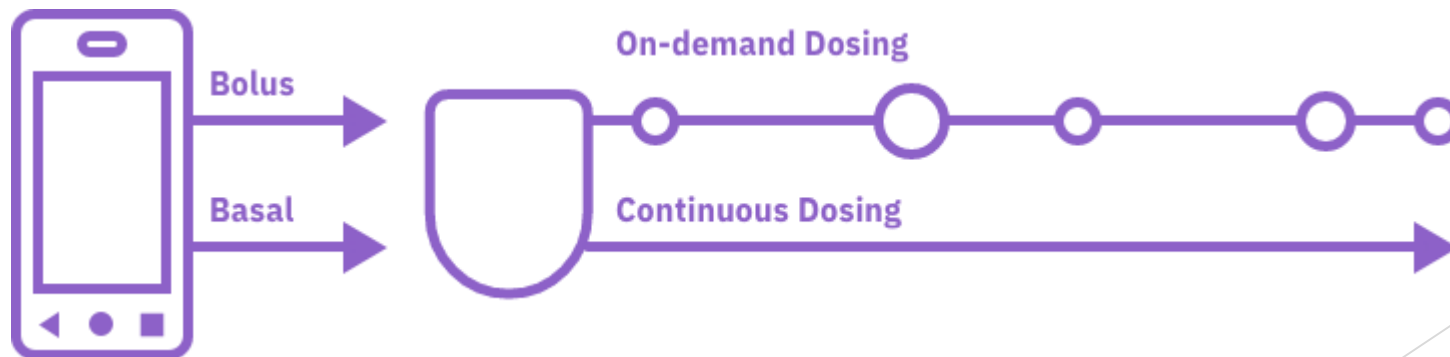
Smart insulin patches- the future?

A cure for DM type I?

▶ Cure: Pancreatic transplant for type I or any insulin-dependent

▶ Risks of the transplant (specifically the anti-rejection meds); benefits must outweigh the risks of DM

▶ Often because of ESRD, there is a simultaneous kidney and pancreas transplant

▶ Very few transplants performed: 500-1000/year in USA (www.kidney.org)

Cleveland Clinic Journal of Medicine
March 12, 2019
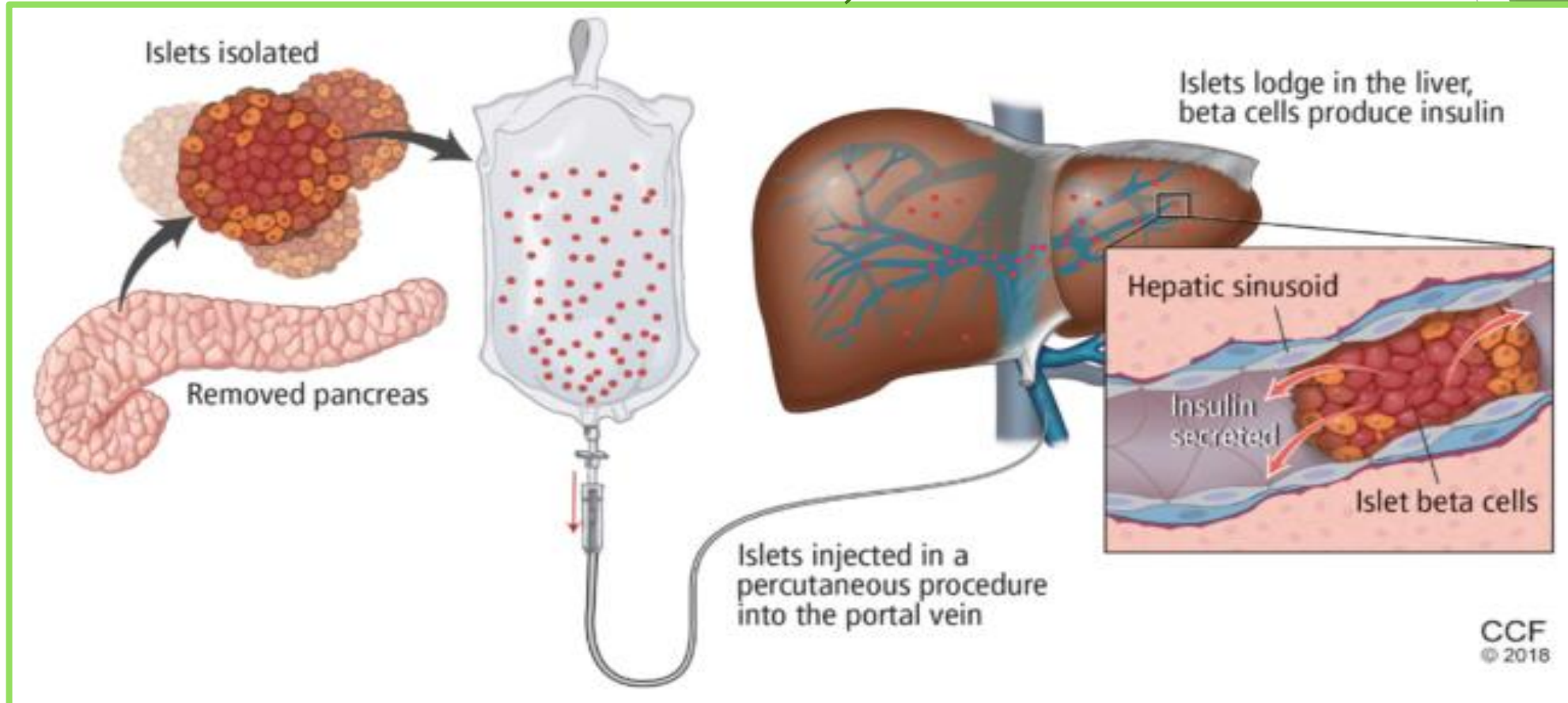
Can DM II be cured?

▶ No cure

▶ Controversial treatment plan:

▶ "Reversing Type 2 diabetes starts with ignoring the guidelines" by TEDxPurdueU   Dr. Sarah Hallberg

▶ "carbohydrate/sugar toxicity" "ignore the ADA guidelines" https://www.youtube.com/watch?v=da1vvigy5tQ&t=222s

▶ Remission: Not taking meds; labs normal 6 months

▶ Reverse: (resolved) lost more than 30 pounds, high % don't ever have to take meds again

Summary

TYPE OF DIABETES	RISK FACTORS	AUTOIMMUNE?
DM TYPE I	Family history, genetics, age, race	YES
DM TYPE 1.5	Obesity, insulin resistance, DM Type II	YES
DM TYPE II	Obesity, inactivity, GDM	NO
MODY	Genetics	NO
GDM	Obesity, >35 years old, family history, poly cystic ovarian syndrome, history of GDM	NO

Post-Assessment/Poll question #3

True or False: Diabetes type I is treated with hormone replacement therapy.

Post-Assessment/Poll question #4

True False: Diabetes type II can be 100% cured.

Post-Assessment/Poll question #5

Which is true regarding Gestational Diabetes?

a) An elephant can have it also
b) It mostly happens to mothers under 30 years old
c) If you get it once, you are more likely to get it again
d) It is an autoimmune disease

Resources/Websites

- Adcesconnect.org- Association of Diabetes Care and Education Specialists

- Cdc.gov

- Diabetes.org= American Diabetes Association

- Mayoclinic.org

- Nih.gov

- Who.int

- Drperlmutter.com (Grain Brain)

Let food be thy medicine,
& medicine be thy food. -Hippocrates

Thank you, Tracy   tyoung@bartonhealth.org