Beverly Thomassian, RN, MPH, BC-ADM, CDCES
Pronouns: She, her and hers Founder - www.DiabetesEd.net

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Hawaii ADCES Coordinating Body

Hawaii Chapter President Naomi Fukuda, APRN, BC-ADM, CDCES
Camlyn Masuda, PharmD, CDCES, BCACP & Kourtney Inoue

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Thinking about taking the CDCES Exam?

CDCES Deluxe Prep Bundle on DiabetesEd Online University only $299 (usually $449).

Use coupon code **Aloha26.**
Will be active for 1 year. Expires on Sept 25 , 2027.

www.DiabetesEd.net (search Hawaii)

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Speakers & Agenda

08:00 am – 09:40 am | Updates to the ADA Standards of Care
Presenter: Beverly Thomassian

09:40 am – 10:10 am | Break and visit exhibitors

10:10 am – 11:50 am | Identify the key elements of the standards that improve clinical care for people with diabetes

11:50 am – 1:00 pm | Lunch and visit exhibitors

1:00 pm – 2:05 pm | Diabetes Mysteries Case Studies

2:05 pm – 2:25 pm | Break and visit exhibitors

2:25 pm – 3:30 pm | Exploring Lesser-Known Diabetes Complications

3:30 pm – 4:30 pm | Complex diabetes presentations in clinical care

- *Presenter:* Dr. Alan Parsa

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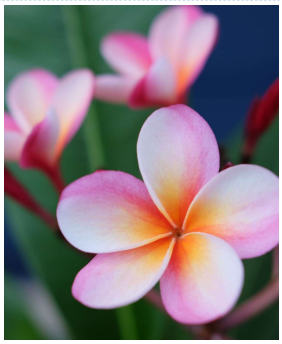
Coach Bev has no Conflict of Interest

- 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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Standards of Care Update & Solving Diabetes Mysteries

Objectives:

1. State 3 changes and updates to the annual ADA Standards of Medical Care in Diabetes.
2. List at least one key element of the discussed standards that improve clinical care for people with diabetes.
3. Describe strategies to use the ADA hyperglycemia algorithm to determine appropriate use of the latest medications that
address hyperglycemia and cardiorenal health.
4. Explore case studies that delve into unusual presentations of diabetes and co-conditions.
5. Describe identification of lesser-known complications of diabetes such as cancer, PMOS, obstructive sleep apnea, sexual dysfunction, eye and dental issues.
6. Share practical approaches to treat a variety of diabetes presentations in clinical care.

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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.
- Make sure cost is not a barrier 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—2026

American Diabetes Association Professional Practice Committee for Diabetes*

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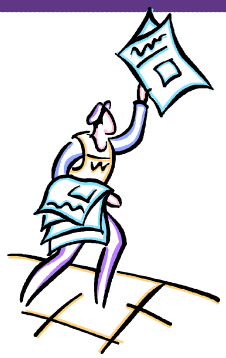
CDC Announces



35% of Americans will have Diabetes by 2050

Boyle, Thompson, Barker, Williamson
2010, Oct 22:8(1)29
www.pophealthmetrics.com

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Poll Question 1

- What percent of total people in the U.S. are living with undiagnosed and diagnosed type 2 diabetes?
- A. About 30%
- B. 11.3%
- C. 14.7%
- D. 25.6%

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Type 2 Diabetes in America 2026

- 14.7% with Diabetes - 38 million adults
  - 25% don't know they have it
- 44% with Prediabetes – 115+ 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://gis.cdc.gov/grasp/diabetes/diabetesatlas-statsreport.html

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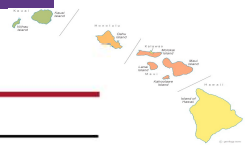
Diabetes in Hawaii



American Diabetes Association.

The Burden of Diabetes in Hawaii

Diabetes is an epidemic in the United States. According to the Centers for Disease Control and Prevention (CDC), over 38 million Americans have diabetes and face its devastating consequences. What's true nationwide is also true in Hawaii.

Hawaii's diabetes epidemic:

- Approximately 130,200 adults in Hawaii, or 9.5% of the adult population, have diagnosed diabetes.
- Every year, an estimated 10,000 adults in Hawaii are diagnosed with diabetes.

The serious complications of diabetes include heart disease, stroke, amputation, end-stage kidney disease, blindness—and death.

Diabetes Is Expensive

- **136 million Americans have diabetes or prediabetes**
- **1.2 million Americans are diagnosed with diabetes every year**
- **About 1 in 3 seniors in the United States has diabetes**
- **Diabetes contributes to the death of nearly 400,000 Americans annually**

ADA Diabetes.org 2024

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Disparities in Diabetes Prevalence Among Native Hawaiians/Other Pacific Islanders and Asians in Hawai'i

ORIGINAL RESEARCH — Volume 16 — February 21, 2019

Diabetes is most prevalent among the following populations in Hawai'i.

According to data tracked by America's Health Rankings and researchers at the John A. Burns School of Medicine, Native Hawaiians, Pacific Islanders, and Filipino residents have disproportionately high rates, with **22.4% of Native Hawaiians** being diagnosed with diabetes.

compared with 5 -7% of white residents of the state.

https://drc.jabsom.hawaii.edu/diabetes-in-hawaii/index.html

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Diabetes Prevalence Stats

- **For adults in U.S., diabetes prevalence:**
  - American Indians and Alaska Natives – highest rates
  - Non-Hispanic Blacks (17.4%),
  - People of Hispanic origin (15.5%),
  - Non-Hispanic Asians (16.7%)
  - White Individuals (13.6%)
- **Education and SES and Location**
  - Less than high school ed (13.1%)
  - More than high school (6.9%)
  - Living below federal poverty (13.1%)
  - Living at 500% of federal poverty (5.1%)
  - Rural living (9.5%)
  - Metropolitan (8.1%)

1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2026

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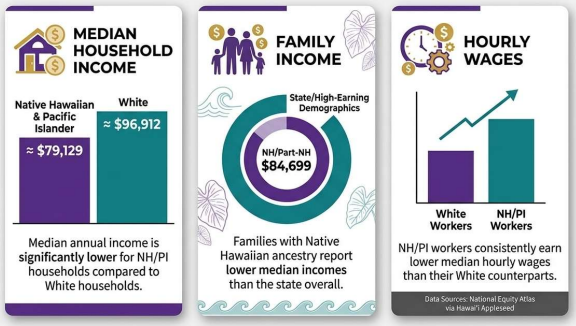
Income Disparity



***A complex issue impacting well-being and opportunity.**

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THE INTERSECTION OF POVERTY AND HEALTH EQUITY

JOHN HOPKINS MEDICINE FRAMEWORK: HEALTH EQUITY WORK

Expert **Dr. Sherita Golden** emphasizes addressing underlying social and economic determinants rather than focusing on race alone.

Dr. Sherita Golden, Johns Hopkins Medicine Expert

- **Shared Across Demographics:** While diabetes burdens specific racial groups differently, poverty creates a common thread of structural and environmental hardship across diverse regions like Appalachia, Mississippi, and New Mexico.
- **Broadening the Lens:** Health equity work requires addressing underlying social and economic determinants rather than focusing on race alone.

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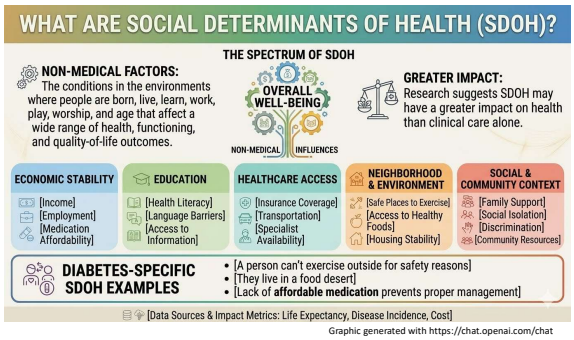
Social Determinants (Drivers) of Health



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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—2026

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Rising Complication Rates

- Since 2010, adults with diabetes across the U.S. complication rates are increasing for:
  - kidney failure,
  - nontraumatic lower-extremity amputations,
  - stroke,
  - heart failure, and
  - hyperglycemic crises

  Rates of myocardial infarction have plateaued, reversing decades of earlier improvements

1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2026

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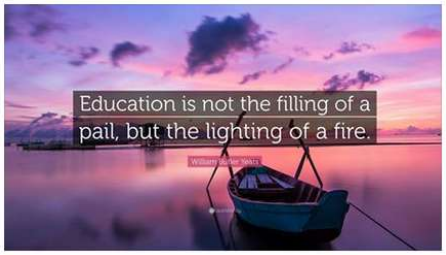
Let's meet people where they are at.



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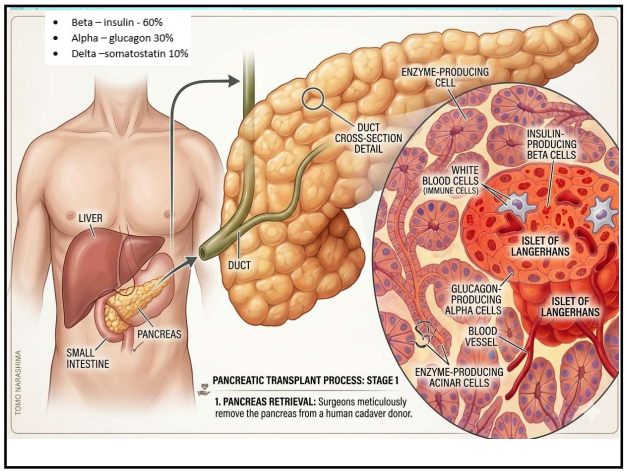

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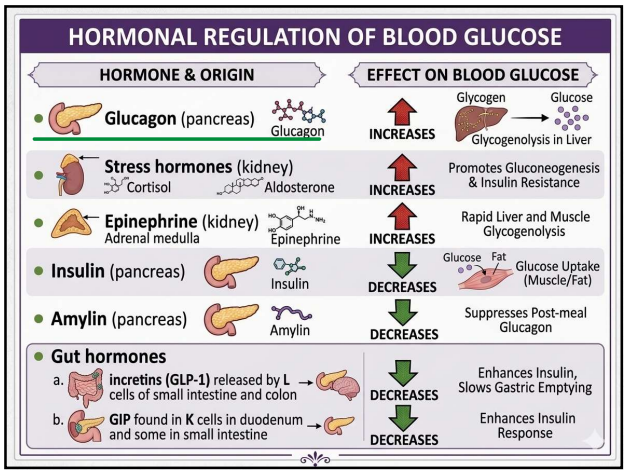

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Poll Question 2

- 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

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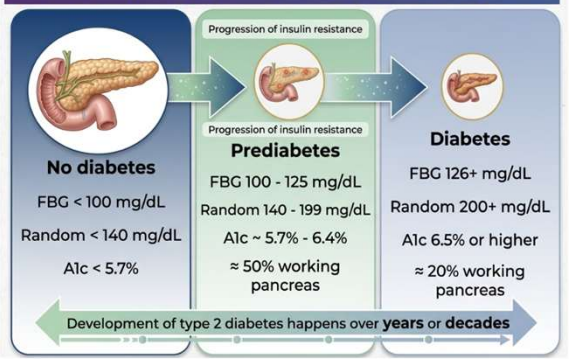
2. Diagnosis and Classification of Diabetes | Natural History of Diabetes



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Pre Diabetes & Type 2- Screening Guidelines (ADA 2026 Clinical Practice Guidelines)

1. Start screening all people at age 35.
2. Screen at any age if BMI ≥ 25 (Asians BMI ≥ 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
   - History of pancreatitis, prediabetes, GDM, periodontal disease

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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

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)

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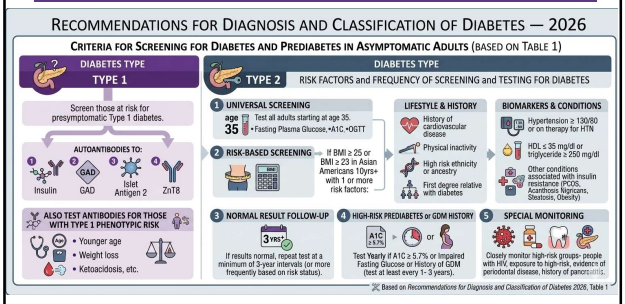
Diabetes Screening Guidelines

(ADA 2026 Clinical Practice Guidelines – Cheat Sheet)



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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.

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PREDIABETES is FREAKING ME OUT

- **115.2 million** people in US have prediabetes
- More than **44%** of adults (Over 2 in 5)
- **80%** don't know they have it
- In 3–5 years, **~30%** with prediabetes will develop diabetes
- Higher risk of **Heart Attack**, **Stroke**, Neuropathy, Vessel Disease

Do I look like I am freaking out?

Section 3: Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2026, American Diabetes Association

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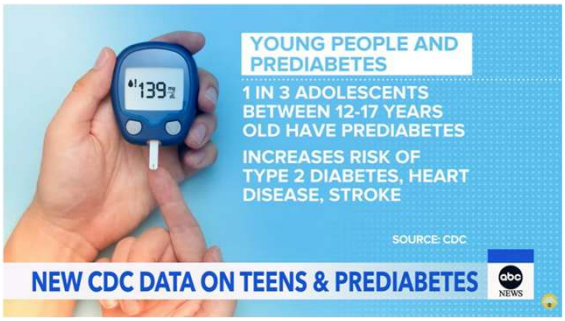
PreDiabetes in Youth at 30%



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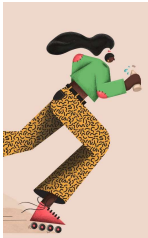
3. Prevent or Delay Diabetes for those with Prediabetes

- Prediabetes defined as:
  - A1c 5.7 – 6.4% or fasting BG 100 -125mg/dl
- Action:
  - Screen yearly for diabetes
  - For adults with BMI 23/25
    - Refer to DPP approved programs (can use certified tech assisted technologies.
    - Includes intensive behavioral lifestyle interventions with 3-7% wt reduction goal + 150 min exercise week
    - Provide in person or certified assisted programs



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

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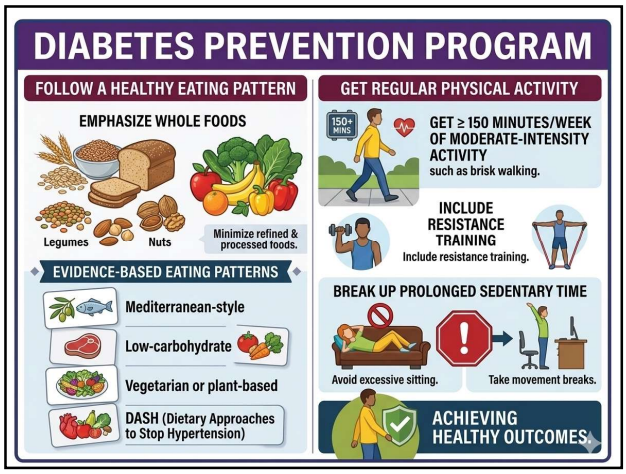

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DPP Short Term & Long-Term Evidence

The U.S. DPP trial demonstrated intensive lifestyle intervention **Reduces risk of incident type 2 diabetes by 58% over 3 years.**

- In the U.S. Diabetes Prevention Program Outcomes Study (DPPOS) benefits continued:
  - 34% reduction at 10 years
  - 27% reduction at 15 years
  - 24% reduction at 21 years*

*major cardiovascular events were not significantly different from comp group 21 years after the DPP concluded.

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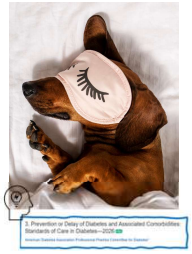
Sleep quality and Diabetes Risk

- **Night owls have 2.5 higher odds for type 2 than early birds (chronotype)**
- Poor sleep quality associated with 40% increased risk of developing type 2 diabetes
- Sleep modulates important metabolic, endocrine, cardiovascular processes.
- Sleep quality "an individual's self-satisfaction with all aspects of sleep experience."



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3. Metformin & Prediabetes

- Use metformin for prevention of type 2 for those at high risk:
  - 25–59 yrs with BMI ≥35
  - A1C 6.0% or more
  - History of GDM
- Periodic assess of B12, esp if have anemia, peripheral neuropathy.
- Consider Metformin to prevent hyperglycemia in high-risk individuals:

3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2026

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Common Oral Diabetes Meds

Diabetes Education Services

Download Success! Get Our Free CDCES Coach App

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides • Decreases hepatic glucose output • First line med at diagnosis of type 2	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	

Biguanide derived from:
Goat's Rue *Galega officinalis*, French Lilac
Does NOT harm kidneys
$10 for 3-month supply from Walmart & other pharmacies

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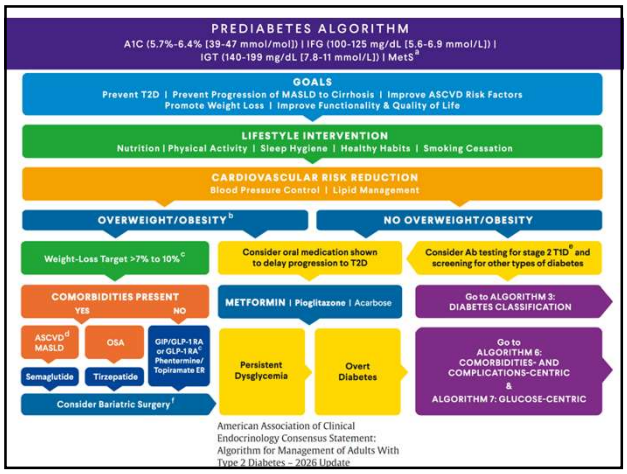

American Association of Clinical Endocrinology Consensus Statement: Algorithm for Management of Adults With Type 2 Diabetes – 2026 Update

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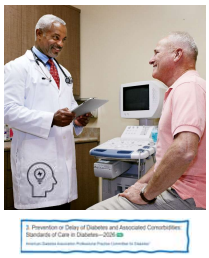
GLP-1 Therapy for Prediabetes?

- GLP-1's for weight management with BMI of 25+ is highly beneficial - should be considered.
- Every kilogram of weight loss confers a 16% reduction in risk of progression over 3.2 years



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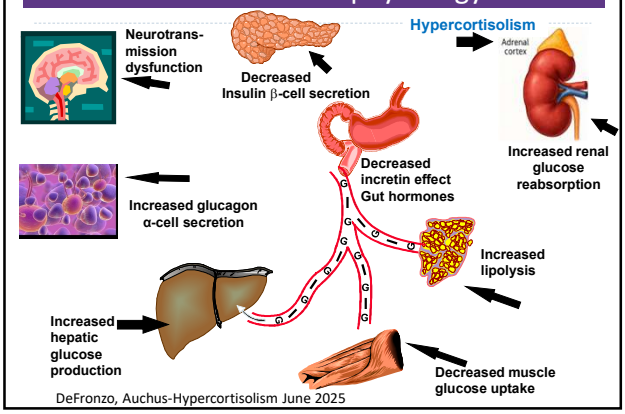
The Noxious Nine – Pathophysiology T2D



DeFronzo, Auchus-Hypercortisolism June 2025

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Poll Question 5

WR has diabetes is on max dose Metformin and Sulfonylurea. A1C is 8.4. Has been trying to lose weight with limited success. Which of the following medications would be indicated?

a. Basal insulin
b. GLP-1 Receptor Agonists
c. Meglitinides
d. Bolus insulin

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Incretins: GLP & GIP Receptor Agonists

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

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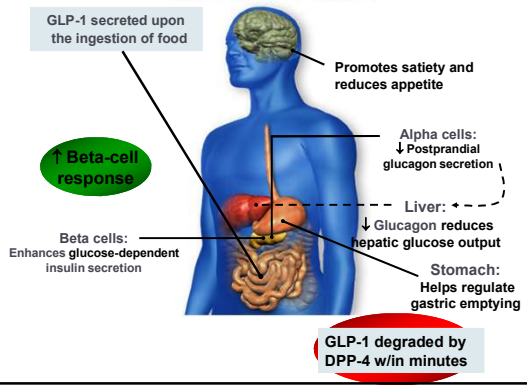
GLP-1 Effects in Humans
Understanding the Natural Role of Incretins



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Pocket Card: GLP-1 & GIP RA

GLP-1 & GIP for Diabetes & Weight Loss

Class/Action	Generic Name	Diabetes Version Dose & Indications	Wt loss Version Max Dose & Indications	Considerations
GLP-1 RA - Glucagon Like Peptide Receptor Agonist **"Incretin Mimetic"** • Increases insulin release with food • Slows gastric emptying • Promotes satiety • Suppresses glucagon	exenatide 2x day injection	exenatide 5 and 10 mcg		**Side effects:** N/V, wt loss. Report signs of pancreatitis or ileus, stop med. **Black box warning:** Avoid if family history medullary thyroid tumor. FDA approved to reduce Major Adverse CV Events; MI, Stroke, Death (except exenatide, Saxenda). †Approved for peds 10-17 yrs ††Approved for Peds 12-17 years Lowers A1C ~ 0.5 - 1.6% Wt loss: 4-9% (Diabetes versions)
	liraglutide 1x day injection	Victoza† 0.6, 1.2, 1.8mg	Saxenda†† - 3.0mg	
	dulaglutide 1x week injection	Trulicity† 0.75, 1.5, 3.0, 4.5mg		
	semaglutide 1x week injection	Ozempic 0.25, 0.5, 1.0, 2.0mg Tx for CKD	Wegovy†† - 2.4mg High Dose - 7.2mg Tx for MASH	
	semaglutide Daily Oral - fasting w/ H20	Oral Ozempic 1.5, 4, 9 mg Rybelsus 3, 7, 14 mg	Wegovy - 25mg Oral tablet	
GLP-1 & GIP Receptor Agonist Activates receptors for GLP-1 (see above) & Glucose-dependent Insulinotropic Polypeptide (GIP).	tirzepatide 1x week injection. Single dose prefilled pen or vial. Gradually adjust dose based on shared decision, individual goals.	Mounjaro† 2.5, 5.0, 7.5, 10, 12.5, 15 mg. Reduces Major Adverse CV Events; MI, Stroke, Death	Zepbound Max dose 15mg Tx for sleep apnea	**Side effects:** N/V, wt loss. Report pancreatitis or signs of ileus, stop med. **Black box warning:** Avoid if family hx of medullary thyroid tumor. †Approved for peds 10-17 yrs Lowers A1C ~ 1.8 - 2.4% Wt loss: 7-14% (Diabetes versions)

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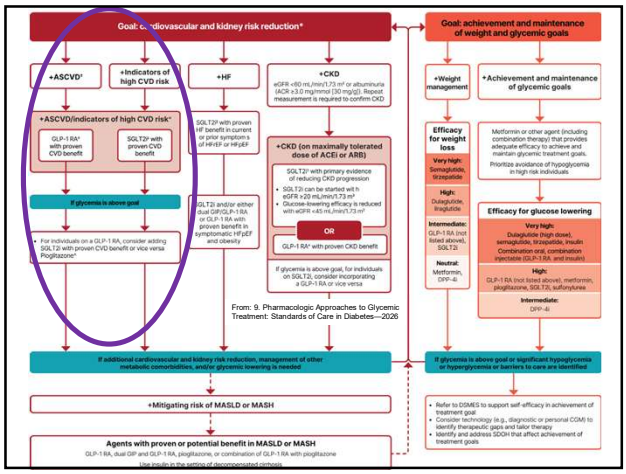
Goal: achievement and maintenance of weight and glycemic goals
+ASCVD
+Indicators of high CVD risk
+HF
+CKD
+ASCVD/indicators of high CVD risk
GLP-1 RA with proven CVD benefit
SGLT2i with proven CVD benefit
If glycemia is above goal
+CKD (on maximally tolerated dose of ACEi or ARB)
OR
GLP-1 RA with proven CKD benefit
+Weight management
+Achievement and maintenance of glycemic goals
Efficacy for weight loss
Very high:
High:
Intermediate:
Neutral:
Efficacy for glucose lowering
Very high:
High:
Intermediate:
From: 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026
If additional cardiovascular and kidney risk reduction, management of other metabolic comorbidities, and/or glycemic lowering is needed
If glycemia is above goal or significant hypoglycemia or hyperglycemia or barriers to care are identified
+Mitigating risk of MASLD or MASH
Agents with proven or potential benefit in MASLD or MASH

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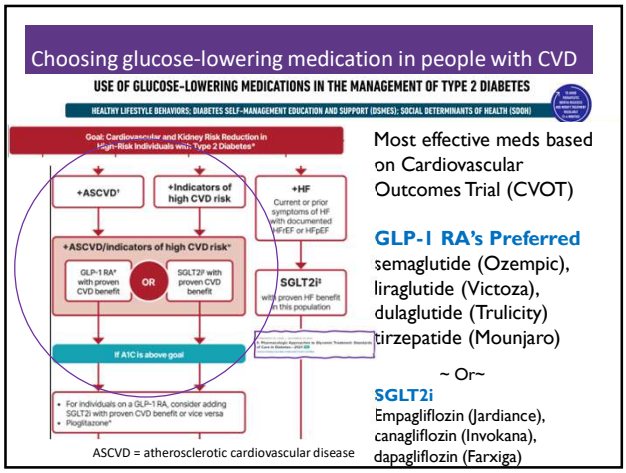
Choosing glucose-lowering medication in people with CVD
USE OF GLUCOSE-LOWERING MEDICATIONS IN THE MANAGEMENT OF TYPE 2 DIABETES
HEALTHY LIFESTYLE BEHAVIORS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT (DSMES); SOCIAL DETERMINANTS OF HEALTH (SDOH)
+ASCVD
+Indicators of high CVD risk
+HF
Current or prior symptoms of HF with documented HFrEF or HFpEF
+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
If A1C is above goal
For individuals on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit or vice versa
Pioglitazone
ASCVD = atherosclerotic cardiovascular disease
Most effective meds based on Cardiovascular Outcomes Trial (CVOT)
GLP-1 RA's Preferred
semaglutide (Ozempic),
liraglutide (Victoza),
dulaglutide (Trulicity)
tirzepatide (Mounjaro)
~ Or~
SGLT2i
Empagliflozin (Jardiance),
canagliflozin (Invokana),
dapagliflozin (Farxiga)

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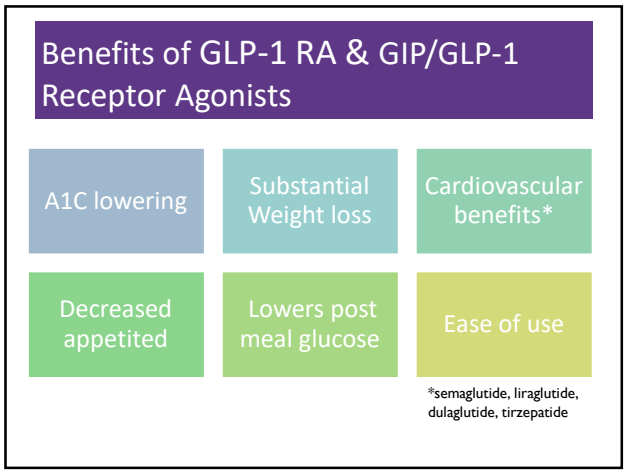
Benefits of GLP-1 RA & GIP/GLP-1 Receptor Agonists
A1C lowering
Substantial Weight loss
Cardiovascular benefits*
Decreased appetited
Lowers post meal glucose
Ease of use
*semaglutide, liraglutide, dulaglutide, tirzepatide

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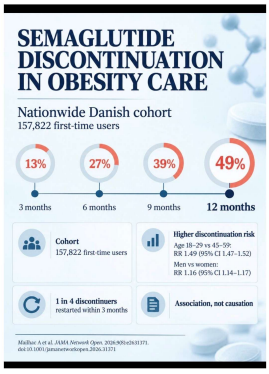
Counseling Points: GLP-1 RA & GLP-1/GIP

- Avoid if personal or family history of medullary thyroid cancer or personal history of Multiple Endocrine Neoplasia type 2 (MEN-2)
- Avoid in combo with DPP-4 inhibitors
- Watch for intestinal obstruction
- Increased risk of biliary disease
- Education: Eat smaller meals to reduce nausea and limit high fat meals
- Use of non-FDA *compounded* products not recommended

If on tirzepatide and oral contraceptives, use back up contraception for first 4 weeks

46

Stopping GLP-1s is Common



Sudden discontinuation of semaglutide and tirzepatide 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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Pocket Card: GLP-1 & GIP RA

GLP-1 & GIP for Diabetes & Weight Loss

Class/Action	Generic Name	Diabetes Version Dose & Indications	Wt loss Version Max Dose & Indications	Considerations
GLP-1 RA - Glucagon Like Peptide Receptor Agonist **"Incretin Mimetic"** • Increases insulin release with food • Slows gastric emptying • Promotes satiety • Suppresses glucagon	exenatide 2x day injection	exenatide 5 and 10 mcg		**Side effects:** N/V, wt loss. Report signs of pancreatitis or ileus, stop med.
	liraglutide 1x day injection	Victoza† 0.6, 1.2, 1.8mg	Saxenda†† - 3.0mg	**Black box warning:** Avoid if family history medullary thyroid tumor.
	dulaglutide 1x week injection	Trulicity† 0.75, 1.5, 3.0, 4.5mg		FDA approved to reduce Major Adverse CV Events; MI, Stroke, Death (except exenatide, Saxenda).
	semaglutide 1x week injection	Ozempic 0.25, 0.5, 1.0, 2.0mg Tx for CKD	Wegovy†† - 2.4mg High Dose - 7.2mg Tx for MASH	†Approved for peds 10-17 yrs ††Approved for Peds 12-17 years
	semaglutide Daily Oral - fasting w/ H20	Oral Ozempic 1.5, 4, 9 mg Rybelsus 3, 7, 14 mg	Wegovy - 25mg Oral tablet	Lowers A1C ~ 0.5 - 1.6% Wt loss: 4-9% (Diabetes versions)
GLP-1 & GIP Receptor Agonist Activates receptors for GLP-1 (see above) & Glucose-dependent Insulinotropic Polypeptide (GIP).	tirzepatide 1x week injection. Single dose prefilled pen or vial. Gradually adjust dose based on shared decision, individual goals.	Mounjaro† 2.5, 5.0, 7.5, 10, 12.5, 15 mg. Reduces Major Adverse CV Events; MI, Stroke, Death	Zepbound Max dose 15mg Tx for sleep apnea	**Side effects:** N/V, wt loss. Report pancreatitis or signs of ileus, stop med. **Black box warning:** Avoid if family hx of medullary thyroid tumor. †Approved for peds 10-17 yrs Lowers A1C ~ 1.8 - 2.4% Wt loss: 7-14% (Diabetes versions)

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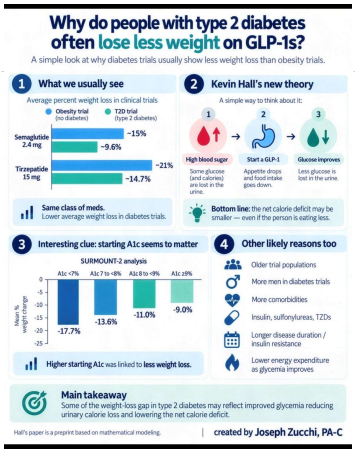

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GLP-1 /GIPs Approved for Weight Loss

- Liraglutide (Daily)
  - Victoza 1.8 mg (diabetes)
  - Saxenda 3 mg (wt loss)
  - 6% wt loss, $1349 a mo
- Semaglutide:
  - Ozempic 2mg (diabetes)
  - Wegovy 2.4mg (wt loss)
  - Wegovy 7.2mg (high dose)
  - Oral Wegovy 25mg (oral)
  - 6% wt loss, $1349 a mo
- Tirzepatide
  - Mounjaro 15mg (diabetes)
  - Zepbound 15mg(wt loss)
  - 13% wt loss - $1056 a mo

All 3 Approved for use in adults with a:

- BMI of ≥ 30 or
- BMI of ≥ 27 or greater who have hypertension, type 2 diabetes, or dyslipidemia.

Foundayo (Orforglipron): small-molecule, oral GLP-1 receptor agonist - a once-daily pill with no water or food restrictions – up to 17.2 mg daily

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Incretin Therapy: Nutrition Strategies

Adverse Effect	Nutrition Intervention
Prevent Malnutrition & Sarcopenia	Sufficient protein (min. 60 gm, up to 1.2-1.5 gm/kg), Nutrient-dense foods eating pattern to support needs Encourage resistance training
Nausea	Small frequent meals Limit high fat foods Stay hydrated, limit carbonation
Constipation	Fiber, Fluids & Movement Consider stool softener as needed.
Diarrhea	Fiber & Fluids Limit sugar alcohols, coffee, dairy, alcohol and carbonation

Incretin-Based Therapies and Lifestyle Interventions: The Evolving Role of Registered Dietitian Nutritionists in Obesity Care
Gigliotti, Linda et al. Journal of the Academy of Nutrition and Dietetics

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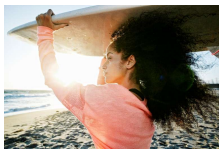
Next Step for KR – Question 4

KR is a 47yoM with type 2 diabetes x 5 years. Had recent stroke. A1C was 6.7% now increased to 8.2%. Not able to surf as much and gaining some weight. GFR 90+ and UACR less than 30mg/gm. What class of med would be best to start?

A. SGLT-2i
B. Biguanide - Metformin
C. DPP-IV
D. GLP-1 RA



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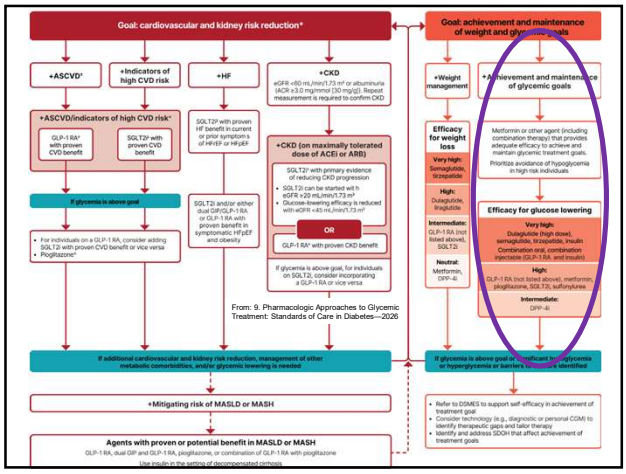

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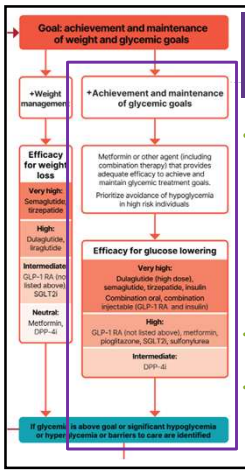

Metformin is "Usually" 1st Line

- 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.

9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026

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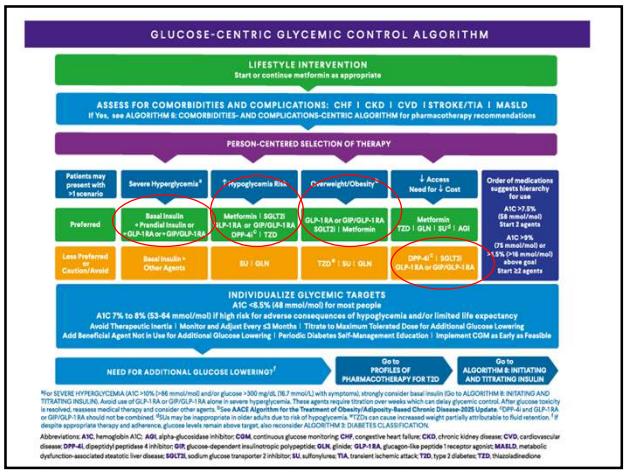

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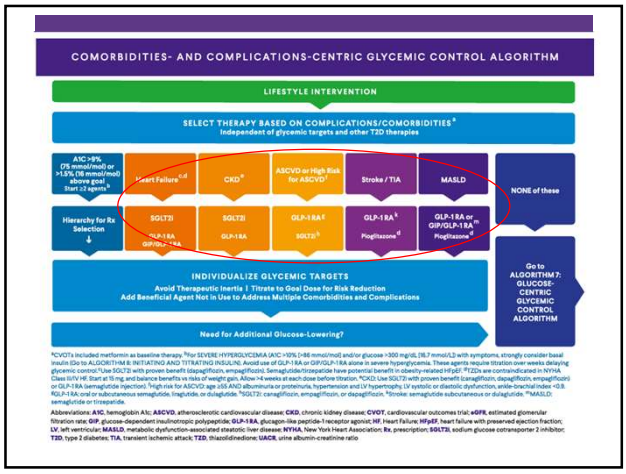

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DiaBingo

B Frequent skin and yeast infections can indicate?
B A BMI of ____ or more increases risk of diabetes
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 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

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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.

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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

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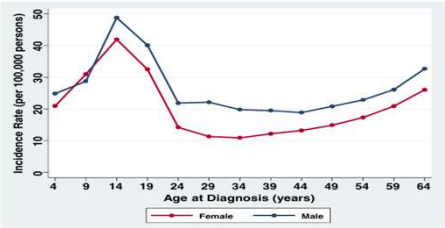
Clinical onset of T1D can occur at any age



* 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.

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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.

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Screen people at increased risk of T1D

Screening for T1D autoantibodies is recommended by

American Diabetes Association.
ISPAD International Society for Pediatric and Adolescent Diabetes
Breakthrough T1D™ Formerly JDRF

First-degree relatives of individuals with T1D

~15x greater risk

of T1D versus the general population

Individuals with personal or family history of select autoimmune diseases

2-3X greater risk of T1D in individuals with select autoimmune diseases

Thyroid disorders
- Hashimoto's thyroiditis
- Graves' disease

Celiac disease

Also screen those with phenotypic risk factors that overlap with T1D (ex. Younger age at diagnosis, intentional weight loss, ketoacidosis, short to insulin treatment)

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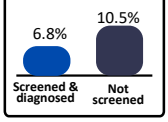
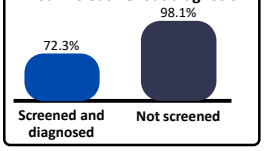
Benefits of early detection of pre-symptomatic T1D

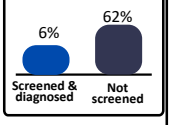
Lower HbA1C



Decreased frequency of insulin treatment at diagnosis



Lower rates of DKA



Sims E. et al. Diabetes. 2022 Apr 1;71(4):610-623.
Hummel S, et al. Diabetologia. 2023 Sep;66(9):1633-1642

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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)
Insulin autoantibody (IAA)
Insulinoma-associated antigen 2 autoantibody (IA-2A)
Zinc transporter 8 autoantibody (ZnT8A)
Islet cell autoantibody (ICA)

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Stages of T1D

	Stage 1	Stage 2	Stage 3
Characteristics	• Autoimmunity	• Autoimmunity	• Autoimmunity
	• Normoglycemia	• Dysglycemia	• Overt hyperglycemia
	• Presymptomatic	• Presymptomatic	• 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

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PHARMACOLOGIC INTERVENTION TO DELAY AND TREAT T1D: Key Data on Teplizumab-Tzield

THERAPY PROFILE: Teplizumab-Tzield

CD3 — T-cell

CD3-monoclonal antibody

14-day IV infusion course (daily)

TRIAL DESIGN & PATIENT SELECTION

TRIAL SETTING
Type 1 Diabetes TrialNet Study Group (TN-10 trial)

PATIENT CRITERIA
Individuals ≥8 years old with Stage 2 T1D
1. Stage 2 T1D
2. Newly diagnosed Stage 3 T1D

FDA approval for Stage 3 expands the available population (e.g., PROTECT trial data)

KEY EFFICACY DATA: DELAYING SYMPTOMATIC T1D

TEPLIZUMAB GROUP (n=44) — delaying
Median Time to Delay: 48.4 months

PLACEBO GROUP (n=32)
Median Time to Delay: 24.4 months

Beta-Cell Preservation

DELAYS ONSET OF SYMPTOMATIC (STAGE 3) T1D BY A MEDIAN OF 2 YEARS

ADDITIONAL INFO

FINANCIAL ASSISTANCE
Financial assistance available $100,000 for treatment

FDA STATUS: APPROVED FOR STAGES 2 & 3
Teplizumab-Tzield (TZIELD) is FDA approved for Stage 2 AND Stage 3 Type 1 Type 1 Diabetes.

Herold KC, 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 Aug 15;381(7):603-613.

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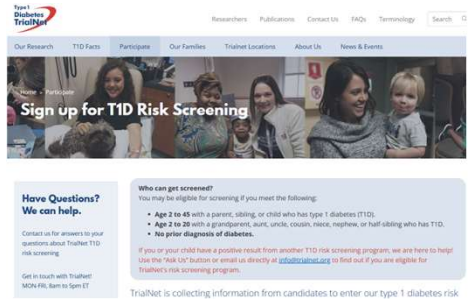
www.TrialNet.org

- How to get families linked to screening?



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MJ Case Study

INITIAL DIAGNOSIS & MANAGEMENT

MJ is 65 years old

RECENT T2 DIABETES T2D

- PCP started MJ on Metformin; scheduled for 3-month follow-up.

LABORATORY RESULTS AT DIAGNOSIS

Fasting Glucose: **182**
A1c: **8.2%**

- At visit MJ reports has been implementing diet changes since initial diagnosis, "was sugar lover" and taking medications consistently.

MEDICAL HISTORY & RISK FACTORS

- **MEDICAL HISTORY**
  - hyperlipidemia
  - hypothyroidism
  - gastroesophageal reflux disease
  - osteopenia
  - h/o pacemaker placement
  - recently diagnosed melanoma

KEY RISK & SOCIAL FACTORS

- Reports a strong family history of diabetes.
- Significant life stress over the previous year.

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MJ Case Study: Medications

MEDICATION HISTORY & CURRENT REGIMEN

Medications: Metformin 1000 mg BID (Twice Daily) for past 3 months.

At time of referral (3-month follow-up), provider review

DECISION-MAKING FLOW

Provider prescribed initiation of new therapy based on accessible options.

SGLT2 inhibitor vs. **GLP-1 AGONIST**

SGLT2 inhibitor

GLP-1 AGONIST

Financially Inaccessible

$400 copay

ADDITIONAL MEDICATIONS & PLAN

- **OTHER PRESCRIBED MEDICATIONS**
  - rosuvastatin 10 mg,
  - omeprazole 40 mg capsule,
  - levothyroxine 100 mcg tab,
  - Vitamin D 2000 IU

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Physical and Labs

Anthropometric Data

- **Height: 5 ft 7 in**
- **Weight: 125 lb (56.8 kg)**
- Usual body weight: 130–134 lb

Laboratory Results

Labs: 1 week prior to visit

- **Hemoglobin A1c: 10.0%**
- **Glucose: 263 mg/dL**
- Total cholesterol: 168 mg/dL
- HDL: 74 mg/dL
- LDL: 70 mg/dL
- Triglycerides: 120 mg/dL

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Questions

- What labs do you want to draw to determine if right diagnosis?
- What change in therapy?
- If you were starting MJ on insulin, what would be the dose?
- What medical nutrition therapy would you recommend?
- Are there any concerns with the current treatment plan?

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Type 1 Diabetes Features?

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

- 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.

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026

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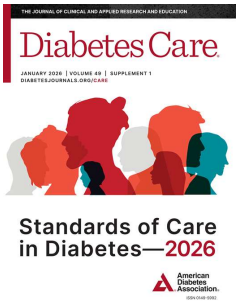
Standard 4 & AACE



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4. Comprehensive Medical Evaluation and Assessment of Comorbidities

- Use person-centered communication, culturally sensitive, strength-based language and active listening;
- Elicit individual preferences and beliefs; develop self-management plan together.
- Diabetes Care coordinated by multi disciplinary team:
  - CDCES, Providers, nurses, dietitians, exercise specialists, pharmacists, dentists, podiatrists, and behavioral health professionals.
- Goal is to optimize health outcomes and health-related quality of life.

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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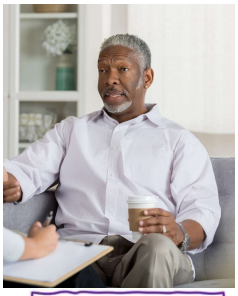
Communication Goals

- The communication goal between health care professionals and people with diabetes is to:
- Establish a collaborative relationship.
- Assess and address self-management barriers *without* blaming people with diabetes for "noncompliance" or "nonadherence"
  - when the outcomes of self-management are not optimal.



4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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Language Guidelines – 5 Key Points

- Use language that is:
  - **Neutral, nonjudgmental**, and based on facts, actions, physiology, or biology.
  - **Free from stigma**.
  - **Strength based,** respectful, and inclusive, imparts hope.
  - **Fosters Collaboration** between people with diabetes and health care professionals.
  - **Person centered**

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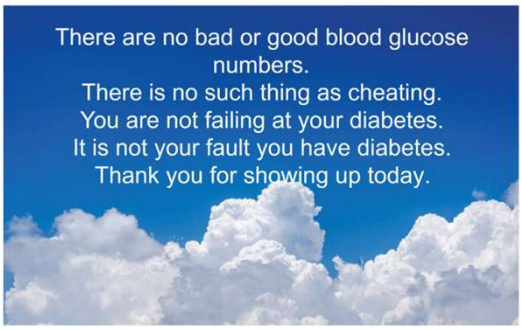
Create a Judgement Free Zone – Roll out the Carpet of Acceptance



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Cultural Humility

Graphic generated with https://chat.openai.com/chat

Cultural humility is an active, self-reflective, lifelong practice involving continuous exploration of our own and others' cultural identities and beliefs;

- an awareness of one's own biases and background;
- treating others with respect, openness, and empathy;
- and reducing power imbalances within relationships and communities.

Cultural humility is a key ingredient in building relationships and partnerships of trust.

https://cahealthadvocates.org/cultural-humility-what-is-it-why-it-matters/

78

Self Reflective Question

- A person shows up to appointment, and tells you they are only taking their daily insulin injection about 4 times a week.
- What feelings would that evoke?

curiosity

Use OARS Method to explore further.

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OARS Communication Framework

- Open-ended Questions: 'What concerns you most?'
- Affirmations: 'You've worked hard.'
- Reflective Listening: 'This feels exhausting.'
- Summaries: 'Let me summarize...'

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What Matters Most to YOU?

What Matters Most – Structured Tool

It is important to make health decisions that line up with your priorities, especially when you have many medical concerns. To do so, it is important to know what matters most to you. For some, this can be hard to put into words. This tool may help.

Circle **up to 3 things in each column** that **MATTER MOST** to you.

FUNCTIONING	ENJOYING LIFE	CONNECTING
• Think clearly • Walk or move around by myself • Choose where I live • Eat foods I enjoy • Work or volunteer • Make decisions about my finances • Dress or bathe myself • Be able to see (or hear, smell, taste, touch) • Drive or be able to get around outside my home • Other:	• Participate in favorite hobbies (like sports, gardening, woodworking, reading, art, etc.) • Attend social events (like movies, concerts, parties, meetings, etc.) • Participate in religious/spiritual services or practices • Spend time outdoors or connecting to nature • Do things to improve myself, learn, or be creative • Have physical touch and / or sexual intimacy • Have quiet time doing nothing in particular • Travel and/or see new places • Exercise • Other:	• Spend time with family and friends • Have good relationships with family or friends • Connect to God or a higher power • Avoid being a burden to others • Take care of my pet(s) • Feel connected to positive aspects of myself • Contribute to my community or neighborhood • Take care of family or friends (like being a caregiver) • Other:

Of all the things you circled, Which 3 Matter Most above all? (Put an X next to them).
In your own words, what do they mean to you?

Moye J, Driver JA, Owsiany MT, Chen LQ, Whitley JC, Auguste EJ, Paik JM. Assessing What Matters Most in Older Adults With Multicomplexity. Gerontologist. 2022 Apr 20;62(4):e224-e234. doi: 10.1093/geront/gnab071. PMID: 34043004; PMCID: PMC8982330.

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Our Curiosity Makes a Difference

What is something you would like me to know about you?

EXPERTISE IN ACTION | #ADCES26 82

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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

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026 ADA

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ADA 2026 ABC Goals

- Pre-meal BG 80-130 (Individualize)
- 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

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ADA – Complete Medical Evaluation

- Review, confirm diabetes diagnosis
- Assess glycemic status
- Eval for diabetes complications/ health status
- ID care partners, support systems
- Investigate co-conditions, overall health status
- Assess Social Determinants of Health (SDOH) & Barriers
- Review risk factor mgmt.
- Collaborate on plan of care

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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Case Study - JR

- 38 yr old, BMI 24.3, arrives in clinic for physical. Says has been feeling tired lately, but attributes that to the 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?

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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

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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Case Study - JR

- 38 yr old, BMI 24.3, arrives in clinic for physical. Says has been feeling tired lately, but attributes that to the 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?

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Physical Exam

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

- 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
- Reproductive history
- 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
Past medical and family history			
Diabetes history			
• Characteristics at onset (e.g., age and symptoms and/or signs)	✓		
• Review of previous treatment plans and response	✓		
• Assess frequency, cause, and severity of past hospitalizations	✓		
Family history			
• Family history of diabetes in a first-degree relative	✓		
• Family history of autoimmune disorders	✓		
Personal history of complications and common comorbidities			
• Common comorbidities (e.g., obesity, OSA, and MASLD)	✓		✓
• High blood pressure or abnormal lipids	✓		✓
• Macrovascular and microvascular complications	✓		✓
• Hypoglycemia: awareness, frequency, causes, and timing of episodes	✓	✓	✓
• Presence of hemoglobinopathies or anemias	✓		✓
• Last dental visit	✓		✓
• Last foot exam	✓		✓
• Last dilated eye exam	✓		✓
• Visits to specialists	✓		
• Disability assessment and use of assistive devices (e.g., physical, cognitive, vision and auditory, history of fractures, and podiatry)	✓	✓	✓
• Personal history of autoimmune disease	✓		
Surgical and procedure history			
• Surgeries (e.g., metabolic surgery and transplantation)	✓	✓	✓
Interval history			
• Changes in medical or family history since last visit		✓	✓
Behavioral factors			
• Physical activity, sleep behaviors, eating patterns and weight history	✓	✓	✓
• Assess familiarity with carbohydrate counting (e.g., type 1 diabetes or type 2 diabetes treated with MDI)	✓		✓
• Screen for OSA	✓	✓	✓
• Tobacco, alcohol, and substance use	✓		✓
Medications and vaccinations			
• Current medication plan	✓	✓	✓
• Medication-taking behavior, including rationing of medications and/or medical equipment	✓	✓	✓

Standard 4 – Diabetes Medical Evaluation

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

Laboratory evaluation			
• A1C, if the results are not available within the past 3 months or if earlier assessment is necessary	✓	✓	✓
• Lipid profile, including total, LDL, and HDL cholesterol and triglycerides‡	✓		
• Liver function tests (i.e., FIB-4)‖	✓		✓
• Spot urinary albumin-to-creatinine ratio	✓		✓
• Serum creatinine and estimated glomerular filtration rate§	✓		✓
• Thyroid-stimulating hormone in people with type 1 diabetes‡	✓		✓
• Celiac disease screening in people with type 1 diabetes‖	✓		
• Vitamin B12 if taking metformin for >5 years	✓		✓
• CBC with platelets	✓		✓
• Serum potassium levels in people treated with ACE inhibitors, ARBs, or diuretics§	✓		✓
• Calcium, vitamin D, and phosphorous as appropriate	✓		✓

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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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 20 & 27
- Platelets 217
- K+ 3.8

- Family history
  - Dad with type 2, history of stroke
- B/P
  - 156/88 then 148/82
- BMI 24.3
- Skin – some acanthosis nigricans visible on neck
- Lower extremities okay
- Mouth - gingivitis

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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

- What is the Priority for JR?
- Assess:
  - Diabetes self-management, nutrition, psychosocial health, risk of acute and chronic complications
  - Sleep habits
  - Cancer screenings
  - Bone Health
  - Liver Health
  - Cardiovascular disease
  - Reproductive and Sexual Health
  - Smoking cessation
  - Ophthalmological, dental and podiatric referrals

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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Case Study - JR

- 38 yr old, BMI 24.3, arrives in clinic for physical and wonders why she can't get pregnant. Says has been feeling tired lately, but attributes that to the job. In office fingerstick reads 228 mg/dl.
- 1. What lab tests are needed?
- 2. What would you include in your initial exam?
- What referrals?
- What tools?

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Referrals for Initial Care Mgmt

- ✓ Eye professional – annual check
- ✓ RD for nutrition therapy
- ✓ DSMES - Diabetes Self-Management Education Support
- ✓ Dentist for comprehensive dental examination
- ✓ Women's health specialist
- Behavioral health professional & audiology, if indicated
- Social worker/community resources
- Rehab medicine for cog/disability eval

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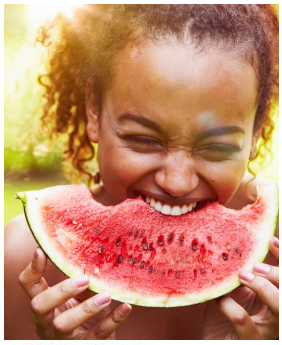
Medical Nutrition Therapy Works



- MNT is effective and beneficial to people with prediabetes and diabetes.
- When delivered by an RDN, MNT is associated with A1C absolute decreases of:
  - 1.0–1.9% for people with type 1 diabetes and
  - 0.3–2.0% for people with type 2 diabetes

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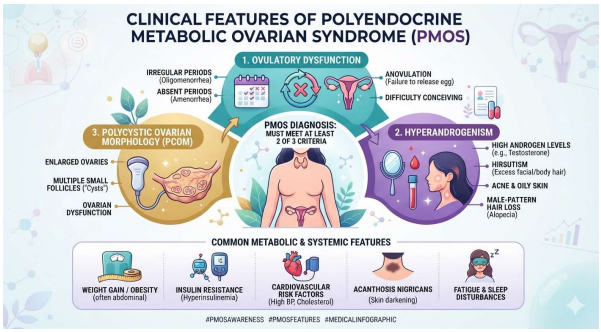
PCOS to PMOS



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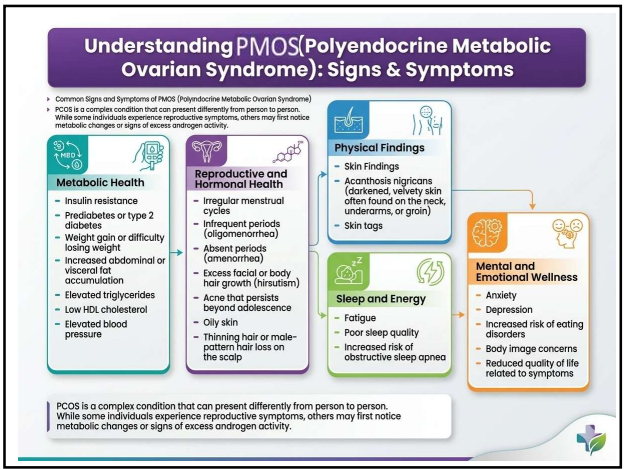

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Treatment for PMOS

- **Lifestyle interventions –** activity, nutritious foods, adequate sleep, and stress management
- **Medications**
  - Metformin
  - GLP-1 receptor agonists or dual GIP/GLP-1 therapies.
  - Combined hormonal contraceptives can help regulate menstrual cycles and reduce symptoms of androgen excess
  - Spironolactone may be prescribed for acne or excess hair growth.
- Many people with PMOS spend years seeking answers before receiving a diagnosis.
- Not everyone with PMOS has overweight or obesity.
- Up to 20–30% of individuals may have a normal BMI yet still experience insulin resistance, androgen excess, ovulatory dysfunction, or cardiometabolic risk.

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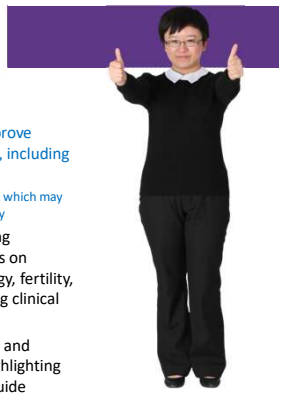
GLP-1 Receptor Agonists and Reproductive Health

Implications for Contraception, Fertility, and Pregnancy

Florence Porterfield, MD[1], Jennifer Mulligan, MD[1], Katherine Salim, DO[1], Olayemi Olubowale, MD, MA[2], Fatima Cody Stanford, MD, MPH, MPA, MBA, MACP, FAMWA, FTOS[1,3,4,*]



- In women with PMOS, GLP-1 RAs improve metabolic and endocrine parameters, including
  - reductions in androgen levels and
  - increases in sex- hormone binding globulin, which may contribute to improved menstrual regularity
- GLP-1 RAs are increasingly used during reproductive age, making their effects on contraception, reproductive physiology, fertility, and pregnancy an important emerging clinical consideration.
- Evidence regarding fertility outcomes and pregnancy safety remains limited, highlighting the need for prospective studies to guide counseling on GLP-1 RA use in reproductive-aged individuals.

Endocrinol Metab Clin N Am ■ (2026) ■–■
https://doi.org/10.1016/j.ecl.2026.01.001 endo.theclinics.com
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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)
  - Spironolactone 50mg

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
  - Brushing – once daily
  - Alcohol and other drug use
    - Drinks a glass of wine with dinner
  - Coping – had appt with women's health specialist – has PMOS
  - Affordability
  - Met with CDCES and RDN
  - Has appt with Eye doctor and dentist

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JR's Question

- Does diabetes cause complications?
  - Yes
  - No, not always

Let's get JR in to get Eyes and Teeth Evaluated

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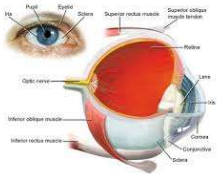
Eye Disease Overview

- Diabetes retinopathy - leading cause of adult blindness.
- Factors that increase risk / co-associated:
  - Chronic hyperglycemia
  - Nephropathy
  - Hypertension
  - Dyslipidemia



People with diabetes also have more glaucoma, cataracts and other eye disorders earlier and more frequently.

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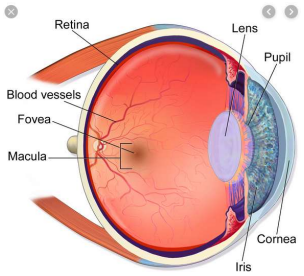
Eye Disease and Education

- Diabetes Retinopathy
- Other Diabetes Eye Complications
- Prevention and Treatment
- Promoting Self-Care



Eye Anatomy

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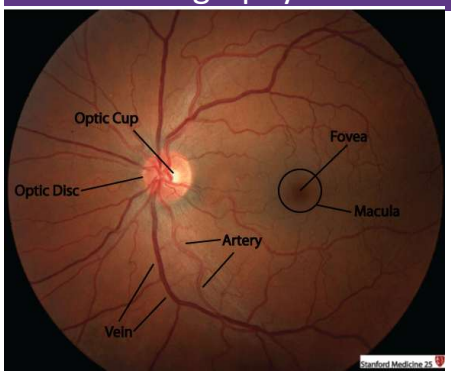
Fundus Geography



The retina is the only portion of the central nervous system visible from the exterior. Likewise the fundus is the only location where vasculature can be visualized.

Fundoscopy

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What is Retinopathy?

- Retina – layer of nerve tissue in back of eye responsible for processing images and light
- Damage to the microvascular layer that nourishes the retina
- Leads to leakage of blood components through vessel walls and creation of unstable blood vessels due to hypoxia
- Disturbance in nerve layer = visual symptoms

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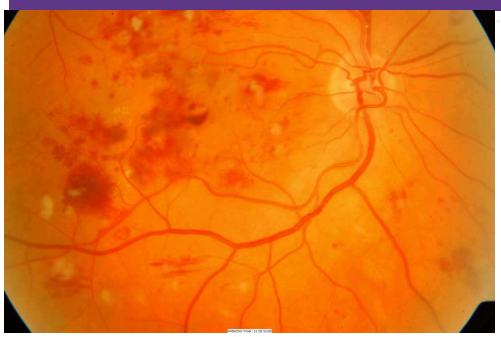
Non Proliferative



Dilated capillaries (microaneurisms) leak red blood cells and plasma into retina. Results in retinal hemorrhages, edema and deposits (exudates).

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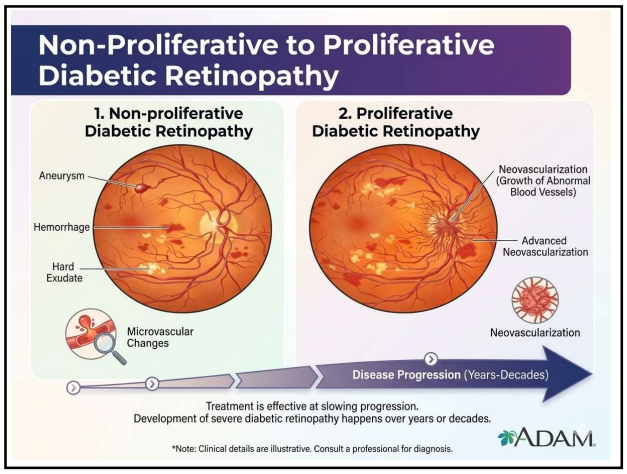

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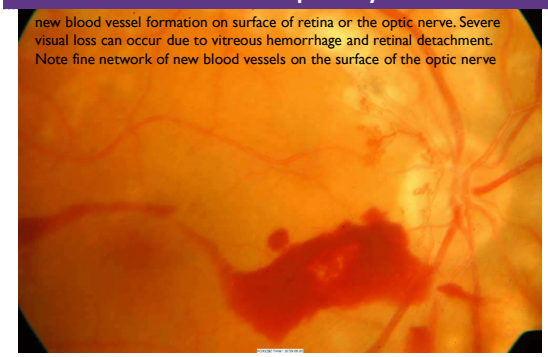
Proliferative retinopathy

new blood vessel formation on surface of retina or the optic nerve. Severe visual loss can occur due to vitreous hemorrhage and retinal detachment. Note fine network of new blood vessels on the surface of the optic nerve



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Proliferative Diabetic Retinopathy (PDR)

- Clinical Findings
  - Ischemia induced neovascularization
    - at the optic disk (NVD)
    - elsewhere in the retina (NVE)
  - Vitreous hemorrhage
  - Retinal traction, tears, and detachment
  - Diabetes Macular Edema must also be evaluated

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PDR Signs

Blurred central or side vision (left, blurred side vision) or a blind spot in central vision (right) may indicate diabetic retinopathy

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Retinopathy Changes How We See

View of boys by person with healthy vision

View of boys by person with diabetic retinopathy.

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Quick question 6

- Which of the following is a recommended treatment for proliferative retinopathy?
  - A. Vitamin E supplements
  - B. Laser phototherapy
  - C. Anti-Vascular Endothelial Growth Factor
  - D. Both B and C

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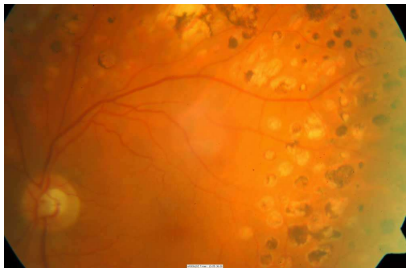
Pan Retinal Photocoagulation



Decreases risk of severe vision loss by 50% or more
Destroys 12% of retina and loss of visual field.
Once stabilized, can achieve excellent control of PDR if B/P and BG well controlled.

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PDR Management

- Management/Treatment
  - 2-4 month follow-up
- Treatment includes:
  - Laser therapy or
  - Anti-Vascular Endothelial Growth Factor (Anti- VEGF) eye injections
- Vitrectomy if bleeding into vitreous

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12. Microvascular Complications - Eyes

- Optimize BG and B/P Control to protect eyes
- Screen with initial dilated and comprehensive eye exam by ophthalmologist or optometrist
  - Type 2 at diagnosis, then every year*
  - Type 1 within 5 years of dx, then every year*
  - *If **no** evidence of retinopathy **and** glycemic indicators within goal range, then screening every 1–2 years may be considered.

.

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High Quality Fundus Photography to Screen for Retinopathy

Can detect most clinically significant diabetic retinopathy.

- Serves as screening tool for retinopathy, not substitute for comprehensive eye exam
- Appropriate to use retinal photography with remote reading or U.S. FDA of approved artificial intelligence algorithms to improve access to diabetes retinopathy screening.
- Refer for comprehensive in-person eye exam when indicated.

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Sexual and Dental Health

- Screen for those with prediabetes and diabetes for **sexual dysfunction.**
- Men – erectile dysfunction and level of libido

- **Dental health**
- Coordinate efforts between medical and dental teams.
- Refer for dental exam at least once a year.
- Treatment can lower A1C 0.4%

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

American Diabetes Association Professional Practice Committee for Diabetes*

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Poll Question 7

- Diabetes is associated with an increased risk of oral disease. Which of the following statements is true for people with diabetes?

a. Benefit from vinegar gargles to decrease bacterial load
b. At greater risk for tongue cancer.
c. 1 in 5 cases of tooth loss is linked to diabetes
d. Diabetes is associated with increased tonsillitis.

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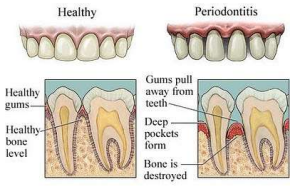
Periodontal Disease

- 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.
- First time, periodontal disease is listed as a risk factor for diabetes in ADA Stds.



Oral Care Matters
- See dentist at least yearly
- Dental hygienist twice yearly
- Brush twice daily
- Floss daily

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Gingivitis

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Mild to Severe Periodontitis

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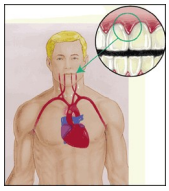
Periodontal disease and Heart Disease



- Heart disease link:
  - oral bacteria enter the blood stream, attach to fatty plaques in coronary arteries increasing clot formation
  - inflammation increases plaque build up, which may contribute to arterial inflammation
- Hyperglycemia = Gingivitis = Heart Disease

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Keeping Oral Healthy

- Oral disease linked with heart disease
- Dental exams (every 6 mo's)
- Metabolic control critical
- Quit smoking
- Brush twice daily and floss daily.
- Help access affordable dental care.

Best $10 investment

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Fractures

- Hip fractures:
  - Type 1 - 4.3 relative risk associated w/ osteoporosis
  - Type 2 – 1.8 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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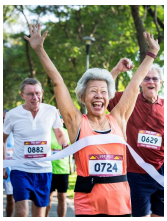
Bone Mineral Density Testing

- Determination of fracture risk traditionally relied on measurements of bone mineral density (BMD) and the World Health Organization–defined T-score of less than −2.5 SD.
- Now established that the consideration of other risk factors improves the categorization of fracture risk



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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.

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Assess Risk factors for Fracture

Table 4.4—Diagnostic assessment

Individuals who should receive BMD 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

Avoid TZDs if high risk and use caution with medications that can cause hypo (insulin, meglitinides and sulfonylureas)

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American Diabetes Association Professional Practice Committee for Diabetes

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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
  - Tirzepatide (Zepbound)
  - Continuous positive oral airway pressure and devices
  - Surgery

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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Sexual Functions as We Age

- 20-30 years — trice daily
- 30-40 years — tri weekly
- 40-50 years — try weekly
- 50-60 years — try weakly
- 60-70 years — try oysters
- 70-80 years — try anything
- 80-90 years — try to remember

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Women with Diabetes & Sexual Health

- Screening for desire (libido), arousal, and orgasm difficulties, particularly in those who experience 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.

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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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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Improving Sex Life

People with diabetes get more vaginal and bladder infections

- Difficulty achieving orgasm due to neuropathy
- Painful intercourse due to lack of vaginal lubrication

Treatment

- Lower blood glucose / blood pressure
- Treat vaginal infections and UTI's
- Water based lubricants for vaginal dryness
- Hormone replacement therapy
- Eat to prevent lows during intimacy
- Allow time, touching and romance

Many people with diabetes have issues with sexual desire, arousal, or orgasm. How about you?"

132

Erectile Dysfunction

- Affects about 50% of men with diabetes
- Loss of erections sufficient for intercourse
- Due to combo of vascular and nerve damage
- Address BG, BP, smoking and other factors
- Tests: penile tumescence to eval if organic or psychogenic
- Treatment:
  - Sildenafil (Viagra), Vardenafil (Levitra), Tadalfil (Cialis)
    - Use caution if taking nitrate drugs. Check w/ MD first
  - Other meds, vacuum devices, prosthetics
  - HRT- testosterone gel, patches, injections, pills

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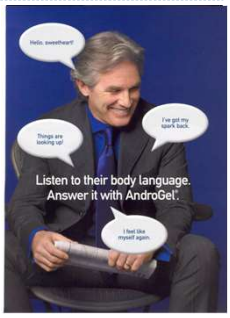
Men with Diabetes 2x's risk for low testosterone

- Symptoms include low sex drive, ED, depression, lack of energy and vitality
- Low T easily diagnosed and managed, only 10% of men currently treated
- Initial Screening:
  - Total testosterone: if < 300 ng/dl = hypogonadal
  - am testing preferred, repeat to confirm
- Treatment: determine cause, testosterone replacement therapy



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JR Return Visit 6 months

- A1c 7.3% (was 8.6)
- TSH 1.9 mIU/L
- B/P 132/82 Pulse 76

- Meds include:
  - Metformin 2000 mg
  - Empagliflozin 25 mg
  - Glipizide 20 mg BID
  - Lovastatin 40 mg
  - Lisinopril 40mg
  - Spironolactone 50 BID
  - 10 units basal insulin

Provider increased lisinopril & empagliflozin to 25mg and added 10 units basal insulin
Would you suggest a different approach?

- Started CGM
  - TIR 68%
  - TBR 6% (mostly overnight)
- Walking after dinner.
- Saw dentist & eye doctor
- Sometimes forgets to take meds at night
- Sleeping better
- Worried if meds are causing harm
- Using contraception

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Diabetes Toolkit - Individualize

- Meter/CGM
- List of Meds
- Meals & Snacks
- When to Get Help
- Emotional Support

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

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Poll Question 8

In the 2026 ADA Standards they recommend pharmacologic agents along with lifestyle interventions to treat people with diabetes and Metabolic Associated Steatohepatitis (MASH). Which of the following are the recommended diabetes medications to treat MASH?

A. Vitamin E and SGLT-2
B. Pioglitazone and/or GLP-1 RA / GIP
C. Fish oil supplements and statin
D. Metformin and/or bolus insulin therapy

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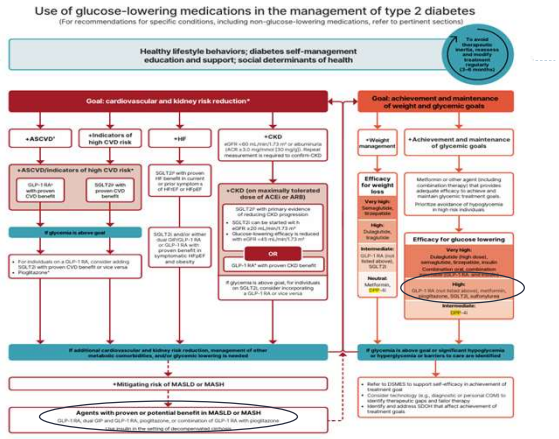

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Liver Disease: MASLD or MASH

- In adults with T2D, MASLD and overweight/obesity, consider using a GLP-1 RA with demonstrated benefits in MASH or a GLP-1/GIP RA with potential benefits for MASH

Semaglutide
Tirzepatide
Pioglitazone

- In adults with biopsy proven MASH, GLP-1 RA is preferred.
- Pioglitazone or a dual GIP/GLP-1 RA can be considered for glycemic management due to potential beneficial effects on MASH.
- Insulin preferred for decompensated cirrhosis

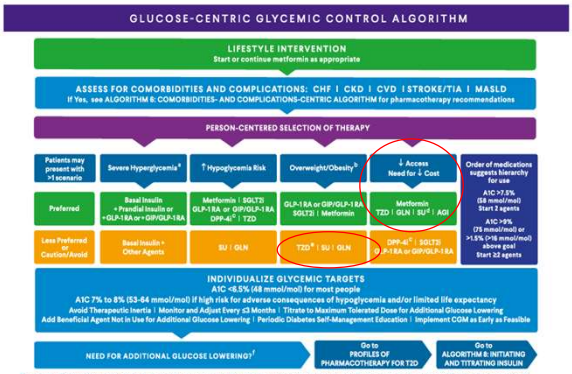
139

Insulin Sensitizers

- **Action**: decrease insulin resistance by making muscle and adipose cells more sensitive to insulin, decrease free fatty acids
- **Name**:
  - pioglitazone (Actos) – bladder cancer warning
    - Dosing: 15-45 mg daily
    - Consider adding low dose if history of stroke or have 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

Thiazolidinediones "TZDs" • Increases insulin sensitivity	pioglitazone (Actos)	15 – 45 mg daily	Pioglitazone is recommended for people with diabetes after a stroke and/or to treat steatosis. May increase bladder cancer risk. Start with low dose, increase if needed. Monitor for edema. Increases fracture risk. Lowers A1C 0.5 – 1.0%.

140



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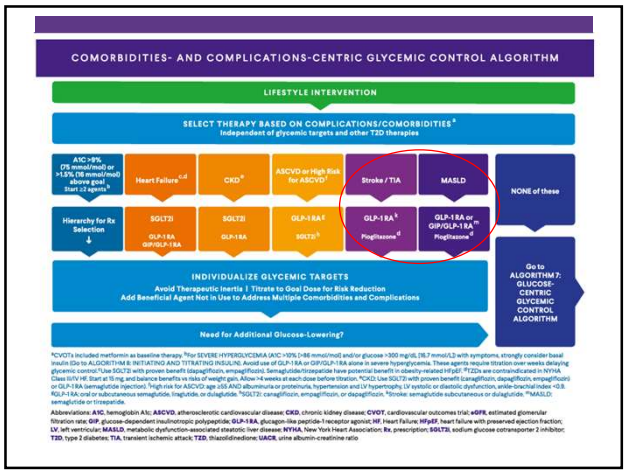

142

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

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Case Study LS

LS is 69 with type 2 diabetes for over a decade. Takes metformin 1000mg twice daily. Admitted to hospital with heart failure.

A1C=7.3%.

UACR 212mg/gm

eGFR=56

B/P 146/82

What class of diabetes med do we need to start ASAP?

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

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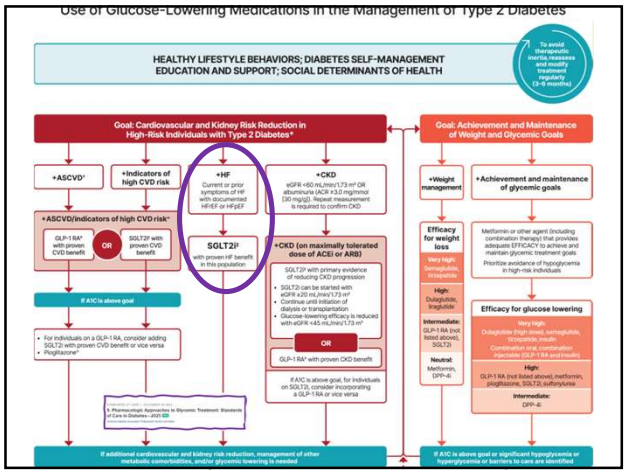
SGLT2 Inhibitors- "Glucoretics"

- **Action**: decreases renal reabsorption of glucose proximal tubule of kidneys (reset renal threshold)
- **Preferred** diabetes treatment for people with heart and kidney failure. Decreases BG & CV Risk.
- AWP: ~$650 a month

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

146



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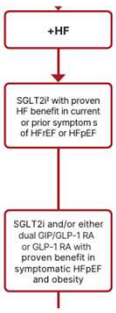
Heart Failure



In heart failure, use SGLT2i because they improve heart failure and kidney outcomes.

Empagliflozin - Canagliflozin - Dapagliflozin - Ertugliflozin

New for 2026 –
9.9 In adults with T2D, obesity, and symptomatic HF with preserved ejection fraction, include a GIP/GLP-1 agonist or GLP-1 agonist with demonstrated benefits for BG reduction in HF events (irrespective of A1C).

GLP-1 RA Semaglutide

GLP-1/GIP RA Tirzepatide

HFpEF Heart failure with preserved ejection fraction ≥40%),

(HFrEF) Heart failure with reduced ejection fraction ≤40%),

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Side Effects of SGLT-2 Inhibitors

- Genitourinary infections
- Volume depletion
- Increased urination
- Hypotension
- Monitor Lytes
- Diabetes ketoacidosis (DKA)

149

Case Study LS

LS is 69 with type 2 diabetes for over a decade. Takes metformin 1000mg twice daily. Admitted to hospital with heart failure.

A1C=7.3%.
UACR 212mg/gm
eGFR=46
B/P 146/82

What class of diabetes med do we need to start?

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

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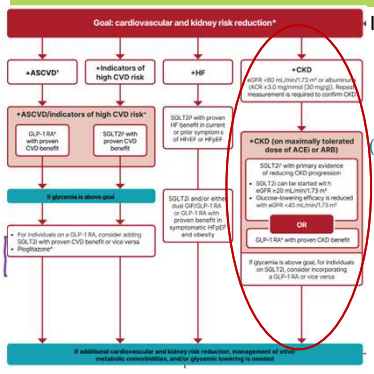
Chronic Kidney Disease - Choosing glucose-lowering medication



- In renal failure, use SGLT-2 in people with GFR ≥ 20 and continue until initiation of dialysis or transplantation. (When GFR <45, SGLT-2's don't lower BG much.)

Or

GLP* with proven CVD benefit if SGLT2 not tolerated or contraindicated

*Semaglutide improves kidney function.

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New in 2026: GLP-1 in Kidney Disease

- In adults with T2D and advanced CKD (eGFR <30), a GLP-1 RA is preferred for glycemic management due to lower risk of hypoglycemia and for CV event reduction.
- Individuals on dialysis can be safely initiated or continued on GLP-1 based therapy to reduce CV risk and mortality
- Reminder: only GLP-1 with renal restrictions are exenatide and lixisenatide

From: 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026

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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

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Poll Question 8

- JR, a 67-year-old with type 2 diabetes for 7 years, with an A1C of 9.7% was started on empagliflozin 10mg two weeks ago. Other labs include a GFR of 49 and a UACR of 34 mg/g. Also takes glargine 12 units and pioglitazone. JR drinks a few beers at night. Partner calls you in a panic and says JR is admitted to the hospital in DKA. What is the most likely explanation?

A. Excess alcohol intake leading to starvation ketosis
B. Potential side effect of SGLT-2 Inhibitors
C. Low GFR and elevated UACR increase hyperglycemic risk
D. JR is misdiagnosed and likely has type 1 diabetes

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SGLT-2 Inhibitors – DKA Warning

Common Oral Diabetes Meds

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

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Signs and Symptoms Euglycemic DKA

- Similar in presentation to hyperglycemic DKA.
- **Don't** usually have polydipsia or polyuria since serum glucose is normal.
- S/S include nausea, vomiting, shortness of breath, generalized malaise, lethargy, loss of appetite, fatigue, or abdominal pain.
- Ill feeling individuals with diabetes plus malaise, dyspnea, nausea, or vomiting need to eval serum pH and get blood or urine ketone testing.

Euglycemic Diabetic Ketoacidosis
Michael C. Plewa; Michael Bryant; Robin King-Thiele.

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FDA NEWS RELEASE

FDA Authorizes First Wearable Device That Continuously Monitors Both Ketone Levels and Blood Sugar

New device can help people with diabetes detect warning signs of a dangerous complication before it becomes a medical emergency

For Immediate Release: August 25, 2026

The U.S. Food and Drug Administration today authorized the Libre Duo 10 Day Continuous Dual Glucose Ketone Monitoring System for people aged 2 years and older living with diabetes. The Libre Duo 10 Day is the first wearable device in the U.S. that continuously monitors ketone levels, and the first in the world to continuously monitor both ketones and blood sugar (glucose) together in a single device.

"Today's authorization is a breakthrough for the safety of children and adults living with diabetes," **said Michelle Tarver, M.D., Ph.D., Director of the FDA's Center for Devices and Radiological Health**. "Knowing that ketone levels are rising, and having that information in real time, around the clock, can be the difference between early intervention and a life-threatening emergency."

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	DKA	EDKA
Labs	**DKA**	**EDKA**
Glucose	200+	<200
Beta-hydroxybutyrate	3+	3+
Urine ketones	2+	2+
Blood pH	< 7.3	<7.3
Bicarb	<18	<18
Anion gap	>12	>12

ADA/EASD/AACE 2024 Hyperglycemic Crises in Adults Consensus Report

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Poll Question 9

- 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

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Poll Question 10

- Which of the following is true in the U.S.?

A. Diabetes is the 3rd leading cause of death
B. Cancer is more common in people with diabetes
C. Cancer is the leading cause of death
D. Diabetes starves tumors and decreases growth rate.

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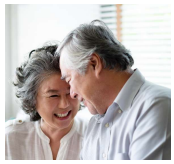
Cancer and Diabetes

- 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



4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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Leading Causes of Death in U.S.

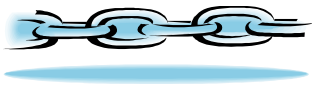
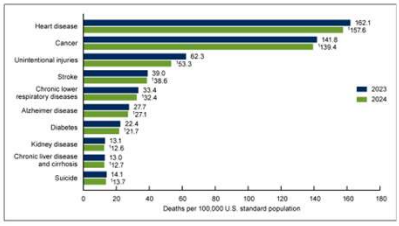


Figure 4. Age-adjusted death rate for the 10 leading causes of death in 2024: United States, 2023 and 2024



- Cancer is the 2nd leading cause of death
- Diabetes is the 7th leading cause of death

Cancer and diabetes are diagnosed within the same individual more frequently than would be expected, even after adjusting for age.

https://www.cdc.gov/nchs/products/databriefs/db548.htm

162

What links Diabetes and Cancers?

- Hyperinsulinemia
- Hyperglycemia
- Inflammation

CA Cancer J Clin. 2010 Jul-Aug;60(4):207-21. doi: 10.3322/caac.20078. Epub 2010 Jun 16.

Diabetes and cancer: a consensus report

Edward Giovannucci [1], David M Harlan, Michael C Archer, Richard M Bergenstal, Susan M Gapstur, Laurel A Habel, Michael Pollak, Judith G Regensteiner, Douglas Yee

Affiliations + expand

PMID: 20554718 DOI: 10.3322/caac.20078

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Risk Factors Common to Diabetes & Cancer

- Aging
- Extra weight
- Diet
- Physical inactivity
- Ethnicity
- Alcohol
- Smoking
- Changes in the DNA?

Biologic links incompletely understood

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Type 2 Diabetes and Cancer

- People with prediabetes and type 2 Two-fold higher risk for cancers of
  - Liver
  - Pancreas
  - Endometrium
- 1.2 to 1.5 fold risk of cancers of
  - Colon
  - Breast
  - Bladder.
- Lower risk of prostate cancer

Diabetes and Cancer: A Consensus Report Cancer J Clinic 2010
Joint statement American Cancer Society and American Diabetes Assoc

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How Many People Die of Cancer Each Year?

Excluding non-melanoma skin cancer, at least 40% of newly diagnosed cancers in US adults — about 850,000 cases in 2026 — are potentially avoidable, including the 19% of cancers associated with cigarette smoking and 5% associated with alcohol consumption.

Estimated Deaths

Male			Female		
Lung & bronchus	63,040	19%	Lung & bronchus	61,950	21%
Prostate	36,320	11%	Breast	42,140	14%
Colon & rectum	30,110	9%	Pancreas	25,510	9%
Pancreas	27,230	8%	Colon & rectum	25,120	8%
Liver & intrahepatic bile duct	19,650	6%	Uterine corpus	14,450	5%
Leukemia	13,900	4%	Ovary	12,450	4%
Esophagus	12,940	4%	Liver & intrahepatic bile duct	11,330	4%
Urinary bladder	12,640	4%	Leukemia	10,010	3%
Non-Hodgkin lymphoma	11,710	4%	Brain & other nervous system	8,380	3%
Kidney & renal pelvis	10,200	3%	Non-Hodgkin lymphoma	8,260	3%
All sites	**327,290**		**All sites**	**298,850**	

Estimates are rounded to the nearest 10 and exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Rank is based on modeled projections and may differ from observed data.

©2026, American Cancer Society, Inc., Surveillance, Prevention, and Health Services Research

https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2026/2026-cancer-facts-and-figures.pdf

166

ADA Standard 4 – Cancer Info

- Diabetes is associated with increased risk of liver, pancreas, endometrium, colon/rectum, breast, and bladder cancer.
- Shared risk factors between type 2 diabetes and cancer (older age, obesity, and physical inactivity) but may also be due to diabetes-related factors.
- Encourage regular cancer screenings & reduce modifiable cancer risk factors (obesity, physical inactivity, and smoking).
- New onset of atypical diabetes (lean body habitus and negative family history) in a middle-aged or older person may precede the diagnosis of pancreatic adenocarcinoma.

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

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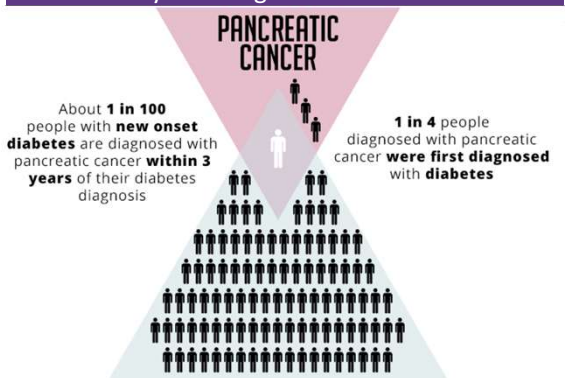
Diabetes may be 1st sign of Pancreatic Cancer



https://www.cancer.gov/news-events/cancer-currents-blog/2021/pancreatic-cancer-diabetes-early-detection

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Pancreatic Cancer

- Pancreatic cancer is only the 11th most common cancer in the US, it's the 3rd leading cause of death from cancer.
- No screening tests exists to catch it early.
- Watch for signs: Rapid developing hyperglycemia with wt loss. Usually in older individuals.
- 80% of time, people are not diagnosed with pancreatic cancer until after it's invaded nearby tissues or spread to other organs.
- Overall, only about 10% of people with pancreatic cancer will be alive 5 years after diagnosis.

https://www.cancer.gov/news-events/cancer-currents-blog/2021/pancreatic-cancer-diabetes-early-detection National Cancer Institute

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MEDPAGE TODAY

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Oncology/Hematology » Other Cancers

'Grand Slam' Pancreatic Cancer Drug Wins FDA Ap

— RAS inhibitor daraxonrasib doubled survival outcomes in second-line trial

by Charles Bankhead, Senior Editor, MedPage Today

August 26, 2026 - 2 min read Add MedPage Today on Google

The FDA approved the first-in-class RAS inhibitor daraxonrasib (Rasonque) for metastatic pancreatic ductal adenocarcinoma (PDAC), the most common form of pancreatic cancer.

The approval stipulates use in adults with PDAC previously treated with at least one prior systemic regimen or that is ineligible for multiagent systemic therapy. The oral drug targets multiple isoforms of RAS, a driver mutation for most patients with PDAC.

"This drug showed unprecedented results in an area of high unmet need," said Angelo de Claro, MD, the director of FDA's Oncology Center of Excellence, in a statement. "The approval was granted 6.5 months before the user fee deadline, demonstrating the FDA's commitment to accelerating the approval of

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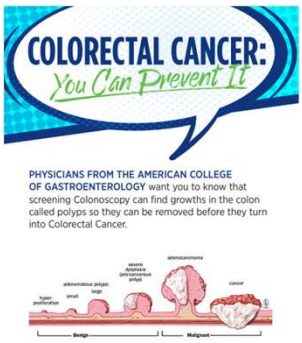
Colorectal Cancer Screening Recommendations 2026

- All people at age 45 need screening for colon cancer

https://gi.org/topics/colorectal-cancer/



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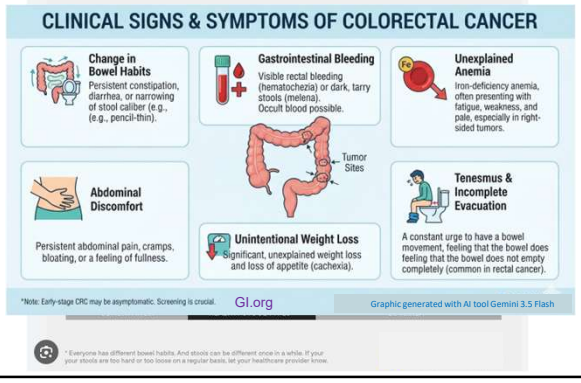
Look at your Poop – Stool Chart



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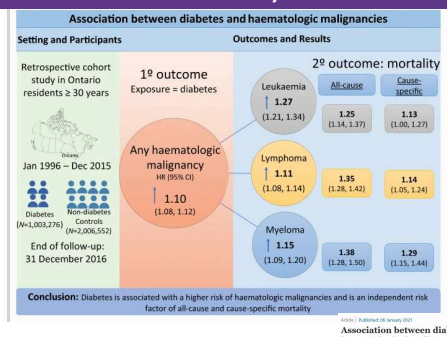
Diabetes Increases Hematologic Cancers and Mortality



https://doi.org/10.1007/s00125-020-05338-7

Article | Published 06 January 2021

Association between diabetes and haematological malignancies: a population-based study

Ines S. Gava, Matthew C. Cheung, Shahrzad Ravi, Yindia Ma, Rana C. Lega & Jonathan L. Lipscombe

Diabetologia 64, 585–593(2021) | Cite this article

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Poll question 11

- A 58-year-old without a history of diabetes is receiving treatment with an immune checkpoint inhibitor for metastatic melanoma. Four months after beginning therapy, presents with polyuria, weight loss, nausea, and fatigue. Laboratory findings include:
  - Plasma glucose: 465 mg/dL
  - Blood ketones: Positive
  - Arterial pH: 7.18
  - C-peptide: Undetectable

Which mechanism most likely explains this sudden hyperglycemia?

- A. Progressive insulin resistance caused chronically elevated cortisol levels
- B. Autoimmune destruction of pancreatic beta cells
- C. Glucocorticoid-induced hepatic glucose production
- D. Pancreatic exocrine insufficiency from chronic pancreatitis

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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

1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2026

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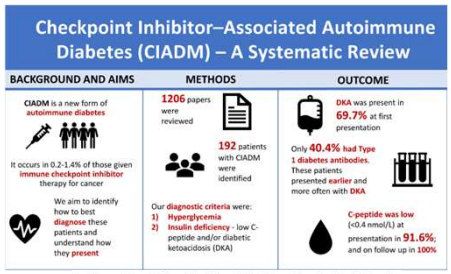
Checkpoint Inhibitors cause immune meditated diabetes

"treatment with immune checkpoint inhibitors for cancer can cause acute autoimmune type 1 diabetes"



2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026

Linda Wu, Venessa Tsang, Alexander M. Menzies, Sarah C. Sasson, Matteo S. Carlino, David A. Brown, Roderick Clifton-Bligh, Jenny E. Gunton; Risk Factors and Characteristics of Checkpoint Inhibitor–Associated Autoimmune Diabetes Mellitus (CIADM): A Systematic Review and Delineation From Type 1 Diabetes. Diabetes Care 1 June 2023; 46 (6): 1292–1299. https://doi.org/10.2337/dc22-2202

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Immune Checkpoint Inhibitors (ICIs) in Oncology

Checkpoint Target	Mechanism of Action	Common Agents (Brand Names)	Primary FDA Indications
PD-1 *(Programmed Cell Death Protein 1)*	**Blocks PD-1 receptors** on T-cells, preventing tumor cells from shutting down T-cell activity.	• **Pembrolizumab** (Keytruda) • **Nivolumab** (Opdivo) • **Cemiplimab** (Libtayo)	Melanoma, Non-Small Cell Lung Cancer (NSCLC), Renal Cell Carcinoma, Hodgkin Lymphoma
PD-L1 *(Programmed Death-Ligand 1)*	**Targets the ligand** on tumor cells or immune cells, preventing it from binding to and disabling T-cells.	• **Atezolimumab** (Tecentriq) • **Durvalumab** (Imfinzi) • **Avelumab** (Bavencio)	Small Cell Lung Cancer (SCLC), Non-Small Cell Lung Cancer (NSCLC), Triple-Negative Breast Cancer
CTLA-4 *(Cytotoxic T-Lymphocyte-Associated Protein 4)*	**Inhibits the CTLA-4 pathway** during early T-cell activation in the lymph nodes, boosting overall immune response.	• **Ipilimumab** (Yervoy) • **Tremelimumab** (Imjudo)	Advanced Melanoma, Colorectal Cancer (MSI-H/dMMR), combined with PD-1 inhibitors for NSCLC/RCC

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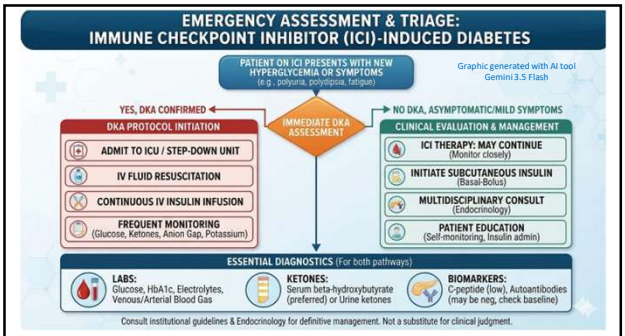

The most likely Immune checkpoint inhibitors that rigger rapid, autoimmune-mediated destruction of beta cells include:

- anti-PD-1 (i.e., nivolumab and pembrolizumab) and
- those that target programmed cell death protein ligand 1 (PD-L1) (i.e., durvalumab and avelumab).
- Hyperglycemia as a result of ICIs can occur at any time after the initiation of therapy —as quickly as 1 week after the first dose to up to 12 months after.

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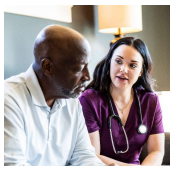
PI3K Inhibitors



- PI3K inhibitors used primarily to treat:
  - advanced breast cancer (specifically HR+/HER2- tumors with PIK3CA mutations) and
  - blood cancers (such as lymphomas, leukemias, and follicular lymphoma).
- Phosphatidylinositol 3-kinase (PI3K) inhibitors are small molecules designed to disrupt intracellular signaling pathways, thereby inhibiting cancer cell growth and survival.
- Within this class, targeted inhibition of the alpha isoform (PI3Kα) disrupts downstream insulin receptor signaling, frequently resulting in profound, on-target hyperglycemia and acute insulin resistance.

ADA Standard 9 2026 https://doi.org/10.2337/dc26-S009

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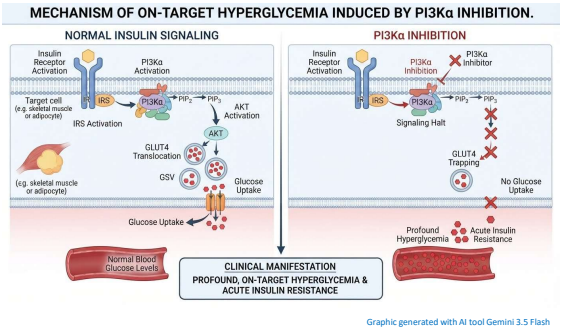
PI3kα Inhibition



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Which PI3Kα medications are associated with glucose elevations?

Alpelisib and inavolisib

- These two PI3Kα inhibitors have a 60% incidence of causing hyperglycemia, typically appearing within the first 2 weeks of therapy.
- People at increased risk of hyperglycemia from PI3Kα inhibitor therapy include those with:
  - preexisting prediabetes
  - BMI >25
  - age >65 years
  - being treated with glucocorticoid.
- Glucose management is crucial since significant hyperglycemia can lead to discontinuation and/or reduction in PI3Kα medication dose, which can decrease therapy efficacy.

ADA Standard 9 2026 https://doi.org/10.2337/dc26-S009

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Treatment for Hyperglycemia secondary to PI3Kα Inhibitors

- **Metformin is the first-line oral agent to treat PI3Kα inhibitor–induced hyperglycemia**
  - Proactive use of metformin may prevent hyperglycemia
  - Consider potential adverse effects of metformin therapy, particularly diarrhea, which is also a frequent adverse effect of PI3Kα therapy.
- **Pioglitazone** is also an option as monotherapy or in combination with metformin, but its slow onset of action can limit its effectiveness.
- **SGLT2 inhibitors** have also shown efficacy, but close monitoring is needed, as ketoacidosis has been reported.

- **Meds to Avoid**
- **Only consider Insulin and sulfonylureas** as a **last resort.**
  - Increased insulin levels may reactivate the PI3K pathway, counteracting the antitumor effects of PI3K inhibition.
- **Avoid using GLP-1 RAs** with PI3K inhibitors-
  - Treatment is not recommended at this time due to their uncertain effect on PI3K inhibitor efficacy (based on their increase in insulin secretion) and the potential to cause nausea and vomiting.

ADA Standard 9 2026 https://doi.org/10.2337/dc26-S009

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What Can Health Professionals Do?

- Be aware of treatments and medications that can cause sudden hyperglycemia.
- Promote healthy foods, activity, quit smoking, and resources.
- Encourage appropriate screening for cancer and to report any symptoms
- Focus on **prevention** of diabetes

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Modifiable Risk Factors

- **Quit Smoking**: Cigarettes smoking is leading preventable cause of cancer, linked to 20% of all cancers and 30% of cancer deaths. Both direct and secondhand smoke cause significant DNA damage.
- **Ultraviolet (UV) Radiation:** Exposure to excessive sunlight and indoor tanning beds damages skin cells, significantly increasing the risk of melanoma and other skin cancers.
- **Infectious Agents:** Some cancers are driven by preventable viral and bacterial infections, primarily Human Papillomavirus (HPV) and Hepatitis B and C. Promote screening and vaccinations.
- **Get enough sleep**

Meet with RDN!

- Less meat, processed foods.
- More fiber, whole foods
- Consider decreasing alcohol consumption

Get active - reduces risk of colon, post-menopausal breast and endometrial cancer.

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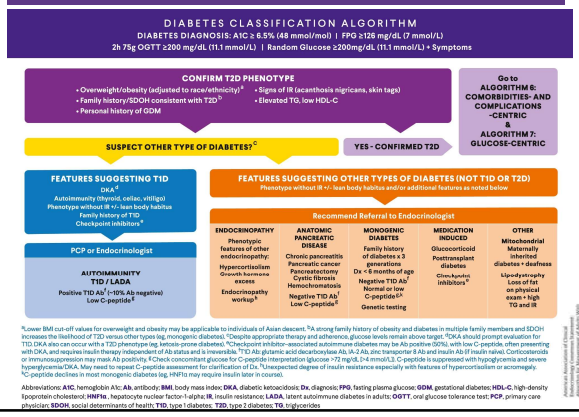
AACE 2026 Classification Algorithm



[A]Lower BMI cut-off values for overweight and obesity may be applicable to individuals of Asian descent. [D]A strong family history of obesity and diabetes in multiple family members and SDOH increases the likelihood of T2D versus other types (eg, monogenic diabetes). [C]Despite appropriate therapy and adherence, glucose levels remain above target. [E]DKA should prompt evaluation for T1D. DKA also can occur with a T2D phenotype (eg, ketosis-prone diabetes). [F]Checkpoint inhibitor–associated autoimmune diabetes may be Ab positive (50%), with low C-peptide, often presenting with DKA, and requires insulin therapy independent of Ab status and is irreversible. [G]T1D Ab: glutamic acid decarboxylase Ab, IA-2 Ab, zinc transporter 8 Ab and insulin Ab (if insulin naïve). Corticosteroids or immunosuppression may mask Ab positivity. [H]Check concomitant glucose for C-peptide interpretation (glucose >72 mg/dL [>4 mmol/L]). C-peptide is suppressed with hypoglycemia and severe hyperglycemia/DKA. May need to repeat C-peptide assessment for clarification of Dx. [I]Unexpected degree of insulin resistance especially with features of hypercortisolism or acromegaly. [J]C-peptide declines in most monogenic diabetes (eg, HNF1α may require insulin later in course).

Abbreviations: **A1C**, hemoglobin A1c; **Ab**, antibody; **BMI**, body mass index; **DKA**, diabetic ketoacidosis; **Dx**, diagnosis; **FPG**, fasting plasma glucose; **GDM**, gestational diabetes; **HDL-C**, high-density lipoprotein cholesterol; **HNF1α**, hepatocyte nuclear factor-1-alpha; **IR**, insulin resistance; **LADA**, latent autoimmune diabetes in adults; **OGTT**, oral glucose tolerance test; **PCP**, primary care physician; **SDOH**, social determinants of health; **T1D**, type 1 diabetes; **T2D**, type 2 diabetes; **TG**, triglycerides

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RL needs to get on Basal Insulin

- But, doesn't want to inject insulin every day.
- Now what?

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Insulin PocketCard™

Diabetes Education Services 25

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Action		Insulin Name	Effective Onset	Effective Peak	Effective Duration	Considerations
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. 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.
		Lispro-aabc (Lyumjev)	15 - 17 min	2 - 3 hrs	5 - 7 hrs	
	Rapid Acting Analogs	Aspart (Novolog / Merilog/ Kirsty)	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	
	Long Acting	Glargine (Lantus*/ Basaglar/ Semglee/ Rezvoglar/ Langlara)	2 - 4 hrs	No Peak	20 - 24 hrs	
		Degludec (Tresiba)*	~ 1 hr		< 42 hrs	
	Ultra Long	Icodec (Awiqli) Once Weekly U-700	16 - 18 hrs	2 - 4 days	≥ 7 days	
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.

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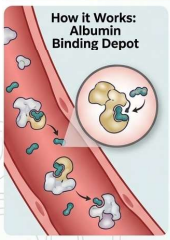
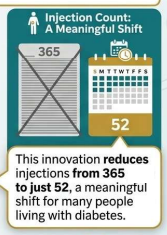
What Is Insulin Icodec?

- **What Is Insulin Icodec?**
  - Insulin icodec (brand name *Awiqli®*) is the **first once-weekly basal insulin analog** designed to provide steady glucose control over **7 days** with a **single injection.**



- Unlike traditional basal insulins, icodec is engineered to:
  - Bind to albumin in the bloodstream, creating a circulating depot
  - Release insulin slowly over the course of a week
  - Maintain stable basal insulin levels with fewer peaks and troughs



This innovation **reduces** injections **from 365 to just 52**, a meaningful shift for many people living with diabetes.

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Pharmacology Spotlight: Why Insulin Icodec Is Unique

- **Once-weekly, ultra–long-acting basal insulin formulated at U-700 concentration (700 units/mL)**.
- **Half-life of about one week**, reaches steady state after several weekly doses, with minimal peak-to-trough variability.
- Because of this prolonged action, dose adjustments must be made thoughtfully, as changes take longer to fully manifest.

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Clinical Efficacy: What Does the Evidence Show?

- The **ONWARDS Phase 3 clinical program** (≈4,000 participants with type 2 diabetes) demonstrated:
  - A1C reduction comparable to once-daily basal insulin
  - Non-inferiority to standard basal insulins like degludec or glargine
- Similar risk of hypoglycemia
- Slightly increased time in range
- For clinicians, this means:
  - 👉 Similar outcomes
  - 👉 With fewer injections
  - 👉 And potentially happier people

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Dosing & Titration Insulin Icodec

- Dosing is typically based on the person's **current total daily basal insulin dose**, with the goal of maintaining equivalent weekly insulin exposure.
- Multiply the existing **daily basal dose by 7** to estimate the initial once-weekly dose, titration based on fasting glucose trends.
- **If insulin-naïve**, a standard starting dose (e.g., 70 units once weekly in clinical trials) may be used, with adjustments made weekly or every few weeks depending on glycemic response.
- **Individualization is key**
- **Dose Adjustment in Altered Kidney Function** –
  - eGFR of 50 or greater – no dosage adjustment needed.
  - eGFR of 10-50 – administer 75% of the usual starting dose.
  - eGFR less than 10 – administer 50% of usual dose.

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Packaging and Storage

- **Icodec insulin is available in 3 different pen sizes and has a 12 week shelf life at room temperature**.
- Pens can be dialed in 10-unit increments with a maximum dose of 700 units.
  Download our Insulin Storage and Dispensing Info

Diabetes Education

Insulin Storage and Dispensing Info

Product Name/Type	Expiration when opened, stored at room temp up to 86 F	Pens per Box Or Vial	Units per Pen/Vial	Max Dose / Notes
Basal Insulins - Long and Ultra Long Acting				
Glargine (Lantus) Biosimilars: Basaglar Semglee/Rezvoglar - Pen Delivery - Vials; Lantus, Semglee	28 Days 28 Days	5 Pens 1 Vial	300 units in 3 mL 1000 Units	80 Units
Degludec (Tresiba) - Pen	56 Days	5 Pens	300 units in 3mL	80 Units
Icodec (Awiqli) U-700 Once weekly injection	12 weeks	1 pen/pack with needles	700 units in 1.0 mL 1050 units 1.5 mL 2100 units in 3mL	Max dose 700 units. Flex Touch Pen dials in 10-unit dosing increments.

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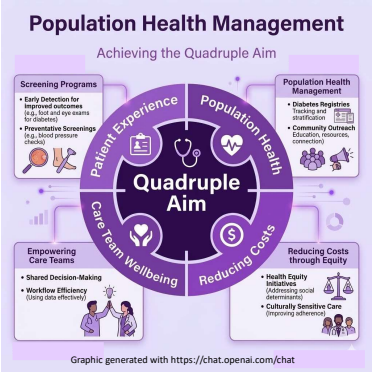
Population Health Management

- Diabetes registries
- Screening programs
- Health equity initiatives
- Community outreach



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The ABC's of Diabetes Management

A - A1c less than 7%, TIR 70%
B - Blood pressure < 130/80
C - Cholesterol
LDL< 70, HDL > 40, Triglycerides < 150
D - Drugs- Keep list on phone
E - Exercise and Eyes
F - Food and Feet
G – Glucose checks and goals
H- Healthy Coping - Hoorah for your hard work!
K – Kidneys – Check UACR & GFR

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Mahalo

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

Diabetes Education SERVICES

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BREAK TIME

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