From Fundamentals to Advanced Diabetes Practice

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▸ Pronouns: She, her and hers
Founder - www.DiabetesEd.net

Accreditation

Partners for Advancing Clinical Education

Diabetes Education SERVICES

Joint Accreditation Statement

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Type of Activity: Application

Dietitian Continuing Education

This program offers 8 CPEUs for dietitians.

Claiming Credit

Instructions for Claiming Credit

To receive CE credit, learners must follow these steps:

1. Visit https://cme.partnersed.com/BTB1029 or scan the QR Code:
2. Sign Up or Log in.
3. Complete the activity evaluation.
4. Upon completion of all evaluation questions your credit will be made available for download immediately.

For Pharmacists: Upon successfully completing the activity evaluation, your credit will be submitted to CPE Monitor. Please check your NABP account within thirty (30) days to make sure the credit has posted.

Coach Bev has no Conflict of Interest

▸ She's not on any speaker's bureau.

▸ Does not invest or have any financial relationships with diabetes related companies.

▸ Gathers information from reading package inserts, research and articles.

▸ The ADA Standards of Medical Care is main resource for course content.

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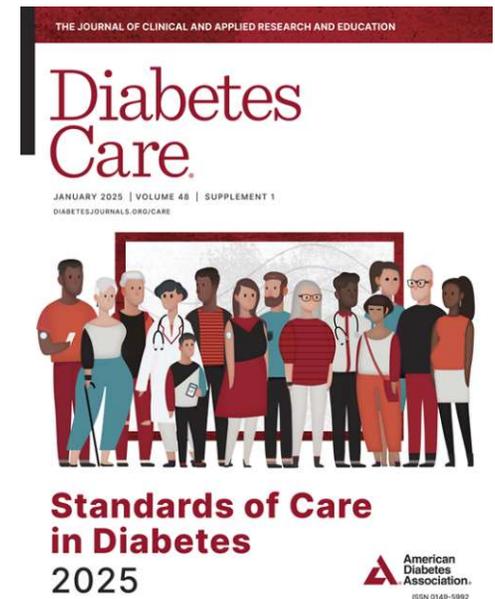
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Faculty	Financial Relationships
Beverly Thomassian	Has no relevant financial relationships.

Diabetes Management: From Fundamentals to Advanced Practice

Objectives:

▶ Review the changes & updates to the annual ADA *Standards of Medical Care in Diabetes.*

▶ Identify the key elements of the standards that improve clinical care for people with diabetes.

▶ Review and discuss appropriate use of the latest medications that address hyperglycemia and cardiorenal health.

▶ Describe strategies to incorporate lifestyle changes into diabetes self-management.

▶ Share practical approaches to assess and address diabetes distress in clinical care.

THE JOURNAL OF CLINICAL AND APPLIED RESEARCH AND EDUCATION

Diabetes Care.

JANUARY 2025 | VOLUME 48 | SUPPLEMENT 1
DIABETESJOURNALS.ORG/CARE

Standards of Care in Diabetes
2025

American Diabetes Association.

ISSN 0149-5992

17. Diabetes Advocacy

▸ People living with diabetes deserve to be free from the burden of discrimination.

▸ We need to all be a part of advocating to ensure a healthy and productive life for people living with diabetes.

▸ Decrease barriers to diabetes self-management.

Diabetes Care needs to meet outlined standards in all settings.
- In school setting
- Young children in childcare
- For Drivers
- In work settings
- In Detention Facilities
- Insulin Access & Affordability
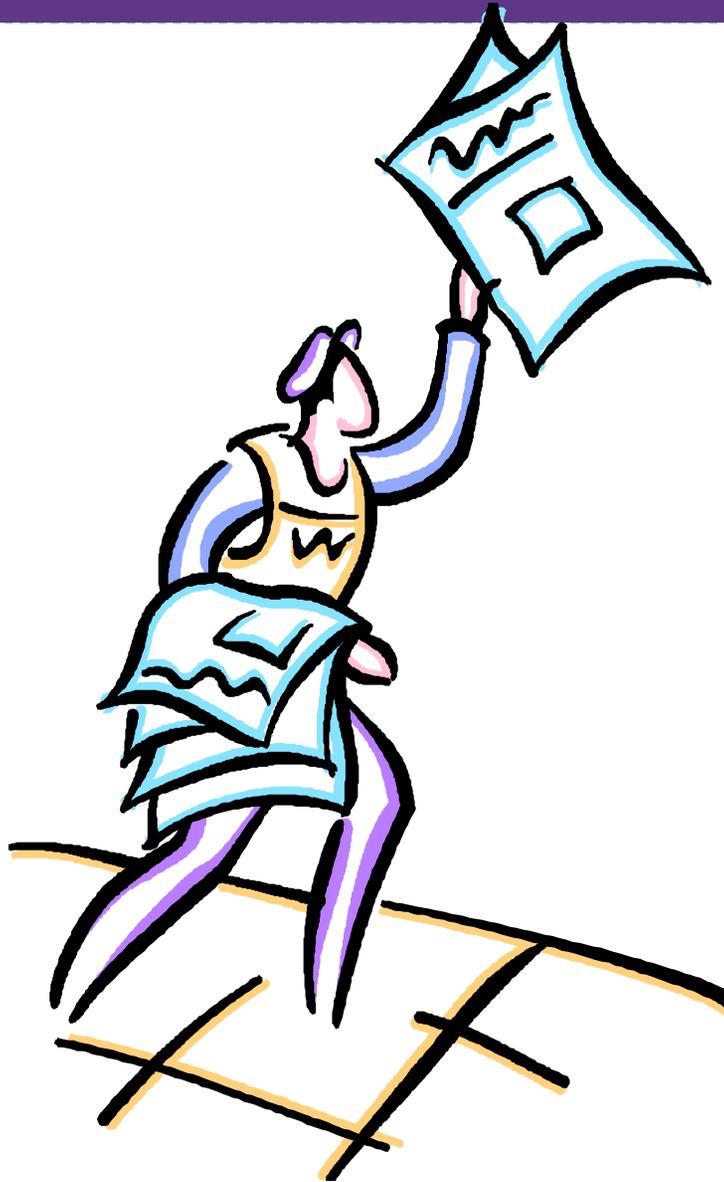
17. Diabetes Advocacy: Standards of Care in Diabetes—2025

Poll Question 1

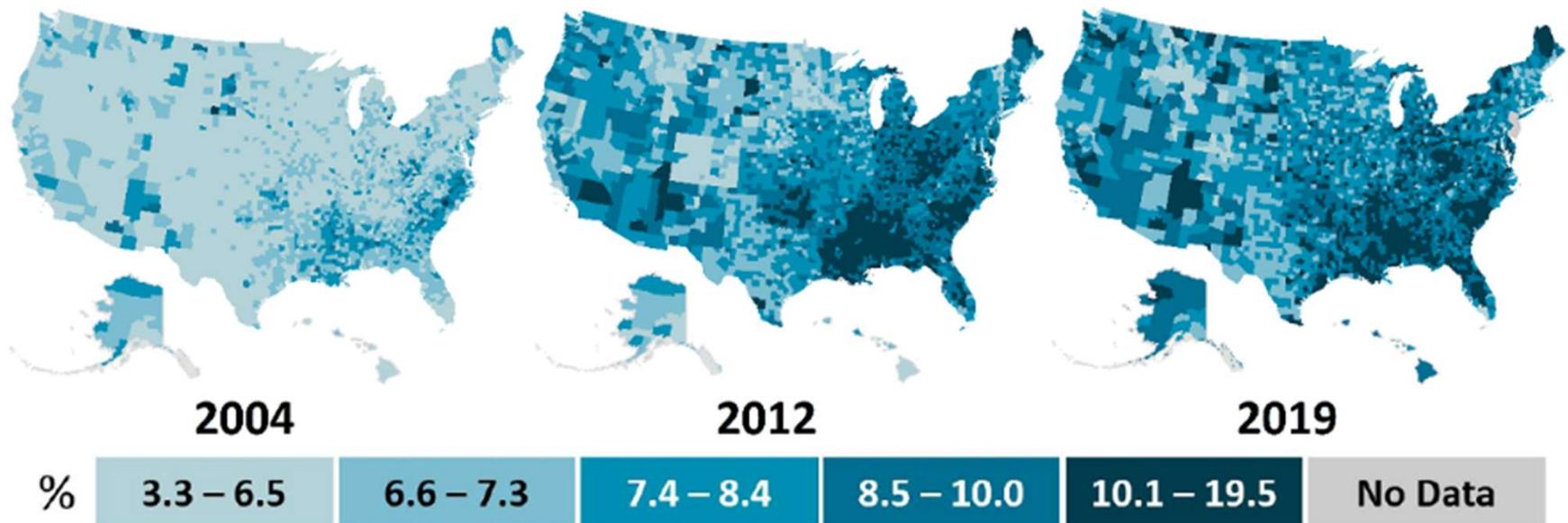▸According to the CDC, what best describes the current prevalence of prediabetes and diabetes in the U.S.?

a. 30% of people above the age of 20 have type 2 diabetes.

b. The rate of type 1 and type 2 diabetes have tripled since 2010.

c. A total of 50% of people have prediabetes or diabetes.

d. 1 out of 2 persons above age 20 have prediabetes.

Type 2 Diabetes in America 2025

- ▶ **16.8% with Diabetes**
  - ▶ 11% don't know they have it
- ▶ **38% with Prediabetes – 97 million adults**

Figure 3. Age-adjusted, county-level prevalence of diagnosed diabetes among adults aged 20 years or older, United States, 2004, 2012, and 2019

https://www.cdc.gov/nchs/data/databriefs/db516.pdf

2004   2012   2019

| % | 3.3 – 6.5 | 6.6 – 7.3 | 7.4 – 8.4 | 8.5 – 10.0 | 10.1 – 19.5 | No Data |

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

NCHS Data Brief ■ No. 516 ■ November 2024

Prevalence of Total, Diagnosed, and Undiagnosed Diabetes in Adults: United States, August 2021–August 2023

Jane A. Gwira, M.D., M.P.H., Cheryl D. Fryar, M.S.P.H., and Qiuping Gu, M.D., Ph.D.

Diabetes Prevalence by Ethnic Group

▶ For adults, diabetes prevalence highest among:

- American Indians and Alaska Natives (14.5%),
- Non-Hispanic Blacks (12.1%),
- People of Hispanic origin (11.8%),
- Non-Hispanic Asians (9.5%)

Figure 2. Age-adjusted estimated prevalence of diagnosed diabetes by race/ethnicity group and sex for adults aged 18 years or older, United States, 2018–2019

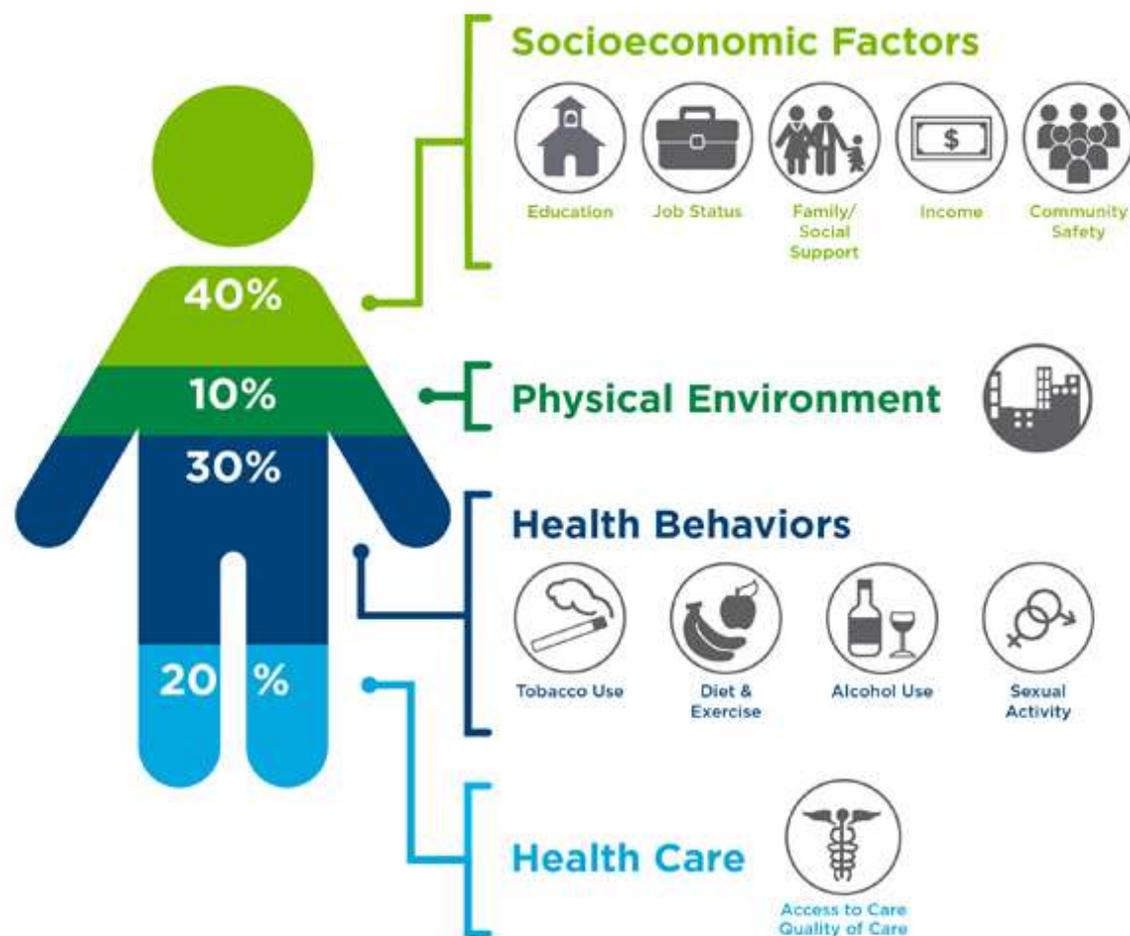www.cdc.gov/diabetes/data/statistics-report/diagnosed-diabetes.html
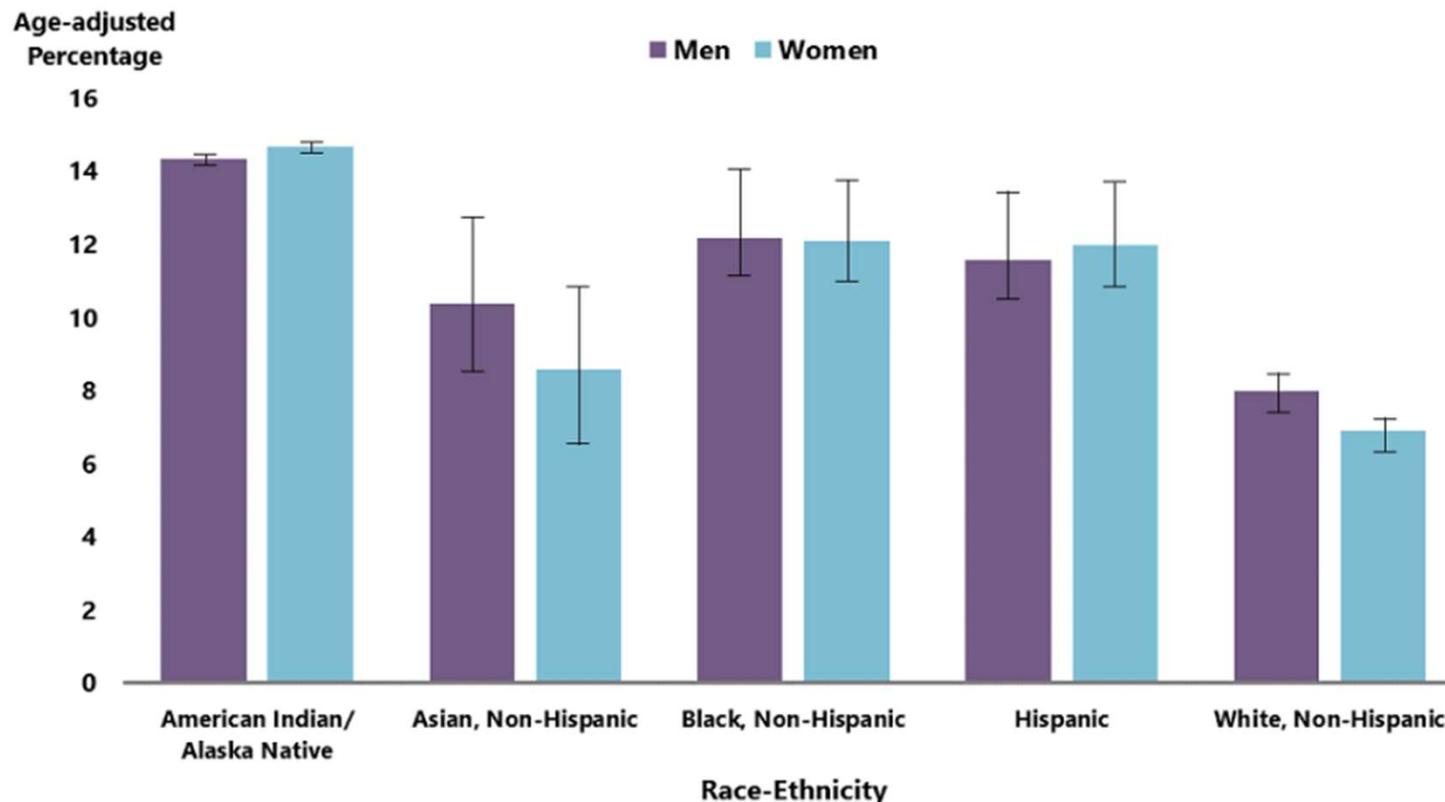
Address Barriers to Self Management

- **Barriers exist** within health system, payer, health care professional & individual.
- **Address barriers** through innovation, including community health workers, telehealth, other digital health solutions.
- **Consider social determinants of health** in the target population when designing care.

1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2025 (FREE)
American Diabetes Association Professional Practice Committee

What Goes Into Your Health?

Socioeconomic Factors
Education · Job Status · Family/Social Support · Income · Community Safety

40%

Physical Environment

10%

30%

Health Behaviors
Tobacco Use · Diet & Exercise · Alcohol Use · Sexual Activity

20 %

Health Care
Access to Care Quality of Care

Source: Institute for Clinical Systems Improvement, Going Beyond Clinical Walls: Solving Complex Problems (October 2014)

https://coveragetoolkit.org/health-equity/defining-health-equity/

Social Drivers of Health

‣The conditions in which people:
  ‣ Play
  ‣ Live
  ‣ Work
  ‣ Learn
  ‣ Pray

Directly affects their health risks and outcome

*AADE Population Health & Diabetes Educators Evolving Role 2019*

Status of Diabetes Care

- In 2015–2018, U.S. community-dwelling adults with diabetes achieved:
  - A1C <7% by 50.5%
    - 75.4% achieved A1C <8%.
  - BP target of <130/80 achieved by 47.7%
    - 70.4% achieved blood pressure <140/90 mmHg.
  - Lipid control (non-HDL cholesterol) <130 mg/dL, achieved by 55.7%
- 22.2% met targets for all three risk factors
- Many not receiving adequate lifestyle or pharmacotherapy.

1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2025 FREE

American Diabetes Association Professional Practice Committee

Let's meet people where they are at.
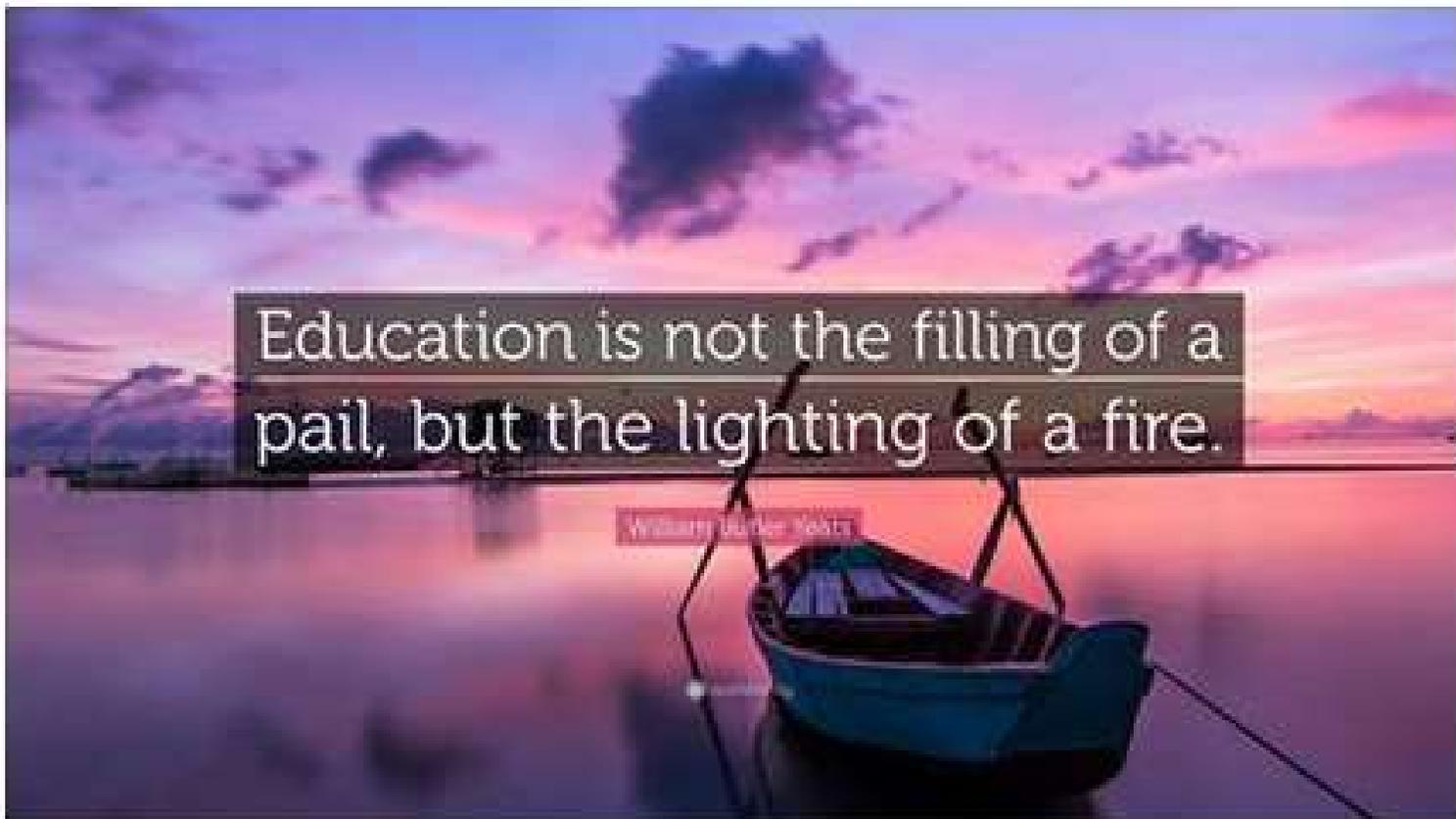
Pre Diabetes & Type 2- Screening Guidelines (ADA 2025 Clinical Practice Guidelines)

1. Start screening all people at age 35.

2. Screen at any age if BMI $\geq$ 25 (Asians BMI $\geq$ 23) plus one or > additional **risk factor**:

   ▸ First-degree relative w/ diabetes

   ▸ Member of a high-risk ethnic population

   ▸ Habitual physical inactivity

   ▸ History of heart disease

   ▸ Check more frequently if taking high risk meds; antiretrovirals, 2nd generation antipsychotics or steroids, thiazide diuretics, statins

   ▸ History of pancreatitis, prediabetes, GDM, periodontitis

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2025 FREE
American Diabetes Association Professional Practice Committee

Diabetes 2 - Who is at Risk?

(ADA 2024 Clinical Practice Guidelines)

Screen using A1C, Fasting Blood Glucose or OGTT.

Repeat screening at least every 3 years if negative.

*If prediabetes or on high risk meds, recheck yearly

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2025 FREE
American Diabetes Association Professional Practice Committee

Risk factors cont'd

▸ HTN - BP > 130/80

▸ HDL < 35 or triglycerides > 250

▸ History of Gestational Diabetes Mellitus

▸ Polycystic ovary syndrome (PCOS)

▸ Other conditions associated w/ insulin resistance:
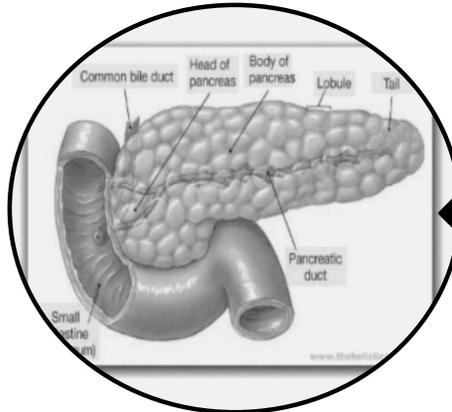
  ▸ Elevated BMI, acanthosis nigricans (AN)

Poll Question 2

▸Which of the following level is considered diabetes range?

   a. Random BG of 211

   b. A1c of 5.9 %

   c. After meal BG of 197

   d. Fasting BG 119

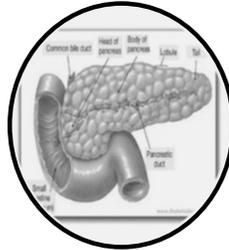**No diabetes**

FBG <100

Random <140

A1c <5.7%

Yes!

NO

Prediabetes

FBG 100-125

Random 140 - 199

A1c ~ 5.7- 6.4%

50% working pancreas
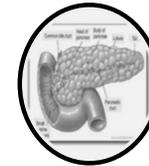
Diabetes

FBG 126 +

Random 200 +

A1c 6.5% or +

20% working pancreas

Development of type 2 diabetes happens over years or decades

Poll Question 3

▸ What best describes prediabetes in the U.S.?

a. Prediabetes affects 18-20% of people above the age of 20.

b. Prediabetes is associated with increased risk of CV disease

c. The prevalence of prediabetes and diabetes are almost equal.

d. Most people with BMI of 30 or greater have prediabetes.

PreDiabetes is FREAKING ME OUT

- 96 million people in US
 - 38% of population
- 80% don't know they have it
- In 3-5 years, about 30% of predm will get diabetes
- Associated with higher rates of heart attack, stroke, neuropathy and vessel disease

Do I look like I am freaking out?

3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2025 FREE

American Diabetes Association Professional Practice Committee

Get About 7 Hours of Quality Sleep to Prevent Diabetes

▸ Poor sleep quality was associated with a 40–84% increased risk of developing type 2 diabetes in a meta-analysis.

▸ Chronotype preference has been linked with many chronic diseases, including type 2 diabetes.

  ▸ For those with a preference for evenings (i.e., going to bed late and getting up late)

    ▸ 2.5-fold higher odds ratio for type 2 diabetes than for those with a preference for mornings (i.e., going to bed early and getting up early),

    ▸ Independent of sleep duration and sleep sufficiency
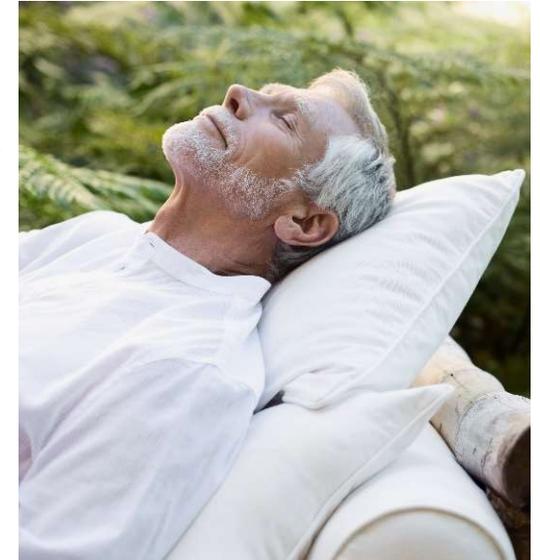
3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2025 FREE
American Diabetes Association Professional Practice Committee

The composition of the gut microbiome may also affect the likelihood of developing type 2 diabetes.

3. Pharmacologic Interventions

▶ Use more intensive approach for high-risk individuals:
  ▶ BMI of 35+
  ▶ If A1C is ~6.0 or FPG is 110
  ▶ History of GDM
▶ No FDA approved med for prevention (off label)
▶ Consider Metformin Therapy for Prediabetes
  ▶ Monitor B12 level (esp with neuropathy or anemia)

▶ CV Risk Mitigation important.
▶ Statin can increase BG, stop if notice elevation
▶ Consider low dose pioglitazone (Actos) if history of stroke.

3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2025 [FREE]
American Diabetes Association Professional Practice Committee
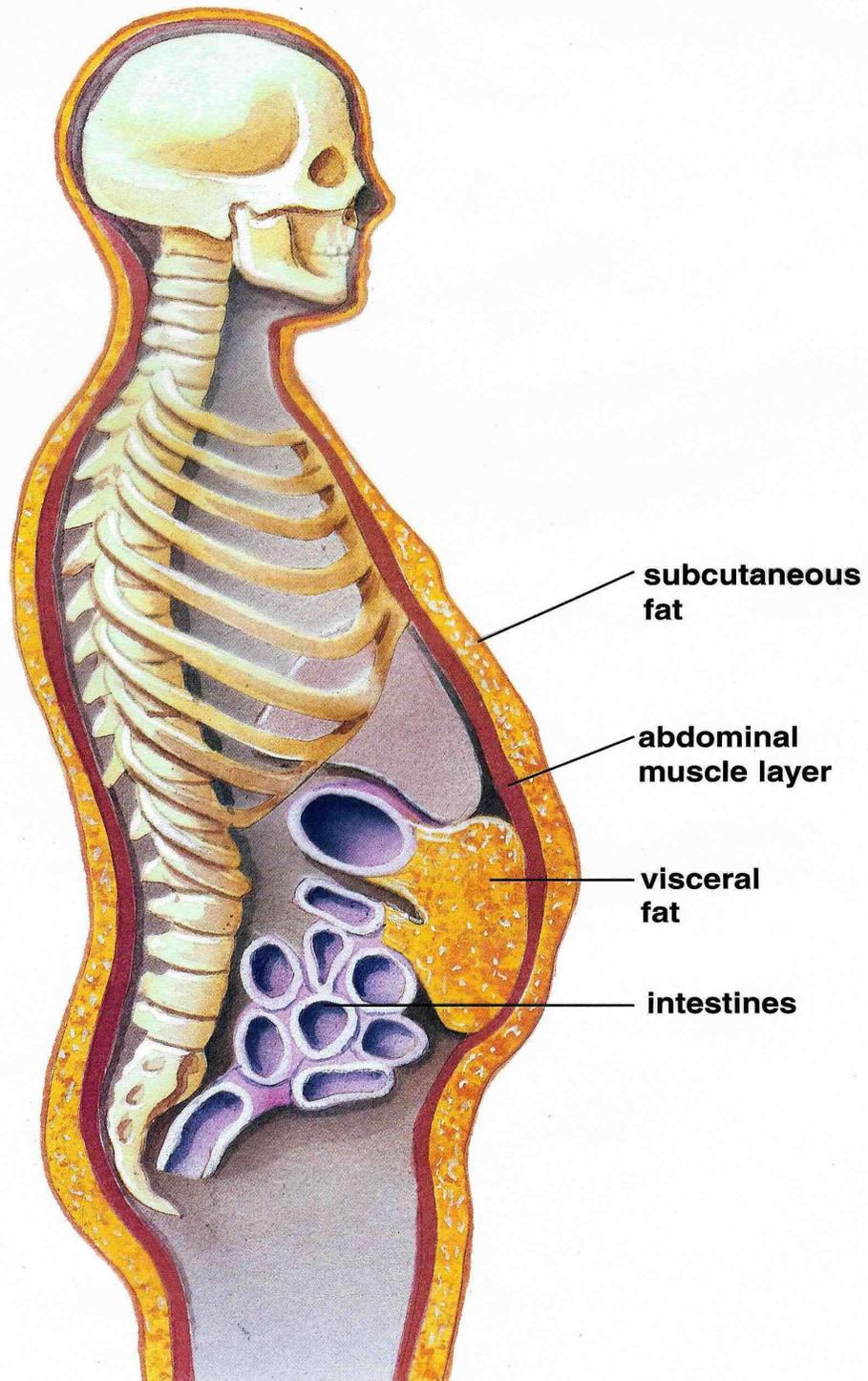
Indications for Insulin Sensitizers
Rosiglitazone (Avandia), Pioglitazone (Actos)

▸ **Action**: decrease insulin resistance by making muscle and adipose cells more sensitive to insulin. Decrease free fatty acids

▸ **Names**:

  ▸ pioglitazone (Actos) – bladder cancer warning

    ▸ Dosing: 15-45 mg daily

    ▸ Consider adding low dose if history of stroke or with steatosis

▸ **Efficacy/ Considerations**

  ▸ Reduce A1C ~0.5-1.0%

  ▸ 6 weeks for maximum effect

  ▸ Pioglitazone $5 a month

  ▸ Can cause fluid retention, not indicated w/ CHF

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Thiazolidinediones "TZDs" • Increases insulin sensitivity	pioglitazone (Actos) rosiglitazone	15 – 45 mg daily 4 – 8 mg daily	Black Box Warning: TZDs may cause or worsen CHF. Monitor for edema and weight gain. Increased peripheral fracture risk. Actos may increase risk of bladder cancer. Lowers A1c 0.5% – 1.0%

Visceral Fat and Subcutaneous Fat

subcutaneous
fat

abdominal
muscle layer

visceral
fat

intestines

The Noxious Nine – Pathophysiology T2D

Neurotrans-mission dysfunction

Decreased Insulin β-cell secretion

Hypercortisolism

Adrenal cortex

Increased renal glucose reabsorption

Increased glucagon α-cell secretion

Decreased incretin effect Gut hormones

Increased lipolysis

Increased hepatic glucose production

Decreased muscle glucose uptake

DeFronzo, Auchus-Hypercortisolism June 2025

POLL Question #4

▸ AJ is a 52-year-old with type 2 diabetes presents with worsening hyperglycemia despite taking three diabetes medications. AJ says, "No matter what I do, I can't seem to get my blood sugars down".

▸ Which of the following clusters of physical findings would increase your suspicion that AJ is struggling with hypercortisolism?

A. Dorsocervical fat pad, wide purple striae and bruising.

B. Peripheral muscle hypertrophy, thick hair growth, and flushed skin.

C. Weight loss, skin hyperpigmentation, and generalized muscle wasting.

D. Pallor, brittle nails, and spoon-shaped fingernails.

Signs of Hypercortisolism

SIGNS OF HYPERCORTISOLISM

- Facial Rounding
- Purple Abdominal Striae
- Thin Skin
- Thin Extremities
- Hypertension
- Buffalo Hump
- Easy Bruising
- Central Obesity
- Easy Bruising

▸ **Other signs**
  ▸ High blood pressure,
  ▸ Hyperglycemia
  ▸ Visceral adiposity
  ▸ Bone loss, fractures
  ▸ muscle weakness,
  ▸ excessive hair growth,
  ▸ acne,
  ▸ mood changes like irritability and depression.

Hypothalamus → CRH → Pituitary → ACTH → Adrenal → Cortisol

▸ Cortisol effects: gluconeogenesis, insulin resistance, fat redistribution

CATALYST Study Findings

▸Findings from the CATALYST study, the largest prospective trial of its kind, suggest that hypercortisolism may be a significant contributing factor in as many as one in four patients with difficult-to-control type 2 diabetes.

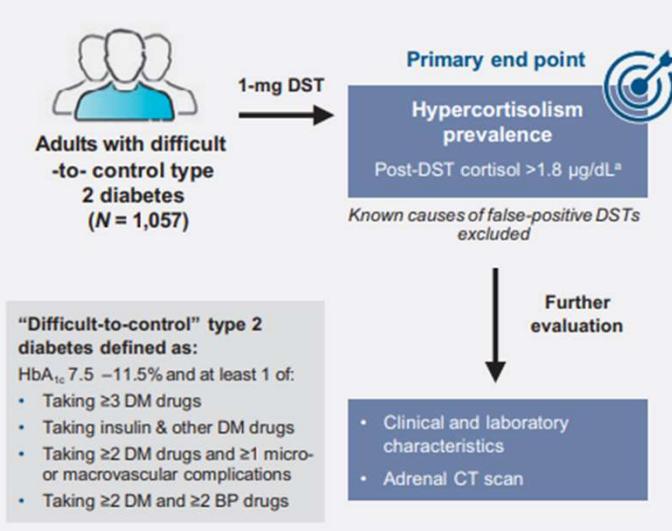# CATALYST Study: Hypercortisolism & Difficult-to-Control Type 2 Diabetes

▸ **Study Design Overview** Prospective observational screening of ~1,000 adults with HbA1c 7.5–11.5%, on multiple antihyperglycemic agents.

▸ Screening tool: Overnight 1 mg dexamethasone suppression test (DST).

▸ Hypercortisolism defined as post-DST cortisol >1.8 µg/dL with adequate dexamethasone levels.

Study Design & Prevalence

CATALYST
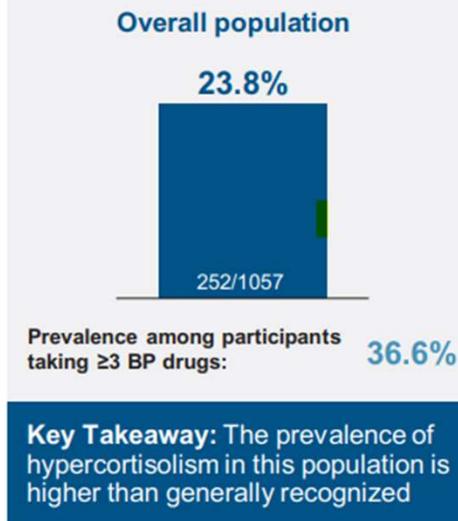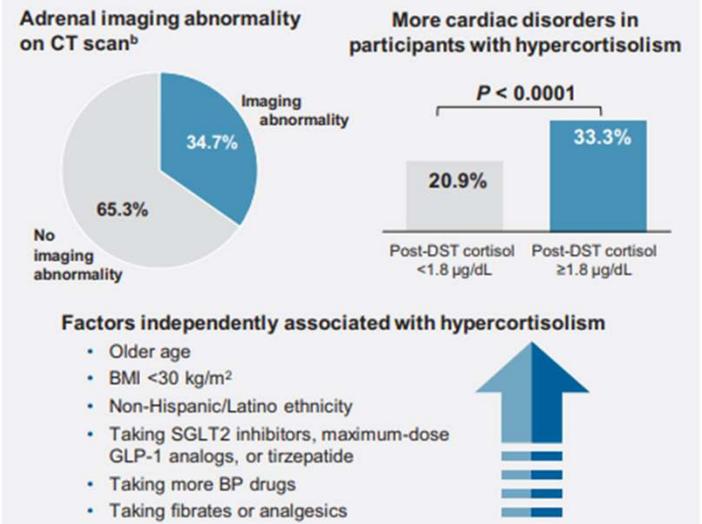Study of Hypercortisolism in Patients with Difficult-to-Control Type 2 Diabetes

Prevalence of hypercortisolism in patients with difficult-to-control type 2 diabetes

CATALYST Part 1 Study Design (NCT05772169)

Adults with difficult-to-control type 2 diabetes (N = 1,057)

1-mg DST →

Primary end point

Hypercortisolism prevalence
Post-DST cortisol >1.8 µg/dL[a]

Known causes of false-positive DSTs excluded

Further evaluation

• Clinical and laboratory characteristics
• Adrenal CT scan

"Difficult-to-control" type 2 diabetes defined as:
HbA$_{1c}$ 7.5 –11.5% and at least 1 of:
• Taking ≥3 DM drugs
• Taking insulin & other DM drugs
• Taking ≥2 DM drugs and ≥1 micro- or macrovascular complications
• Taking ≥2 DM and ≥2 BP drugs

Hypercortisolism Prevalence

Overall population

23.8%

252/1057

Prevalence among participants taking ≥3 BP drugs: 36.6%

Key Takeaway: The prevalence of hypercortisolism in this population is higher than generally recognized

Other Key Findings

Adrenal imaging abnormality on CT scan[b]

Imaging abnormality 34.7%

No imaging abnormality 65.3%

More cardiac disorders in participants with hypercortisolism

$P < 0.0001$

20.9% — Post-DST cortisol <1.8 µg/dL
33.3% — Post-DST cortisol ≥1.8 µg/dL

Factors independently associated with hypercortisolism
• Older age
• BMI <30 kg/m^2
• Non-Hispanic/Latino ethnicity
• Taking SGLT2 inhibitors, maximum-dose GLP-1 analogs, or tirzepatide
• Taking more BP drugs
• Taking fibrates or analgesics

[a]With dexamethasone ≥140 ng/dL. [b]In patients with hypercortisolism. BP, blood pressure; CT, computed tomography; DM drug, glucose-lowering drug; DST, dexamethasone suppression test; GLP-1, glucagon-like peptide 1.

▸ **Findings**

▸ 23.8% of study participants had hypercortisolism

  ▸ Prevalence 36.6% in those on ≥3 antihypertensives

  ▸ 34.7% adrenal abnormalities on CT

John B. Buse ✉ iD; Steven E. Kahn iD; Vanita R. Aroda iD; Richard J. Auchus; Timothy Bailey; Irina Bancos; Robert S. Busch; Elena A. Christofides iD; Ralph A. DeFronzo iD; Bradley Eilerman iD; James W. Findling; Vivian Fonseca iD; Oksana Hamidi; Yehuda Handelsman iD; Harold J. Miller; Jonathan G. Ownby; John C. Parker; Athena Philis-Tsimikas; Richard Pratley; Julio Rosenstock iD; Michael H. Shanik; Lance L. Sloan; Guillermo Umpierrez iD; Iulia Cristina Tudor; Tina K. Schlafly iD; Daniel Einhorn; CATALYST Investigators

Study Design – Part 2 (Intervention)

Randomized, double-blind, placebo-controlled intervention

N = 136 participants with confirmed hypercortisolism

Mifepristone: 300 mg daily escalating up to 900 mg over 24 weeks

Primary endpoint: HbA1c reduction; Secondary: weight, meds, safety.

Mifepristone is a glucocorticoid (cortisol) receptor Antagonist.

10% experience adverse side effects from glucocorticoid withdraw.

SE's include: fatigue, N/V, hypokalemia, edema, HTN

CATALYST Treatment Outcomes

Mifepristone significantly improves glycemic control and weight
Next steps: broader screening, novel cortisol-targeted therapies,
long-term outcomes.

A1c ↓ ~1.5% vs. 0.2% in placebo group

Weight ↓ ~10 pounds; waist circumference ↓ ~2 inches

Many reduced or stopped other diabetes meds, including insulin.

Adverse events mostly mild to moderate (glucocorticoid withdrawal symptoms).

Hypokalemia observed; manageable clinically.

Discontinuation ~40%, mostly due to tolerability issues.

Question: How realistic is this to implement in primary care / Endo settings?

Hypercortisolism in Type 2

Cortisol increases gluconeogenesis in the liver

Reduces peripheral glucose uptake → insulin resistance

Stimulates protein catabolism and lipolysis

Chronic cortisol elevation → persistent hyperglycemia

- Can lead to "Difficult to Control Type 2 Diabetes"
- CATALYST study revealed about 24% of people with elevated BG despite meds, may be due to hypercortisolism.
- Treatment with mifepristone decreased weight, waistline, BG.

Adrenal cortex

DeFronzo, Auchus-Hypercortisolism June 2025

pmc.ncbi.nlm.nih.gov+3HCP
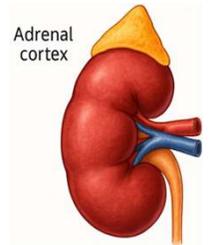
Step Wise Approach to Hyperglycemia 2025

▸ *Usually, start one medication at a time*

▸ *However, evidence supports initial combo therapy if A1C 8.5% or more, to quickly reach goals and slow decline of glucose control.*

▸ Where to start?

  ▸ Individual values

  ▸ CVD, Heart failure or Kidney Disease

  ▸ Minimize Hypoglycemia

  ▸ Minimize wt gain or promote wt loss

  ▸ Consider Cost

Use of Glucose-Lowering Medications in the Management of Type 2 Diabetes

HEALTHY LIFESTYLE BEHAVIORS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT; SOCIAL DETERMINANTS OF HEALTH

To avoid therapeutic inertia, reassess and modify treatment regularly (3–6 months)

Goal: Cardiovascular and Kidney Risk Reduction in High-Risk Individuals with Type 2 Diabetes*

+ASCVD†

+Indicators of high CVD risk

+HF
Current or prior symptoms of HF with documented HFrEF or HFpEF

+CKD
eGFR <60 mL/min/1.73 m² OR albuminuria (ACR ≥3.0 mg/mmol [30 mg/g]). Repeat measurement is required to confirm CKD

+ASCVD/indicators of high CVD risk#

GLP-1 RA# with proven CVD benefit **OR** SGLT2i‡ with proven CVD benefit

SGLT2i‡
with proven HF benefit in this population

+CKD (on maximally tolerated dose of ACEi or ARB)

SGLT2i‡ with primary evidence of reducing CKD progression
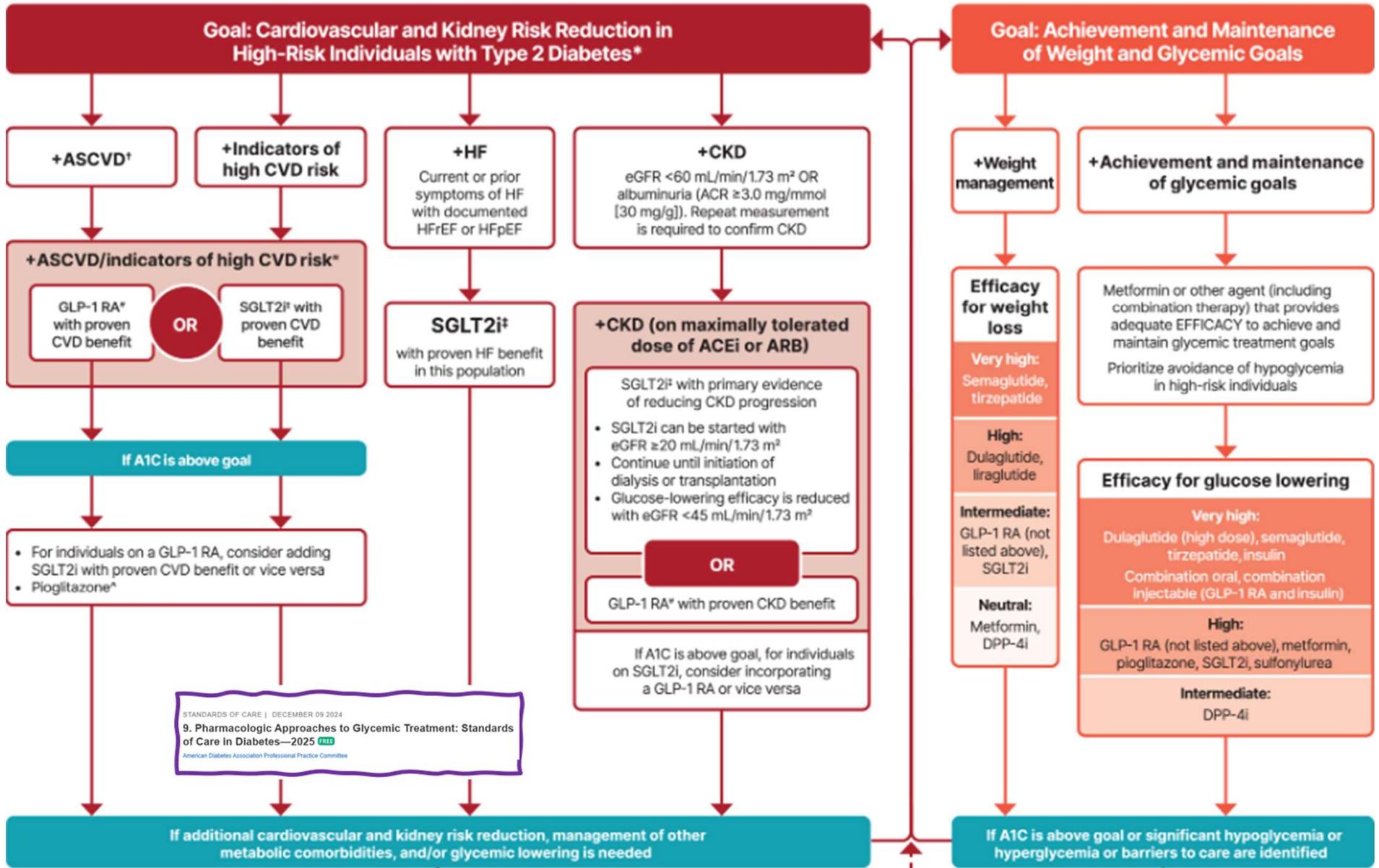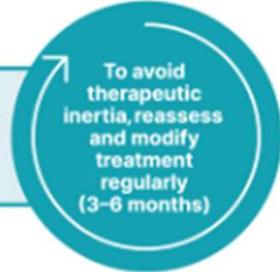- SGLT2i can be started with eGFR ≥20 mL/min/1.73 m²
- Continue until initiation of dialysis or transplantation
- Glucose-lowering efficacy is reduced with eGFR <45 mL/min/1.73 m²

OR

GLP-1 RA# with proven CKD benefit

If A1C is above goal

- For individuals on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit or vice versa
- Pioglitazone^

If A1C is above goal, for individuals on SGLT2i, consider incorporating a GLP-1 RA or vice versa

If additional cardiovascular and kidney risk reduction, management of other metabolic comorbidities, and/or glycemic lowering is needed

Goal: Achievement and Maintenance of Weight and Glycemic Goals

+Weight management

+Achievement and maintenance of glycemic goals

Metformin or other agent (including combination therapy) that provides adequate EFFICACY to achieve and maintain glycemic treatment goals

Prioritize avoidance of hypoglycemia in high-risk individuals

Efficacy for weight loss

Very high: Semaglutide, tirzepatide

High: Dulaglutide, liraglutide

Intermediate: GLP-1 RA (not listed above), SGLT2i

Neutral: Metformin, DPP-4i

Efficacy for glucose lowering

Very high: Dulaglutide (high dose), semaglutide, tirzepatide, insulin
Combination oral, combination injectable (GLP-1 RA and insulin)

High: GLP-1 RA (not listed above), metformin, pioglitazone, SGLT2i, sulfonylurea

Intermediate: DPP-4i

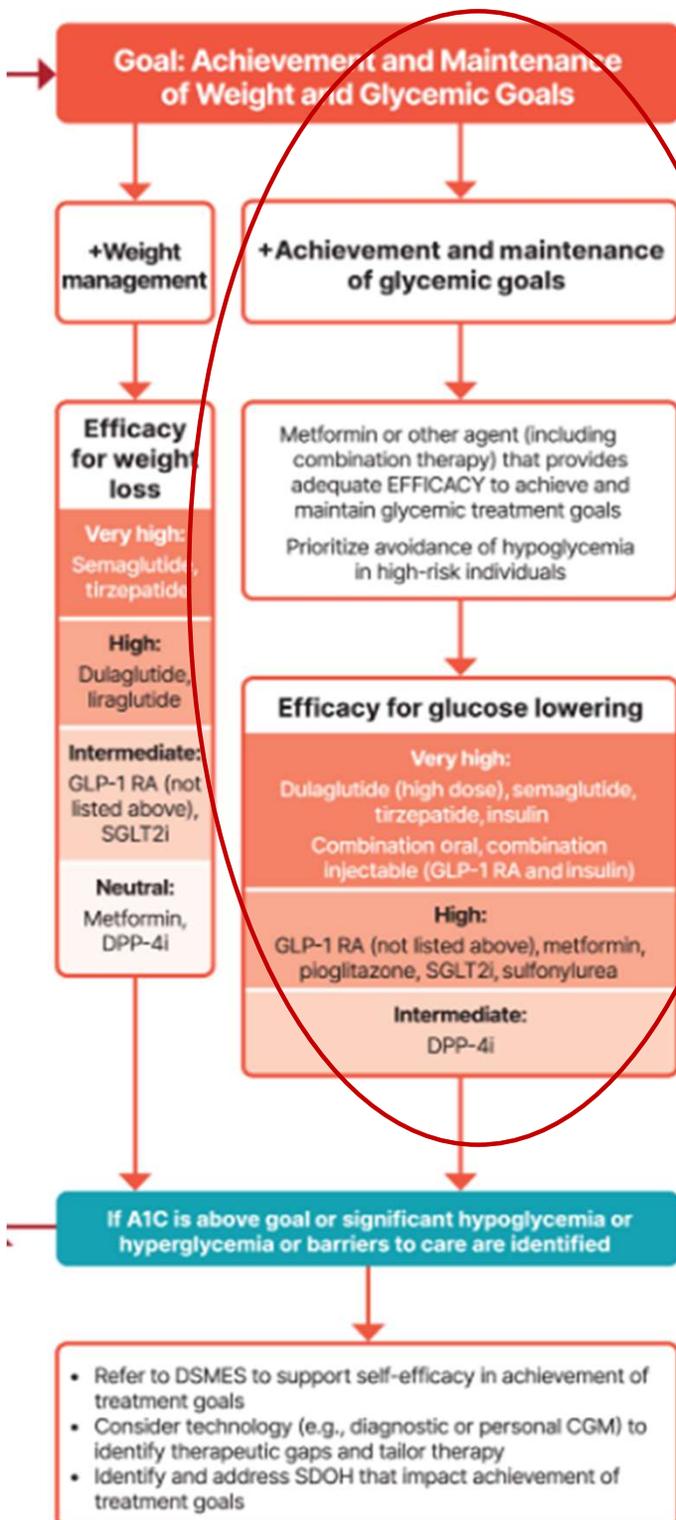**If A1C is above goal or significant hypoglycemia or hyperglycemia or barriers to care are identified**

Quick Question 5

▶ RT, a 61-year-old woman with BMI of 28 and type 2 diabetes 3 months. She wanted to try to manage diabetes with diet and exercise. GFR in 90s, UACR 14mg/gm, A1c 7.4%. Based on this info, which medication would you start?

▶ A. Pioglitazone

▶ B. Metformin

▶ C. GLP1-RA

▶ D. Sulfonylurea

Metformin is "Usually" 1st Line

Flowchart (left):

Goal: Achievement and Maintenance of Weight and Glycemic Goals

+Weight management

+Achievement and maintenance of glycemic goals

Metformin or other agent (including combination therapy) that provides adequate EFFICACY to achieve and maintain glycemic treatment goals

Prioritize avoidance of hypoglycemia in high-risk individuals

Efficacy for weight loss

- Very high: Semaglutide, tirzepatide
- High: Dulaglutide, liraglutide
- Intermediate: GLP-1 RA (not listed above), SGLT2i
- Neutral: Metformin, DPP-4i

Efficacy for glucose lowering

- Very high: Dulaglutide (high dose), semaglutide, tirzepatide, insulin; Combination oral, combination injectable (GLP-1 RA and insulin)
- High: GLP-1 RA (not listed above), metformin, pioglitazone, SGLT2i, sulfonylurea
- Intermediate: DPP-4i

If A1C is above goal or significant hypoglycemia or hyperglycemia or barriers to care are identified

- Refer to DSMES to support self-efficacy in achievement of treatment goals
- Consider technology (e.g., diagnostic or personal CGM) to identify therapeutic gaps and tailor therapy
- Identify and address SDOH that impact achievement of treatment goals

Text (right):

- **Why metformin?**
  - Longstanding evidence
  - High efficacy and safety
  - Inexpensive - 3 months for $12
  - Weight neutral
  - Check B12 levels at intervals especially if anemia or neuropathy.

- If ASCVD, HF or CKD or high ASCVD risk, use SGLT2i or GLP-1 RA +/- metformin
- If A1C ≥ 8.5%, consider combo therapy.

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides • Decreases hepatic glucose output	metformin (Glucophage) Riomet (liquid metformin)	500 - 2550 mg (usually BID w/ meal) 500 - 2550 mg 500mg/5mL	**Side effects:** nausea, bloating, diarrhea, B12 deficiency. To minimize GI Side effects, use XR and take w/ meals. **Obtain GFR before starting.** • If GFR <30, do not use. • If GFR <45, don't start Meformin • If pt on Metformin and GFR falls to 30-45, eval risk vs. benefit; consider decreasing dose. **For dye study,** if GFR <60, liver disease, alcoholism or heart failure, restart metformin after 48 hours if renal function stable. **Benefits:** lowers cholesterol, no hypo or weight gain, cheap. Approved for pediatrics, 10 yrs + Lowers A1c 1.0%-2.0%.
	Extended Release-XR (Glucophage XR) (Glumetza) (Fortamet)	(1x daily w/dinner) 500 – 2000 mg 500 – 2000 mg 500 – 2500 mg	
Sulfonylureas • Stimulates sustained insulin release	glyburide: (Diabeta) (Glynase PresTabs)	1.25 – 20 mg 0.75 – 12 mg	Can take once or twice daily before meals. Low cost generic. **Side effects**: hypoglycemia and weight gain. Eliminated via kidney. **Caution**: Glyburide most likely to cause hypoglycemia. Lowers A1c 1.0% – 2.0%.
	glipizide: (Glucotrol) (Glucotrol XL)	2.5 – 40 mg 2.5 – 20 mg	
	glimepiride (Amaryl)	1.0 – 8 mg	

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Metformin and Kidney Disease – 2025 Update

▶ Metformin is also a preferred agent in CKD due to well-documented efficacy and safety profile in type 2 diabetes.

　　▶ However, there is no documented direct kidney benefit.

▶ Don't start metformin if eGFR is <45

▶ Reduce dose of metformin if eGFR is <45 individual is already on metformin.

▶ Stop metformin once eGFR is <30

Poll Question 6

▸ RL is a 43 year old who was on insulin after experiencing GDM. She then was started on a GLP-1, Metformin and an SGLT-2, and stopped the insulin completely. Her daughter told her, "Your breath smells funny". A1C 7.9%. What are you worried about?

a. Euglycemic DKA
b. Dental caries
c. Renal failure
d. Steatosis

SGLT-2 Inhibitors

Common Oral Diabetes Meds

Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors "Glucoretic" • Decreases glucose reabsorption in kidneys	Canagliflozin* (Invokana)	100 - 300 mg 1x daily	**Side effects:** hypotension, UTIs, genital infections, increased urination, weight loss, ketoacidosis.
	Dapagliflozin*† (Farxiga)	5 - 10 mg 1x daily	**Heart Failure, CV & Kidney Protection:** 1st line therapy for Heart Failure (HF), Kidney Disease (CKD), Cardiovascular Disease, before or with metformin
	Empagliflozin*† (Jardiance)	10 - 25 mg 1x daily	**Considerations:** If GFR ≥ 20, use SGLT-2 to reduce CVD, Heart Failure and Chronic Kidney Disease.
	Ertugliflozin (Steglatro)	5 – 15 mg 1x daily	Limited BG lowering effect if GFR <45. See package insert for GFR cut-offs and dosing.
	Bexagliflozin (Brenzavvy)	20 mg 1x daily	**Benefits:** SGLT-2s* reduce BG, CV death & HF, slow CKD. †Approved for peds, 10 yrs +. Lowers A1C 0.6% to 1.5%.

FDA Warning of DKA – Not approved for Type 1 (but used off-label)
~ increases risk of EDKA by 4-6%
Increased risk for those with type 2 on insulin + SGLT-2 Inhibitor
Decreased insulin dose due to lower BG on SGLT-2 Inhibitors
Can lead to insulin deprivation and ketoacidosis

Benefits of SGLT-2 Inhibitors

A1C lowering	Weight loss	Cardiovascular
Renal	Heart failure	Blood pressure lowering

Side Effects of SGLT-2 Inhibitors

Genitourinary infections	Volume depletion	Increased urination
Hypotension	UTI	Diabetes ketoacidosis (DKA)

SGLT-2i Indications Summary

Drug	Lower BG	Reduce CV Risk?	Use to treat Heart Failure?	Slow renal disease?
Dapagliflozin (Farxiga)	Yes	Yes	Yes +/- Diabetes	Yes
Empagliflozin (Jardiance)	Yes	Yes	Yes +/- Diabetes	Yes
Canagliflozin (Invokana)	Yes	Yes	Yes w/ Diabetes	Yes
Ertugliflozin (Steglatro)	Yes	No	Yes w/ Diabetes	Yes
Bexagliflozin (Brenzavvy)	Yes	NA	NA	NA

Use of Glucose-Lowering Medications in the Management of Type 2 Diabetes

HEALTHY LIFESTYLE BEHAVIORS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT; SOCIAL DETERMINANTS OF HEALTH

To avoid therapeutic inertia, reassess and modify treatment regularly (3–6 months)

Goal: Cardiovascular and Kidney Risk Reduction in High-Risk Individuals with Type 2 Diabetes*

+ASCVD†

+Indicators of high CVD risk

+HF
Current or prior symptoms of HF with documented HFrEF or HFpEF

+CKD
eGFR <60 mL/min/1.73 m² OR albuminuria (ACR ≥3.0 mg/mmol [30 mg/g]). Repeat measurement is required to confirm CKD

+ASCVD/indicators of high CVD risk≈

GLP-1 RA# with proven CVD benefit **OR** SGLT2i‡ with proven CVD benefit

SGLT2i‡
with proven HF benefit in this population

+CKD (on maximally tolerated dose of ACEi or ARB)

SGLT2i‡ with primary evidence of reducing CKD progression

- SGLT2i can be started with eGFR ≥20 mL/min/1.73 m²
- Continue until initiation of dialysis or transplantation
- Glucose-lowering efficacy is reduced with eGFR <45 mL/min/1.73 m²

OR

GLP-1 RA# with proven CKD benefit

If A1C is above goal, for individuals on SGLT2i, consider incorporating a GLP-1 RA or vice versa

If A1C is above goal

- For individuals on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit or vice versa
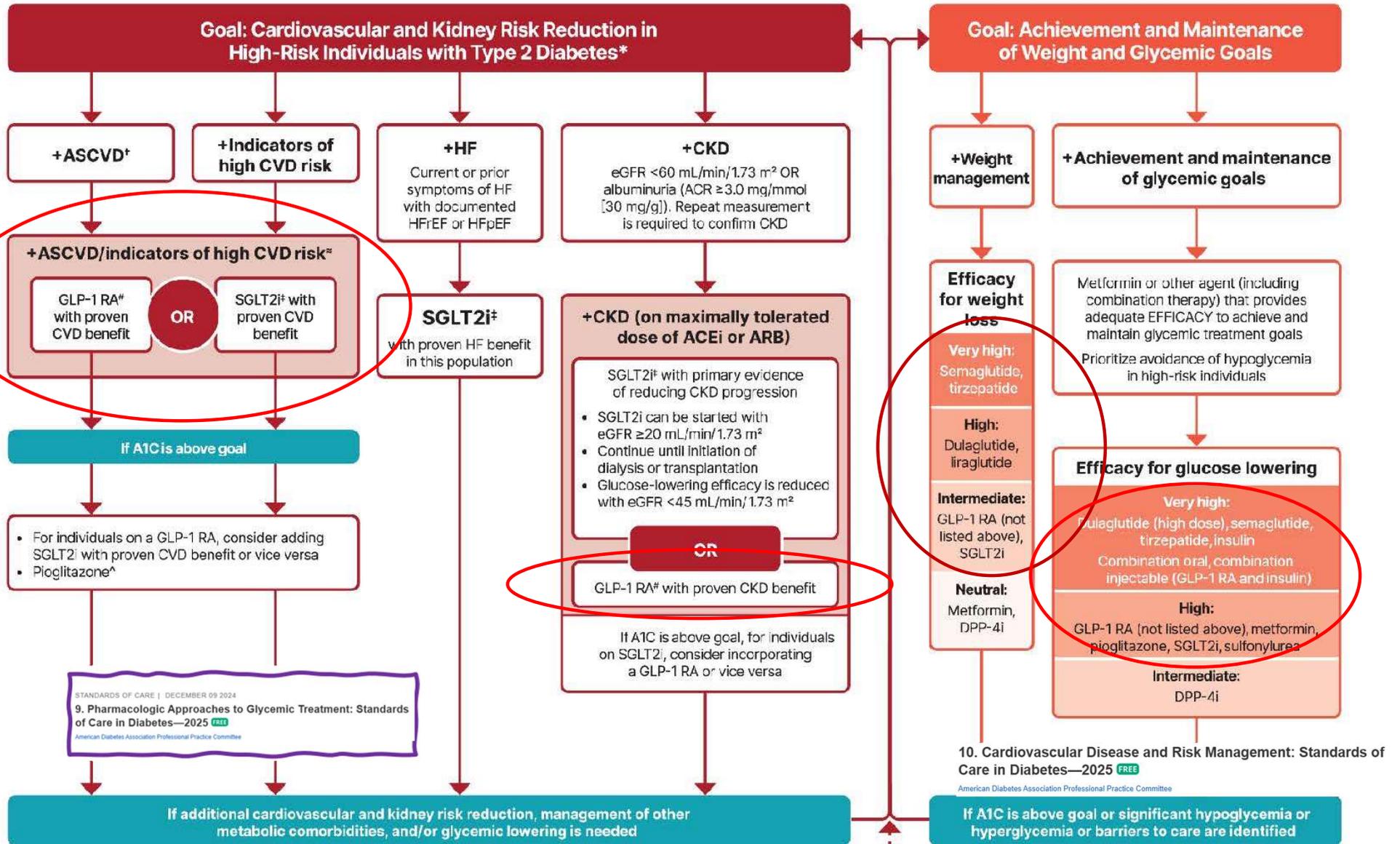- Pioglitazone^

STANDARDS OF CARE | DECEMBER 09 2024
9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2025 FREE
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High: GLP-1 RA (not listed above), metformin, pioglitazone, SGLT2i, sulfonylurea

Intermediate: DPP-4i

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If additional cardiovascular and kidney risk reduction, management of other metabolic comorbidities, and/or glycemic lowering is needed

If A1C is above goal or significant hypoglycemia or hyperglycemia or barriers to care are identified

Case Study Question 7

MZ is complaining of nausea, and increased eructation?

What class of medication may be causing these side effects?

a. GLP-1/GIP Receptor Agonists

b. Metformin

c. SGLT-2 Inhibitor

d. DPP-IV Inhibitor
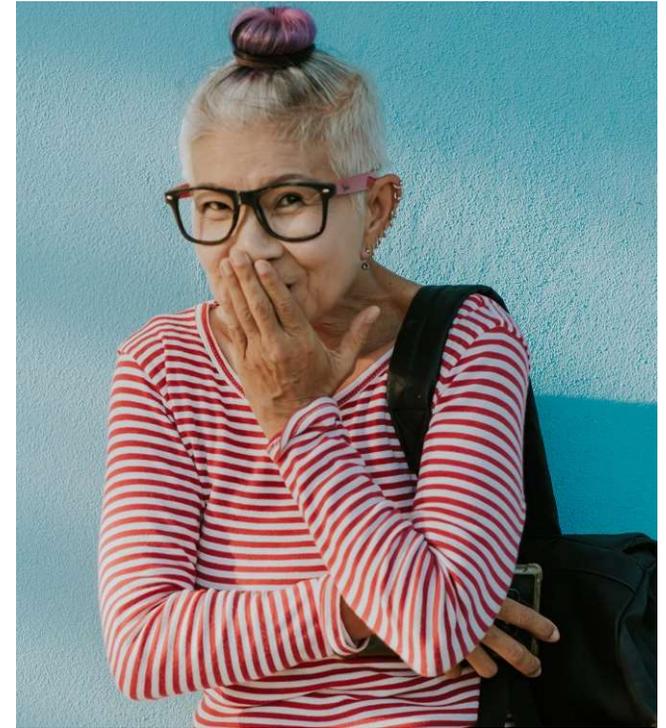
Incretins: GLP & GIP Receptor Agonists

GLP-1: glucagon like peptide 1
GIP: glucose-dependent insulinotropic polypeptide

GLP-1 Effects in Humans
Understanding the Natural Role of Incretins

GLP-1 secreted upon the ingestion of food

Promotes satiety and reduces appetite

↑ Beta-cell response

Alpha cells:
↓ Postprandial glucagon secretion

Liver:
↓ Glucagon reduces hepatic glucose output

Beta cells:
Enhances glucose-dependent insulin secretion

Stomach:
Helps regulate gastric emptying
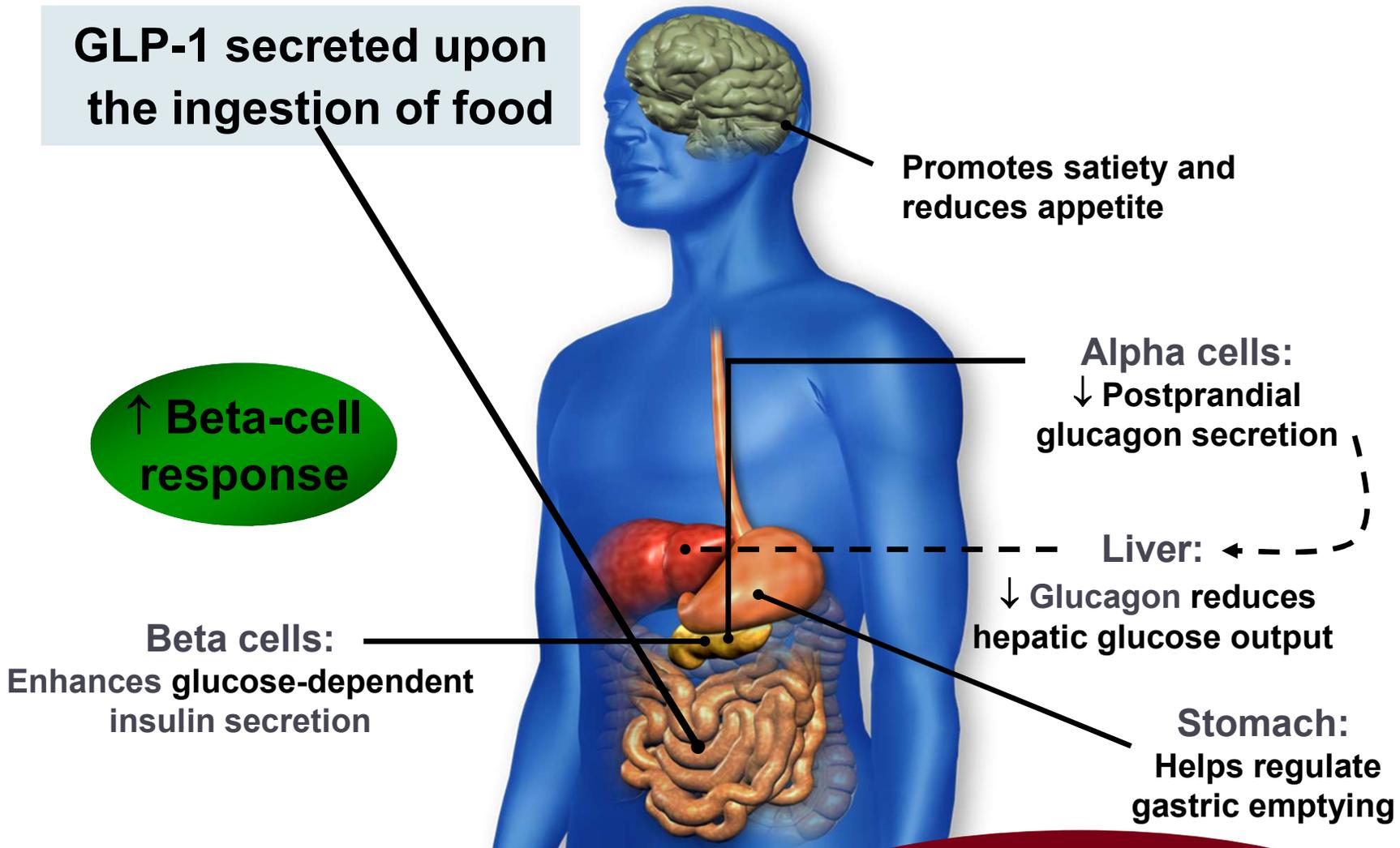
Adapted from Flint A, et al. *J Clin Invest*. 1998;101:515-520
Adapted from Larsson H, et al. *Acta Physiol Scand*. 1997;160:413-422
Adapted from Nauck MA, et al. *Diabetologia*. 1996;39:1546-1553
Adapted from Drucker DJ. *Diabetes*. 1998;47:159-169

GLP-1 degraded by DPP-4 w/in minutes

Pocket Card: GLP-1 & GIP RA

GLP-1 & GIP Receptor Agonists

Class/Main Action	Name	Dose Range	Considerations
GLP-1 RA - Glucagon Like Peptide Receptor Agonist **"Incretin Mimetic"** • Increases insulin release with food • Slows gastric emptying • Promotes satiety • Suppresses glucagon	exenatide (Byetta) exenatide XR† (Bydureon)	5 and 10 mcg BID 2 mg 1x a week Pen injector - Bydureon BCise	**Side effects:** nausea, vomiting, weight loss, injection site reaction. Report signs of acute pancreatitis or intestinal blockage (ileus) and stop med. **Black box warning:** Thyroid C-cell tumor warning (avoid if family history of medullary thyroid tumor). *Significantly reduces risk of CV death, heart attack, and stroke. §Approved to reduce risk of CKD †Approved for pediatrics 10-17 yrs Lowers A1C 0.5 – 1.6% Weight loss: 4-6% body weight loss.
	liraglutide*† (Victoza)	0.6, 1.2 and 1.8 mg daily	
	dulaglutide*† (Trulicity)	0.75, 1.5, 3.0 and 4.5 mg 1x a week pen injector	
	semaglutide*§ (Ozempic) (Rybelsus) Oral tablet	0.25, 0.5, 1.0 and 2.0 mg 1x a week pen injector 3, 7, 14 mg - Original dosing. 1.5, 4, 9 mg - New dosing. AM dose, pre-food, w/ water sip	
GLP-1 & GIP Receptor Agonist Activates receptors for GLP-1 (see above) & Glucose-dependent Insulinotropic Polypeptide (GIP).	Tirzepatide (Mounjaro)	2.5, 5.0, 7.5, 10, 12.5 and 15 mg 1x a week injection Single dose via prefilled pen or vial. Adjust dose based on shared decision making and individual goals.	**Side effects:** nausea, diarrhea, injection site reaction. Report pancreatitis, signs of intestinal blockage. **Black box warning:** Avoid if family history of medullary thyroid tumor. Lowers A1C ~ 1.8 - 2.4% Weight loss: 7-13% body weight loss at max dose.

Counseling Points: GLP-1 RA & GLP-1/GIP

- Avoid if personal or family history of medullary thyroid cancer
- Avoid in combo with DPP-4 inhibitors
- Watch for intestinal obstruction
- Use of non-FDA *compounded* products not recommended
- Avoid with history pancreatitis
- If on tirzepitide, use back up contraception for first 4 weeks
- Ask about recent eye exam
  - Potential increase in diabetes retinopathy

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Sudden discontinuation of semaglutide and tirzepitide results in regain of one-half to two-thirds of the weight loss within 1 year. Consider trying lowest effective dose, using intermittent therapy, or stopping medication followed by close weight monitoring.

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SGLT2i‡
with proven HF benefit in this population

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SGLT2i‡ with primary evidence of reducing CKD progression
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- Glucose-lowering efficacy is reduced with eGFR <45 mL/min/1.73 m²

OR

GLP-1 RA# with proven CKD benefit

If A1C is above goal, for individuals on SGLT2i, consider incorporating a GLP-1 RA or vice versa

If A1C is above goal

- For individuals on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit or vice versa
- Pioglitazone^

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Intermediate:
DPP-4i

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Indication Chart for GLP/GIP Receptor Agonists - Diabetes, Weight, CVD and Others

Drug	Type 2 Diabetes	Weight Loss Indication	CV Indication	Other Indication
Exenatide IR (Byetta)	Yes	No	No	
Exenatide ER (Bydureon)	Yes, 10 yrs and older	No	No	
Dulaglutide (Trulicity)	Yes, 10 yrs and older	No	Yes	
Liraglutide (Victoza)	Yes, 10 yrs and older	No	Yes	
Liraglutide (Saxenda)	No	Yes, 12 yrs and older	No	
Semaglutide (Ozempic)	Yes	No	Yes	CKD
Semaglutide (Wegovy)	No	Yes, 12 yrs and older	Yes	MASH
Oral Semaglutide (Rybelsus)	Yes	No	CV benefit, indication pending	
Tirzepatide (Mounjaro)	Yes	No	No	
Tirzepatide (Zepbound)	No	Yes	No	Sleep Apnea

Diana Isaacs, PharmD, BCPS, BCACP, BC-ADM, CDCES   Beverly Thomassian, RN, MPH, CDES, BC-ADM

DiaBingo

B Frequent skin and yeast infections

B A BMI of _____ or greater indicates increased pre/diabetes risk?

B To reduce complications, control **A**1c, **B**lood pressure, **C**holesterol

B PreDiabetes – fasting glucose level of ____ to _____

B Erectile dysfunction indicates greater risk for _____

B Diabetes – fasting glucose level_____ or greater

B Type 1 diabetes is best described as an _____ disease

B People with diabetes are _____ times more likely to die of heart dx

B Elevated triglycerides, < HDL, smaller dense LDL

B Each percentage point of A1C = _____ mg/dl glucose

B At dx of type 2, about __% of the beta cell function is lost

B Diabetes – random glucose _____ or greater

Medication Taking Behaviors

- Adequate medication taking is defined as 80%
- 23% of time, if A1c, B/P, lipids above target - due to med taking behavior
- Assess for barriers
- If taking meds 80% of time and goals not met, consider medication intensification

Barriers include:
Forgetting to fill Rx, forgetting to take, fear, depression, health beliefs, med complexity, cost, knowledge gap, system factors, etc.

Work on targeted approach for specific barrier

Wait, What About Emotions?

Diabetes Admit for Hyperglycemia

▸ John is admitted for hyperglycemia because he stopped taking his diabetes meds.

▸ HCP says, "Don't you realize you are going to get complications, like kidney disease or amputation if you don't take your medications?"

▸ Door Closed – No Connection made

How Does John Feel?

▸ Embarrassed
▸ Ashamed
▸ Defeated
▸ Angry
▸ Unheard

How does HCP feel?

▸ Frustrated
▸ Defeated
▸ Worried

Missed Appointments due to Stigma and Shame

A recent survey of over 2,600 people with diabetes across eight countries revealed that nearly 40% of missed doctor's appointments are due to stigma or shame.

Abbott. (2025, February 4). Abbott's Above the Bias film reveals misconceptions can impact diabetes care. https://abbott.mediaroom.com/2025-02-04-Abbotts-Above-the-Bias-FilmReveals-Misconceptions-Can-Impact-Diabetes-Care

Diabetes Visit – Let's Go *through*

A small adjustment can make a BIG Difference

‣ HCP says, "John, I am worried about you and your elevated blood glucose. Can you share what is going on in your life?"

‣ Door Open – Connection made

How Does John Feel?

‣ Heard & Seen
‣ Recognized
‣ Connected
‣ Engaged

How does the HCP feel?

‣ Connected
‣ Concerned
‣ Collaborative

Healing to HCP

Bidirectional Healing

Healing to Person
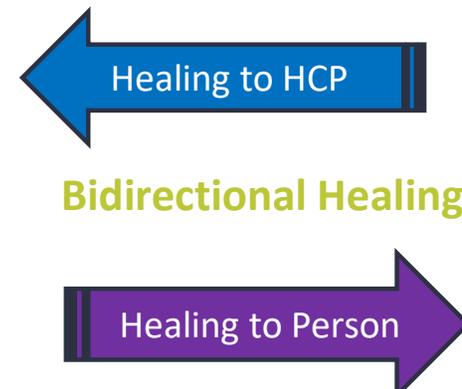
Create a Judgement Free Zone – Roll out the Carpet of Acceptance

There are no bad or good blood glucose numbers.
There is no such thing as cheating.
You are not failing at your diabetes.
It is not your fault you have diabetes.
Thank you for showing up today.

EMBARK Trial

Adults with type 1 diabetes experienced reductions in diabetes distress and HbA1c after participating in a virtual emotion-focused and/or education/behavioral program

EMBARK: a randomized, controlled clinical trial comparing three interventions aimed at reducing diabetes distress and improving HbA1c among adults with type 1 diabetes.

Streamline, an educator-led education and management program

TunedIn, a psychologist-led program focused exclusively on the emotional side of diabetes

FixIt, an integration of Streamline and TunedIn.

- All interventions were group based and virtual over 3–4 months.
- Recruitment occurred through clinics and community organizations in the United States.

Change in Diabetes Distress

STREAMLINE: -0.45
TUNEDIN: -0.75
FIXIT: -0.9
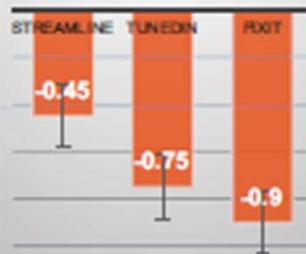
% of participants whose Diabetes Distress score improved to <2.0

STREAMLINE: 27.2
TUNEDIN: 50.2
FIXIT: 30.7

Change in HbA1c

STREAMLINE: -0.72
TUNEDIN: -0.64
FIXIT: -0.4
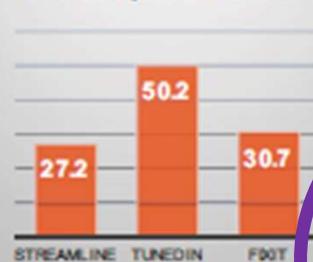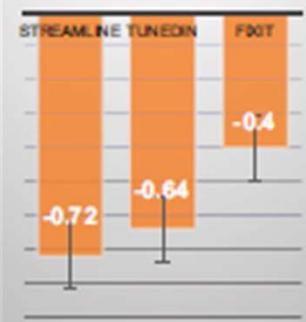
% of participants whose HbA1c decreased by ≥0.5%

STREAMLINE: 53.2
TUNEDIN: 55.7
FIXIT: 34.8

All three programs demonstrated substantive and sustained reductions in Diabetes Distress and HbA1c at 12-month follow-up.

TunedIn, the emotion-focused program, had the most consistent benefits across both Diabetes Distress and HbA1c.

Group-based, fully virtual, and time-limited programs like these can augment and enhance existing care.

Findings highlight the value of using emotion-focused strategies, like those used in TunedIn, for adults with type 1 diabetes to augment and enhance existing care.

EMBARK: A Randomized, Controlled Trial Comparing Three Approaches to Reducing Diabetes Distress and Improving HbA1c in Adults With Type 1 Diabetes. *Diabetes Care* 2024; dc232452. https://doi.org/10.2337/dc23-2452

Embark Trial – Emotions as Priority

I have finally given myself permission to make addressing the emotional aspects of diabetes a priority.

~Coach Beverly

Releasing the Brake

▸ This strategy recognizes that diabetes distress acts as a brake on the application of existing diabetes knowledge and skills.

▸ By releasing the diabetes distress brake through emotion-focused intervention, the negative cycle can be efficiently ended.
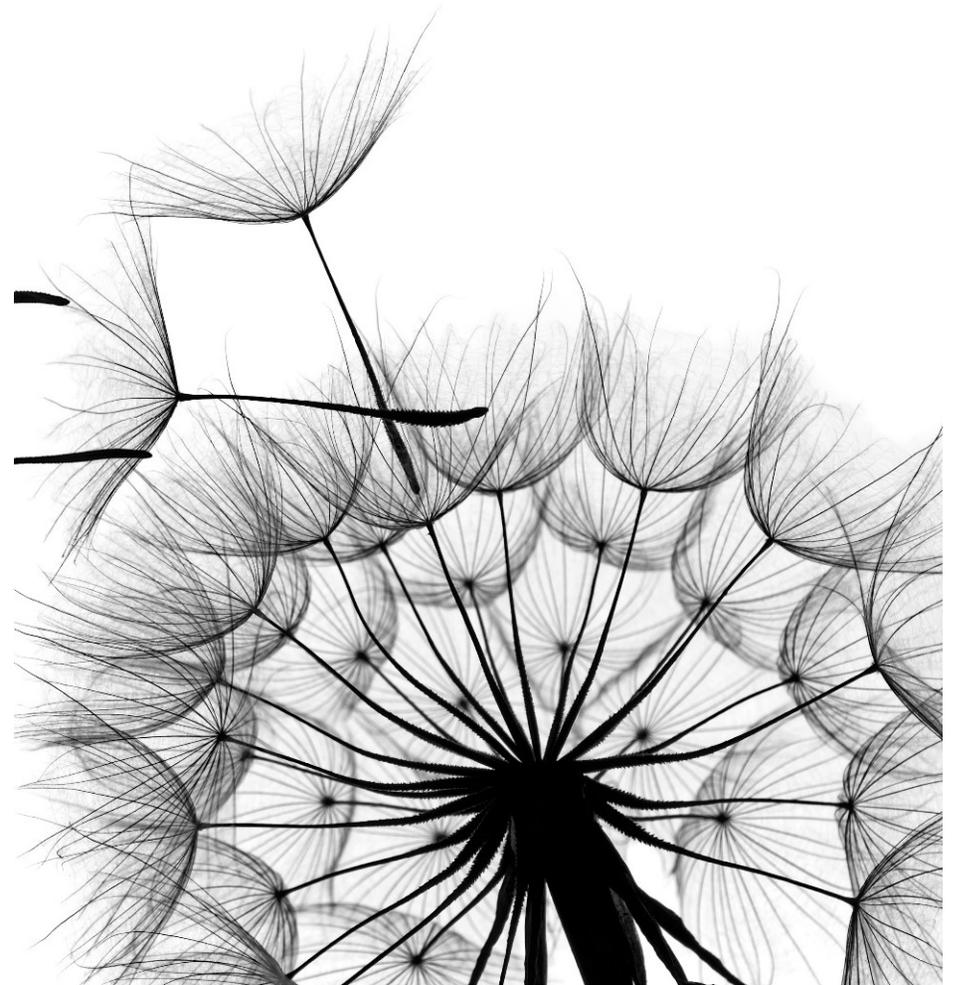
Commit to Listening at least Half of the Time

Language of Diabetes Education

Old Way

- Control diabetes
- Test BG
- Patient
- Normal BG
- Non-adherent, compliant
- Refuse

New Way

- Manage
- Check
- Participant
- BG in target range
- Focus on what they are accomplishing
- Decided, chose

American Diabetes Association, Diabetes Care
The Use of Language in Diabetes Care and Education, 2017

Diabetes is Complex

▸ Goal – achieve well being and negotiated outcomes

▸ Psychological factors:

  ▸ Environmental

  ▸ Social

  ▸ Behavioral

  ▸ Emotional

▸ Keep it person centered while integrating care into daily life

  ▸ Consider the individual

4. Comprehensive Medical Evaluation and Assessment of Comorbidities

- Person centered communication, strength-based language, active listening, literacy, quality of life

- It is necessary to take into account all aspects of a person's life circumstance (SDOH)

- It is important to integrate medical eval, engagement and lifestyle changes.

- Interdisciplinary teams provide best care

Decision Cycle for Person-Centered Glycemic Management in Type 2 Diabetes

REVIEW AND AGREE ON MANAGEMENT PLAN

- Review management plan
- Mutually agree on changes
- Ensure agreed modification of therapy is implemented in a timely fashion to avoid therapeutic inertia
- Undertake decision cycle regularly (at least once or twice a year)
- Operate in an integrated system of care

ASSESS KEY PERSON CHARACTERISTICS

- The individual's priorities
- Current lifestyle and health behaviors
- Comorbidities (i.e., CVD, CKD, and HF)
- Clinical characteristics (i.e., age, A1C, and weight)
- Issues such as motivation, depression, and cognition
- Social determinants of health

PROVIDE ONGOING SUPPORT AND MONITORING OF

- Emotional well-being
- Lifestyle and health behaviors
- Tolerability of medications
- Biofeedback including BGM and CGM, weight, step count, A1C, BP, and lipids

GOALS OF CARE

- Prevent complications
- Optimize quality of life

CONSIDER SPECIFIC FACTORS THAT IMPACT CHOICE OF TREATMENT

- Individualized glycemic and weight goals
- Impact on weight, hypoglycemia, and cardiovascular and kidney protection
- Underlying physiological factors
- Side effect profiles of medications
- Complexity of treatment plan (i.e., frequency, and mode of administration)
- Treatment choice to optimize medication use and reduce treatment discontinuation
- Access, cost, availability of medication, and lifestyle choices

IMPLEMENT MANAGEMENT PLAN

- Ensure there is regular review; more frequent contact initially is often desirable for DSMES

AGREE ON MANAGEMENT PLAN

- Specify SMART goals:
  - Specific
  - Measurable
  - Achievable
  - Realistic
  - Time limited

USE SHARED DECISION-MAKING TO CREATE A MANAGEMENT PLAN

- Ensure access to DSMES
- Involve an educated and informed person (and the individual's family or caregiver)
- Explore personal preferences
- Language matters (include person-first, strengths-based, empowering language)
- Include motivational interviewing, goal setting, and shared decision-making

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2025 FREE

Diabetes Goals and Treatment Plan

The goals of treatment for diabetes are to prevent or delay complications and optimize quality of life.

⬇

Goals and plans co-created by the care team and individual based on preferences, values, and goals.

⬇
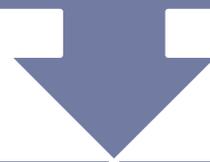
Management plan considers the person's:

| Age, cognitive abilities, school/work schedule and conditions, | Health beliefs, support systems, social situation, financial concerns, cultural factors, literacy and numeracy | Eating patterns, physical activity, (mathematical literacy) | Diabetes history (duration, complications, and current use of medications), comorbidities, disabilities, health priorities, other medical conditions | Preferences for care, access to health care services, and life expectancy |

Case Study - JR

- 38 yr old male, BMI 28, arrives in clinic for physical. Says he has been feeling tired lately, but attributes that to his job. In office fingerstick reads 228 mg/dl.
- 1. What lab tests are needed?
- 2. What would you include in your physical exam?
- What vaccinations?
- What referrals?
- What tools?

Lab Eval at Initial & Annual Visit

- A1c (each 3-6 mo's)
- Each year
  - Lipids, CBC with platelets
  - Liver function
  - Spot urinary albumin-to-creat ratio (UACR))
  - Serum creat and GFR
  - TSH, celiac (type 1)
  - B12 if on metformin >5yrs
  - Calcium, Vita D, and phosphorus if appropriate

- Serum K
  - If on ACE, ARBs or diuretics

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American Diabetes Association Professional Practice Committee

Case Study - JR

- 38 yr old male, BMI 28, arrives in clinic for physical. Says he has been feeling tired lately, but attributes that to his job. In office fingerstick reads 228 mg/dl.

- 1. What lab tests are needed?

- 2. What would you include in your initial exam?

- What vaccinations?

- What referrals?

- What tools?

Physical Exam

▶ Height, weight, BMI, pubertal development

▶ Blood pressure

▶ Fundoscopic exam, thyroid

▶ Skin exam –insertion sites, acanthosis, fungus, sores, feet

▶ Bone health, Hypo

▶ Depression, Distress Anxiety

▶ Functional and cognitive issues

▶ Comprehensive foot exam

  ▶ Visual eval

  ▶ Screen for Peripheral Arterial Disease

  ▶ Monofilament and vibration assessment

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Table 4.1—Components of the comprehensive diabetes medical evaluation at initial, follow-up, and annual visits

	Visit		
	Initial	Every follow-up	Annual
• Vitamin B12 if taking metformin for >5 years	✓		✓
• CBC with platelets	✓		✓
• Serum potassium levels in people with diabetes on ACE inhibitors, ARBs, or diuretics§	✓		✓
• Calcium, vitamin D, and phosphorous for appropriate people with diabetes	✓		✓
Physical examination			
• Height, weight, and BMI; growth and pubertal development in children and adolescents	✓	✓	✓
• Blood pressure determination	✓	✓	✓
• Orthostatic blood pressure measures (when indicated)	✓		✓
• Fundoscopic examination (refer to eye specialist)	✓		✓
• Thyroid palpation	✓		✓
• Skin examination (e.g., acanthosis nigricans, insulin injection or insertion sites, and lipodystrophy)	✓	✓	✓
• Comprehensive foot examination	✓		✓
• Visual inspection (e.g., skin integrity, callous formation, foot deformity or ulcer, and toenails)*	✓	✓	✓
• Check pedal pulses and screen for PAD with ABI testing if a PAD diagnosis would change management	✓		✓
• Determination of temperature, vibration or pinprick sensation, and 10-g monofilament exam	✓		✓
• Screen for depression, anxiety, diabetes distress, fear of hypoglycemia, and disordered eating	✓		✓
• Assessment for cognitive performance if indicated†	✓		✓
• Assessment for functional performance if indicated†	✓		✓
• Consider assessment for bone health (e.g., loss of height and kyphosis)	✓		✓

Standard 4 – Diabetes Medical Evaluation

Assessment and Treatment Plan

Assessing risk of diabetes complications → • ASCVD and heart failure history → • ASCVD risk factors and 10-year ASCVD risk assessment →

• Staging of chronic kidney disease → • Hypoglycemia risk → • Assessment for retinopathy →

• Assessment for neuropathy → • Assessment for MASLD/MASH → Goal setting →

• Set A1C/blood glucose/time in range → • If hypertension is present, establish blood pressure goal → • Weight management and physical activity goals →

• Diabetes self-management goals

Therapeutic treatment plans

- Lifestyle management
- Pharmacologic therapy: glucose lowering
- Pharmacologic therapy: cardiovascular and kidney disease risk factors
- Weight management with pharmacotherapy or metabolic surgery, as appropriate
- Use of glucose monitoring and insulin delivery devices
- Referral to diabetes education, behavioral health, and medical specialists

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Assessment and Treatment of Disabilities

▸ Diabetes associated with increased risks of disability due to neuropathy, visual impairment and lower limb complications

▸ Refer to specialist

▸ Take preventive action to maximize quality of life.

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Assess for disability at the initial visit and for decline in function at each subsequent. If a disability is impacting functional ability or capacity to manage their diabetes, refer to appropriate specialist.

Lab Test, BP, Family History

- A1C – 9.8%
- Cholesterol - 216
- LDL – 164 mg/dL
- HDL – 46
- Triglycerides – 276
- TSH – 1.43
- GFR - >60
- UACR - <30 mg/gm
- ALT, AST 90 & 85
- Platelets 217
- K+ 3.8

- Family history
  - Dad with type 2, history of stroke

- B/P
  - 156/88 then 148/82

- BMI 31
- Skin – some acanthosis nigricans visible on neck
- Lower extremities okay
- Mouth - gingivitis

Acanthosis Nigricans

- A skin disorder characterized by darkening (hyperpigmentation) and thickening (hyperkeratosis)of the skin
  - mainly in the folds of the skin in the armpit (axilla), groin and back of the neck.
- Acanthosis nigricans is not a skin disease per se but a cutaneous sign of an underlying condition or disease.
  - Associated with extra weight and insulin resistance

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Medical Evaluation Goal

- Prioritize components based on time and resources.
- Assess:
  - Diabetes self-management, nutrition, psychosocial health, risk of acute and chronic complications
  - Immunizations
  - Sleep habits
  - Cancer screenings
  - Bone Health
  - Liver Health
  - Cardiovascular disease
  - Smoking cessation
  - Ophthalmological, dental and podiatric referrals

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Poll Question 8

▸ JR is 38 years old and has new diabetes. Wondering what vaccinations they need this year. **What is the BEST answer?**

A. Influenza vaccine

B. Hepatitis B vaccine

C. Herpes Zoster vaccine

D. Both A and B

Immunization Schedule for Diabetes 2025

Vaccine	Who by Age	Series and Frequency
Hepatitis B Vaccine	Less than 60 years*	2-3 dose series
RSV	Adults ≥ 60 years	Single dose
Influenza (avoid live attenuated vaccine)	All	Annually
Tetanus, diphtheria, pertussis (TDAP)	All adults; extra dose during pregnancy	Booster every 10 years.
Zoster	50+	2 dose Shingrix
COVID-19	Starting at age 6 mo's	Initial vaccination and boosters
Pneumonia (PPSV23) Pneumovax	Adults 19-64*	See Standards for schedule and details and for those 65 or older.
*Pneumococcal Conjugate Vaccine (PCV15, PCV20)	19-64 with underlying risk factors or no previous vaccination*.	May need PPSV23 follow-up vaccine ≥1 year.* If 65+, discuss with provider.

2025 ADA Standards, Vol.48, S66-S67
*See Table 4.3 for detailed info/considerations

For a comprehensive list of vaccines, refer
CDC & Prevention at cdc.gov/vaccines

For educational purposes only. www.DiabetesEd.net

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Referrals for Initial Care Mgmt

▸ Eye professional – annual check

▸ Family planning

▸ RD for nutrition therapy

▸ DSMES - Diabetes Self-Management Education Support

▸ Dentist for comprehensive dental examination

▸ Behavioral health professional & audiology, if indicated

▸ Social worker/community resources

▸ Rehab medicine for cog/disability eval

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Critical times to provide and modify DSMES
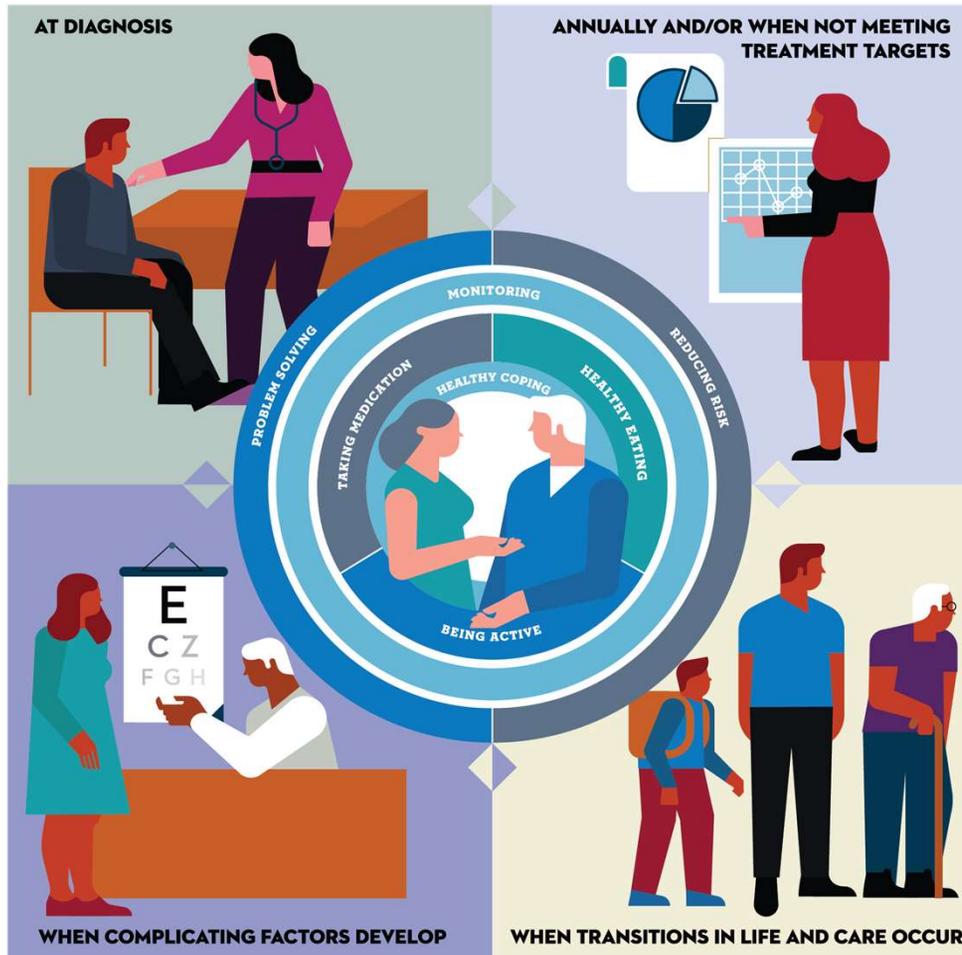
- At diagnosis

- Annually and/or when not meeting treatment goals

- When complicating factors develop (medical, physical, psychosocial) develop

- When transitions in life and care occur.

Powers MA, Bardsley JK, et al. DSMES Consensus Report, The Diabetes Educator, 2020
ADCES. AADE7 Self-Care Behaviors, The Diabetes Educator, 2020

5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2025 [FREE]
American Diabetes Association Professional Practice Committee

Diabetes Self-Management Topics

▸ History of DSME attendance

▸ Individual visit with RD, RN, CDCES

▸ Hypoglycemia – timing of episodes, awareness, frequency and action

▸ Pregnancy planning

▸ Assess & Screen for Psychosocial /Emotional Issues

   ▸ Anxiety

   ▸ Depression

   ▸ Distress

   ▸ Serious mental illness (increases risk of diabetes)

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- What tools?

Diabetes Toolkit - Individualize

Meter
- Strips that aren't expired?

List of Meds

Plan for Lows

Emergency Plan

Power back-up

- BG Checks and logging results
- Diabetes ID
  - Phone, medic alert, on person
- Carbohydrate source
  - Granola bar, glucose tabs, GU, gummy bears
- Rescue Meds

Behavioral Factors and Med Taking

▸ Eating Patterns & weight history, carb counting

▸ Sleep behaviors – goal 7 hrs

▸ Tobacco, alcohol, substance use, physical activity

▸ Social supports and coping skills, daily routine

▸ Medication taking behaviors

   ▸ How many times a day/week are you taking this medication?

   ▸ Complimentary meds

   ▸ Evaluate for hyper and hypo glycemia

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Cost Related Barriers

- Among people with chronic illnesses, 2/3 of those who reported not taking medications as prescribed due to CRB never shared this with their physician.

- Especially associated with diabetes medications and insulin.

JR Returns in 1 month

- Blood glucose improved
- B/P 142/94 Pulse 86

- Meds started include:
  - Metformin 1000 mg
  - Glipizide 10 mg BID (sulfonylurea)
  - Lovastatin 40 mg
  - Lisinopril 20mg (ACE Inhibitor)

Provider increases metformin/glipizide and adds SGLT-2 Empagliflozin 10 mg

- JR checks BG 4-7 x's a week.
  - Lowest 152, Highest 289
- What other issues do we need to evaluate?
  - Activity – mostly sedentary
  - Sleep: 6-7 hrs a night
  - Pain issues – knees
  - Brushing – once daily
  - Alcohol and other drug use
    - Drinks a few beers on weekends
  - Coping - okay
  - Steatosis – elevated LFTs
  - Affordability
  - Met with CDCES and RD

JR Return Visit 3 months

- A1c 8.6% (was 9.8)
- TSH 1.9 mIU/L
- B/P 136/84 Pulse 76
- Has gained about 4 pounds

- Meds include:
  - Metformin 2000 mg
  - Empagliflozin 10 mg
  - Glipizide 20 mg BID
  - Lovastatin 40 mg
  - Lisinopril 20mg (increase to 40)

Provider increases lisinopril & empagliflozin to 25mg and adds 10 units basal insulin

Would you suggest a different approach?

- JR checks BG each morning and sometimes at hs
  - Lowest 68 after taking meds (usually around 140ish)
  - Highest 249

- Has started walking after dinner.
- Is trying to eat healthier, but upset he gained wt.
- Says the meds are affordable so far.
- Made dental appt and is trying to brush 2x day

ADA – Follow-up Visit to include:

- **Interval medical history**
  - Psychosocial Status
  - Assess med taking behavior
- **Physical exam**
  - Skin appearance
  - Ambulation and gate
  - Lower extremities, feet
  - Activity levels strengthening and cardiovascular workout
- **Health**
  - Dental health
  - Eye check
  - Mammogram
  - Vaccinations
  - RDN, CDCES, Diabetes Ed Program

- **Nutritional status and relationship with food**
  - GI health (constipation, diarrhea, gastroparesis, liver)
  - GU health – continence, creat, GFR, UACR
  - Menstruation and contraception
  - Thyroid – Symptoms + TSH
  - Heart – blood pressure, chest pain, heart rate, cholesterol

Periodontal Disease

- More severe and prevalent with diabetes and elevated A1C levels.
  - periodontal treatment associated with better glycemic control
    (A1C 8.3% vs. 7.8%)
  - Benefits lasted for 12 mo's

- People with periodontal disease have higher rates of diabetes.
- Bidirectional
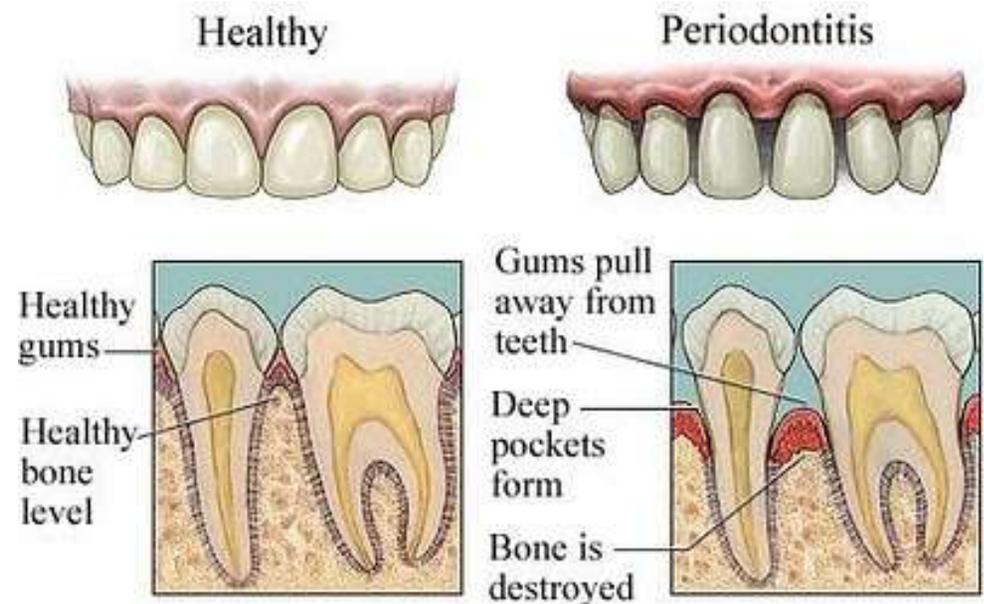
Oral Care Matters
- See dentist at least yearly
- Dental hygienist twice yearly
- Brush twice daily
- Floss daily

Hypoglycemia (Glucose) Alert Values

▸ **BG <70mg/dl – Level 1**
  ▸ Follow 15/15 rule and contact provider make needed changes

▸ **BG < 54mg/dl – Level 2**
  ▸ Indicates serious hypo. Contact provider for med change. Glucagon Emergency Kit

▸ **Severe Hypoglycemia – Level 3**
  ▸ Requires external assistance – no threshold

SHAKY

Tx of Level 2 & 3 Hypoglycemia

▸ If can swallow w/out risk of aspiration, try gel, honey, etc. inside cheek

▸ If unable to swallow, D50 IV or Glucagon

▸ Glucagon injection (need Rx)

  ▸ Inform and instruct caregivers, school personnel, family, coworkers of hypo signs and appropriate action

  ▸ Dosing: Adults 1mg, Children <20kg 0.5mg

  ▸ Glycemic effect 20 - 30mg, short lived

  ▸ Must intake carb as soon as able

▸ If on Insulin or level 2 or 3 hypo, (<54), get Glucagon ER Kit and Sensor. Re-evaluate diabetes med treatment plan.

Glucagon Rescue Medications for Diabetes-Related Hypoglycemia

Name/Delivery	Supplied	Dose Range		Age / Route / Storage
		Adult	**Peds / Age WT Dosing**	
Glucagon Emergency Kit Injection requires mixing glucagon powder	1mg / 1mL vial + syringe	1mg	0.03mg/kg or < 6yrs or < 25 kgs | 0.5mg ≥ 6yrs or > 25kgs | 1mg	All ages approved SubQ or IM admin Expires in 2 years at room temp.
Baqsimi Nasal glucagon powder	3 mg intranasal device	3 mg	< 1 yrs: not recommended 1 yr or older | 3mg dose	Approved Age 1+ Nasal admin Expires ~ 2 years at room temp (keep in shrink-wrapped tube).
Gvoke Injectable liquid stable glucagon solution	0.5mg or 1.0mg in -Prefilled syringe -HypoPen auto-injector -Kit with vial and syringe	1 mg	< 2yrs: not recommended 2- 12 yrs < 45kg | 0.5mg ≥ 45kg | 1mg 12 yrs or older | 1mg	Approved Age 2+ SubQ admin in arm, thigh, abdomen Expires in 2 years at room temp (keep in foil pouch).
Dasiglucagon (Zegalogue) Stable liquid glucagon analog	0.6mg/0.6mL Prefilled syringe Autoinjector	0.6mg	< 6yrs: not recommended 6 yrs or older | 0.6mg	Approved Age 6+ SubQ in abdomen, buttocks, thigh outer upper arm Expires in 1 year at room temp. (store in red protective case).

All raise BG 20+ points. Can cause nausea, vomiting. After admin, roll person on side. Seek medical help. If no response after 1st dose, give 2nd dose in 15 mins. When awake, give oral carbs ASAP when safe to swallow. Please consult package insert for detailed info. All PocketCard content is for educational purposes only. Please consult prescribing information for detailed guidelines.

Assess for Hypo

Review history of hypoglycemia at every clinical encounter for all individuals at risk for hypoglycemia

Evaluate hypoglycemic events

Screen for impaired hypoglycemia awareness at least annually.

Consider individual's risk for hypoglycemia when selecting diabetes medications and glycemic goals.

Use of CGM is beneficial and recommended for individuals at high risk for hypoglycemia.

Hypoglycemia: Identify, Treat, & Prevent

SCAN ME

Step 1

Identify your signs of hypoglycemia or low blood sugar:

- Sweaty
- Shaky
- Hungry
- Can't think straight
- Headache
- Irritated, grouchy
- Other

Step 2

If have signs of hypo, treat with carbs until glucose reaches 70+, then eat usual meal.

- Sugary drink, 4–8oz
- Piece of fruit
- Raisins, handful
- Glucose tabs, 4+
- Honey/glucose gel
- Skittles candy, 15+

Step 3

Have glucagon rescue meds available.

In case of severe hypo, identify someone (ahead of time) who can get medical help & give a glucagon rescue medication.

Notify your provider of low blood sugar events.

Hypoglycemia Levels:

Level 1 – Glucose less than 70

Level 2 – Glucose less than 54

Level 3 - Severe, needs assistance

Identify Causes of Hypo & Problem Solve to Prevent Future Episodes

» Low carb meal
» Extra activity
» Drinking alcohol

» Delayed, missed meal
» Too much insulin/meds
» Insulin timing

SDOH and Hypoglycemia

Food insecurity, housing instability, underinsured, under-resourced living areas is associated with increased risk of hypoglycemia-related emergency department visits

Identify if fasting part of religious observances

Young children and older adults at highest risk

Insulin pumps with automated low-glucose suspend and automated insulin delivery systems have been shown to be effective in reducing hypoglycemia in type 1 diabetes

If on insulin or sulfonylurea – special precautions required

- Carb source on person, car, by bed at all times
- Identification
  - Phone (ICE)
  - Wallet Card
  - Bracelet
- If pattern of lows, med adjustment required

- Pre-meal target
  - 100-130?
- Post meal
  - Less than 180
- Bedtime
  - 110 - 180

JR Return Visit 6 months

- A1c 7.3% (was 8.6)
- TSH 1.9 mIU/L
- B/P 132/82 Pulse 76
- Denies any low blood sugar
- Lost 2 pounds

- Meds include:
  - Metformin 2000 mg
  - Empagliflozin 25 mg
  - Glipizide 20 mg BID
  - Lovastatin 40 mg
  - Lisinopril 40mg
  - 10 units basal insulin

- JR checks BG each morning and sometimes at hs
  - Lowest 112 (usually around 130ish)
  - Highest 230

- Still walking after dinner.
- Hasn't seen dentist
- Sometimes forgets to take meds at night
- Sleeping better
- Worried if meds are causing harm
- Started taking cinnamon capsules

Diabetes Distress

▸ High levels of diabetes distress significantly impact medication-taking behaviors and are linked to higher A1C, lower self-efficacy, and poorer dietary and exercise behaviors

▸ Assess for Diabetes Distress yearly

▸ Mindful Self-Compassion is important

▸ Counseling and DSME can help

Diabetes Distress Scale cont.

- Feeling that diabetes is <u>taking up too much of my mental and physical</u>

-    <u>energy every day.</u>

- Feeling that <u>my doctor doesn't know enough</u> about diabetes and
- diabetes care/ <u>doesn't give me clear enough directions</u> .

- Feeling <u>angry, scared, and/or depressed</u> … think about living with diabetes

- 4.   Feeling that <u>I am not testing my blood sugars</u> frequently enough.

- 5.   Feeling that I am often <u>failing with my diabetes routine.</u>

- Feeling that <u>friends or family are not supportive</u> enough of self-care
- efforts (planning activities that …, encourage me to eat the "wrong" foods).

- 7.   Feeling that <u>diabetes controls my life.</u>
- 8.   *<u>Not feeling motivated</u>* to keep up my diabetes self management.

- (17) Scoring

DDS

Initial Eval – Looking for Comorbidities

▸ Other conditions that may appear

  ▸ Cancer

  ▸ Cognitive impairment

  ▸ Hyper/Hypoglycemia

  ▸ Psychosocial/Emotional Issues

  ▸ Obstructive sleep apnea

  ▸ Steatosis

  ▸ Pancreatitis

  ▸ Low Testosterone in Men

  ▸ Sexual Health

  ▸ Hearing Impairment

  ▸ Fractures

  ▸ Periodontal disease

  ▸ Cardiovascular disease

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Type 3c Diabetes (Pancreatogenic)

- Includes both structural and functional loss of insulin secretion in the context of exocrine pancreatic dysfunction.
- About 5-10% of diabetes, often misdiagnosed as type 2 diabetes.

- The diverse set of etiologies includes:
  - pancreatitis (acute and chronic) ~70%
  - trauma or pancreatectomy
  - neoplasia
  - cystic fibrosis
  - hemochromatosis
  - fibrocalculous pancreatopathy
  - rare genetic disorders, and idiopathic

Pancreatitis

▸ People with diabetes 2xs risk of acute pancreatitis

▸ After episode of pancreatitis, one third of people will get prediabetes or diabetes

▸ Pancreatitis is an exocrine dysfunction:

  ▸ Disrupts global architecture or physiology of pancreas

  ▸ Results in both exocrine and endocrine dysfunction

Healthy Pancreas vs Pancreatitis
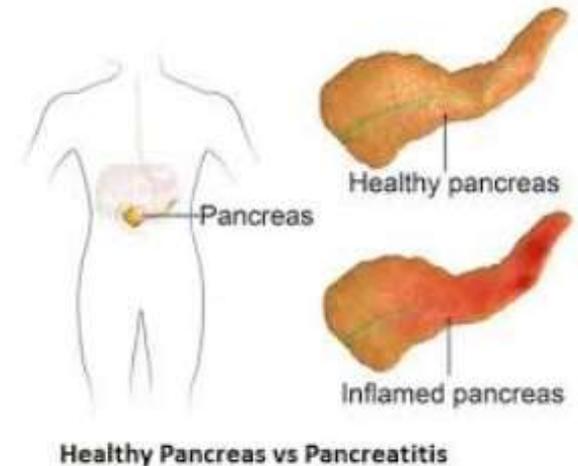
Pancreatitis

▶ Pancreatitis caused by digestion of the organ from pancreatic enzymes normally carried to the SI through pancreatic duct.

▶ Detected through elevated Amylase levels & pain

▶ Causes:

  ▶ HIV meds and other meds

  ▶ Alcohol ingestion

  ▶ Gallstones blocking pancreatic enzyme flow to SI

  ▶ Elevated triglycerides

  ▶ Cancer, injury and other

Common bile duct
Gallbladder
Pseudocyst
Gallstones
Pancreatic duct
Duodenum

PANCREATIC CANCER

16 WARNING SIGNS YOU SHOULD KNOW

PANCREATIC CANCER ACTION NETWORK

SYMPTOMS

Pancreatic cancer may cause only vague symptoms. If you are experiencing one or more of these unexplained symptoms, the Pancreatic Cancer Action Network urges you to see your doctor.

Abdominal or mid-back pain | Loss of appetite | Jaundice | Weight loss | Nausea | Change in stool | Recent onset diabetes

The American Cancer Society's estimates for pancreatic cancer in U.S. for 2023 are:
• About 64,050 people will be diagnosed with pancreatic cancer.
• About 50,550 people will die of pancreatic cancer.
• Pancreatic cancer accounts for about 3% of all cancers in the US and about 7% of all cancer deaths.

https://pancan.org/

Cancer and Diabetes

▶ Diabetes is associated with increased risk of cancers of:

  ▶ liver, pancreas, endometrium, colon and rectum, breast, and bladder.

▶ Association may result from shared risk factors between type 2 diabetes and cancer

  ▶ Older age, obesity, and physical inactivity

  ▶ May also be due to diabetes-related factors such as underlying disease physiology

  ▶ Encourage people with diabetes to undergo recommended age-and sex-appropriate cancer screenings

Fractures

- Hip fractures:
  - Type 1 - 6.3 relative risk associated w/ osteoporosis
  - Type 2 – 1.7 relative risk
- Health care professionals can:
  - Assess risk fracture risk and history, esp with older clients
  - Recommend bone mineral density assessment
  - Assess if would benefit from vita d supplement
  - Home health/ Physical Therapy
  - Use TZDs and SGLT's with caution

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Bone Mineral Density Testing

▸ People aged ≥65 years

▸ Postmenopausal women and men aged ≥50 years with history of adult-age fracture or with diabetes–specific risk factors:

- Frequent hypoglycemic events

- Diabetes duration >10 years

- Diabetes medications: insulin, thiazolidinediones, sulfonylureas

- A1C >8%

- Peripheral or autonomic neuropathy, retinopathy, nephropathy

- Frequent falls

- Glucocorticoid use

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If at Risk for Fracture - Advise people with diabetes on their intake of calcium (1,000–1,200 mg/day) and vitamin D to ensure it meets the recommended daily allowance through their diet or supplemental means.

Sensory Impairment

- Hearing impairment 2xs as common in diabetes
  - Due to oxidative stress + hyperglycemia
  - Leads to cochlear microangiopathy and auditory neuropathy
- Risk factors
  - Low HDL cholesterol, coronary heart disease, peripheral neuropathy, and general poor health have been reported as risk factors for hearing impairment

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Cognitive Impairment

▸ Meta-analysis showed individuals with diabetes had

  ▸ 43% higher risk of all types of dementia,

  ▸ 43% higher risk of Alzheimer dementia

  ▸ 91% higher risk of vascular dementia

  ▸ compared with individuals without diabetes

⟷

▸ People with Alzheimer dementia are more likely to develop diabetes than people without Alzheimer dementia.

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TYPE 3 DIABETES

134
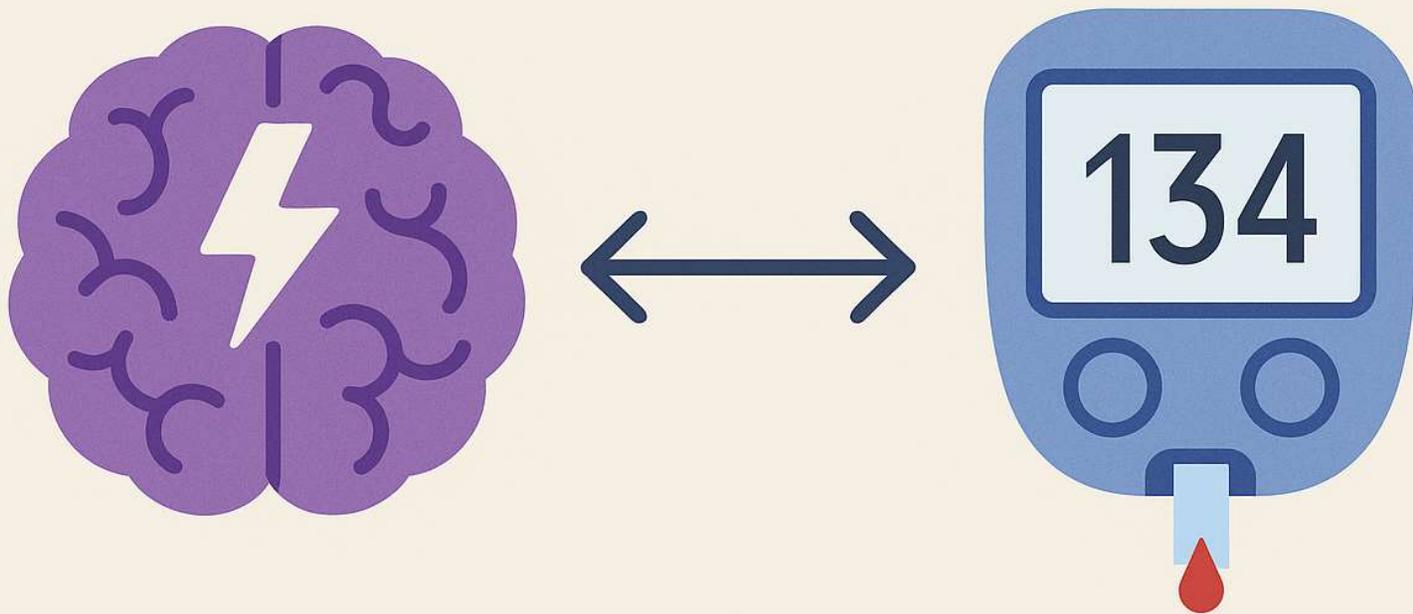
The link between insulin resistance and neurodegeneration

What is 'Type 3 Diabetes'?

▸ A term linking Alzheimer's disease to insulin resistance in the brain.

▸ Not an official diagnostic category.

▸ Still an emerging field with ongoing studies

▸ Suggests that Alzheimer's may be a form of brain-specific diabetes.

Type 3 Diabetes and Its Role Implications in Alzheimer's Disease

Alzheimer's & Diabetes Link

- Type 2 Diabetes increases Alzheimer's risk by 60–80%
- Reduced insulin receptors in brains of people with Alzheimer's
- Insulin signaling is crucial for clearing amyloid beta plaques from brain.
- The brain uses insulin for memory and learning-neuromodulator.
- Insulin resistance contributes to cognitive decline.
- Amyloid beta plaques and tau tangles are influenced by insulin signaling and availability.
- Lead to neurodegeneration.

Link Between Gut and Brain
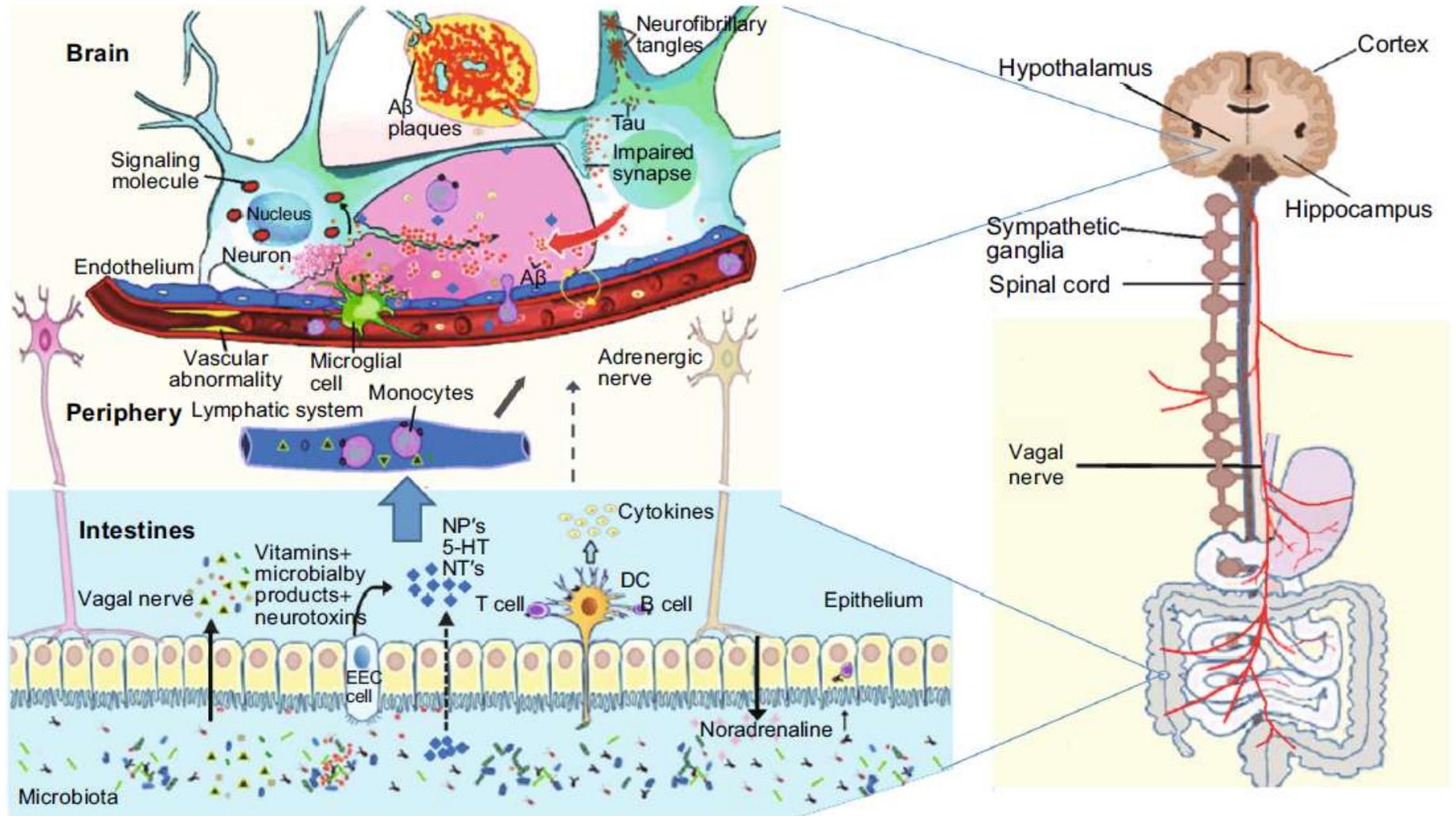
Review

The Microbiota–Gut–Brain Axis and Neurological Disorders: A Comprehensive Review

Potential Interventions

▸ Lifestyle: Mediterranean diet, physical activity.

▸ Optimize glucose and blood pressure.

▸ Investigational: Intranasal insulin, GLP-1 agonists

▸ Reduce systemic inflammation.

▸ Improved nutrition and gut health.
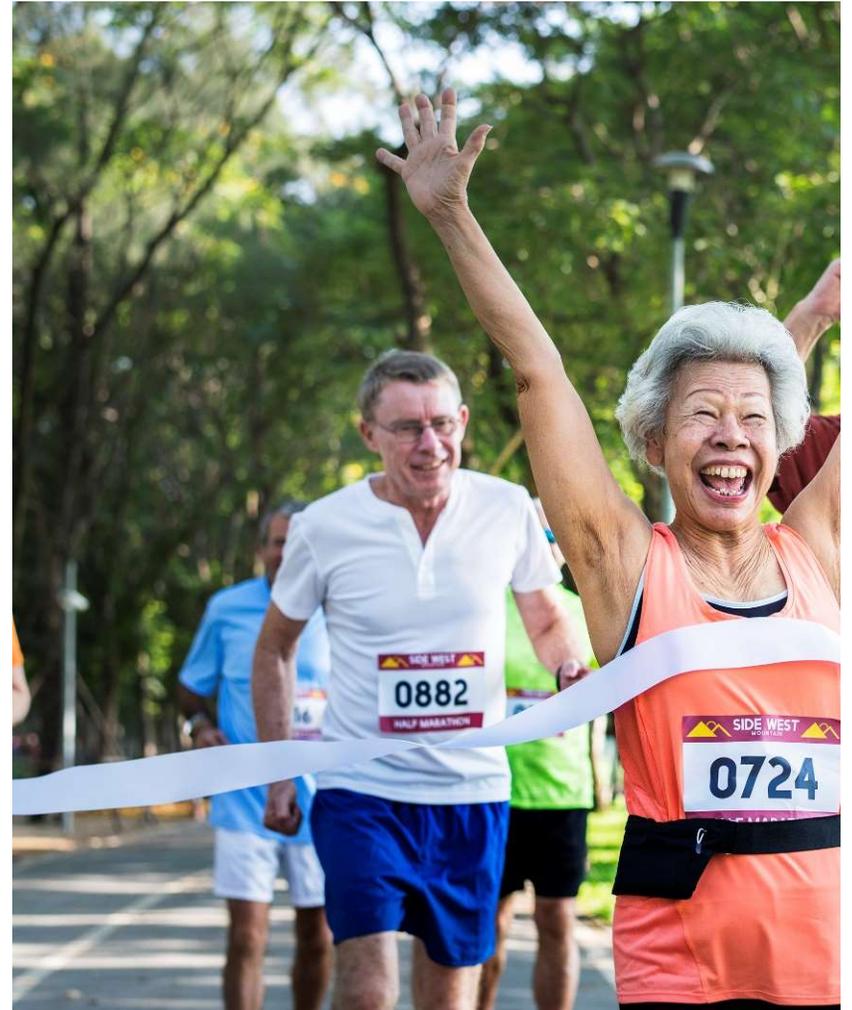
Summary

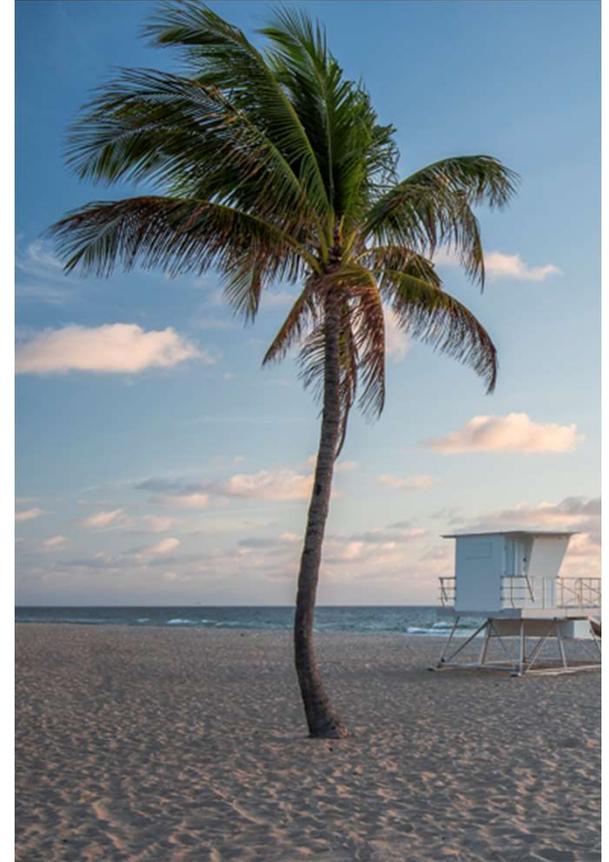'Type 3 Diabetes' reflects the link between metabolic and brain health

Early intervention can support cognitive function

Encourages whole-person, compassionate care

Assess Sexual Health

▸ **In men with diabetes or prediabetes:**

  ▸ 52.5% in men with diabetes have ED.

  ▸ inquire about sexual health (e.g., low libido and erectile dysfunction [ED].

  ▸ If symptoms and/or signs of hypogonadism are detected (e.g., low libido, ED, and depression), screen with a morning serum total testosterone level.

  ▸ Best predictors of ED are age (>40 years), CVD, diabetes, hypertension, obesity, dyslipidemia, metabolic syndrome, hypogonadism, smoking, depression, and use of medications such as antidepressants and opioids.

  ▸ ED is also a predicator of heart disease.

  ▸ Assess, treat and refer

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Assess Sexual Health

‣ In women with diabetes or prediabetes, assess sexual health:

‣ 33% reported female sexual dysfunction (FSD)

‣ Screen for desire (libido), arousal, orgasm difficulties, particularly in those with depression and/or anxiety and those with recurrent urinary tract infections.

‣ In postmenopausal women - screen for symptoms and/or signs of genitourinary syndrome of menopause, including vaginal dryness and dyspareunia.

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Obstructive Sleep Apnea - OSA

- OSA affects ~25% of people with type 2
  - Up to 60% of those with type 2 have disordered sleep
- Associated with increased CVD risk
- Signs include excessive daytime sleepiness, snoring and witnessed apnea
- Treatment:
  - Lifestyle modification
  - Continuous positive oral airway pressure and devices
  - Surgery

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2025 FREE

American Diabetes Association Professional Practice Committee

Liver Nomenclature Update

AASLD — AMERICAN ASSOCIATION FOR THE STUDY OF LIVER DISEASES

Old Terms

- Fatty Liver Disease

- Non-Alcoholic Steatohepatitis (NASH)

- Non-Alcoholic Fatty Liver Disease (NAFLD)

New Terms

- Steatotic Liver Disease

- Metabolic Dysfunction-Associated Steatohepatitis (MASH)

- Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

Poll Question 9

▸ What best describes diabetes and Metabolic dysfunction–associated steatotic liver disease (MASLD)?

A. More than 60% of people with diabetes have MASLD.

B. MASLD likely to be found in individuals with type 2 diabetes and BMI < 25

C. Children don't exhibit MASLD.

D. Almost all people with diabetes have MASLD.

MASH & Steatohepatitis

Adults with type 2 diabetes.

- >70% have MASLD
  - Of those 50% have MASH*
  - 12-20% have fibrosis
- Adults with type 1
  - 20% have MASLD
- **Associated with :**

- Increased BMI (30+)

- Cardiometabolic risk factors

- Over 50 yrs

- *ALT & AST 30 units/L +

*ALT & AST
(Eval if more if 30+ for
6 mo's - ADA)

Metabolic Associated Steatohepatitis

MASH is when fat reaches 5% of the liver's weight

Without consumption of significant amounts of alcohol defined as:

- Ingestion of less than 21 standard drinks per week in men and
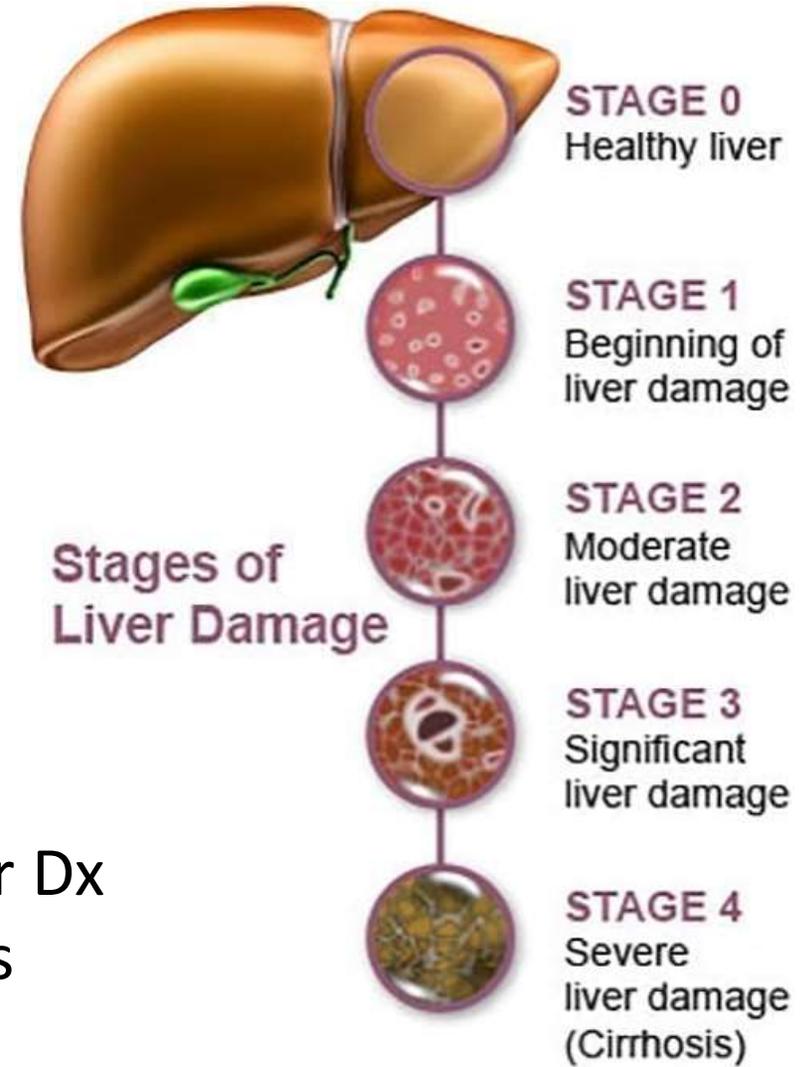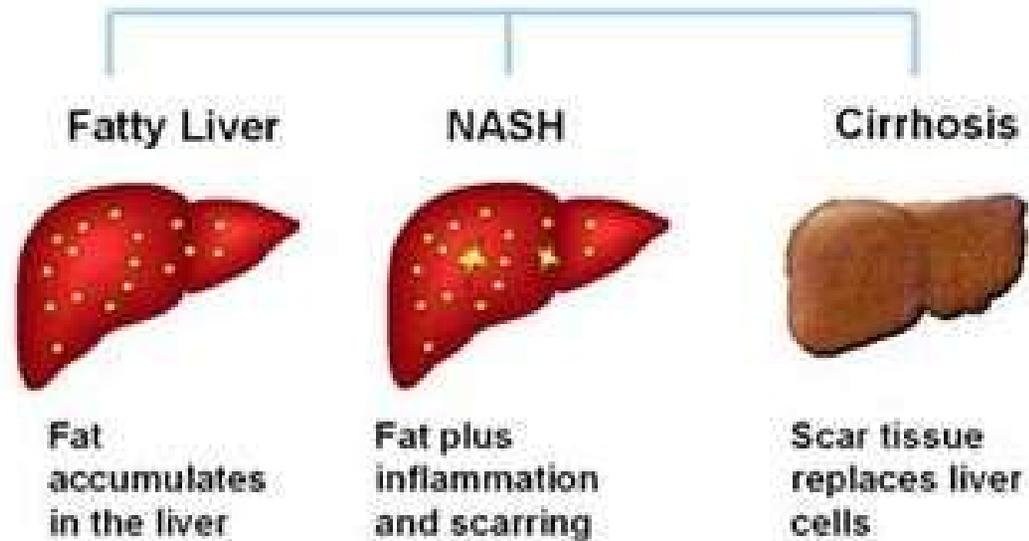- Less than 14 standard drinks per week in women

over a 2-year period preceding evaluation) or the presence of other secondary causes of Steatosis disease.

Metabolic dysfunction–associated steatotic liver disease (MASLD)

Natural History of MASLD to MASH

The Spectrum of NAFLD

Fatty Liver — Fat accumulates in the liver
NASH — Fat plus inflammation and scarring
Cirrhosis — Scar tissue replaces liver cells

Stages of Liver Damage
STAGE 0 — Healthy liver
STAGE 1 — Beginning of liver damage
STAGE 2 — Moderate liver damage
STAGE 3 — Significant liver damage
STAGE 4 — Severe liver damage (Cirrhosis)

MASLD – Metabolic Assoc Steatotic Liver Dx
MASH – Metabolic Assoc Steatohepatitis

https://liverfoundation.org/wp-content/uploads/2020/11/StagesFibrosis.jpg

Symptoms of Steatosis

If symptoms do appear, they may include:

- A feeling of fullness in the middle or upper right side of the abdomen
- Abdominal pain, nausea
- Loss of appetite or weight loss
- Weakness
- Jaundice

- Swelling of the abdomen and legs
- Mental confusion
- Extreme fatigue or tiredness
- Signs of advanced disease include:
  - Portal hypertension, spider angiomas, reddening of palms, declining platelet counts

Mayo Clinic

https://dermcollective.com/palmar-erythema/

Poll Question 10

▸ AR lives with type 2 diabetes, and their waistline is 41 inches. Since their ALT and AST levels are elevated, you know they are at risk for steatosis (MASH). You quickly calculate their Fibrosis-4 Index (FIB-4), by plugging in AR's Age, AST, ALT, platelet count into the FIB-4 calculator. AR's result is 2.83. According to the ADA Standards, with a FIB-4 value of 2.83, which action is required?

A. Start AR on pioglitazone and recheck FIB-4 in 3 months.

B. Encourage AR to see a RDN and stop consumption of alcohol immediately.

C. Suggest increased high intensity activity coupled with a GLP-1 to reduce body weight.

D. Refer AR to liver specialist for further evaluation.

Screening for NASH – FIB-4

Fibrosis-4 (FIB-4) Calculator

The Fibrosis-4 score helps to estimate the amount of scarring in the liver. Enter the required values to calculate the FIB-4 value.
It will appear in the oval on the far right (highlighted in yellow).

$$FIB\text{-}4 = \frac{Age\ (years)\ [38] \times AST\ Level\ (U/L)\ [85]}{Platelet\ Count\ (10^9/L)\ [217] \times \sqrt{ALT\ (U/L)\ [90]}} = 1.57$$

▸ The American College of Gastroenterology considers Upper limit of normal ALT levels:

▸ 29–33 units/L for males

▸ 19–25 units/L for female individuals

(mdcalc.com/calc/2200/fibrosis-4-fib-4-index-liver-fibrosis).

FIB-4 estimates risk of hepatic cirrhosis (age 35+):

▸ Calculated by imputing:

  ▸ Age

  ▸ plasma aminotransferases (AST and ALT)

  ▸ and platelet count

▸ FIB-4 Risk Levels

  ▸ Lower risk is <1.3

  ▸ Intermediate 1.3 to 2.67

  ▸ High risk >2.67

    ▸ considered as having a high probability of advanced fibrosis (F3–F4).

Diagnostic Algorithm for the Prevention of Cirrhosis in People With Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

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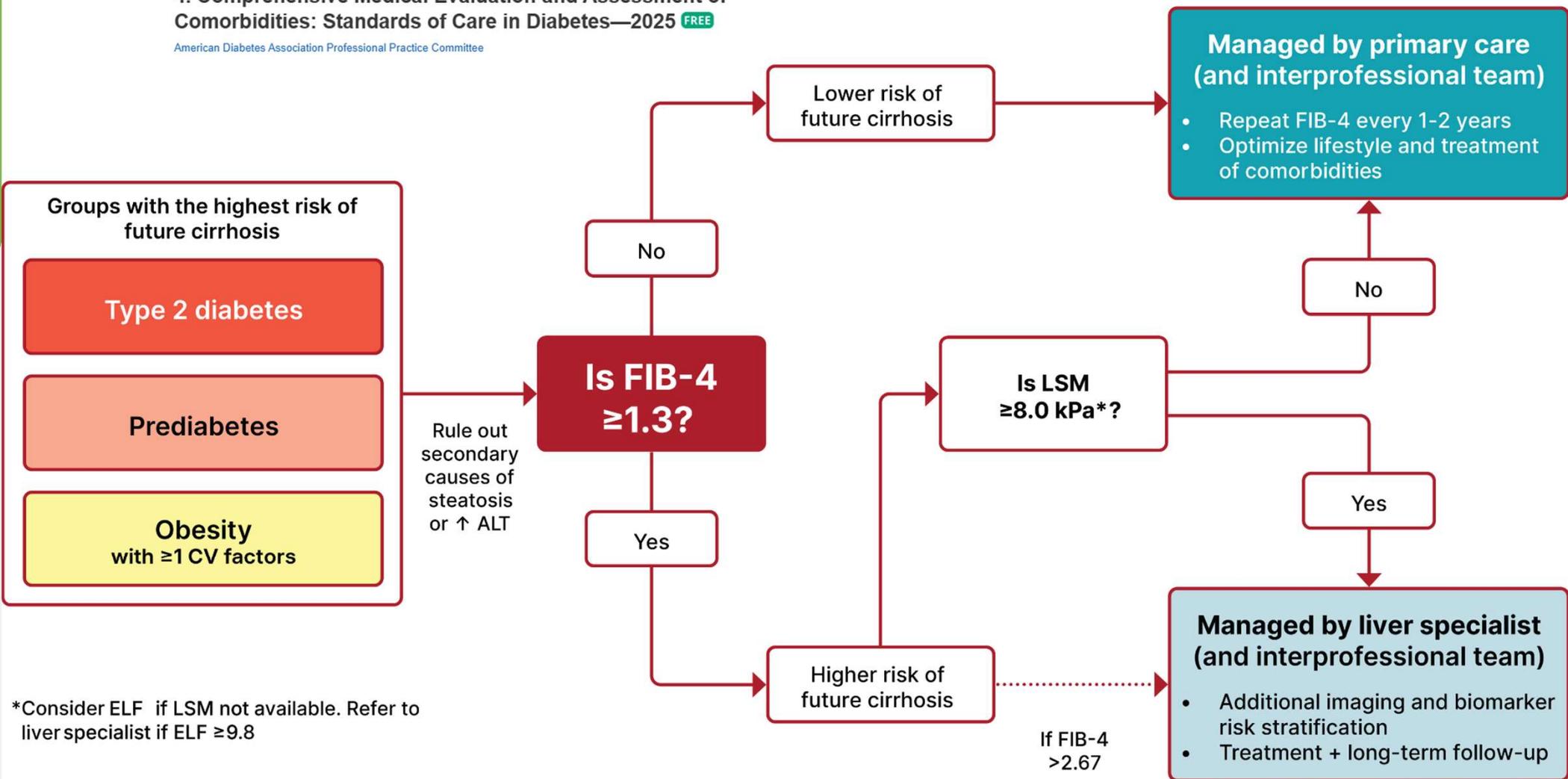
Figure 4.2—ELF, enhanced liver fibrosis test; FIB-4, fibrosis-4 index; LSM, liver stiffness measurement, as measured by vibration-controlled transient elastography. "Fibroscan" *In the absence of LSM, consider ELF a diagnostic alternative. If ELF ≥ 9.8, an individual is at high risk of MASH with advanced liver fibrosis (≥F3–F4) and should be referred to a liver specialist.

Question : What does a Liver Elastography reveal?

The provider is sending JR for a Liver Elastography or FibroScan test since JR has elevated ALT and AST levels along with an elevated Fib-4 score. Which of the following are measured during this liver ultrasound procedure?

A. Liver diameter and density.

B. Liver scarring and ductal health.

C. Hepatocyte density and distribution.

D. Liver stiffness and fat density.
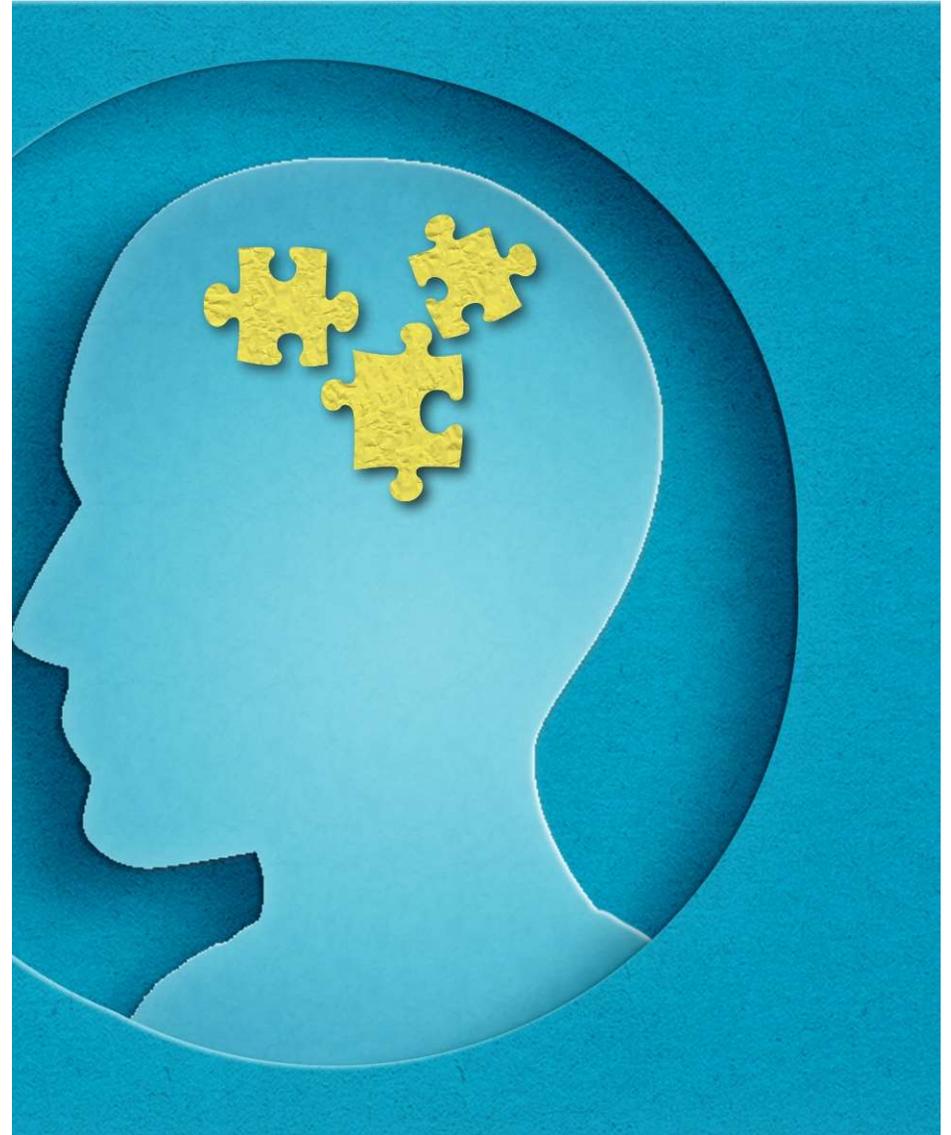
Other Treatments for NAFLD and NASH

▸ Meds that lower glucose, cholesterol and weight

▸ Bariatric surgery

▸ Pioglitazone (Actos)

> ▸ Improves lipid and glucose metabolism
>
> ▸ Reverses steatohepatitis in prediabetes/diabetes
>
> ▸ Causes 1-2% wt gain at 15 mg
>
> ▸ 3-5% wt gain at 45 mg
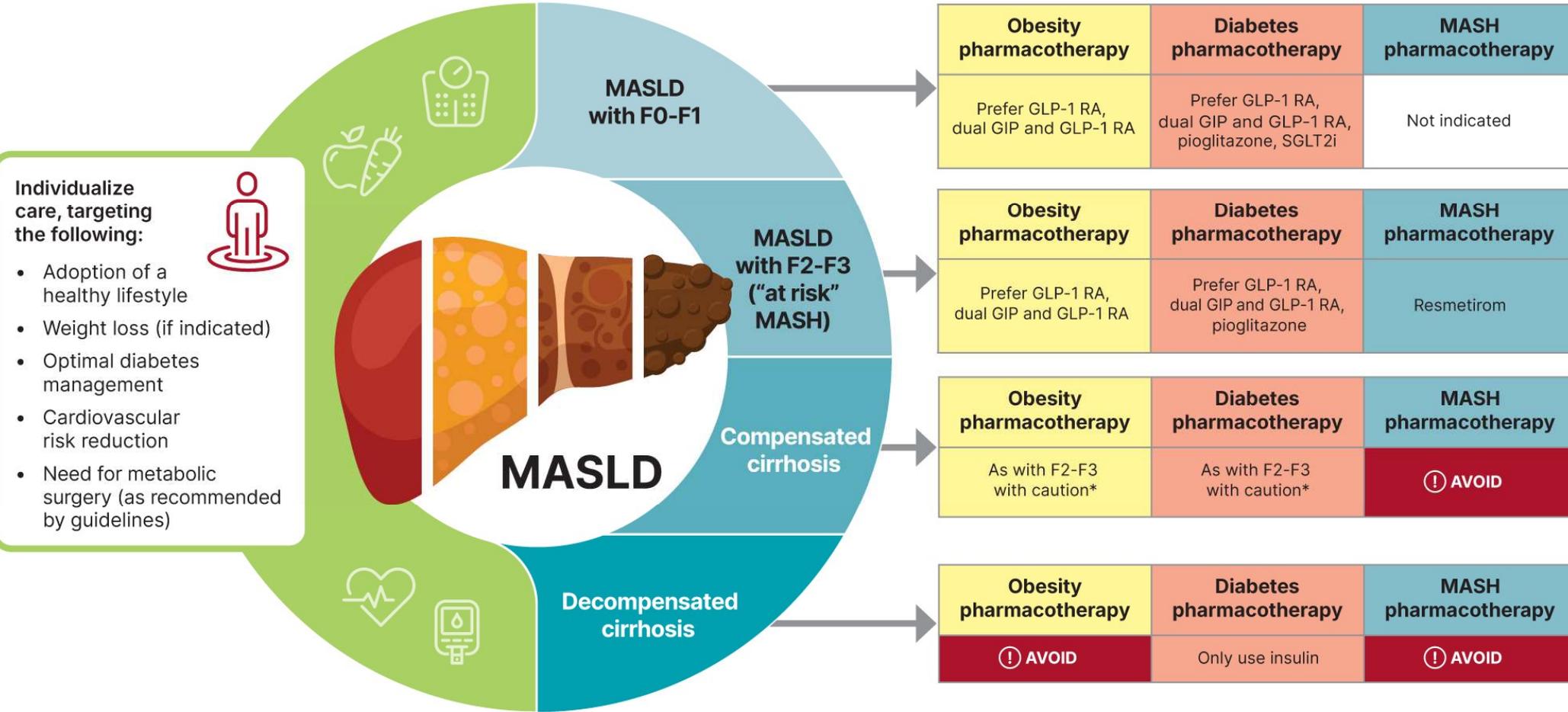
▸ GLP-1 Receptor Agonists (semaglutide)

Support lifestyle changes

Actions To Decrease Steatosis

- **Increase activity**
  - Strength training
  - Yoga or Thai Chi
  - Walking & aerobics

- **Thoughtful eating**
  - More fiber
  - Less processed foods & less added sugar
  - Avoid alcohol

- **Treatment**
  - Pioglitazone
  - GLP-1 – semaglutide
  - Resmetirom
  - Statin

- **Prevention**
  - Cancer Screenings
  - Decrease inflammation

Metabolic Dysfunction–Associated Steatotic Liver Disease (MASLD) Treatment Algorithm

Individualize care, targeting the following:

- Adoption of a healthy lifestyle
- Weight loss (if indicated)
- Optimal diabetes management
- Cardiovascular risk reduction
- Need for metabolic surgery (as recommended by guidelines)

MASLD

MASLD with F0-F1

Obesity pharmacotherapy	Diabetes pharmacotherapy	MASH pharmacotherapy
Prefer GLP-1 RA, dual GIP and GLP-1 RA	Prefer GLP-1 RA, dual GIP and GLP-1 RA, pioglitazone, SGLT2i	Not indicated

MASLD with F2-F3 ("at risk" MASH)

Obesity pharmacotherapy	Diabetes pharmacotherapy	MASH pharmacotherapy
Prefer GLP-1 RA, dual GIP and GLP-1 RA	Prefer GLP-1 RA, dual GIP and GLP-1 RA, pioglitazone	Resmetirom

Compensated cirrhosis

Obesity pharmacotherapy	Diabetes pharmacotherapy	MASH pharmacotherapy
As with F2-F3 with caution*	As with F2-F3 with caution*	⚠ AVOID

Decompensated cirrhosis

Obesity pharmacotherapy	Diabetes pharmacotherapy	MASH pharmacotherapy
⚠ AVOID	Only use insulin	⚠ AVOID

*Individualized care and close monitoring needed in compensated cirrhosis given limited safety data available.

F0-F1, no to minimal fibrosis; F2-F3, moderate fibrosis; F4, cirrhosis;

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JR Return Visit 1 Year – Big Strides

- A1c 6.6%
- LDL 104 (was 164), Trig 169
- B/P 128/76
- UACR < 30, GFR >60
- Liver enzymes below 30
- Saw dentist
- Exercising regularly

- Meds include:
  - Metformin 2000 mg
  - Empagliflozin 25 mg
  - Pioglitazone 15mg (for liver)
  - ~~Glipizide 20 mg BID~~
  - ~~Basal insulin 15 units~~
  - Lovastatin 40 mg (increase?)
  - Lisinopril 40 mg

- JR checks BG 7 -10 times a week.
  - Experiencing 2-3 lows a week
  - Lowest BG was 54
  - Highest 198

**Decide to hold insulin and stop glipizide.
If BG levels increase, add GLP-1 to plan.
Return in 3 mo's**

6. Glycemic Goals & Hypo

A1C

Blood Pressure

Cardiovascular risk reduction

ADA 2025 Summary

A1c less than 7% (individualize)

- Pre-meal BG 80-130
- Post meal BG <180
- Time in Range (70-180) 70% of time

Blood Pressure <130/80

Cholesterol

- Statin therapy based on age & risk status
- If 40+ with ASCVD Risk, decrease LDL by 50%, LDL <70
- If 40+ with ASCVD, decrease LDL by 50%, LDL <55

Poll Question 11

▸ Which of the following methods can be used to assess glycemic status?

   A. A1C

   B. Blood glucose monitoring

   C. Time in Range

   D. Fructosamine

   E. All of the above

Assess Glycemic Status

▸ A1C measurement

▸ Blood glucose monitoring (BGM)

  ▸ by capillary (finger-stick) devices

▸ Continuous glucose monitoring (CGM)

  ▸ using time in range (TIR) or

  ▸ mean CGM glucose.

▸ Fructosamine – 2-4 wk glucose average

  ▸ glycated albumin for those with anemia or hemoglobinopathies
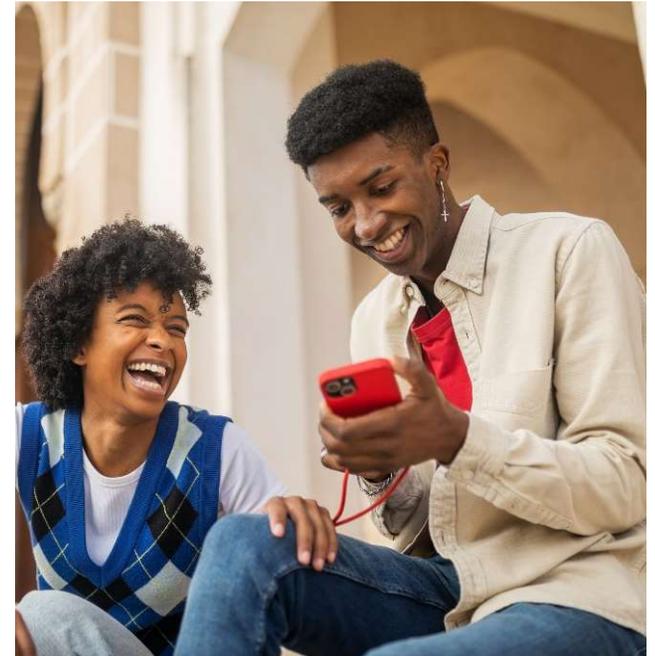
6. Glycemic Goals and Hypoglycemia: Standards of Care in Diabetes—2025
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A1c and Estimated Avg Glucose (eAG)

A1c (%)	eAG
5	**97** (76-120)
6	**126** (100-152)
7	**154** (123-185)
8	**183** (147-217)
9	**212** (170 -249)
10	**240** (193-282)
11	**269** (217-314)
12	**298** (240-347)

eAG = 28.7 x A1c–46.7 ~ 29 pts per 1%
Translating the A1c Assay Into eAG – ADAG Study

6. Glycemic Targets: *Standards of Medical Care in Diabetes—2020*

American Diabetes Association
Diabetes Care 2020 Jan; 43(Supplement 1): S66-S76.
https://doi.org/10.2337/dc20-S006

Ambulatory Glucose Profile

▸ Standardized report with visual cues for those on CGM devices

▸ For most with type 1 or type 2 diabetes
> 70% of readings within BG range of 70-180mg/dL
< 4% of readings < 70 mg/dL
< 1% of readings < 54 mg/dL
< 25% of readings > 180 mg/dL
< 5% of readings > 250 mg/dL

For those with frailty or at high risk of hypoglycemia recommend:
- Target of 50% time in range
- Less than1% time below range

6. Glycemic Goals and Hypoglycemia: Standards of Care in Diabetes—2025 FREE

Time in Range (TIR)

▸ Strong correlation between TIR and A1C, with a goal of 70% TIR aligning with an A1C of ~7%

▸ For older adults using CGM, the recommended percent time spent in target range of 70–180 mg/dL is 50%, Hypo < 1%

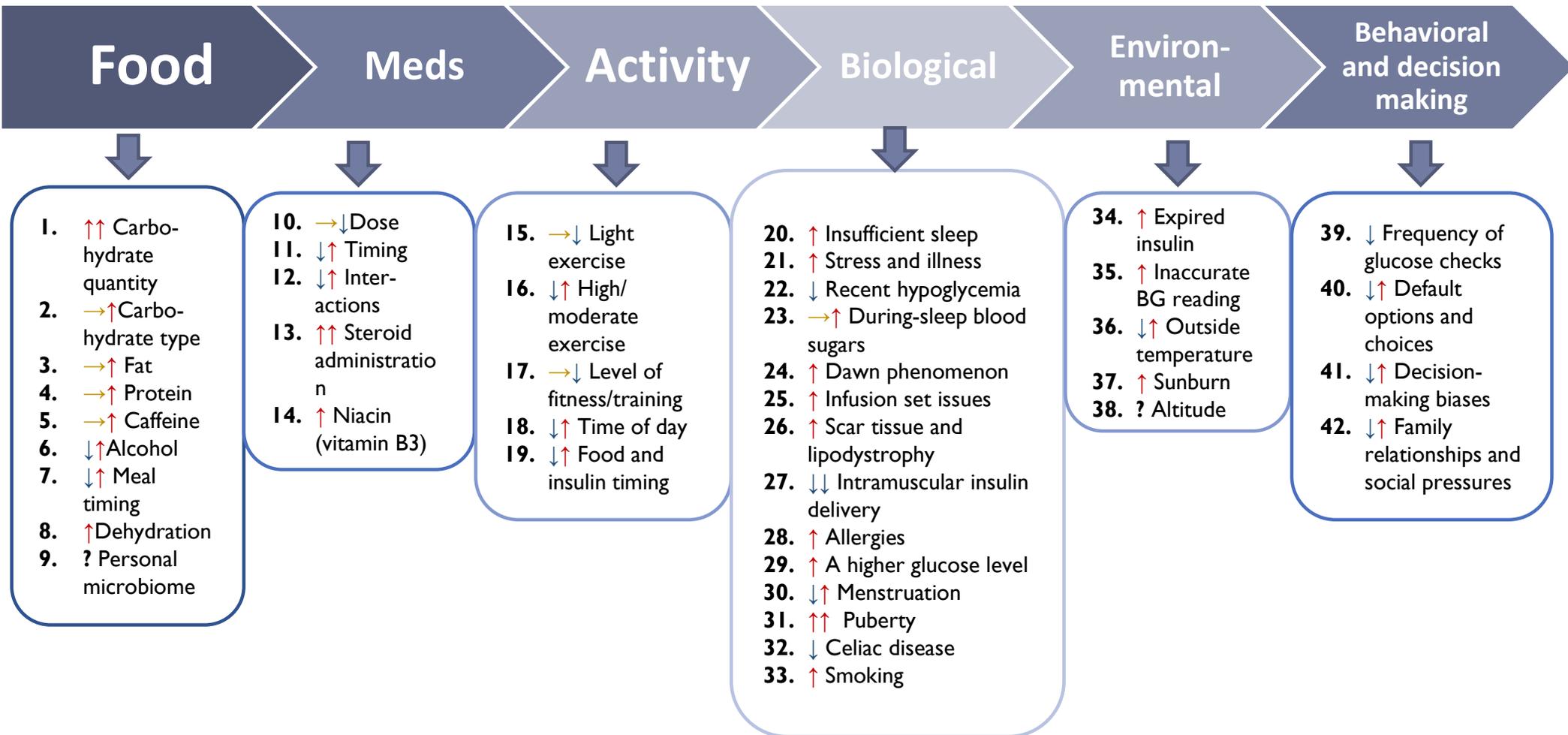▸ *Critical that the glycemic goals be woven into an individualized, person-centered strategy*
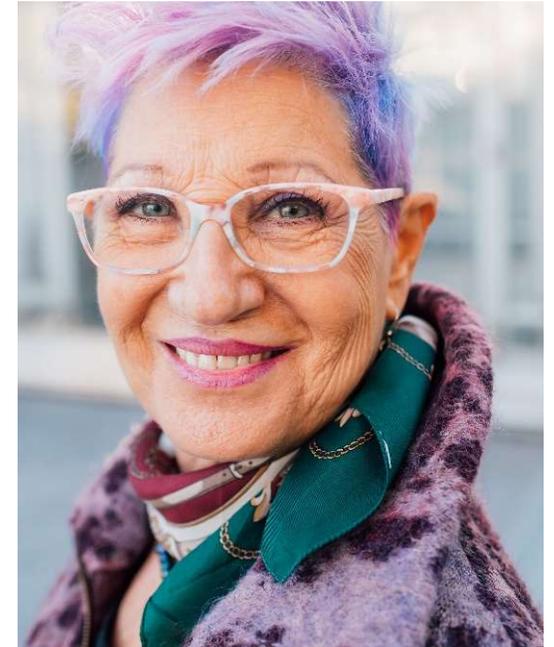
Time In Range – Person Centered

- "Hyperglance-emia"
- Each 1% is 15 minutes (4% an hour)
- There is 24 hours in a day.
  - Goal is 17 hours in range = 70% TIR = A1C of 7%
  - You get 7 hours outside of range.
- You are not defined by your blood glucose.
- What range feels safe for you?
- Try and step back and take in the whole picture.
- Sometimes you need a donut!

At least 42 factors affect glucose!

Food > **Meds** > **Activity** > **Biological** > **Environ-mental** > **Behavioral and decision making**

Food

1. ↑↑ Carbohydrate quantity
2. →↑ Carbohydrate type
3. →↑ Fat
4. →↑ Protein
5. →↑ Caffeine
6. ↓↑ Alcohol
7. ↓↑ Meal timing
8. ↑ Dehydration
9. ? Personal microbiome

Meds

10. →↓ Dose
11. ↓↑ Timing
12. ↓↑ Interactions
13. ↑↑ Steroid administration
14. ↑ Niacin (vitamin B3)

Activity

15. →↓ Light exercise
16. ↓↑ High/ moderate exercise
17. →↓ Level of fitness/training
18. ↓↑ Time of day
19. ↓↑ Food and insulin timing

Biological

20. ↑ Insufficient sleep
21. ↑ Stress and illness
22. ↓ Recent hypoglycemia
23. →↑ During-sleep blood sugars
24. ↑ Dawn phenomenon
25. ↑ Infusion set issues
26. ↑ Scar tissue and lipodystrophy
27. ↓↓ Intramuscular insulin delivery
28. ↑ Allergies
29. ↑ A higher glucose level
30. ↓↑ Menstruation
31. ↑↑ Puberty
32. ↓ Celiac disease
33. ↑ Smoking

Environmental

34. ↑ Expired insulin
35. ↑ Inaccurate BG reading
36. ↓↑ Outside temperature
37. ↑ Sunburn
38. ? Altitude

Behavioral and decision making

39. ↓ Frequency of glucose checks
40. ↓↑ Default options and choices
41. ↓↑ Decision-making biases
42. ↓↑ Family relationships and social pressures

Adapted from Brown A. DiaTribe Learn: Making sense of diabetes... diatribe.org/42factors

> **"The highest form of wisdom is kindness."**
> **The Talmud**

Diabetes Education Services
Published by Beverly Thomassian [?] · July 7 · 🌐

Kindness matters!

Learning to be less harsh or judgmental and more compassionate to oneself may help people with diabetes manage their disease and stave off depression, a recent study suggests.

Self-compassion may help people with diabetes achieve better glucose control and less depression

By Reyna Gobel(Reuters Health) – Learning to be less harsh or judgmental and more...

REUTERS.COM | BY REYNA GOBEL

Good health and function, low treatment risks and burdens

Most adults

Healthy older adults

Older adults with complex/intermediate health

Older adults with very complex/poor health

Any adults with limited life expectancy

<6.5%   <7.0%   <7.5%   <8.0%   No A1C goal

Modifying Factors
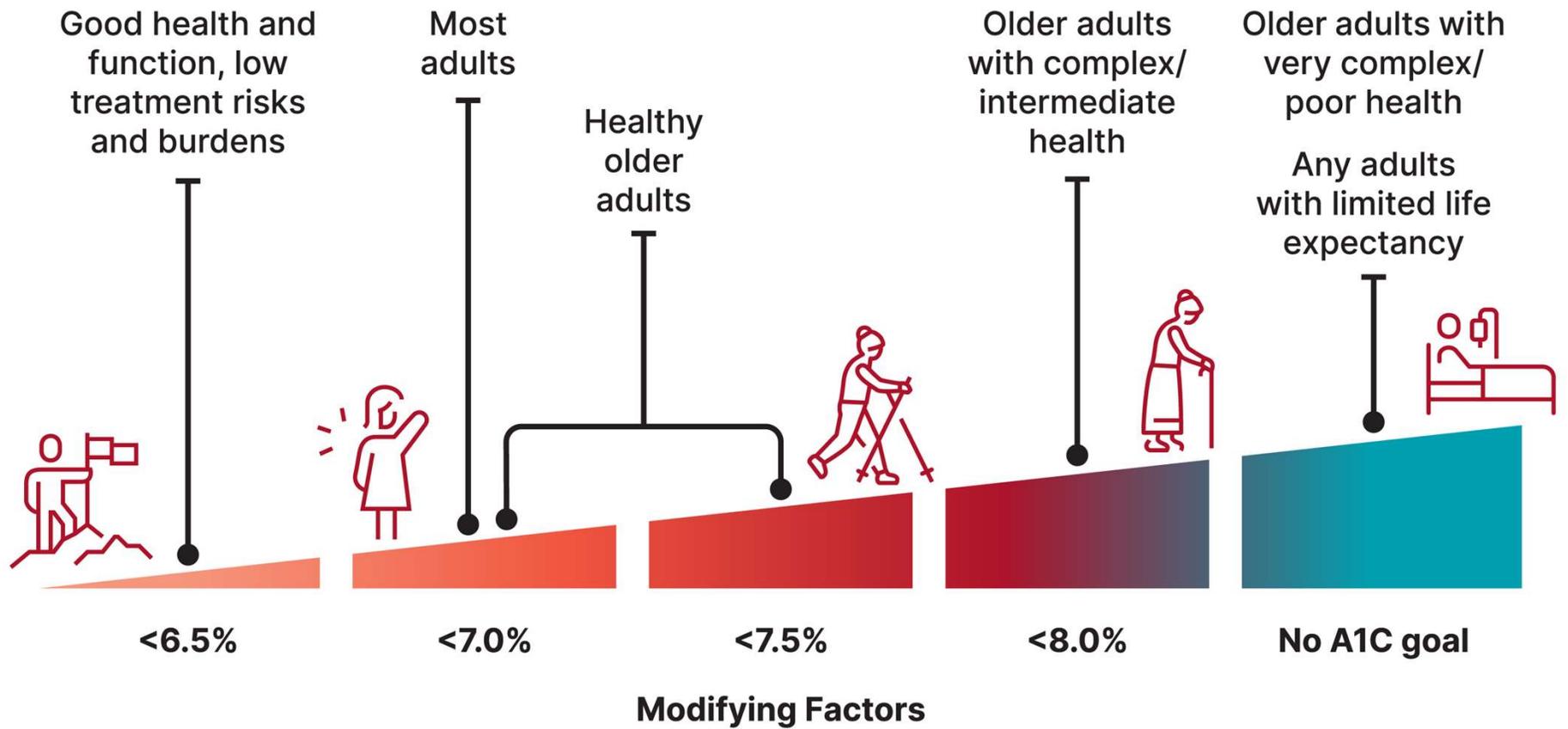
Favor more stringent goal	Favor less stringent goal
Short diabetes duration	Long diabetes duration
Low hypoglycemia risk	High hypoglycemia risk
Low treatment risks and burdens	High treatment risks and burdens
Pharmacotherapy with cardiovascular, kidney, weight, or other benefits	Pharmacotherapy without nonglycemic benefits
No cardiovascular complications	Established cardiovascular complications
Few or minor comorbidities	Severe, life-limiting comorbidities

6. Glycemic Goals and Hypoglycemia: Standards of Care in Diabetes—2025 FREE

Table 6.2

Cardiac and Renal Disease

▸ The combination of 3 comorbidities has been termed *cardiorenal metabolic disease* or *cardiovascular-kidney-metabolic* health

  ▸ ASCVD, heart failure, and chronic kidney disease (CKD)

▸ Recognized interrelationship of cardiometabolic risk factors leading to cardiovascular disease and adverse kidney outcomes in people with diabetes.

  ▸ 3 comorbidities frequently associated with metabolic risk factors & extra weight

  ▸ Incidence of all three conditions rises with *increasing* A1C levels.

Diabetes Meds Lower CardioRenal Risk

- If diabetes plus ASCVD risk factors
  - SGLT-2s* and GLP-1s* reduce risk of major adverse CV events
  - Plus ACE or ARB
  - Post MI, continue beta blockers for 3 years.
- If type 2 diabetes and heart failure
  - SGLT-2s reduce risk of heart failure and hospitalization.
  - Also consider beta blocker

Poll Question 12

▶ Evaluating kidney function is important to determine most beneficial treatment interventions. Which of the following measurements would indicate that JR has healthy kidney function?

A. Urinary albumin creatinine ratio of 30-299 mg/g with GFR of 45.

B. GFR of 60 or greater and urinary albumin creatinine ratio of 12 mg/g.

C. Urinary albumin creatinine ratio less than 30 mg/g and GFR of 30-45.

▶ Creatinine of 1.5 and urinary albumin creatinine ratio of 300 mg/g or greater.

CKD– 2025 Update
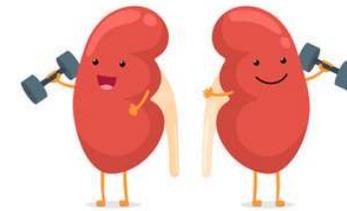
- Optimize glucose and BP to protect kidneys

- Use SGLT-2 with demonstrated benefit to reduce CKD and CVD*

- To reduce CV risk and CKD, use a GLP-1* with demonstrated benefit.

- In people with CKD and albuminuria, a nonsteroidal MRA effective if GFR 25+

- Aim to reduce urinary albumin by ≥30% in people with CKD

  - *SGLT-2i's
    - Empagliflozin, canagliflozin, dapagliflozin
  - *GLP-1 RA's
    - Semaglutide has indication, liraglutide dulaglutide

Albuminuria Categories	Urinary Albumin Creatine Ratio (UACR)
Normal to mildly increased – A1	< 30 mg/g
Moderately increased – A2	30 – 299 mg/g
Severely increased – A3	300 mg/g +

Kidney Disease Stage	GFR
Stage 1 – Normal	90+
Stage 2 – Mild loss	89 - 60
Stage 3a – Mild to Mod	59 - 45
Stage 3b – Mod to Severe	44 - 30
Stage 4 – Severe loss	29 -15
Stage 5 – Kidney failure	14 - 0

11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2025 FREE
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Standard 11 – Protect Kidneys

- Diabetes with a
  - GFR ≥20 and
  - UACR ≥200 mg/g
- Start SGLT2 to reduce chronic kidney disease progression and cardiovascular events.

- If type 2 diabetes and established Chronic Kidney Disease (CKD)
  - Start nonsteroidal mineralocorticoid receptor antagonist (Finerenone) and/or GLP-1 RA recommended for cardiovascular risk reduction.

Finerenone Resource

New nonsteroidal MRAs for Type 2 and Chronic Kidney Disease

Nonsteroidal Selective Mineralocorticoid Antagonist

Indicated for people with chronic kidney disease (CKD) associated with Type 2 diabetes. Reduces the risk of kidney function decline, kidney failure, cardiovascular death, non-fatal heart attacks, and hospitalization for heart failure in adults with chronic kidney disease associated with type 2 diabetes. The mineralocorticoid receptor antagonist blocks the effects of aldosterone and reduces the risk of kidney function decline as well as heart failure.

Class / Action	Generic / Trade Name	Daily Dose	Frequency	Considerations
Nonsteroidal, selective mineralocorticoid antagonist. Blocks mineralocorticoid receptor mediated sodium reabsorption and mineralocorticoid overactivation in epithelial (for example kidneys) and nonepithelial (for example heart, blood vessels) tissues.	**Finerenone / Kerendia**	**10-20 mg**	**Once daily**	Monitor potassium 4 weeks after initiation or dose adjustment (although impact on potassium is much less than non-slective mineralocorticoid antagonists like spironolactone). Since medication is a CYP3A4 substrate, avoid taking with other strong cype3A4 inhibitors. Avoid grapefruit or grapefruit juice. May take with or without food.

Contributor: Diana Isaacs, PharmD, BCPS, BCACP, BC-ADM, CDCES, FADCES, FCCP 2022

Figure 11-12 Holistic Approach to Diabetes + CKD

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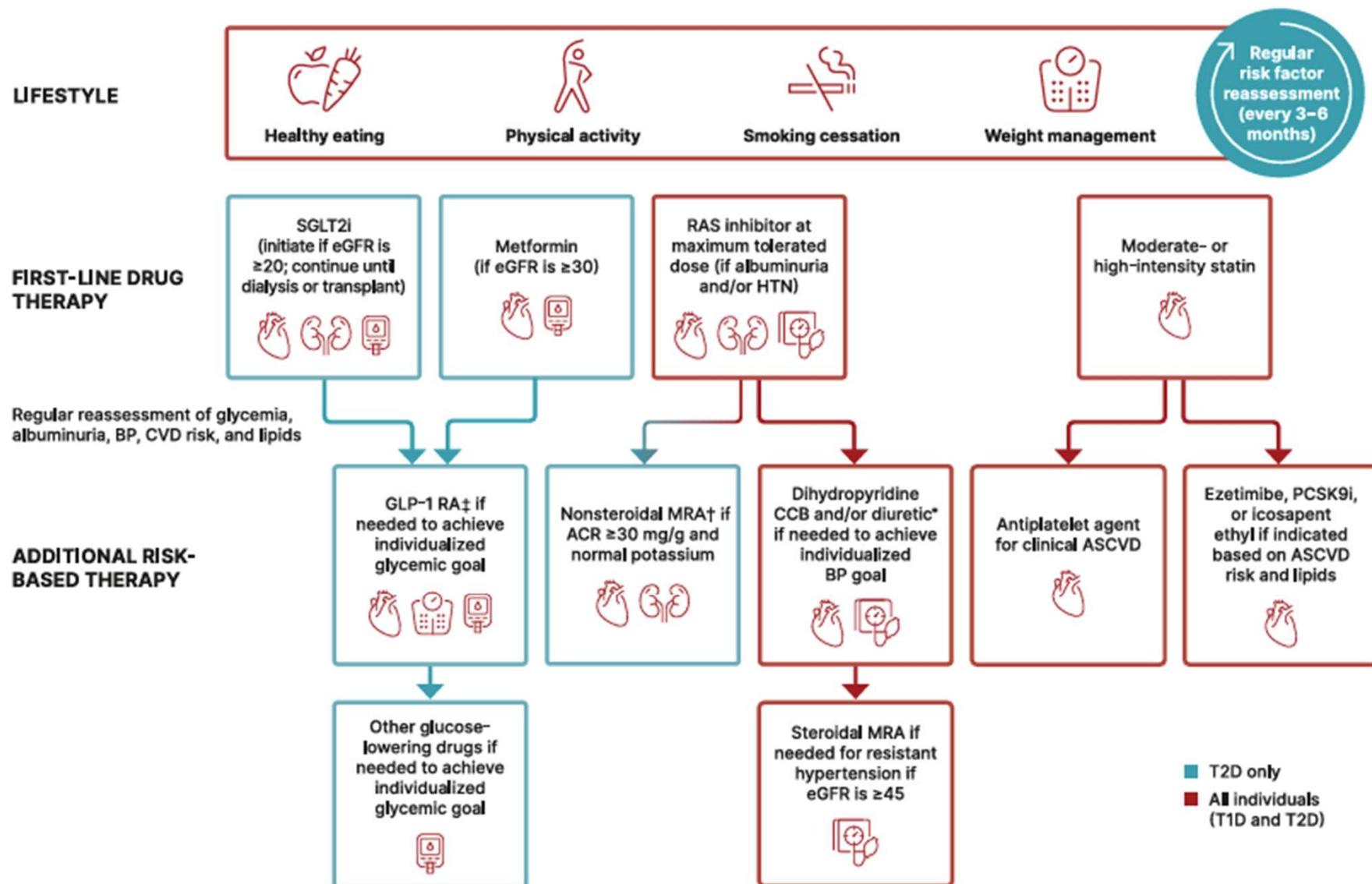
DI1 New slide

Diana Isaacs, 2025-08-25T02:19:23.837

Risk of CKD Progression, CVD

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CKD is classified based on:
- GFR (G)
- Albuminuria (A)

				Albuminuria categories Description and range		
				A1	**A2**	**A3**
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-299 mg/g 3-29 mg/mmol	≥300 mg/g ≥30 mg/mmol
GFR categories (mL/min/1.73 m²) Description and range	G1	Normal or high	≥90	Screen 1	Treat 1	Treat and refer 2
	G2	Mildly decreased	60-89	Screen 1	Treat 1	Treat and refer 2
	G3a	Mildly to moderately decreased	45-59	Treat 1	Treat 2	Treat and refer 3
	G3b	Moderately to severely decreased	30-44	Treat 2	Treat and refer 3	Treat and refer 3
	G4	Severely decreased	15-29	Treat and refer 3	Treat and refer 3	Treat and refer 4+
	G5	Kidney failure	<15	Treat and refer 4+	Treat and refer 4+	Treat and refer 4+

- Low risk (if no other markers of kidney disease, no CKD)
- Moderately increased risk
- High risk
- Very high risk

Kidney Goals and MNT

- In people with chronic kidney disease with UACR ≥300 mg/g
- Goal is a reduction of 30% or greater in mg/g urinary albumin to slow chronic kidney disease progression

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- Nutrition Recommendations
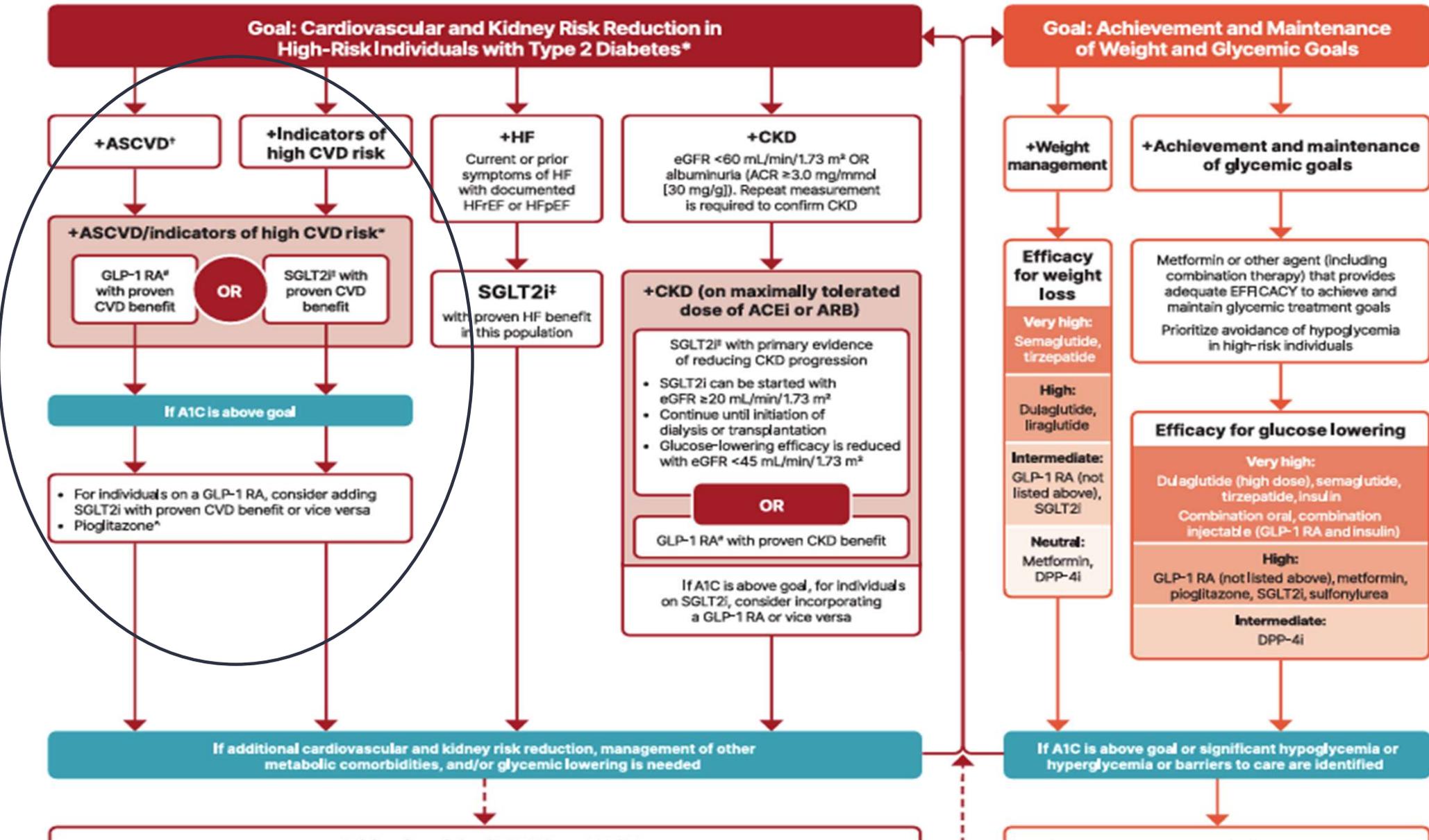- For people with non–dialysis-dependent stage 3 or higher chronic kidney disease
  - dietary protein intake aimed to a target level of 0.8 g/kg body weight per day.
- For those on dialysis,
  - consider protein intake of 1.0–1.2 g/kg/day since protein energy wasting is a major problem in some individuals on dialysis
- Refer to nephrology
  - If GFR < 30 or uncertain CKD etiology

10. Cardiovascular Disease and Risk Management

▶ **Higher risk of Atherosclerotic cardiovascular disease (ASCVD):**

- ▶ history of acute coronary syndrome,
- ▶ myocardial infarction (MI),
- ▶ stable or unstable angina,
- ▶ coronary or other arterial revascularization,
- ▶ stroke, transient ischemic attack,
- ▶ or peripheral artery disease (PAD) including aortic aneurysm.

▶ **2x high risk of Heart Failure**

▶ **Leading cause of morbidity and mortality in people with diabetes**

Large benefits are seen when multiple CV risk factors are addressed simultaneously

With more aggressive goals, rates of CVD have decreased.
CV Risks predicted to increase in future.

Assess ASCVD and Heart Failure Risk Yearly

▸ Duration of diabetes & 55+

▸ BMI

▸ Hypertension

▸ Dyslipidemia

▸ Smoking

▸ Family history of premature coronary disease

▸ Chronic kidney disease – presence of albuminuria

Treat modifiable risk factors as described in ADA guidelines.

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Use of Glucose-Lowering Medications in the Management of Type 2 Diabetes

HEALTHY LIFESTYLE BEHAVIORS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT; SOCIAL DETERMINANTS OF HEALTH

To avoid therapeutic inertia, reassess and modify treatment regularly (3–6 months)

Goal: Cardiovascular and Kidney Risk Reduction in High-Risk Individuals with Type 2 Diabetes*

+ASCVD[†]

+Indicators of high CVD risk

+ASCVD/indicators of high CVD risk[#]

GLP-1 RA[#] with proven CVD benefit **OR** SGLT2i[‡] with proven CVD benefit

If A1C is above goal

- For individuals on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit or vice versa
- Pioglitazone^

+HF
Current or prior symptoms of HF with documented HFrEF or HFpEF

SGLT2i[‡] with proven HF benefit in this population

+CKD
eGFR <60 mL/min/1.73 m² OR albuminuria (ACR ≥3.0 mg/mmol [30 mg/g]). Repeat measurement is required to confirm CKD

+CKD (on maximally tolerated dose of ACEi or ARB)

SGLT2i[‡] with primary evidence of reducing CKD progression
- SGLT2i can be started with eGFR ≥20 mL/min/1.73 m²
- Continue until initiation of dialysis or transplantation
- Glucose-lowering efficacy is reduced with eGFR <45 mL/min/1.73 m²

OR

GLP-1 RA[#] with proven CKD benefit

If A1C is above goal, for individuals on SGLT2i, consider incorporating a GLP-1 RA or vice versa

If additional cardiovascular and kidney risk reduction, management of other metabolic comorbidities, and/or glycemic lowering is needed

Goal: Achievement and Maintenance of Weight and Glycemic Goals

+Weight management

+Achievement and maintenance of glycemic goals

Efficacy for weight loss

Efficacy for weight loss
Very high: Semaglutide, tirzepatide
High: Dulaglutide, liraglutide
Intermediate: GLP-1 RA (not listed above), SGLT2i
Neutral: Metformin, DPP-4i

Metformin or other agent (including combination therapy) that provides adequate EFFICACY to achieve and maintain glycemic treatment goals

Prioritize avoidance of hypoglycemia in high-risk individuals

Efficacy for glucose lowering

Efficacy for glucose lowering
Very high: Dulaglutide (high dose), semaglutide, tirzepatide, insulin Combination oral, combination injectable (GLP-1 RA and insulin)
High: GLP-1 RA (not listed above), metformin, pioglitazone, SGLT2i, sulfonylurea
Intermediate: DPP-4i

If A1C is above goal or significant hypoglycemia or hyperglycemia or barriers to care are identified

Poll Question 13

▸ RJ is a 57 yr old with diabetes. RJ takes an ACE Inhibitor, insulin and a statin. They smoke a pack of cigarettes a day.

▸ According to ADA Standards of Care, what is the blood pressure target for RJ?

▸ A. Less than 120/80

▸ B. Less than 130/80

▸ C. Less than 140/90

▸ D. Less than 135 /85
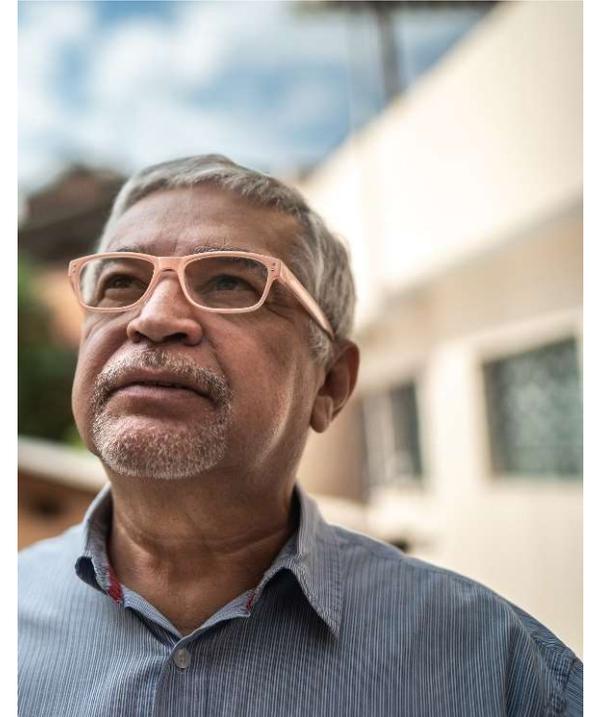
Hypertension Management

Recommendations for the Treatment of Confirmed Hypertension in Nonpregnant People With Diabetes

REASSESS REGULARLY (3-6 MONTHS)

- **Initial BP ≥130/80 and <150/90 mmHg**
  - Start one agent
    - Albuminuria or CAD*
      - **No** → Start ACEi or ARB or CCB† or diuretic‡
      - **Yes** → Start ACEi or ARB
  - Lifestyle management
- **Initial BP ≥150/90 mmHg**
  - Start two agents
    - Albuminuria or CAD*
      - **No** → Start two drugs from ACEi or ARB, CCB† or diuretic‡
      - **Yes** → Start ACEi or ARB and CCB† or diuretic‡

Assess BP management and adverse effects

10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2025 FREE

American Diabetes Association Professional Practice Committee

BP Treatment in addition to Lifestyle

- **First Line BP Drugs if 130/80 +**
  - With albuminuria or CAD
    - Start either ACE or ARB*
  - No albuminuria - Any of the 4 classes of BP meds can be used:
    - ACE Inhibitors, ARBs, thiazide-like diuretics or calcium channel blockers.
    - Monitor K+/Scr 7-14 days after initiation and dose increase for diuretics, ACEI/ARB
  - Avoid ACE and ARB at same time
  - Multiple Drug Therapy often required
- **If BP ≥ 150 /90 start 2 drug combo**

*Albuminuria = Urinary albumin creatinine ratio of 30+

Lipid and HTN Meds Cheat Sheets

Cholesterol Medications

LDL Lowering Medications

Class / Action	Generic / Trade Name	Usual Daily Dose Range	LDL % Lowering	Considerations
"Statins" HMG- CoA Reductase Inhibitors Inhibits enzyme that converts HMG-CoA to mevalonate - limits cholesterol production	Atorvastatin / Lipitor*	10 – 80 mg	20- 60	Lowers TGs 7-30% Raise HDL 5-15% Take at night. **Side effects**: weakness, muscle pain, elevated glucose levels. Review package insert for specific dosing adjustments based on drug, food interactions (ie grapefruit).
	Fluvastatin / Lescol* Lescol XL	20 – 80 mg 80 mg	20- 35	
	Lovastatin* Mevacor Altoprev XL	20 - 80 mg 10 - 60 mg	20- 45	
	Pravastatin / Pravachol*	10 - 80 mg	20- 45	
	Rosuvastatin / Crestor	5 – 40 mg	20- 60	
	Simvistatin / Zocor*	20 – 80 mg	20- 55	
	Pitavastatin / Livalo	2 – 4 mg		
Bile Acid Sequestrants **Action:** Bind to bile acids in intestine, decreasing cholesterol production. Secondary action – raise HDL	Cholestyramine/ Questran*	4 to 16 g per day powder – 1 scoop 4g	Lower LDL by 15-30%	May raise TG levels. Raise HDL 3-5%. Avoid taking in same timeframe w/ other meds – may affect absorption (see package insert). Side effects: GI in nature
	Colesevelam / Welchol **Lowers A1c 0.5%**	3.75 x 1 daily 1.875 x 2 daily (625mg tablets)		
	Colestipol / Colestid	2 - 16 gms per day tabs Powder – 1 scoop = 5g 5 to 20 gm per day Mix w/ fluid		
Cholesterol Absorption Inhibitors	Ezetimibe / Zetia	10 mg – 1x daily	15-20%	Usually used in combo w/statin. Headache, rash.
Plant Stenols	Benecol	3 servings daily	14%	Well tolerated
Plant Sterols	Take Control	2 servings daily	17%	

Triglyceride Lowering / HDL Raising Medications
If TG> 500, lower TG first, then reduce LDL.

Antihypertensive Medications

ACE and ARBs are preferred therapy for diabetes with hypertension and albuminuria – If B/P not at goal with either of these agents, add a diuretic or other class. Do not use during pregnancy or in persons w/ renal or hepatic dysfunction. Start w/ low dose, gradually increase. If one class is not tolerated, the other should be substituted. For those treated with an ACE inhibitor, angiotensin receptor blocker, or diuretic, serum creatinine/estimated glomerular filtration rate and serum potassium levels should be monitored at least annually. ADA Standards CV Disease Risk Management

Class / Action	Generic / Trade Name	Usual Daily Dose Range	Frequency	Considerations
ACE Inhibitors Angiotensin Converting Enzyme **Action -** Block the conversion of AT-I to AT-II. Also stimulates release of nitric oxide causing vasodilation.	benazepril / Lotensin†	10 – 40 mg	1 x a day	Try to take same time each day. Effects seen w/in 1 hr of admin, max effects in 6 hrs. **Side effects**: Can cause cough (due to increased bradykinin) – can try different med in same class. Also can cause fatigue, dizziness, hypotension. †These meds are also available as a combo w/ low dose HCTZ (hydrochlorothiazide). ‡These meds are also available as a combo w/ CCB (calcium channel blocker) usually amlodipine
	captopril /Capoten*†	12.5 - 100 mg	2-3 x a day	
	Enalopril/ Vasotec*†	2.5 - 40 mg	1-2 x a day	
	Fosinopil / Monopril†	10- 40 mg	1 x a day	
	Lisinopril *† Prinivil Zestril	10 – 40 mg 10 - 40 mg		
	Ramipril / Altace*†	2.5 – 10 mg		
	Moexipril / Univasc†	3.75 - 15 mg		
	Perindopril/Aceon‡	2-16 mg		
	Perindopril/ Indapamide combo (Coversyl)	2 - 8 mg 0.625 - 2.5 mg		
	Quinapril /Accupril†	5 – 40 mg		
	Trandolapril/ Mavik	1.0 – 4 mg		
	Trandolapril/ Verapamil combo (TARKA)	1-4 mg 180 to 240 mg		
ARBs -Angiotensin Receptor Blockers **Action -**Block AT-I receptor which reduces aldosterone secretion and vasoconstriction	Azilsartan/Edarbi	40 - 80 mg	1 x daily	Try to take same time each day **Side effects**- Can cause dizziness, drowsiness, diarrhea, hyperkalemia, hypotension.
	Azilsartan/ Chlorthalidone combo (Edarbyclor)	40 mg 12.5 - 25 mg		
	Candesartan/Atacand†	8 – 32 mg		
	Eprosartan/Teveten†	400 - 600 mg		

Website: https://diabetesed.net/coach-bevs-diabetes-cheat-sheets/
On CDCES Coach App too

For exam, know major classes, when used, side effects and considerations.

Poll Question 13

RZ is 47 years old with type 2 diabetes and hypertension. RZ takes metformin 1000 mg BID, plus lisinopril 20mg daily. RZs LDL is 130 mg/dL. Based on the most recent ADA Standards, what is the LDL Cholesterol target for RZ?

A. LDL less than 100 mg/dL.

B. Lower LDL by 50%.

C. LDL target of 70 mg/dL or less.

D. Determine LDL target based on ASCVD risk.

Lipid Monitoring and Lifestyle Treatment Strategies

- ▶ Lipid Goals
  - ▶ LDL < 70 or 55 based on risk
  - ▶ HDL >40
  - ▶ Triglycerides <150

> **Monitoring:**
> If **not** taking statins and underage of 40.
> - check at time of diagnosis and every 5 yrs.
> **On statin**
> Monitor lipids at diagnosis and yearly.
> Monitor lipids 4-12 weeks after statin dose adjustment.

- ▶ Weight loss if indicated
- ▶ Mediterranean or DASH Diet
- ▶ Reduction of saturated fat intake
- ▶ Increase of omega-3 fatty acids, viscous fibers and plant stanols/sterols
- ▶ Increase activity level
- ▶ BG lowering helps lower triglycerides and increase HDL

Statin Therapy

▸ **High intensity statins (lowers LDL 50%):**

  ▸ atorvastatin (Lipitor) 40-80mg

  ▸ rosuvastatin (Crestor) 20-40mg

▸ **Moderate intensity (lowers LDL 30-50%)**

  ▸ atorvastatin (Lipitor) 10-20mg

  ▸ rosuvastatin (Crestor) 5-10mg

  ▸ simvastatin (Zocor) 20-40mg

  ▸ pravastatin (Pravachol) 40 – 80mg

  ▸ lovastatin (Mevacor) 40 mg

  ▸ fluvastatin (Lescol) XL 80mg

  ▸ pitavastatin (Livalo) 1-4mg

New Lipid Lowering Medications

Contributor: Diana Isaacs, PharmD, BCPS, BCACP, BC-ADM, CDCES, FADCES, FCCP 2022

PCSK9 Inhibitors Lipid Medications
Proprotein convertase subtilisin/kexin type 9

	Alirocumab (Praluent)	Evolocumab (Repatha)
FDA-approved indications	• Primary hyperlipidemia (HLD) • Homozygous familial hypercholesterolemia (HoFH) • Secondary prevention of cardiac events	
Dosing	• **HoFH**: 150 mg SC q2 weeks • **HLD or secondary cardiac prevention**: 75 mg SC q2 weeks or 300 mg SC q4 weeks; if adequate LDL response not achieved, may increase to max of 150 mg q2 weeks	• **HoFH**: 420 mg SC q4 weeks; may increase to 420 mg q2 weeks if meaningful response not achieved in 12 weeks • **HLD or secondary cardiac prevention**: 140 mg q2 weeks or 420 mg q4 weeks
Dosage forms	• Auto-injector 75 mg/mL or 150 mg/mL	• Repatha Sure Click (auto-injector) 140 mg/mL • Repatha Pushtronex System (single use infusor with pre-filled cartridge) 420 mg/3.5 mL – administered over 9 minutes
Storage	• Store in refrigerator in outer carton until used • Once used, keep at room temperature, use within 30 days	
Injection clinical pearls	• Do not shake or warm with water • Administer by SC injection into thigh, abdomen, or upper arm • Rotate injection site with each injection	
Drug interactions	• No known significant interactions	
Monitoring parameters	• Lipid panel before initiating therapy, 4-12 weeks after initiating, and q3-12 months thereafter	
Side effects	• Injection site reaction (4-17%) • Hypersensitivity reaction (9%) • Influenza (6%) • Myalgia (4-6%) • Diarrhea (5%)	• Nasopharyngitis (6-11%) • Upper respiratory tract infection (9%) • Diabetes mellitus (9%) • Influenza (8-9%) • Injection site reaction (6%) • Myalgia (4%)

From Meds Cheat Sheet Page

Lipid Therapy in Diabetes by Age

- All ages 20+ *with* ASCVD, add high-intensity statin to lifestyle

- 20–39 and additional ASCVD risk factors
  - may be reasonable to initiate statin therapy in addition to lifestyle.

- 40-75 years
  - Moderate to high intensity statin based on risk (see previous slides)

- 75 years or older and already on statin
  - it is reasonable to continue statin treatment.

- 75 years or older
  - it may be reasonable to initiate moderate-intensity statin therapy after discussion of potential benefits and risks.

Tobacco, Electronic Cigarettes, Alcohol, and Cannabis

Advise all youth with diabetes not to use cannabis recreationally in any form.

- 2 to 3 times higher risk of developing DKA.
- Can lead to cannabis hyperemesis syndrome

- Screen adolescents and young for tobacco or nicotine, electronic cigarettes, substance use, and alcohol use at diagnosis and regularly thereafter.

- Discourage smoking in youth who do not smoke and encourage smoking cessation in those who do smoke (including electronic cigarette use or vaping)
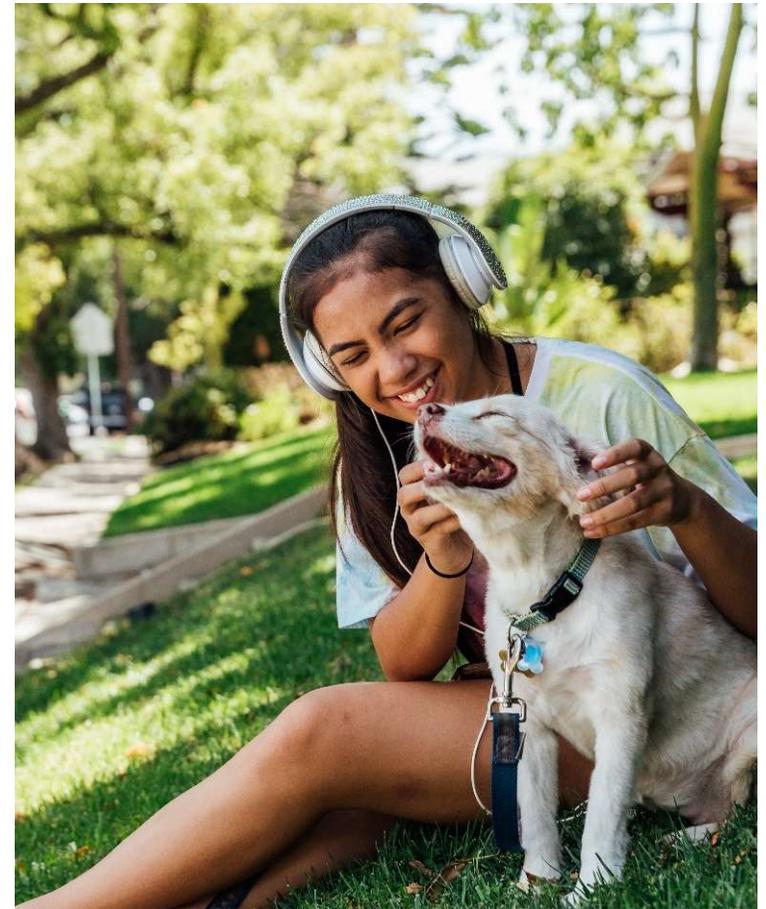
14. Children and Adolescents: Standards of Care in Diabetes —2025 FREE

RL needs your help

- A1C 8.9% (down from 10.4%)
- B/P 139/76   AM BG 100, 2 hr pp 190
- Chol – TG 54, HDL 46, LDL 98
- GFR 47, UACR 34 mg/g

- Meds:
    - Insulin – 28 units glargine insulin
    - Losartan 25mg – ARB for blood pressure
    - Metoprolol 50mg – Beta blocker
    - Glyburide 5mg BID - Sulfonylurea

Any special instructions?
Any meds missing?
Stop any meds?

RL Needs Your Help

▸ A1c 8.9% (down from 10.4%)

▸ B/P 139/76   AM BG 100, 2 hr pp 190

▸ Chol – TG 54, HDL 46, LDL 98

▸ GFR 47, UACR 34 mg/g

▸ Meds:

  ▸ Insulin – 28 units glargine insulin
  ▸ Losartan 25mg – ARB for blood pressure
  ▸ Metoprolol 50mg – Beta blocker
  ▸ Glyburide 5mg BID - Sulfonylurea

  Special instruction – sweating may indicate hypoglycemia

Any special instructions?
Any meds missing?
- Statin
- SGLT 2
- Aspirin?
Stop any meds?

ABC's of Diabetes

▶ **A**1c less than 7% (individualize)

  ▶ Pre-meal BG 80-130

  ▶ Post meal BG <180

  ▶ AGP - Time in Range (70-180) 70% of time

▶ **B**lood Pressure < 130/80

▶ **C**holesterol

  ▶ Statin therapy based on age & risk status

  ▶ If 40+ with ASCVD Risk, decrease 50%, LDL <70

  ▶ If 40+ with ASCVD, decrease 50%, LDL <55

DiaBingo- G

G ADA goal for A1c is less than _____%

G People with DM need to see their provider at least every month

G Blood pressure goal is less than

G People with DM should see eye doctor (ophthalmologist) at least

G The goal for triglyceride level is less than

G Goal for LDL cholesterol for people 40+ with diabetes is _____

G The goal for blood sugars 1-2 hours after a meal is less than:

G People with DM should get this shot every year

G People with DM need to get urine tested yearly for _____

G Periodontal disease indicates increased risk for heart disease

G The goal for blood sugar levels before meals is:

G The activity goal is to do ____ minutes on most days

Stretch and Reflect

▸ Let's take what we have learned and apply it to some different case studies.

Gaining Weight

▸ 68 yr old complains of 4 lb wt gain a week for past month. Wt 140lbs, BMI 27. BG levels 200-300s. B/P 142/96

▸ **Reported** daily meds include:

  ▸ Glyburide 10mg ac breakfast

  ▸ Pioglitazone 30mg ac breakfast

  ▸ Glargine 30units at night

  ▸ Lispro sliding scale with meals

  ▸ Levothyroxine (not sure of dose)

  ▸ Furosemide 20mg a day

  ▸ A new med for "mental health"
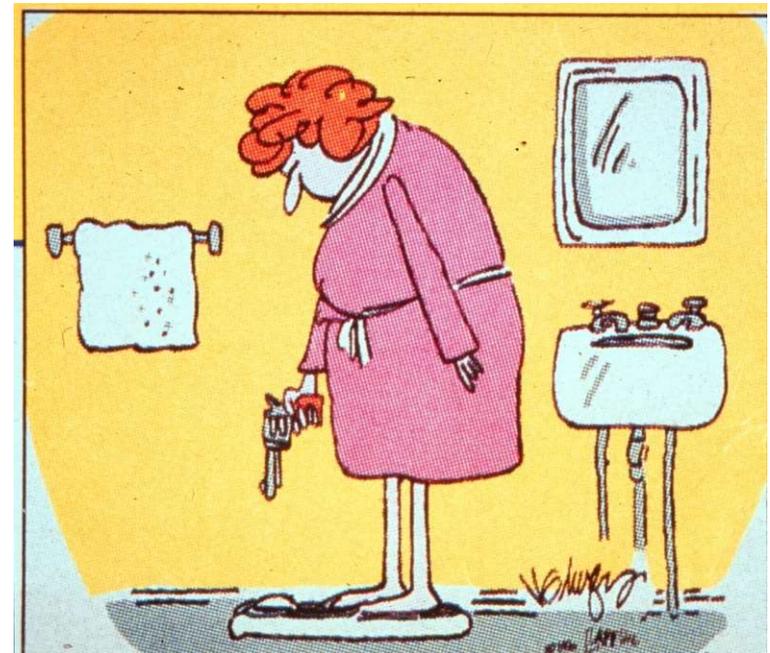
Sulfonylureas - Squirters

▸ Mechanism: Stimulate beta cells to release insulin

▸ Dosed 1-2x daily before meals

▸ Adverse effects

  ▸ Hypoglycemia, Weight gain, watch renal function

▸ Low cost, $12 for 3 months supply

▸ Can help with glucose toxicity, lowers A1C 1-2%

Sulfonylureas	glyburide:		Can take once or twice daily before meals.
• Stimulates sustained insulin release	(Diabeta)	1.25 – 20 mg	Low cost generic.
	(Glynase PresTabs)	0.75 – 12 mg	**Side effects**: hypoglycemia and weight gain. Eliminated via kidney.
	glipizide: (Glucotrol) (Glucotrol XL)	2.5 – 40 mg 2.5 – 20 mg	**Caution**: Glyburide most likely to cause hypoglycemia.
	glimepiride (Amaryl)	1.0 – 8 mg	Lowers A1c 1.0% – 2.0%.

Hypoglycemia & Next Steps

Do NOT Cause Hypoglycemia

- DPP-4 Inhibitor
- GLP-1 RA / GIP
- SGLT-2 Inhibitor
- TZD, Metformin
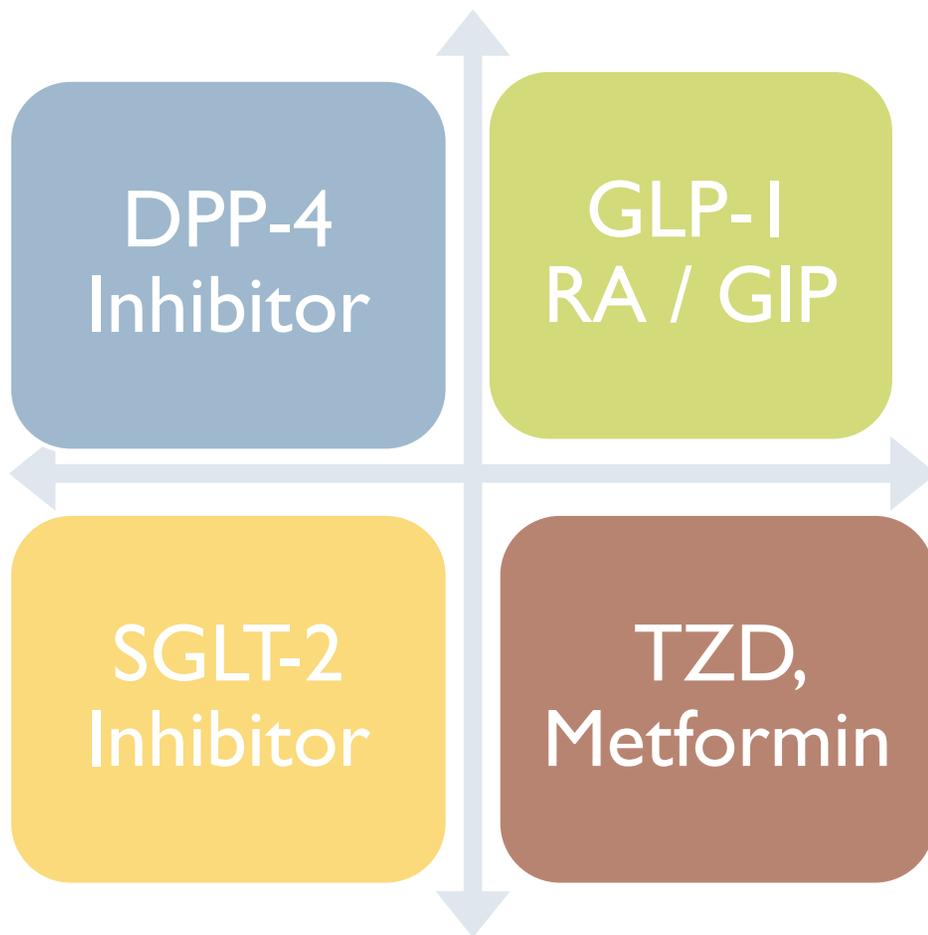
Can Cause Hypoglycemia

- Sulfonylurea
- Meglitinides
- Insulin

Fluid Weight Gain

- People with diabetes at greater risk for Congestive Heart Failure (CHF) due to increased CVD risk factors.

- Pioglitazone, (TZD's), can cause fluid weight gain and CHF.

- SGLT2 indicated in people with CHF

Novel/ Atypical Antipsychotics
Linked to Hyperglycemia

- Zyprexa – olanzapine
- Geodon - ziprasidone
- Seroquel – quetiapine
- Risperdal - risperidone
- Clozaril - clozapine
- Abilify – aripiprazole
- Latuda - lurasidone
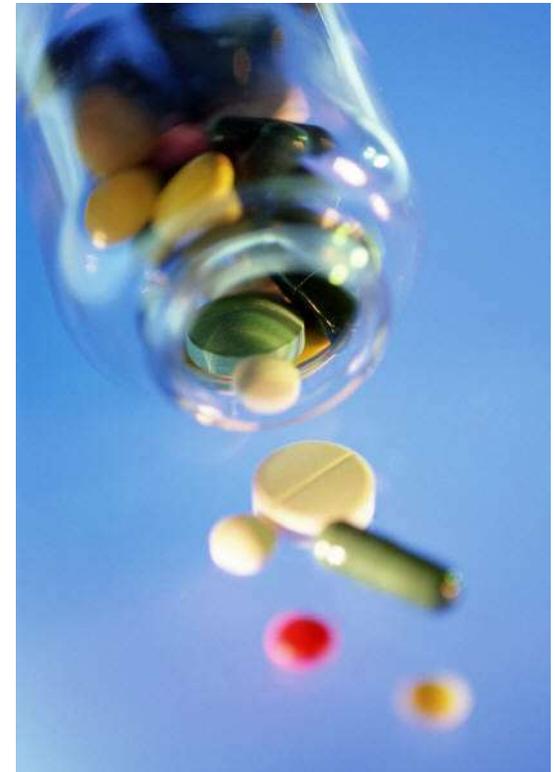
Consensus Development Conference on Antipsychotic Drugs and

Novel / Atypical Antipsychotics Linked to Hyperglycemia

▸ Severe cases of hyperglycemia – even death reported

▸ Monitor BG regularly for DM individuals started on this class of med

▸ If at risk for DM, determine fasting glucose before initiating therapy and monitor closely during treatment

▸ Weight gain may require increased dosing of diabetes therapies.

Summary of FDA warning statement for atypical antipsychotics

"People eat food, not nutrients, nutrient recommendations need to be applied to WHAT people eat"

MACRONUTRIENTS

Carbohydrates   Proteins   Fats

https://innerbody.com/nutrition/macronutrients
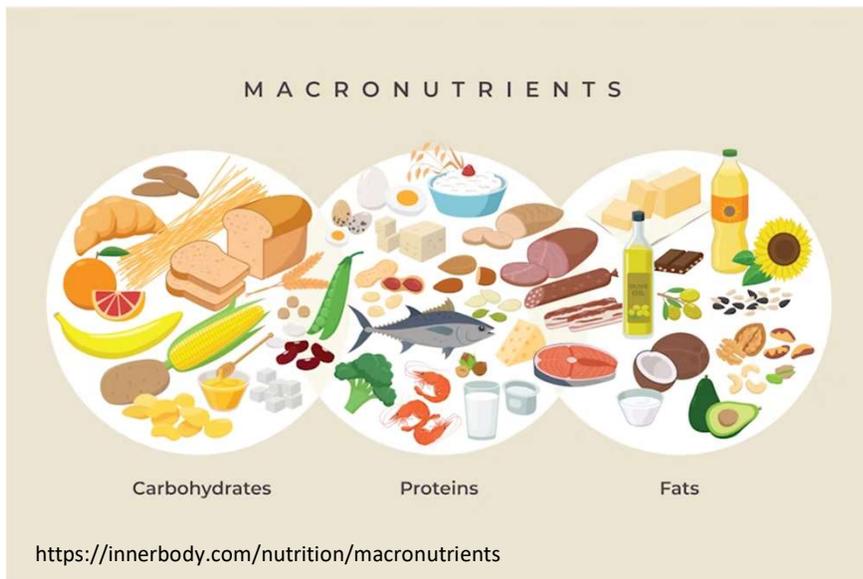
STANDARDS OF CARE | DECEMBER 09 2024

5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2025 FREE

American Diabetes Association Professional Practice Committee

Weight is a Heavy Issue
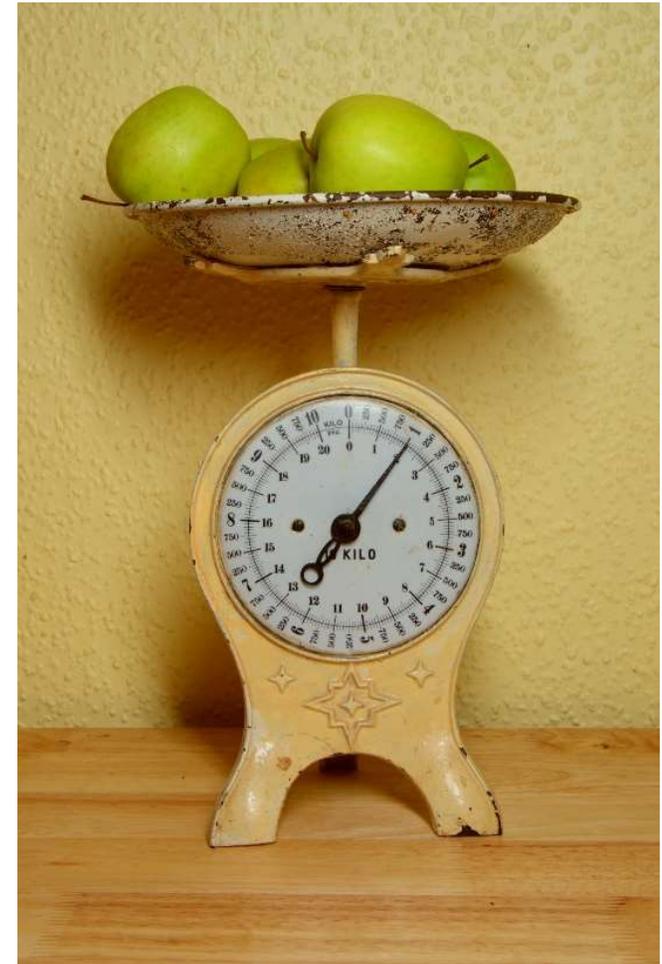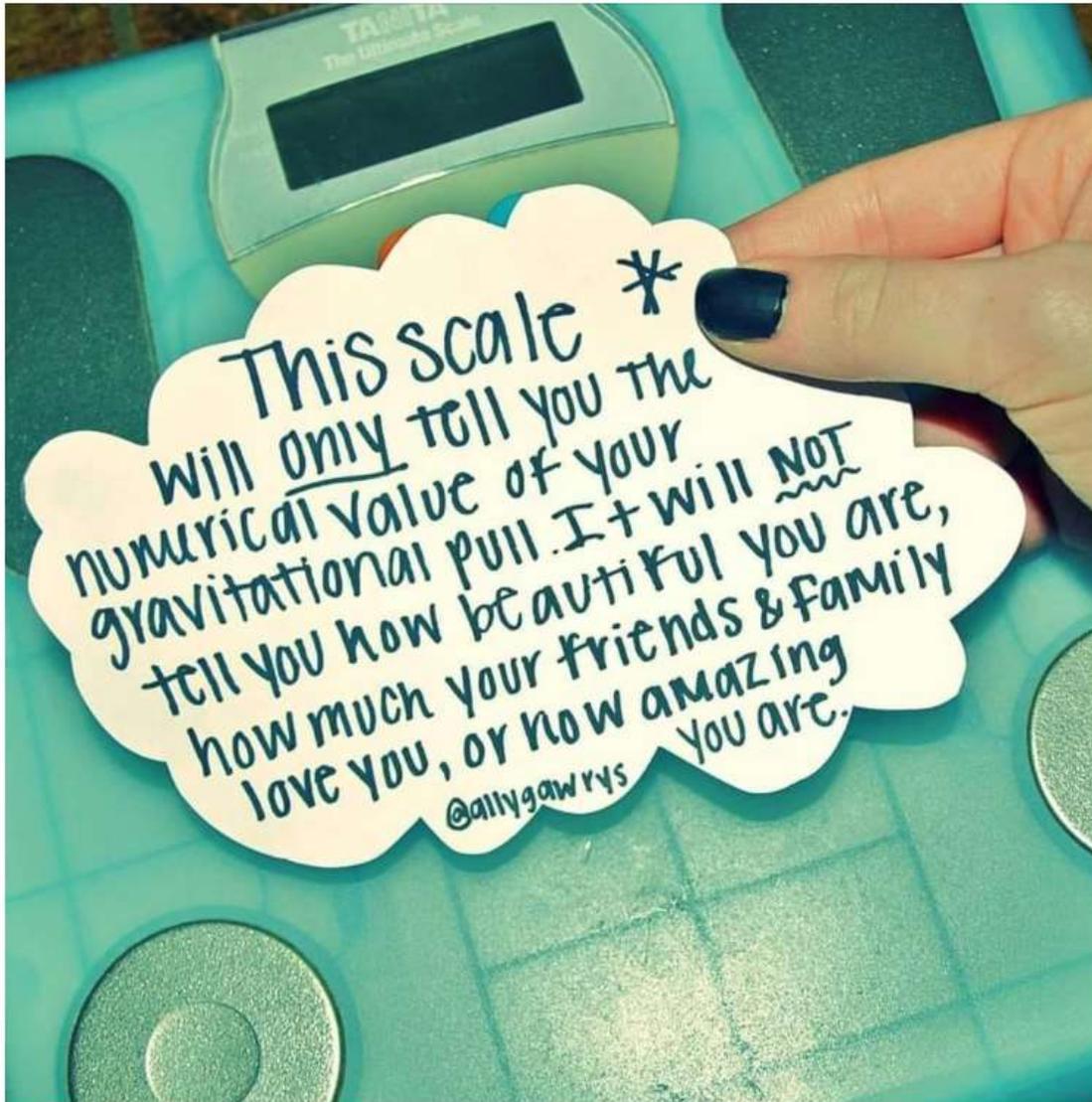
Weight Stigma

▸ Weight stigma, fat bias, and anti-fat bias are ways to describe the bias toward people living in larger bodies.

▸ Fat bias is prevalent among health care professionals and general public.

▸ Health care professionals are strongly encouraged to increase their awareness of implicit and explicit weight-biased attitudes.

▸ Increasing empathy and understanding about the complexity of weight management among health care professionals is a useful avenue to help reduce weight bias.

Health Behavior Change: Shifting Focus

Health at Every Size (HAES) Principles

▸ Weight Inclusivity

▸ Health Enhancement

▸ Eating for Well-being

▸ Respectful Care

▸ Life-Enhancing Movement

"People might think they can tell who's fit and who's not by looking at them, but in fact, it's trickier than that."

Health at Every Size: The Surprising Truth About Your Weight. Dr. Bacon holds a Ph.D. in physiology with a focus on nutrition and weight regulation.

"Lots of people are fat and fit—many avid dancers, runners, lifters, and sports team members are big to start with and stay that way. They tend to be far healthier than thin people who don't move around much or eat a nutritious mix of foods."

"Health at Every Size is about taking care of your body without worrying about whether you're 'too' big or small."

Get a Tape Measure & Other Assessments

Overall - assess individual's
- adipose tissue mass
- using waist circumference
  - 35" woman, 40" man
- waist-to-hip ratio
  - Waist smaller than hips
  - ...ght ratio
  - ...alf height
  - ...ssociated health
  - ...onsequences:
  - ...ical, or
  - ...ell-being

What your Waist-to-Hip Ratio Means

WOMEN	HEALTH RISK	BODY SHAPE
0.80 or below	Low	Pear
0.81 to 0.85	Moderate	Avocado
0.85+	High	Apple

MEN	HEALTH RISK	BODY SHAPE
0.95 or below	Low	Pear
0.96 to 1.0	Moderate	Avocado
1.0+	High	Apple

Prevention and Treatment of Type 2
...25 FREE

American Diabetes Association Professional Practice Committee

Interested in Weight Loss?

▸ Ask Permission

   ▸ Assess readiness/willingness to engage in changes for weight loss

▸ Use non-judgmental language

▸ Action-Based Goals

   ▸ Use shared-decision making for weight-loss goals & intervention strategies

   ▸ Strategies may include dietary changes, physical activity, behavioral therapy, pharmacologic therapy, medical devices, & metabolic surgery

Limit Highly Processed Carbs and Added Sugars Eat more HIGH Fiber foods:

o Choose High fiber carbs loaded with vitamins, minerals and phytonutrients

o "Power Carbs" include:

   o Beans/Lentils

   o Veggies

   o Whole Fruits

   o Low-fat, low sugar milk/yogurt

   o Whole Grain foods

      o as culturally appropriate

Let's Eat Healthy

← THE FOOD PROCESSING SPECTRUM →

UNPROCESSED   MINIMALLY PROCESSED   HIGHLY PROCESSED   ULTRA-PROCESSED

Replace highly processed and ultra-processed foods with whole or minimally processed foods for a healthier eating pattern that supports health.
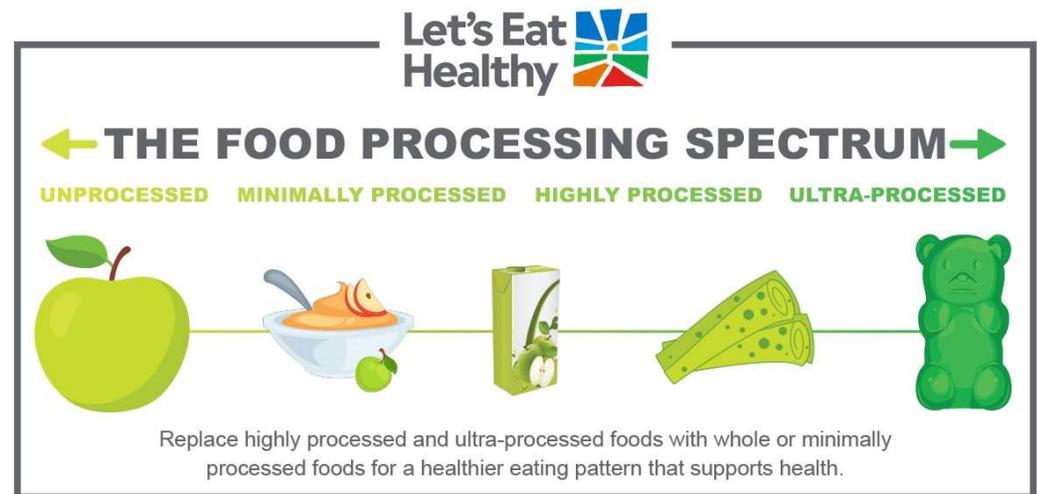
Fiber – the New "F" Word

- **Goal: minimum**
  - 14 gms / 1000 calories, ~ 30 gms a day
- **How?**
  - Avoid highly processed foods
  - Choose > 3 gm fiber per serving
  - Foods: Whole intact grains, legumes, fruits, veggies, nuts/seeds, avocados
- **Why?**
  - Lower all cause mortality and reduced risk of type 2 diabetes
  - Increased microbiome diversity

Nutrition Facts

Serving Size 1 cup (236g)
Servings Per Container about 2

Amount Per Serving

Calories 260 Calories from Fat 130

	% Daily Value*
Total Fat 14g	22%
Saturated Fat 5g	25%
Trans Fat 0g	
Cholesterol 35mg	12%
Sodium 990mg	41%
Total Carbohydrate 19g	6%
Dietary Fiber 3g	12%
Sugars 4g	
Protein 15g	29%

Vitamin A 10% • Vitamin C 0%
Calcium 4% • Iron 8%

*Percent Daily Values are based on a 2,000 calorie diet.

Plan Your Portions

Plan Your Portions
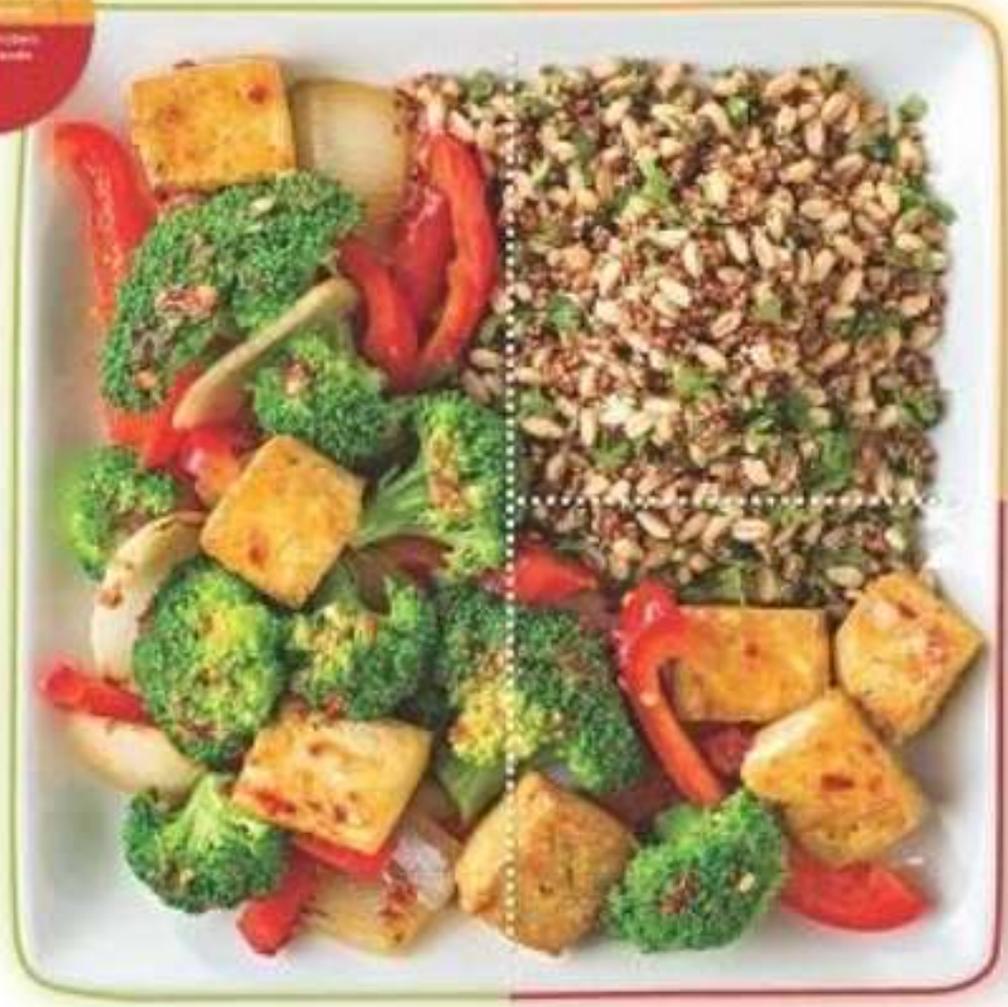
Portion Guide

Water or no-calorie drinks

Use a smaller plate. This is a 9-inch plate to help guide you

9 inches

Poll Question 14

AR is 36 years old with type 2 diabetes and a BMI of 41kg/m^2. Current diabetes medications include: metformin, sitagliptin (Januvia) and empagliflozin (Jardiance) at maximum doses. AR is prescribed tirzepatide (Mounjaro). Based on this information, what action do you recommend to the provider?

A. Verify kidney function first.
B. Stop the sitagliptin when initiating tirzepatide.
C. Decrease the dose of metformin to prevent hypoglycemia.
D. Evaluate thyroid function before starting tirzepatide.

Metabolic (Bariatric) Surgery

- Consider for adults with:
  - BMI >30 (> 27.5 for Asian Americans) who are otherwise good surgical candidates
- Perform at high volume center with an experienced team
- Need lifelong medical & behavioral support & monitoring
- Screen psychological & behavioral health prior to & ongoing
- Monitor for post surgery hypoglycemia

Metabolic Surgery Benefits

More likely to have remission*:

▸ Younger age, duration of diabetes (< 8 yrs), no pre-surgical insulin, greater visceral fat to lose (Asian Americans)

▸ **Year 5 Remission: 86.1% (RYGB) & 83.5% (VSG)**

▸ 35 – 50% re-developed diabetes

▸ Average remission time 8.3 years

  ▸ Majority maintain improved glycemia for 5-15 years

*complete remission =
   A1c levels <6.5%
      without meds

A Roux-en-Y Gastric Bypass
Gastric Pouch
Gastro-Jejunal Anastomosis
Gastric Remnant
Jejuno-Jejunal Anastomosis
Biliopancreatic Limb
Alimentary Limb

B Vertical Sleeve Gastrectomy
Excised Stomach
Gastric Sleeve
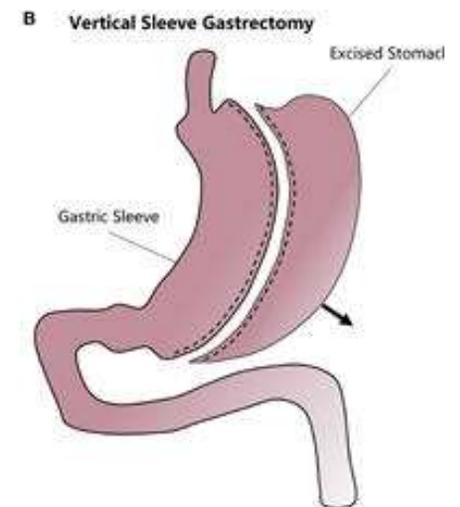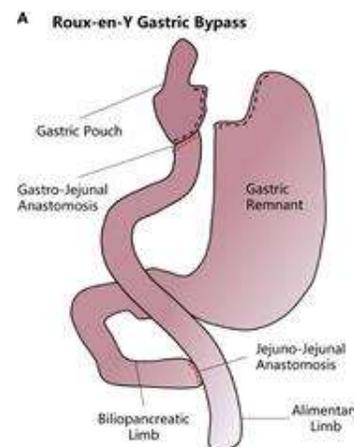
Metabolic Surgery Benefits

- Superior glycemic mgmt & CVD risk reduction for people w/T2DM & Obesity compared to non-surgical interventions.
    - reduces microvascular disease
    - Improves quality of life
    - cancer risk reduction
    - Improved MASH
    - All cause mortality

A Roux-en-Y Gastric Bypass
- Gastric Pouch
- Gastro-Jejunal Anastomosis
- Gastric Remnant
- Jejuno-Jejunal Anastomosis
- Biliopancreatic Limb
- Alimentary Limb

B Vertical Sleeve Gastrectomy
- Excised Stomach
- Gastric Sleeve
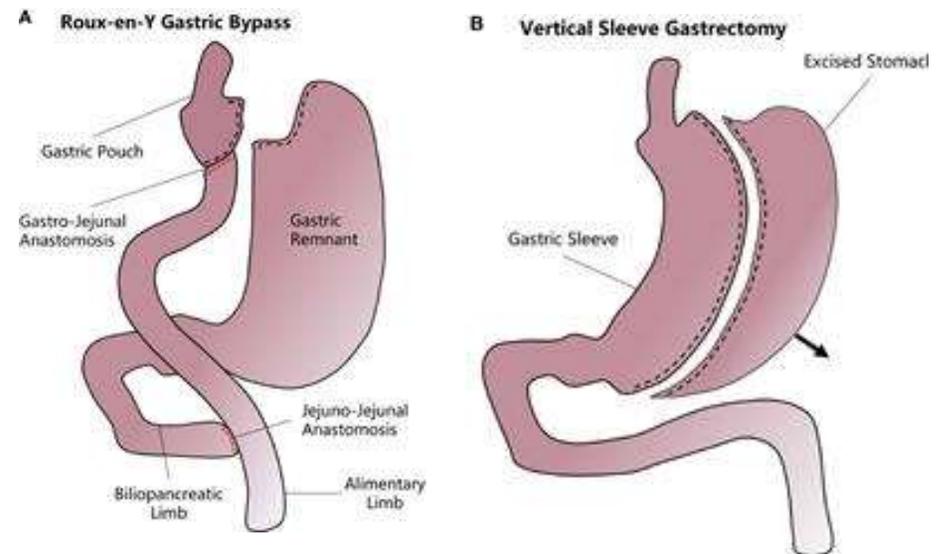
Assessing Malnutrition

- At Risks Groups:
  - Individuals on GLP-1 or GIP RA or after metabolic surgery
  - Individuals with multiple chronic conditions
  - Older age groups
  - Food insecurity and poverty
- Screen:
  - For malnutrition and sarcopenia
- Recommend:
  - Whole- food-based eating pattern
  - Adequate protein
  - Resistance training

Malnutrition is defined by the World Health Organization as "deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients."

SR is Losing Weight

- SR, 49 yr old w/ lean "type 2" 7 yrs.
- Monitors BG 1 x daily
- A1c 13.9%
- Insulin: 14u basal insulin at hs (uses pens)
- Bolus analog if BG > 200 (says too expensive)
- Also on Metformin 500mg BID
- At 5'7, her usual wt is 120, but now 106 lbs
- C/O of nausea, fullness, fatigue
- No health insurance

Prevalence: Hypothyroidism in Diabetes

- **Type 1**
  - Overt hypothyroidism **~4–10%**
  - Subclinical hypothyroidism **~10–15%**
  - Up to **30% of people with T1D** will develop autoimmune thyroid disease in their lifetime.
- **Type 2 diabetes:**
  - Overt hypothyroidism **~10–30%**
  - Higher prevalence of **subclinical hypothyroidism (~5–10%)** than the general population.
- **More Women > men.**
- **Hashimoto's thyroiditis – autoimmune thyroid**
  - most common cause of hypothyroidism w/ diabetes

NIH https://pmc.ncbi.nlm.nih.gov/articles/PMC3647563/

BT1   Updated slide with new stats
               Beverly Thomassian, 2025-08-24T22:57:23.464

Thyroid & TSH* Levels
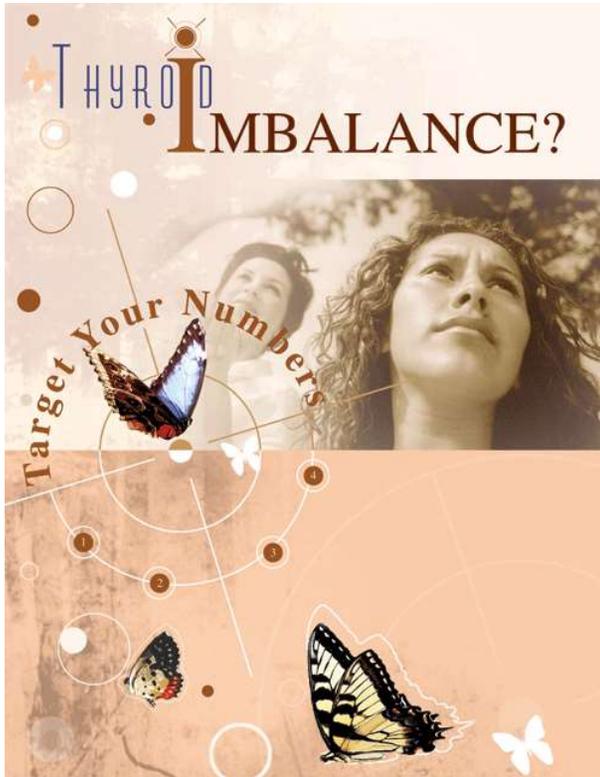
AACE Guidelines

- *Thyroid Stimulating Hormone - secreted by pituitary gland
  - controls thyroid hormone thyroxine production
  - first and best test
  - TSH Norm = up to 4.5 mIU/mL
  - Treatment based on TSH plus symptoms.
    - 4.5 – 10 based on risk, s/s
    - 10 or more = treat
  - Lower = hyperthyroidism
  - Higher = hypothyroidism
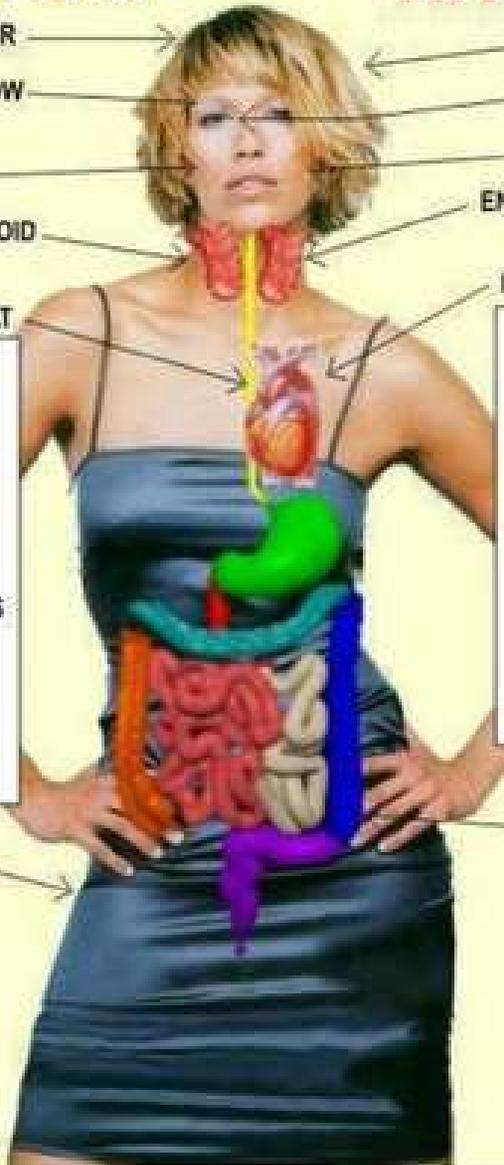
A TSH above 10 mIU/L, in combination with a subnormal free T4 characterizes overt hypothyroidism.

If TSH in range, but person is symptomatic, Check for thyroid peroxidase atb or TPO antibodies

A low TSH indicates hyperthyroidism (0.1 ish)

Poll question 15

▸ Which of the following is a true statement?

a. Atypical antipsychotics are contraindicated for people with diabetes.

b. Hyperthyroidism is more common than hypothyroidism.

c. Depression can be associated with weight gain or weight loss.

d. Hypothyroidism causes LDLs to decrease.

Diabetes Detective

- What other comorbidities are you suspecting?
- Any labs you would like to check?
- What type of diabetes?
- Social situation?
- Consider her lack of insurance and low income level during your discussion.
- Medication and Insulin changes

Type 1 ~ Immune Mediated 5-10% of Diabetes

ADCES In Practice - March 2024
Recent Advances in Type 1 Diabetes: Teplizumab (Tzeild®)

Karen S. Fiano, PHARMD, BCACP, Devada Singh-Franco, PHARMD, CDCES, Young M. Kwon, BS, PHD

1.5 Million people have type 1 in U.S.

Prevalence increasing:

2001 – 1.48 per 1000 youths diagnosed with diabetes

2017 - 2.15 per 1000 youths diagnosed with diabetes

Incidence & Prevalence increasing

Highest incidence in Finland or Northern Europe.

Clinical onset of T1D can occur at any age
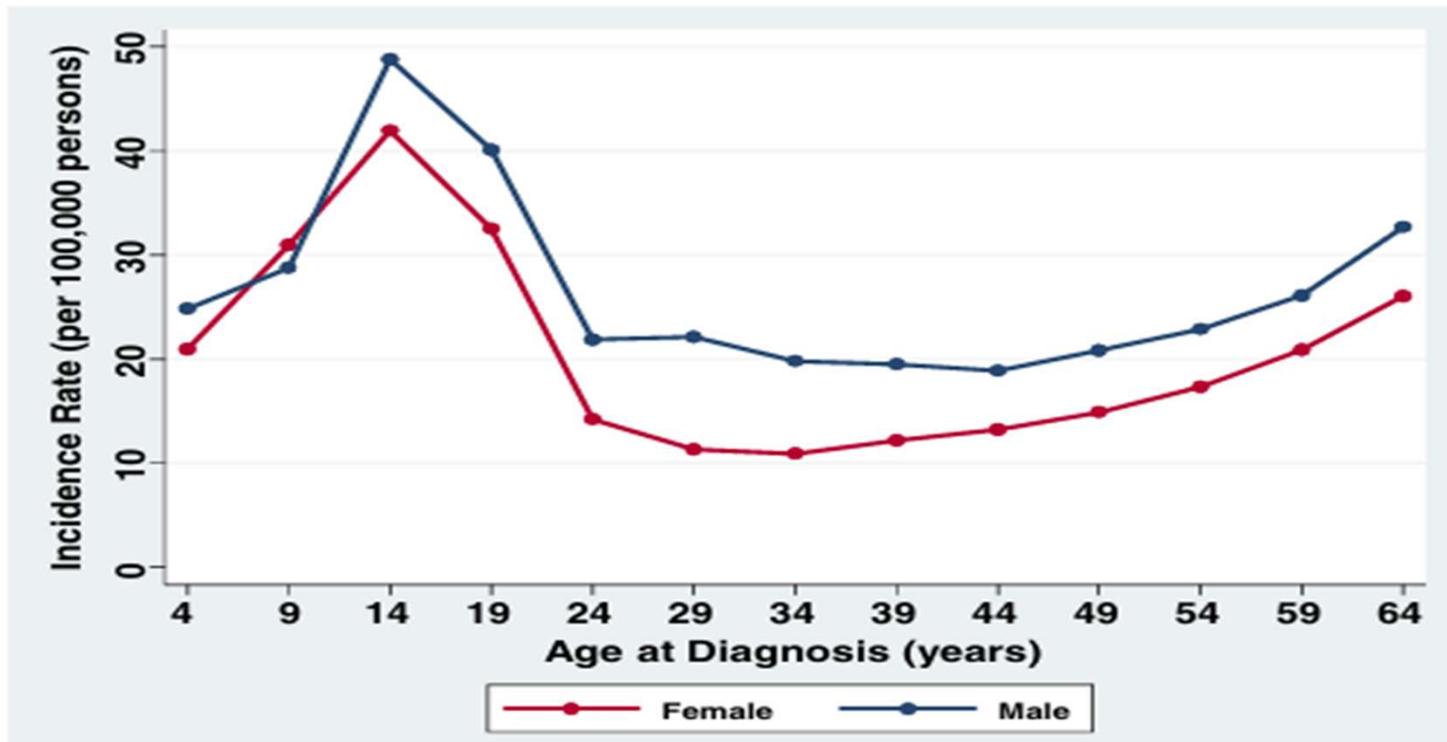
* A longitudinal study comprising 32,476 commercially insured Americans aged 0-64 years who developed T1D between 2001 and 2015.
Rogers MAM, et al. BMC Med. 2017;15(1):199.

DI1   The diagram was messed up, so I went back to the original source and replaced.
Diana Isaacs, 2025-07-20T20:04:33.070

T1D is Often Misdiagnosed as T2D in Adults

TYPE 1 Diabetes

~40% of adults with T1D are initially **misdiagnosed**

75% of those are misdiagnosed as T2D[1]*[†]

TYPE 2 Diabetes

Poor disease management from **misdiagnosis** can have **severe outcomes**[2,3]

| Inadequate glucose control[2] | Diabetic ketoacidosis (DKA)[2] | Poor quality of life[3] |

*Three quarters of T1D is misdiagnosed as T2D. [†]Based on a US retrospective online survey of 2526 adults (aged >18 years) with T1D or caregiver of child with T1D. T1D=type 1 diabetes; T2D=type 2 diabetes.

1. Munoz C, et al. *Clin Diabetes.* 2019;37(3):276–281. **2.** Manov AE, et al. *Cureus.* 2023;15(7):e42459. **3.** The Lancet Regional Health-Europe. *Lancet Reg Health Eur.* 2023;29:100661.

DI1   New slide
Diana Isaacs, 2025-07-20T20:15:42.458

Type 1 is 5- 10% of all Diabetes

- Auto-immune pancreatic beta cells destruction
- Most commonly expressed at age 10 – 14
- Insulin sensitive (require 0.5 - 1.0 units/kg/day)
- Expression due to a combo of genes and environment:
  - Autoimmunity tends to run in families
  - Exposure to virus or other environmental factors

Type 1 Diabetes Features?

▸ For JR, a 28 admitted to the ICU with a blood glucose of 476 mg/dl, pH of 7.1, anion gap of 15. Recently lost 13 pounds.

Type 1 Most Discriminative Features

- Younger than 35 years at diagnosis
- Lower BMI (<25 kg/m^2)
- Unintentional weight loss
- Ketoacidosis
- Glucose 360 mg/dl or greater.

Misdiagnosis is common and can occur in ~40% of adults with new type 1 diabetes

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2025 FREE

American Diabetes Association Professional Practice Committee

Antibody Testing for Type 1

▸ **5–10% of people with type 1 diabetes do not have antibodies.**

  ▸ In those diagnosed at <35 years of age who have no clinical features of type 2 diabetes or monogenic diabetes, a negative result does not change the diagnosis of type 1 diabetes,

▸ Rate of type 1 progression depends on:

  ▸ age at first detection of autoantibody,

  ▸ number of autoantibodies,

  ▸ autoantibody specificity, and autoantibody titer.

  ▸ Glucose and A1C levels may rise well before the clinical onset of diabetes

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2025 FREE
American Diabetes Association Professional Practice Committee

RECOMMENDATIONS FOR DIAGNOSIS AND CLASSIFICATION OF DIABETES – 2025

CRITERIA FOR SCREENING FOR DIABETES AND PREDIABETES IN ASYMPTOMATIC ADULTS – TABLE 1

DIABETES TYPE	RISK FACTORS and FREQUENCY OF SCREENING and TESTING FOR DIABETES
Type 1	Screen those at risk for presymptomatic type 1 diabetes, by testing autoantibodies to insulin, GAD, islet antigen 2 or ZnT8. Also test antibodies for those with type 1 phenotypic risk (younger age, weight loss, ketoacidosis , etc.)

	Stage 1	Stage 2	Stage 3
Characteristics	• Autoimmunity • Normoglycemia • Presymptomatic	• Autoimmunity • Dysglycemia • Presymptomatic	• Autoimmunity • Overt hyperglycemia • Symptomatic
Diagnostic criteria	• 2 or more islet autoantibodies Glucose levels are in normal range FBG<100mg/dL A1C<5.6% 2-h PG <140mg/dL	• 2 or more islet autoantibodies Dysglycemia: Elevated IFG and/or IGT • FPG 100–125 mg/dL • 2-h PG 140–199 mg/dL • A1C 5.7–6.4% or ≥10% increase in A1C	• Autoantibodies may disappear over time (5-10% may not express antibodies) • Diabetes diagnosed by standard criteria

Ordering Autoantibodies

AAbs are currently the only available serum immune marker to identify T1D prior to hyperglycemia and/or symptom onset

	GADA	IAA	IA-2A	ZnT8A	ICA	Blood draw location	Sampling method
Local laboratories (e.g, Guest diagnostics, Labcorp)	✓	✓	✓	✓	✓	Local laboratory or healthcare provider's office	Blood draw
Online ordering, delivery to doctor's office	✓	✓	✓			Testing kits from vendors such as Enable Biosciences through online ordering	In-clinic finger poke blood test
TrailNet			✓	✓	✓	TrailNet-sponsored event, health fair, at-home kit (by mail)	Blood draw or at-home finger poke
Autoimmunity screening for kids	✓	✓	✓	✓		Barbra Davis Center, Children's Hospital Colorado, UC Health Laboratory, at-home kit (by mail)	Blood draw or at-home finger poke

Glutamic acid decarboxylase 65 autoantibody (GADA)

Zinc transporter 8 autoantibody (ZnT8A)   Insulin autoantibody (IAA)

Islet cell autoantibody (ICA)   Insulinoma-associated antigen 2 autoantibody (IA-2A)

DI1   Added the abbreviations for AA at the bottom.

Diana Isaacs, 2025-08-24T01:55:16.461

Poll Question 16

JR's mom has type 1 diabetes and JR's dad has type 2 diabetes. JR is 28 years old and in the emergency room with a glucose of 482 mg/dl. Besides checking glucose, ketones and A1C levels, what else needs to be evaluated?

A. Endogenous insulin titer
B. Glutamic Acid Decarboxylase
C. Beta cells auto antibodies
D. Langerhan's antibody

Determine if Type 1 - Use AABBCC Approach

- **A**ge
  - e.g., for individuals <35 years old, consider type 1 diabetes
- **A**utoimmunity
  - e.g., personal or family history of autoimmune disease or polyglandular autoimmune syndromes
- **B**ody habitus
  - e.g., BMI <25 kg/m2
- **B**ackground
  - e.g., family history of type 1 diabetes

- **C**ontrol
  - e.g., level of glucose control on noninsulin therapies
- **C**omorbidities
  - e.g., treatment with immune checkpoint inhibitors for cancer can cause acute autoimmune type 1 diabetes or presence of other autoimmune conditions

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2025 FREE
American Diabetes Association Professional Practice Committee

Pharmacologic Intervention to Delay Symptomatic Type 1 (in Stage 2)

- Teplizumab (CD3-monoclonal antibody)
- 14-day infusion can delay the onset of symptomatic type 1 diabetes (stage 2)
- An option in selected individuals aged ≥8 years with stage 2 type 1 diabetes.

- In a single trial, 44 individuals received 14-day course of teplizumab vs 32 placebo.
- The median time to stage 3 diagnosis of type 1
  - 48.4 months in tep group
  - 24.4 months placebo
- Cost: $193,000
- Financial assist programs available.

126. Herold KC, Bundy BN, Long SA, et al.; Type 1 Diabetes TrialNet Study Group. An anti-CD3 antibody, teplizumab, in relatives at risk for type 1 diabetes. *N Engl J Med* 2019;381:603–613

Type 1 (stage 2) Delayed with Teplizumab by 2 years   www.DiabetesTrialNet.org

▸ **How to get families linked to screening?**

Medalist Study – Harvard Joslin Diabetes Center

- After 50 years with diabetes
  - Many still produced some insulin
  - Many had no eye disease

Initial Eval – Looking for Autoimmunity

▸ ## Type 1 - Autoimmune Co -Conditions

  ▸ Hashimoto Thyroiditis

  ▸ Graves disease

  ▸ Addison's disease

  ▸ Celiac disease

  ▸ Vitiligo

  ▸ Autoimmune hepatitis, gastritis

  ▸ Myasthenia gravis

  ▸ Pernicious anemia

  ▸ Dermatomyositis
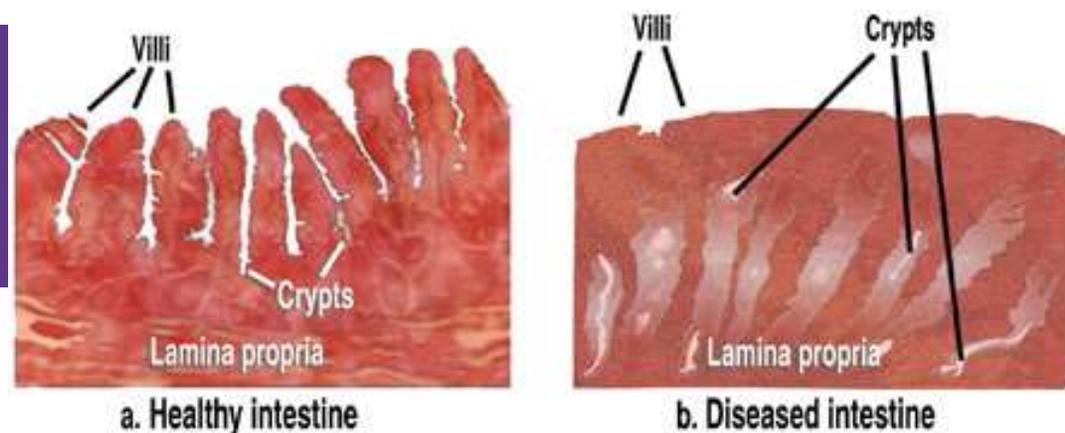

VITILIGO EFFECTS

Hyperthyroidism

Graves' disease is a common cause of hyperthyroidism, an over-production of thyroid hormone, which causes enlargement of the thyroid and other symptoms such as exophthalmos, heat intolerance and anxiety

Exophthalmos (bulging eyes)
Normal thyroid
Enlarged thyroid
Diffuse goiter
ADAM.

▸ Graves Disease (most common)

▸ 0.5 – 2.0% risk in type 1

▸ Autoimmune disorder:

  ▸ Symptoms: wt loss, hypermetabolism, tremor, exopthalmus, palpitations, tachycardia, heat intolerance, nervousness, hyperglycemia

  ▸ Diagnosis: Dx: low TSH, then check T3 & T4, autoantibodies, and thyroid scans

  ▸ Treatment: antithyroid drugs, surgery, radioactive iodine. After treatment, may need thyroid replacement therapy.

AACE Thyroid Guidelines

Celiac Disease

a. Healthy intestine   b. Diseased intestine

- Type 1 – Affects 1-16%

- Screen at diagnosis of type 1 and if symptoms.

- Immune reaction to gluten - affects function of villi in intestine, decreasing nutrient absorption

- S/S: bloating, malabsorption, wt loss, fatty stools, diarrhea, muscle tenderness, failure to thrive

- Diagnosis: measure either anti-endomysial antibodies (EMA) titers or tissue transglutaminase.

- If positive, refer to GI specialist for endoscopy and biopsy of small intestine to confirm diagnosis.

Celiac Disease Treatment

▸ Treatment for celiac disease is a lifetime gluten-free diet

  ▸ Eliminate all wheat (including durum, semolina, spelt, and farro) and the related grains of rye, barley, and triticale.

  ▸ Caution with oats – may be contaminated with wheat

  ▸ Remember "BROW" – Barley, Rye, (some) Oats, Wheat

▸ Refer to a dietitian for help with food selection/label reading

Gastroparesis

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2025 FREE
American Diabetes Association Professional Practice Committee

- Gastroparesis: affects 20 – 30% of individuals with longstanding diabetes
- Delayed emptying of stomach contents due to nerve damage
- S/S include early satiety, fullness, postprandial hypo, vomiting
- Diagnosis: gastric emptying studies, post-prandial hypoglycemia
- Tx: improve BG, small, low fat & fiber meals & meds

Disordered Eating

▸ For people with type 1

   ▸ insulin omission causing glycosuria in order to lose weight is the most reported disordered eating behavior

   ▸ Have high rates of diabetes distress and fear of hypoglycemia.

▸ For people with type 2

   ▸ bingeing excessive food intake with an accompanying sense of loss of control most reported.

   ▸ If treated with insulin, intentional omission is also frequently reported.

Disordered Eating

- People with diabetes give themselves less insulin than needed to lose weight
- Tends to start in adolescence, more likely to occur in women than men.
- Signs: unexplainable spikes, A1c, weight loss, lack of marks from fingerpricks, lack of prescription refills for diabetes meds, records that don't match A1C.
- Treatment – Mental health specialist and team

Insulin - Suggested changes

▸ Bolus insulin 2- 3 times a day – 3 units if don't check BG (eat 45 gms of carb) – Stop metformin

▸ If check BG, add 1 unit for each 50 pts above 150

▸ Try and eat 3 times a day – use liquid calories as needed, low fiber

▸ Check BG at least once a day

▸ Weekly phone call check in

Insulin PocketCard™

Diabetes Education SERVICES

Download Success! Get Our Free CDCES Coach App

Action		Insulin Name	Effective			Considerations
			Onset	Peak	Duration	
Bolus	Very Rapid Acting Analogs	Aspart (Fiasp)	16 - 20 min	1 - 3 hrs	5 - 7 hrs	Bolus insulin lowers after-meal glucose. Post meal BG reflects efficacy. Basal insulin controls BG between meals and nighttime. Fasting BG reflects efficacy.
		Lispro-aabc (Lyumjev)	15 - 17 min	2 - 3 hrs	5 - 7 hrs	
	Rapid Acting Analogs	Aspart (Novolog / Merilog)	20 - 30 min	1 - 3 hrs	3 - 7 hrs	
		Lispro (Humalog*/ Admelog)	30 min	2 - 3 hrs	5 - 7 hrs	
		Glulisine (Apidra)	15 - 30 min	1 - 3 hrs	3 - 4 hrs	
	Short Acting	Regular*	30 - 60 min	2 - 4 hrs	5 - 8 hrs	
Basal	Intermediate	NPH	2 - 4 hrs	4 - 10 hrs	10 - 16 hrs	Side effects: hypoglycemia, weight gain. Typical dosing range: 0.5-1.0 units/kg body wt/day. Discard most open vials after 28 days. For pen storage guidelines, see package insert.
	Long Acting	Glargine (Lantus*/Basaglar/Semglee/Rezvoglar)	2 - 4 hrs	No Peak	20 - 24 hrs	
		Degludec (Tresiba)*	~ 1 hr		< 42 hrs	
Basal + Bolus	Intermediate + short	Combo of NPH + Reg 70/30 = 70% NPH + 30% Reg 50/50 = 50% NPH + 50% Reg	30 - 60 min	Dual peaks	10 - 16 hrs	
	Intermediate + rapid	Novolog® Mix - 70/30 Humalog® Mix - 75/25 or 50/50	5 - 15 min		24 hrs	

*Concentrated insulins available - see Concentrated Insulin Card for details. Insulin action times vary; time periods are general guidelines only. All PocketCard content is for educational purposes only. Please consult prescribing information for detailed guidelines.   © 2/2025

What kind of Diabetes?

▸ 58 yr old, states she has had type 1 diabetes for 18 years. Quit smoking a year ago and gained about 20 lbs. BMI 25.

▸ Meds
  ▸ Humalog 18-23 units before each meal
  ▸ Glargine 28 units at bedtime
  ▸ Metformin 500mg TID

▸ What tests would you recommend?

25% of ind's with Type 1 also have type 2 diabetes.

ADA Post Grad, 2010

Type 5 Diabetes

▸ Form of diabetes linked to chronic malnutrition or prolonged starvation

▸ This condition primarily affects young, undernourished individuals in low- and middle-income countries, particularly in regions like Asia and Africa.

▸ Estimates suggest that up to 25 million people worldwide may be affected with type 5 diabetes.

▸ Mechanism:

   ▸ Severe beta-cell dysfunction from malnutrition

   ▸ Impaired insulin secretion (not autoimmune)

   ▸ May present with hyperglycemia & ketosis

   ▸ Genetic component

Features and Management

- Typical features:
  - Onset in adolescents/young adults
  - History of prolonged malnutrition
  - Thin body habitus with muscle wasting
  - Hyperglycemia + recurrent ketosis, but not autoimmune
- Management:
  - High-protein, low-carbohydrate diet
  - Micronutrient supplementation
  - Careful monitoring of insulin therapy, as inappropriate insulin administration can be harmful.
- Improving nutrition and addressing poverty/food insecurity are central to treatment.
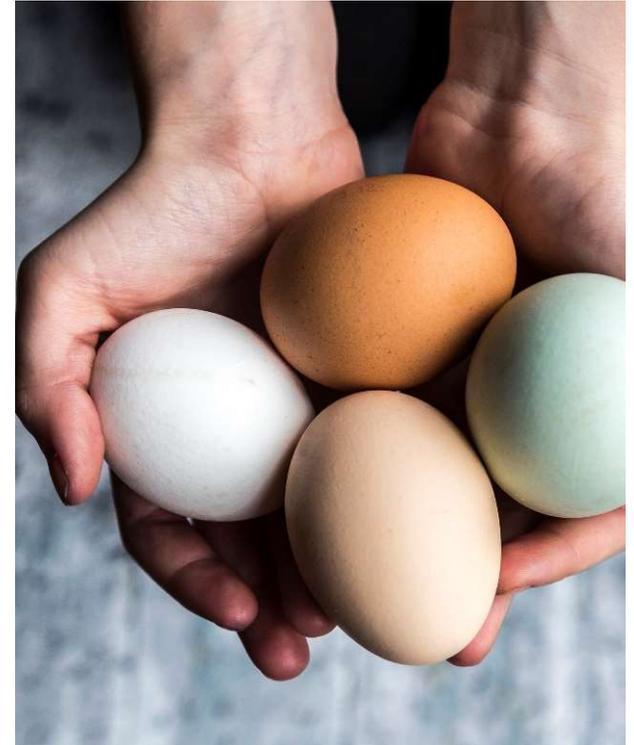
Diabetes Visit – Let's Go *through*

A small adjustment can make a BIG Difference

▸ John arrives at the clinic with a Time in Range slightly above 60%.

▸ HCP says "You do know that the goal for TIR is 70% " (Door closed)

▸ HCP smiles and says, "Wow John, I can see you are making an effort to improve your time in range."
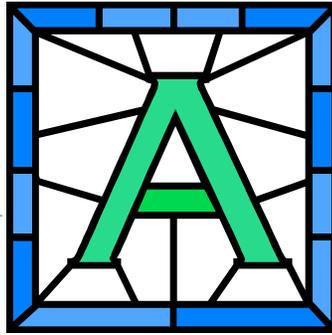
▸ Door Open – Connection made

How Does John Feel?

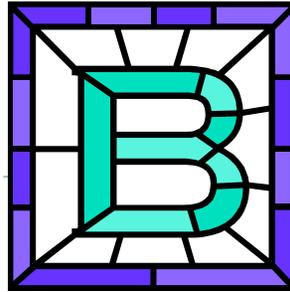▸ Reassured
▸ Heard & Seen
▸ Recognized
▸ Confident
▸ Connected

How does the HCP feel?


Healing to HCP

Bidirectional Healing

Healing to Person
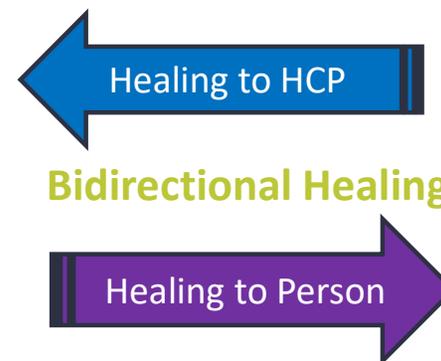
- Ask about their life (SDOH)
- Assess current self-management behaviors
- Assess your feelings
- Accept without judgement
- Acknowledge one thing they are doing right
- Advocate for needed resources

- Beliefs about health and diabetes
- Barriers can be confused with non-compliance
- Burnout lookout. On extended diabetes vacation due to diabetes distress?
- Bouncing back – leaning into resilience
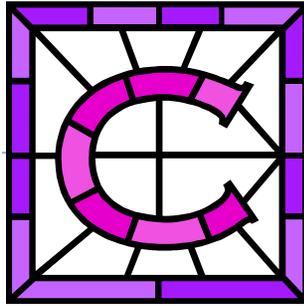
- Having the Conversation
- Coaching that highlights *their* knowledge and resilience.
- Carrots – problem solve together and dig for solutions that are meaningful in everyday life.
- Compassion for the people in our care and ourselves.
- Connection through – opening the door.

DiaBingo - N

N DPP demonstrated that exercise and diet reduced risk of DM by__%

N Average A1c of 7% = Avg BG of _____

N The goal is to eat 14 gms per 1000 cals of this nutrient a day

N Rebound hyperglycemia

N Scare tactics are effective at motivating behavior change

N Get LDL less than _____for most people with diabetes 40 years+

N Drugs that can cause hyperglycemia

N 2/3 cups of rice equals _____ serving carbohydrate

N 1% A1c = how many points of blood sugar _____

N One % drop in A1c reduces risk of complications by ___ %

N 1 gm of fat equal _____kilo/calories
N Metabolic syndrome = hyperinsulinemia, hyperlipidemia, hypertension
N Average American consumes 15 teaspoons of sugar a day.
N Medication derived from the saliva of the Gila Monster

Thank You

- Questions?
- Email: info@diabetesed.net
- Web: www.diabetesed.net
- Phone 530-893-8635

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Diabetes Education SERVICES

Instructions for Claiming Credit

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1. Visit https://cme.partnersed.com/BTB1029 or scan the QR Code:
2. Sign Up or Log in.
3. Complete the activity evaluation.
4. Upon completion of all evaluation questions your credit will be made available for download immediately.

For Pharmacists: Upon successfully completing the activity evaluation, your credit will be submitted to CPE Monitor. Please check your NABP account within thirty (30) days to make sure the credit has posted.

TQRCG

Diabetes: Back to the Basics & Beyond

Partners for Advancing Clinical Education

Diabetes Education Services

Diabetes: Back to the Basics and Beyond

October 29,2025

Learning Objectives

- Review the changes & updates to the annual ADA Standards of Medical Care in Diabetes.
- Identify the key elements of the standards that improve clinical care for people with diabetes.
- Discuss appropriate use of the latest medications that address hyperglycemia and cardiorenal health.
- Describe strategies to incorporate lifestyle changes into diabetes self-management.