



ADA Standards of Diabetes Care Update 2023

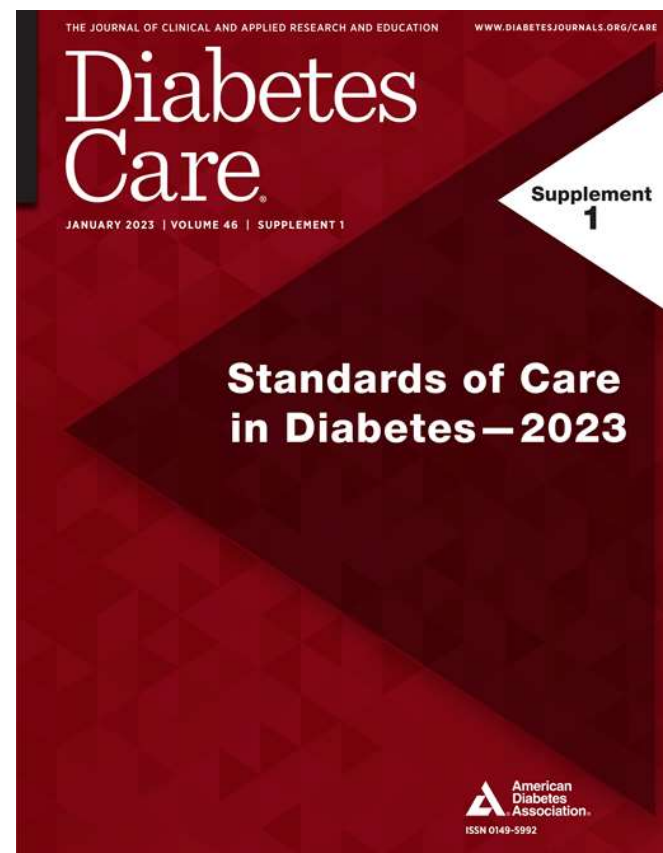
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www.DiabetesEd.net



Coach Bev has no conflicts of interest

- ▶ Not on any speaker's bureau
- ▶ Does not invest in pharmaceutical or device companies
- ▶ Gathers information from reading package inserts, research and standards

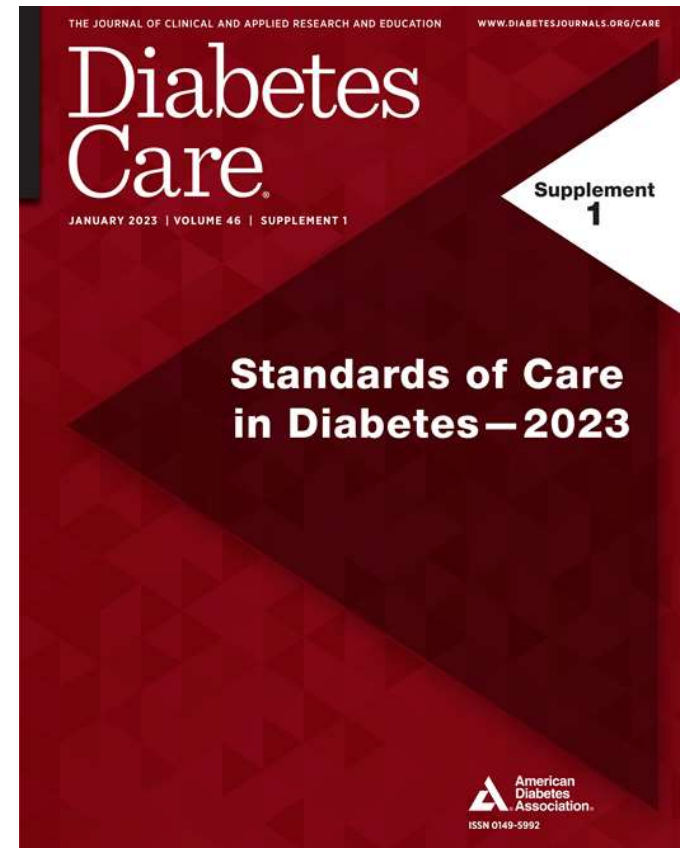


Majority of Content from
ADA Standards
www.Diabetes.org



Standards of Care Annual Update

- ▶ Review critical elements of the ADA Standards of Care with a focus on CV and pharmacologic changes and updates.
- ▶ State national goals and targets for glucose, BP, hypertension and more.
- ▶ Describe the importance of keeping care person centered.
- ▶ List 3 ways you can apply this information to your clinical practice.



1. Improving Care and Promoting Health in Populations

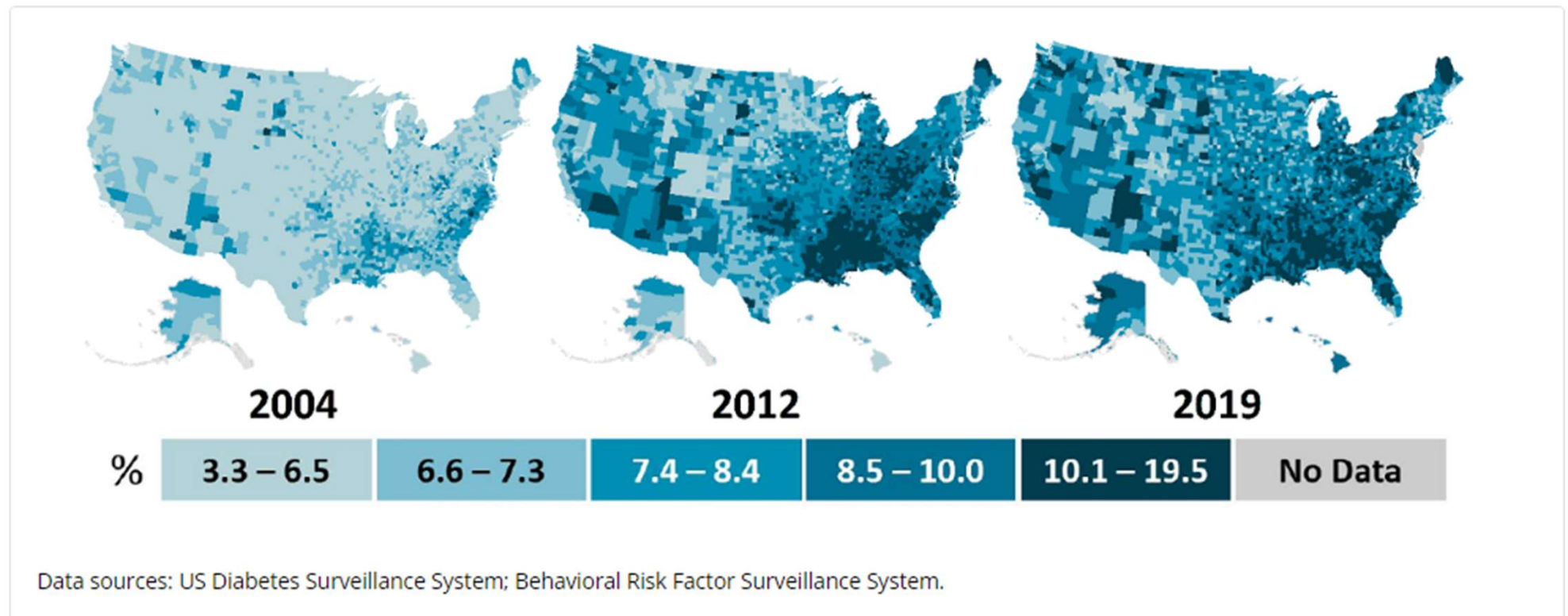
- ▶ Population health defined as
 - ▶ “the health outcomes of a group of individuals, including the distribution of health outcomes within the group”
- ▶ Health Care systems need to offer:
 - ▶ In-person and virtual team–based care
 - ▶ Include knowledgeable and experienced diabetes management professionals
 - ▶ Utilization of patient registries
 - ▶ Decision support tools
 - ▶ Community involvement to meet individual needs.



Type 2 Diabetes in America 2023

- ▶ 11.3% with Diabetes - 37 million adults
 - ▶ 23% don't know they have it
- ▶ 38% with Prediabetes – 96 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



Social Determinants of Health

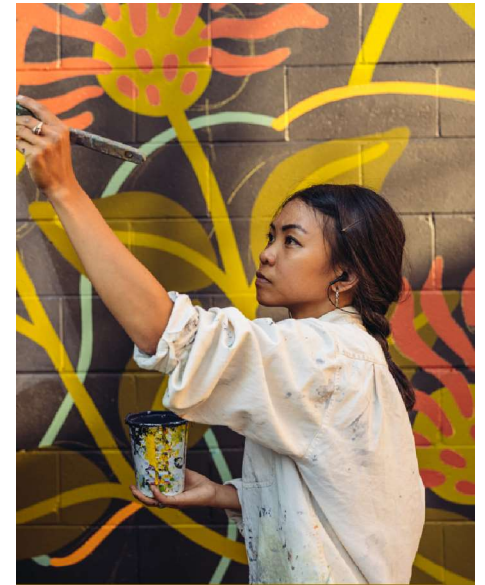
- ▶ The conditions in which people:
 - ▶ Play
 - ▶ Live
 - ▶ Work
 - ▶ Learn
 - ▶ Pray
- ▶ Directly affects their health risks and outcome



*AADE Population Health & Diabetes
Educators Evolving Role 2019*

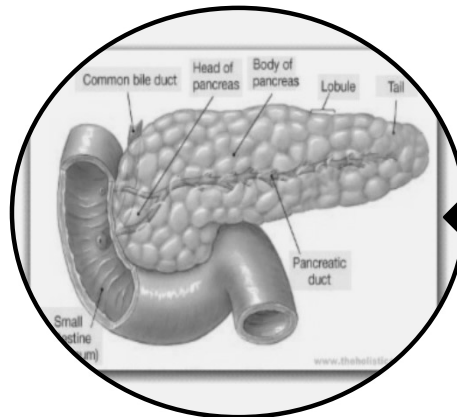
Tailor Treatment for Social Context

- ▶ Consider individualized care and provide resources
- ▶ These factors impair ability to self-manage diabetes.
 - ▶ 20% of people with food insecurity have diabetes
 - ▶ Financial barriers can lead to less healthy food choices and inability to access medications.
 - ▶ Lack of housing – 8% of unhoused people have diabetes.



Need to make
more community
connections
through
Community Health
Workers

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



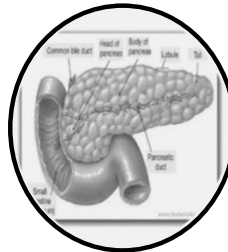
No diabetes

FBG <100

Random <140

A1c <5.7%

Yes!



Prediabetes

FBG 100-125

Random 140 - 199

A1c ~ 5.7- 6.4%

**50% working
pancreas**

NO



Diabetes

FBG 126 +

Random 200 +

A1c 6.5% or +

**20% working
pancreas**

Development of type 2 diabetes happens over years or decades

Pre Diabetes & Type 2- Screening Guidelines (ADA 2023 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
 - ▶ PreDiabetes*
 - ▶ HIV on antiretroviral meds*
 - ▶ History of heart disease



Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)



Screen using A1c, Fasting Blood Glucose or OGTT.

If negative, repeat screening at least every 3 years.

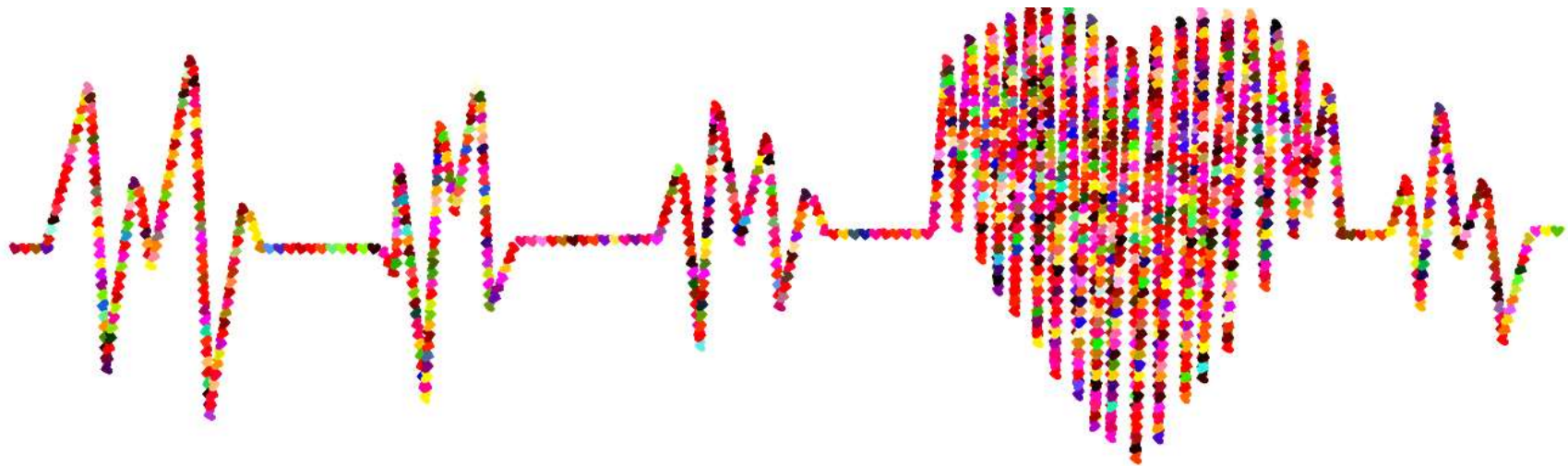
*If prediabetes, on antiretroviral meds, recheck yearly

Risk factors cont'd

- ▶ HTN - BP > 140/90
- ▶ HDL < 35 or triglycerides > 250
- ▶ History of Gestational Diabetes Mellitus
- ▶ Polycystic ovary syndrome (PCOS)
- ▶ Other conditions assoc w/ insulin resistance:
 - ▶ Elevated BMI, acanthosis nigricans (AN)

3. Finding & Treating PreDiabetes Matters

- Prediabetes is associated with heightened cardiovascular risk; therefore, screening for and treatment of modifiable risk factors for cardiovascular disease is critical.



3. Prediabetes Pharmacologic Intervention

- ▶ Consider Metformin Therapy for Prediabetes
- ▶ Especially for ages 25-59
 - ▶ BMI of 35+
 - ▶ If A1c is ~6.0 or FPG is 110mg/dL
- ▶ Women with history of GDM
 - ▶ Monitor B12 level
- ▶ No FDA approved med for prevention (off label)
- ▶ CV Risk Mitigation important.
- ▶ Eval and treat BP, Lipids, smoking
- ▶ Consider low dose pioglitazone (Actos) if history of stroke.



Mr. J - What are Your Recommendations?

Mr. J Profile

67 yr old with newly type 2.

History of stroke, BMI 26.

Meds: Metoprolol, metformin,
lovastatin 20mg.

Labs:

- ▶ A1c 9.3%
- ▶ LDL 136 mg/dl
- ▶ Triglycerides 260mg/dl
- ▶ GFR 58, UACR 32
- ▶ B/P 142/79
- ▶ Liver enzymes in normal range



Self-Care Skills

- ▶ Goes to gym 2-3 times a week
- ▶ Plays golf on occasion.
- ▶ Eats out 2 times a week.

Diabetes Self Management Ed Benefits

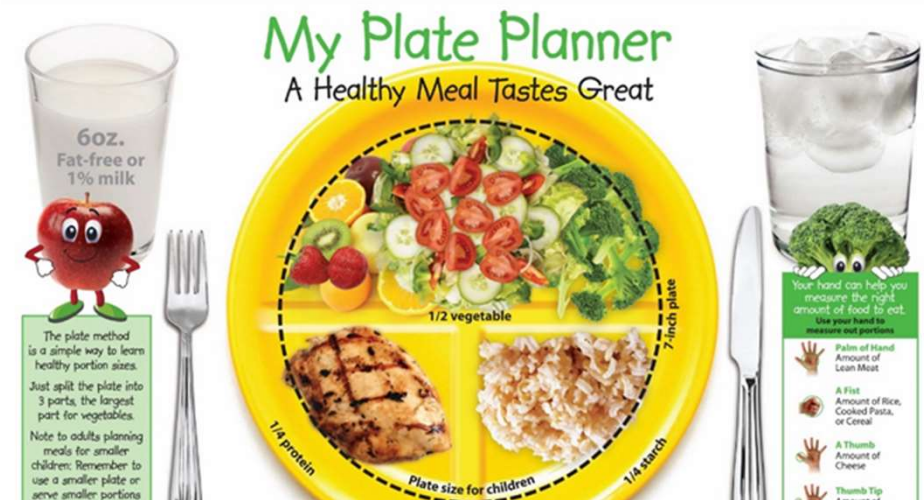
- ▶ Improved knowledge
- ▶ Lower weight
- ▶ Improved quality of life
- ▶ Reduced mortality
- ▶ Positive coping
- ▶ Reduced cost
- ▶ Only 5-7% of Medicare/insured receive DSME)
- ▶ Increased primary care, preventive services
- ▶ Less frequent use of acute care and inpatient admissions
- ▶ More likely to follow best practice recommendations (esp those with Medicare)



ADA MNT Standards 2023

Until there is more evidence:

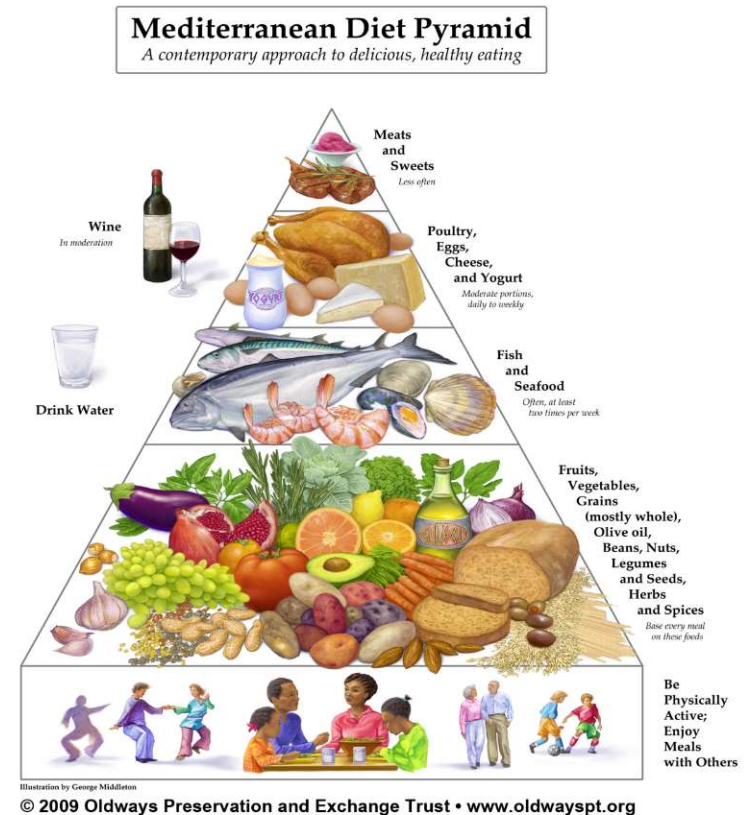
- ▶ Emphasize non starchy vegetables
- ▶ Minimize added sugars, sugary beverages and refined grains
- ▶ Choose whole foods
- ▶ Individualized eating pattern that considers
 - ▶ health status, food and numeracy skills, resources, food preferences, health goals, and food access.



Referral to RD/RDN
Lowers A1c 1-2%

Healthy Eating Patterns

- ▶ Low-Carbohydrate
- ▶ Carb Counting
- ▶ Diabetes Plate Method
- ▶ Mediterranean Diet
- ▶ Plant based eating
- ▶ DASH (Dietary approaches to address hypertension)



Plan Your Portions

portion Guide

Non-starchy Vegetables

Starchy Vegetables

Protein Foods

Fruit

Plan Your Portions

Water or no-calorie drinks

Non-starchy Vegetables

- Asparagus
- Broccoli
- Bunching onions
- Cabbage
- Cauliflower
- Cucumbers
- Dark leafy greens
- Eggplant
- Mushrooms
- Onions
- Pasipara
- Peas
- Red bell peppers
- Spinach
- Tomatoes
- Zucchini

Starchy Vegetables

- Corn
- Green beans
- Winter squash
- White beans
- White rice
- Whole grains
- Whole wheat bread
- Whole wheat pasta
- Whole wheat flour
- Whole wheat cereal
- Whole wheat flour
- Whole wheat flour
- Whole wheat flour
- Whole wheat flour
- Whole wheat flour

Protein Foods

- Eggs
- Lean meats
- Low-fat dairy
- Nuts
- Seeds
- Tempeh
- Tofu

Fruit

- Apples
- Bananas
- Blueberries
- Cherries
- Citrus
- Grapes
- Kiwi
- Mango
- Peaches
- Pineapples
- Raspberries
- Strawberries
- Watermelon
- Yogurt

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

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6. Glycemic Targets – ADA 2023

▶ **A**1c less than 7%

- ▶ Pre-meal BG 80-130

- ▶ Post meal BG <180

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

Glycemic targets need to be woven into the overall person-centered strategy.

▶ **B**lood Pressure < 130/80

▶ **C**holesterol

- ▶ Statin therapy based on age & risk status

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

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

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Self-Care Skills

- ▶ Goes to gym 2-3 times a week
- ▶ Plays golf on occasion.
- ▶ Eats out 2 times a week.
- ▶ Met with RD, signed up for DSMES.

Section 9- Pharmacologic Approaches to Glycemic Treatment

- ▶ Updated Algorithm for Oral Meds and Insulin Therapy
- ▶ More attention to whole person approach to diabetes management.
- ▶ Consider CVD, Heart failure and CKD when choosing diabetes medication



Poll Question

Based on the new ADA Management of Hyperglycemia in Type 2 diabetes, which of the following is an accurate recommendation?

- A. Initiate treatment with metformin for most individuals, including those with cardiovascular disease.
- B. Prioritize the use of organ protective medications in those with cardiorenal disease.
- C. If A1C not at target with 2 or more oral agents, add on basal insulin therapy.
- D. Avoid the use of SGLT-2 Inhibitors in those with an eGFR of less than 25.



Management of Hyperglycemia Type 2

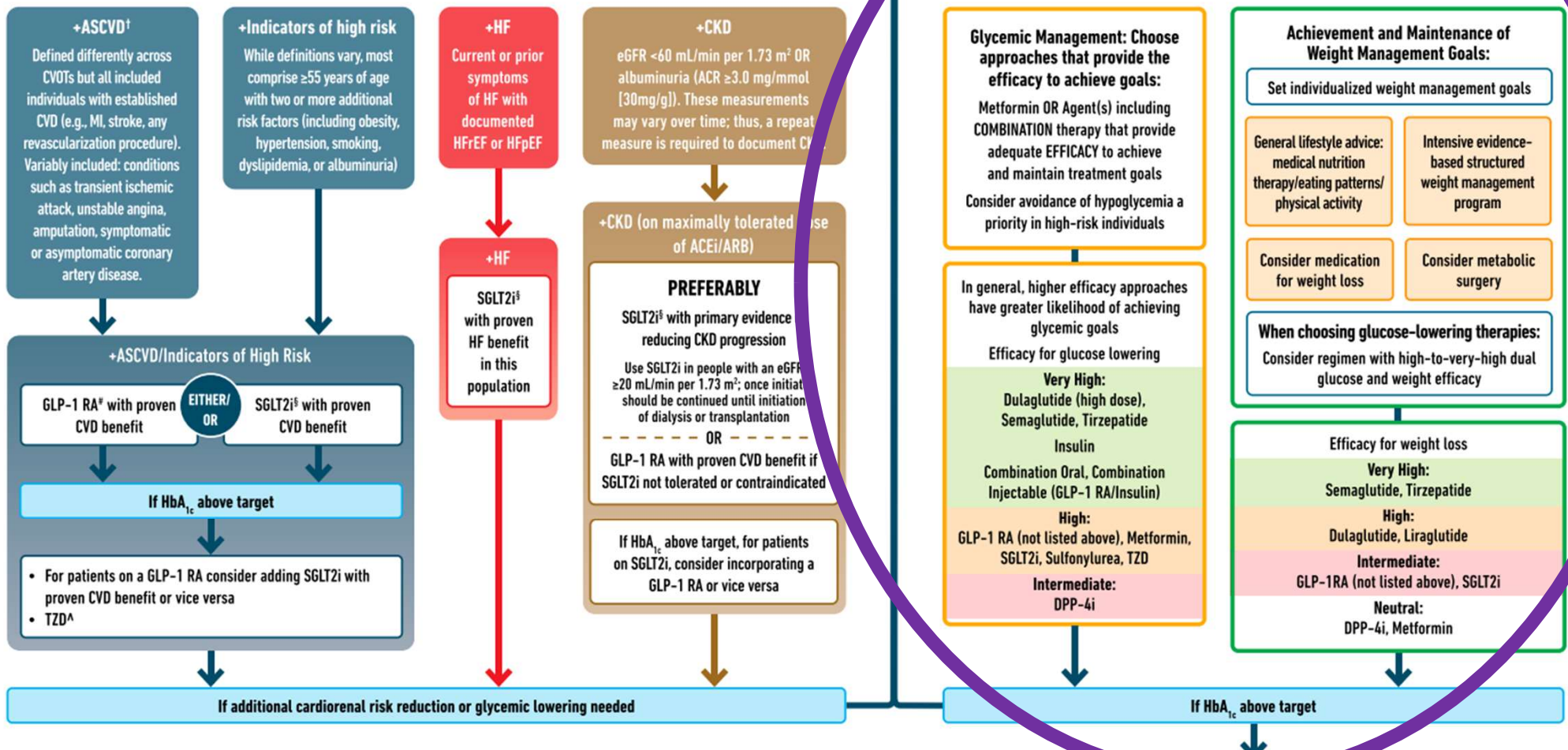
USE OF GLUCOSE-LOWERING MEDICATIONS IN THE MANAGEMENT OF TYPE 2 DIABETES

HEALTHY LIFESTYLE BEHAVIORS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT (DSMES); SOCIAL DETERMINANTS OF HEALTH (SDOH)

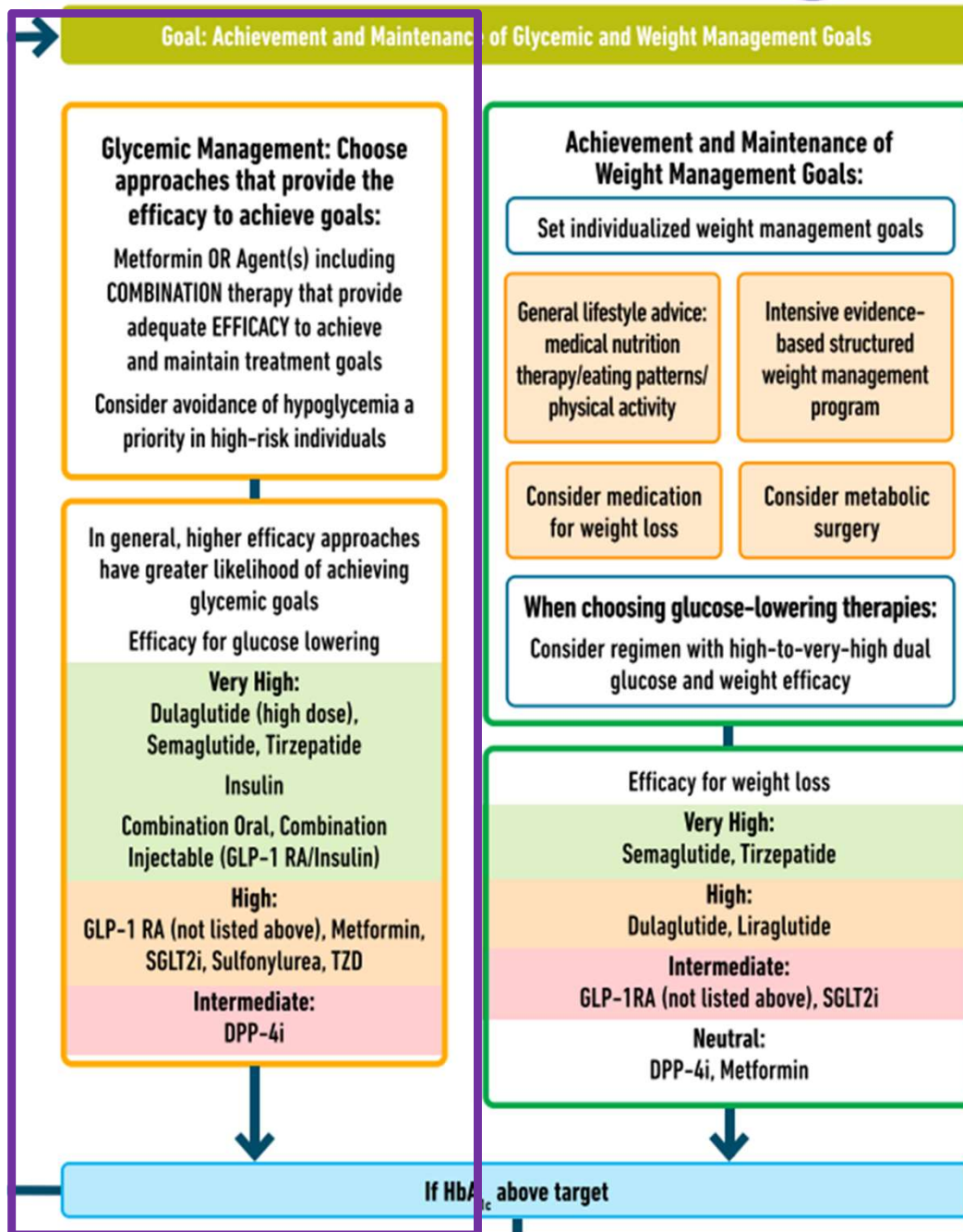


Goal: Cardiorenal Risk Reduction in High-Risk Patients with Type 2 Diabetes (in addition to comprehensive CV risk management)*

Goal: Achievement and Maintenance of Glycemic and Weight Management Goals



Metformin is “Usually” 1st Line



- Why metformin?
 - Longstanding evidence
 - High efficacy and safety
 - Inexpensive - 3 months for \$12
 - Weight neutral
- If ASCVD, HF or CKD or high ASCVD risk, use SGLT2i or GLP-1 RA +/- metformin
- If A1C ≥ 8.5%, consider combo therapy.

ADA/EASD Meds Algorithm 2023

Combo Oral

Medications	Doses in mg
Trijardy XR (3 meds) empagliflozin linagliptin metformin XR	5 - 25 2.5 - 5 1000
Invokamet (canagliflozin/ metformin)	50/500 or 50/1000 150/500 or 150/1000
Synjardy (empagliflozin/ metformin)	5/500 or 12.5/500 5/1000 or 12.5/1000
Synjardy XR (empagliflozin/ metformin XR)	5/1000 or 10/1000 12.5/1000 or 25/1000
Xigduo XR (dapagliflozin/ metformin)	5/500 or 10/500 5/1000 or 10/1000

In general, higher efficacy approaches have greater likelihood of achieving glycemic goals

Efficacy for glucose lowering

Very High:

Dulaglutide (high dose), GLP-1 RAs; Trulicity, Ozempic
Semaglutide, Tirzepatide GLP-1 RA & GIP; Mounjaro

Insulin

Combination Oral, Combination iDegLira, iGlarLixi
Injectable (GLP-1 RA/Insulin)

High:

GLP-1 RA (not listed above), Metformin,
SGLT2i, Sulfonylurea, TZD

Intermediate:

DPP-4i “gliptins”, i.e. Januvia.

Insulin/Injectable Combos

PocketCards updated annually. Download FREE
CDCES Coach App for latest updates and notifications.



Name	Combines	Considerations
iDegLira* Xultophy 100/3.6	Insulin degludec (IDeg or Tresiba) Ultra long insulin + Liraglutide (Victoza) GLP-1 Receptor Agonist (GLP-1 RA)	Xultophy 100/3.6 pre-filled pen = 100 units IDeg / 3.6 mg liraglutide per mL Once daily injection – Dose range 10 to 50 = 10 – 50 units IDeg + 0.36 -1.8 mg liraglutide Recommended starting dose: • 16 iDegLira (= 16 units IDeg + 0.58 mg liraglutide) Titrate dose up or down by 2 units every 3-4 days to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 21 days.
iGlarLixi* Soliqua 100/33	Insulin glargine (Lantus) Basal Insulin + Lixisenatide (Adlyxin) GLP-1 Receptor Agonist	Soliqua 100/33 Solostar Pen = 100 units glargine / 33 µg lixisenatide per mL Once daily injection an hour prior to first meal of day. Dose range 15 – 60 = 15-60 units glargine + 5 – 20µg lixisenatide Recommended starting dose: • 15 units if not meeting glucose target on 30 units basal insulin or GLP-1 RA • 30 units if not meeting glucose target on 30-60 units basal insulin or GLP-1 RA Titrate dose up or down by 2-4 units every week to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 14 days.

AWP \$944

AWP \$646

*Discontinue basal insulin /GLP-1 RA therapy before starting. If dose missed, resume with next usual scheduled dose.

Common Oral Diabetes Meds

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides - Decreases hepatic glucose output - First line med at diagnosis of type 2	metformin (Glucophage)	500 - 2550 mg (usually BID w/ meal)	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 Metformin - 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%.
	Riomet (liquid metformin)	500 - 2550 mg 500mg/5mL	
	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

GOAT'S RUE
(GALEGA OFFICINALIS)

Used for
☐ Diabetes

Potential uses
☐ Cancer
☐ Ovarian cysts

Uses under investigation
☐ Parkinson's
☐ Nerve growth



DPP-4 Inhibitors – “Incretin Enhancers”

► **Action:**

- Increase insulin release w/ meals
- Suppress glucagon

► **Efficacy:** Decreases A1c by 0.6 -0.8%

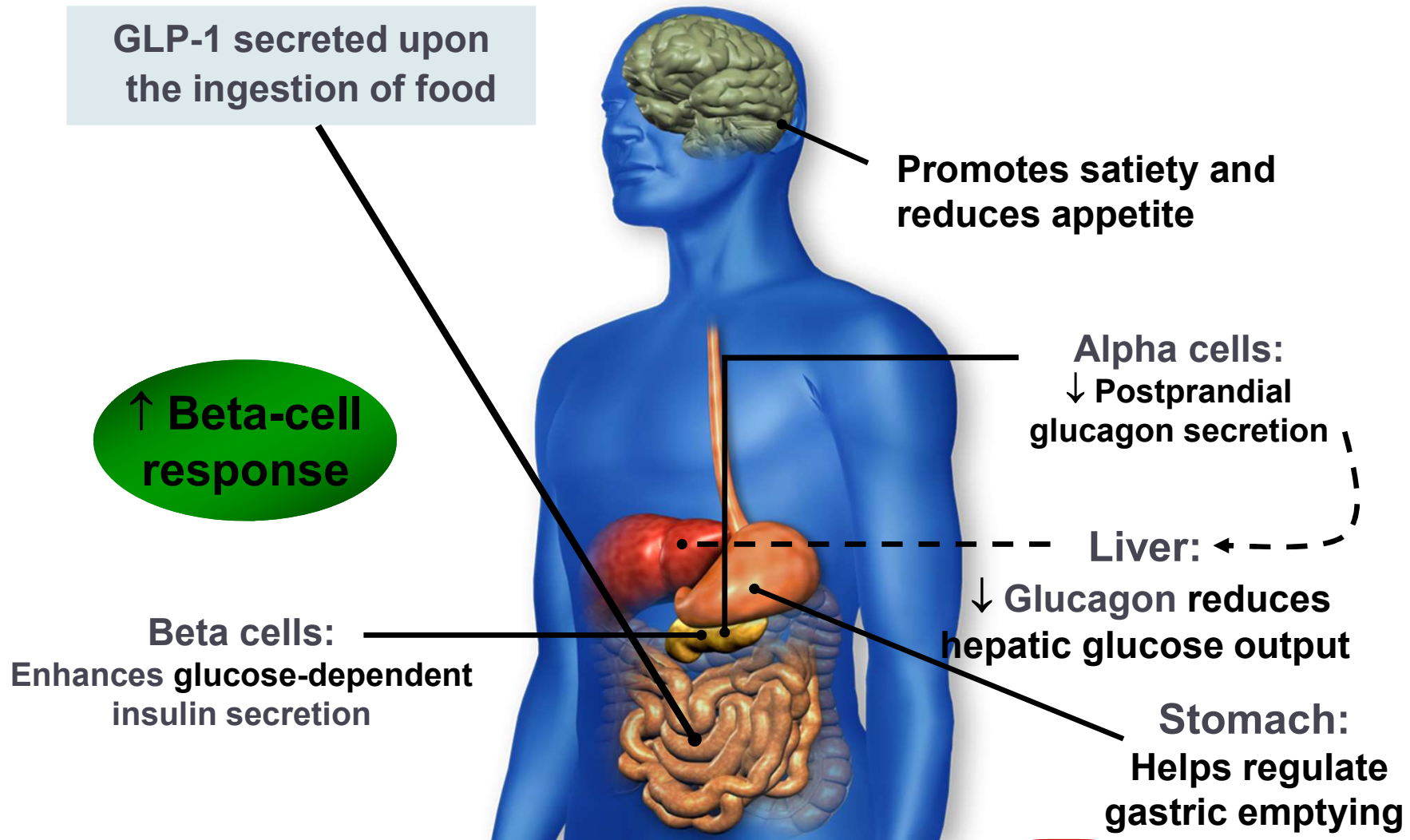
► Saxagliptin, alogliptin increased risk of heart failure

► Average Wholesale Price: \$550-600 month

DPP – 4 Inhibitors “Incretin Enhancers” • Prolongs action of gut hormones • Increases insulin secretion • Delays gastric emptying	sitagliptin (Januvia)	25 - 100 mg daily – eliminated via kidney*	*If creat elevated, see med insert for dosing. Side effects: headache and flu-like symptoms. Can cause severe, disabling joint pain. Contact MD, stop med. Report signs of pancreatitis. †Saxagliptin and alogliptin can increase risk of heart failure. Notify MD for shortness of breath, edema, weakness, etc. No wt gain or hypoglycemia. Lowers A1c 0.6%-0.8%.
	saxagliptin (Onglyza)†	2.5 - 5 mg daily – eliminated via kidney*, feces	
	linagliptin (Tradjenta)	5 mg daily – eliminated via feces	
	alogliptin (Nesina)†	6.25 - 25 mg daily – eliminated via kidney*	

GLP-1 Effects in Humans

Understanding the Natural Role of Incretins



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

GLP-1 & GIP Receptor Agonists

Class/Main Action	Name	Dose Range	Considerations
GLP-1 Receptor Agonist (GLP-1 RA) "Incretin Mimetic" - Increases insulin release with food - Slows gastric emptying - Promotes satiety - Suppresses glucagon	exenatide (Byetta)	5 and 10 mcg BID	Side effects for all: Nausea, vomiting, weight loss, injection site reaction. Report signs of acute pancreatitis (severe abdominal pain, vomiting), stop med. Increase dose monthly to achieve targets. Black box warning: Thyroid C-cell tumor warning (avoid if family history of medullary thyroid tumor). *Significantly reduces risk of CV death, heart attack, and stroke. †Approved for pediatrics 10-17 yrs Lowers A1c 0.5 – 1.6% Weight loss: 4-6% body weight loss.
	exenatide XR† (Bydureon)	2 mg 1x a week Pen injector - Bydureon BCise	
	liraglutide (Victoza)*†	0.6, 1.2 and 1.8 mg daily	
	dulaglutide* (Trulicity)	0.75, 1.5, 3.0 and 4.5 mg 1x a week pen injector	
	lixisenatide (Adlyxin)	10 mcg 1x a day for 14 days 20 mcg 1x day starting day 15	
	semaglutide* (Ozempic)	0.25, 0.5, 1.0 and 2.0 mg 1x a week pen injector	
	(Rybelsus) Oral tablet	3, 7, and 14 mg daily in a.m. Take on empty stomach w/H2O sip	
Dual Incretin Agonist Combines both GLP-1 and GIP Incretins. Same action profile as GLP-1 RA, with more intensive action profile.	Tirzepatide (Mounjaro)	2.5, 5.0, 7.5, 10, 12.5 and 15 mg 1x a week prefilled single dose pen Increase dose by 2.5 mg once monthly to reach targets.	Side effects include: Nausea, diarrhea, injection site reactions. Avoid if family history medullary thyroid tumor. Report pancreatitis. Lowers A1C ~ 1.8 - 2.4% Weight loss: 7-13% body weight loss at max dose.

GLP-1 Receptor Agonist Devices

Byetta



5mcg or 10mcg pen
1 pen/month
Requires Rx for needles

Ozempic



3 pen options: 0.5, 1, 2mg
1 pen/month
Comes with needles

Victoza



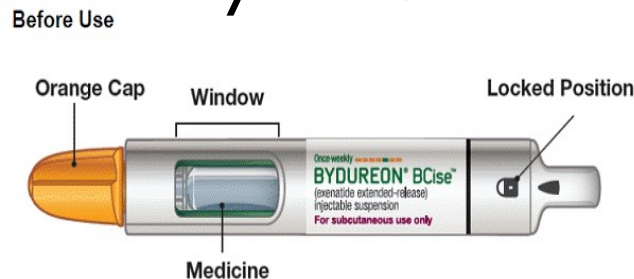
1.2mg, 2 pens/mo
- (15 doses per pen)
1.8mg, 3 pens/month
- (10 doses per pen)
Requires Rx for needles

Adlyxin



Contains 14 doses (20mcg)
2 pens/month
Requires Rx for needles

Bydureon



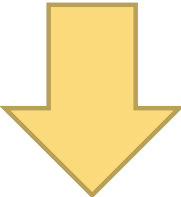
2mg pen
4 pens/month
Shake 15 seconds
Never see needle

Trulicity



0.75, 1.5, 3, 4.5mg pens
4 pens/month
Never see needle

GLP-1 & GIP Receptor Agonists

Class/Main Action	Name	Dose Range	Considerations
GLP-1 RA - Glucagon Like Peptide Receptor Agonist “Incretin Mimetic” - Increases insulin release with food - Slows gastric emptying - Promotes satiety - Suppresses glucagon 	exenatide (Byetta)	5 and 10 mcg BID	Side effects for all: Nausea, vomiting, weight loss, injection site reaction. Report signs of acute pancreatitis (severe abdominal pain, vomiting), stop med. Increase dose monthly to achieve targets. Black box warning: Thyroid C-cell tumor warning (avoid if family history of medullary thyroid tumor). *Significantly reduces risk of CV death, heart attack, and stroke. †Approved for pediatrics 10-17 yrs Lowers A1c 0.5 – 1.6% Weight loss: 4-6% body weight loss.
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	(Rybelsus) Oral tablet	3, 7, and 14 mg daily in a.m. Take on empty stomach w/H2O sip	
GLP-1 & GIP Receptor Agonist Activates receptors for GLP-1 (see above) & Glucose-dependent Insulinotropic Polypeptide (GIP).	Tirzepatide (Mounjaro)	2.5, 5.0, 7.5, 10, 12.5 and 15 mg 1x a week prefilled single dose pen Increase dose by 2.5 mg once monthly to reach targets.	Side effects include: Nausea, diarrhea, injection site reactions. Avoid if family history medullary thyroid tumor. Report pancreatitis or acute gallbladder problems. Lowers A1C ~ 1.8 - 2.4% Weight loss: 7-13% body weight loss at max dose.

Actions of GLP-1 and GIP

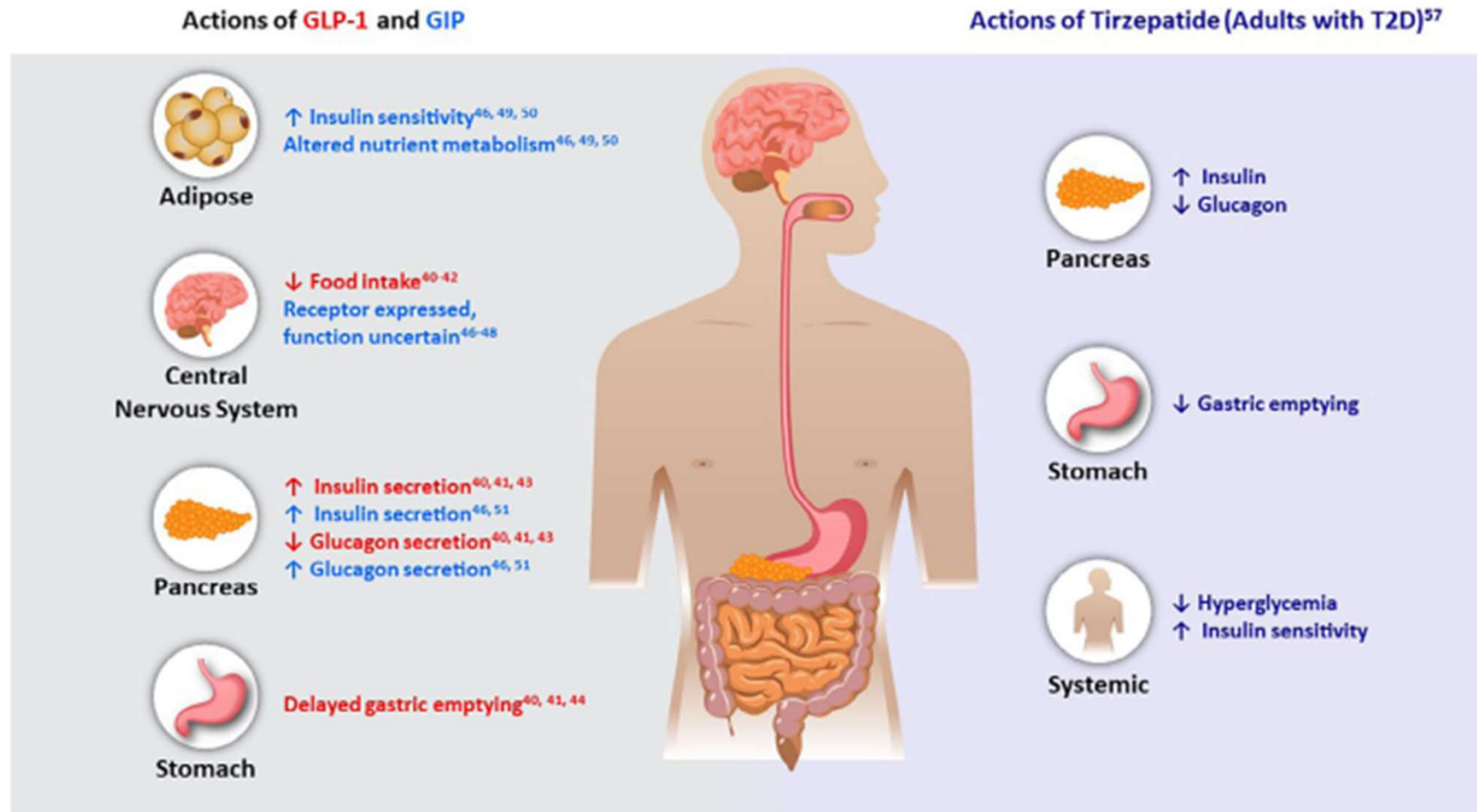


FIGURE 1 Gluco-regulatory actions of GIP and GLP-1 proposed based on preclinical and clinical studies, and actions of tirzepatide in adults with type 2 diabetes. GIP, glucose-dependent insulintropic polypeptide; GLP-1, glucagon-like peptide-1; T2D, type 2 diabetes

Received: 19 May 2022 | Revised: 26 July 2022 | Accepted: 2 August 2022
DOI: 10.1111/dom.14831

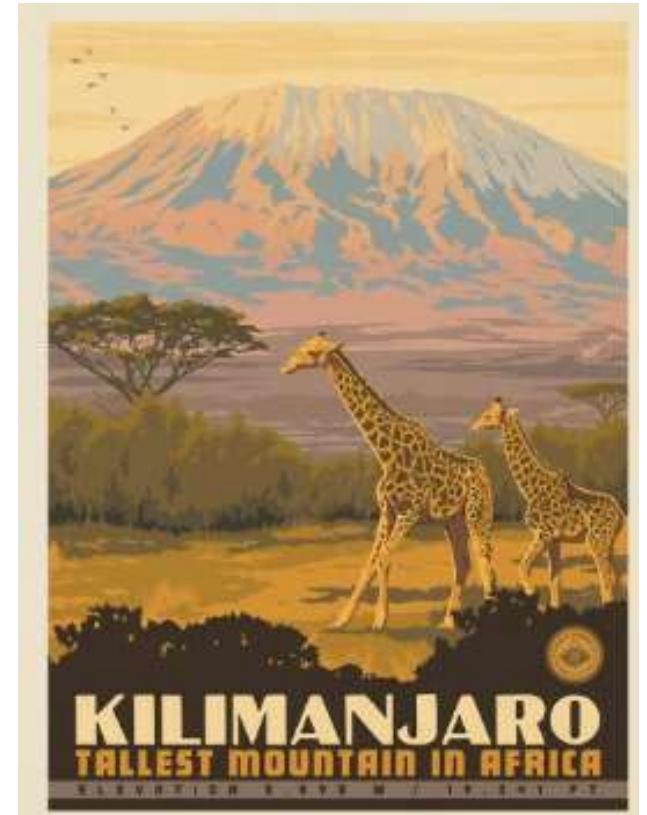
REVIEW ARTICLE

WILEY

Tirzepatide for the treatment of adults with type 2 diabetes:
An endocrine perspective

GIP/GLP-1 Receptor Agonist

- ▶ Tirzepatide (Mounjaro) is a GIP/GLP-1 Receptor Agonist
 - ▶ GIP: glucose-dependent insulinotropic polypeptide
 - ▶ GLP-1: glucagon like peptide-1
- ▶ Studied in the SURPASS clinical program (T2DM)
- ▶ Studied in the SURMOUNT clinical program (Obesity)
- ▶ Once weekly injectable disposable pen: abdomen, legs, arms
- ▶ AWP - \$974 a month



Tirzepatide Wt loss and A1C impact

- ▶ A1C drop in Surpass Trials of
- ▶ 1.9% to 2.6%
- ▶ Weight loss in Surpass Trials of
- ▶ 7.8% to 12.9% or
- ▶ 13.6 to 28.4 pounds
- ▶ Not yet FDA approved as wt loss medication.



Tirzepatide (Mounjaro) Clinical Use

2.5 MG
ONCE WEEKLY



Starting dose (for 4 weeks)

MONTH 1

5 MG
ONCE WEEKLY



For at least 4 weeks

MONTH 2

IF ADDITIONAL GLYCEMIC CONTROL IS NEEDED

7.5 MG
ONCE WEEKLY



For at least 4 weeks

10 MG
ONCE WEEKLY



For at least 4 weeks

12.5 MG
ONCE WEEKLY



For at least 4 weeks

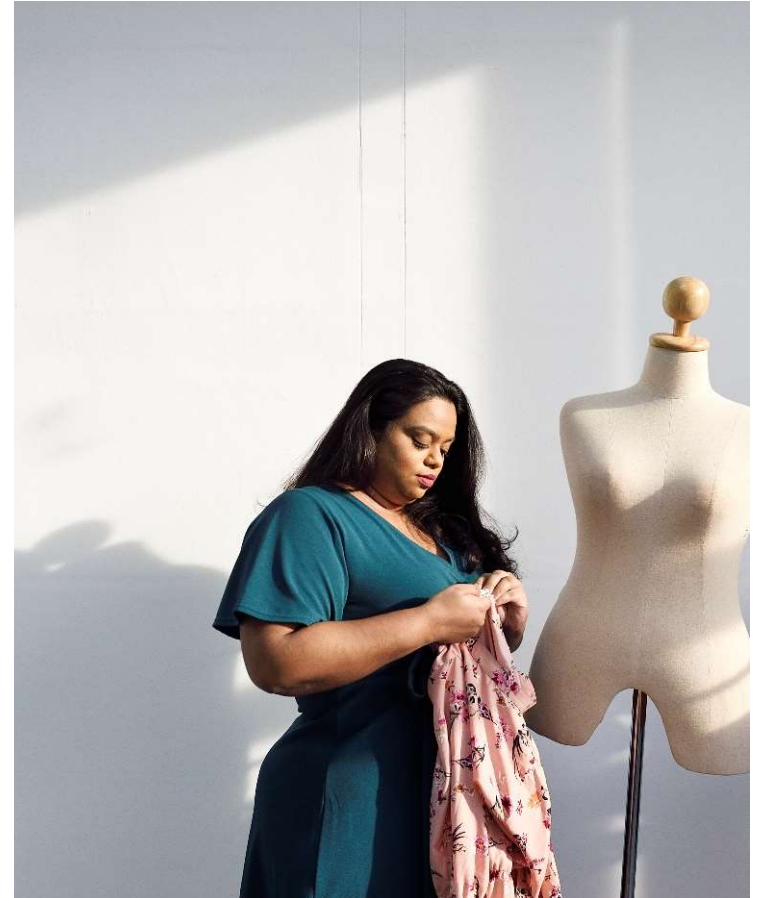
15 MG
ONCE WEEKLY



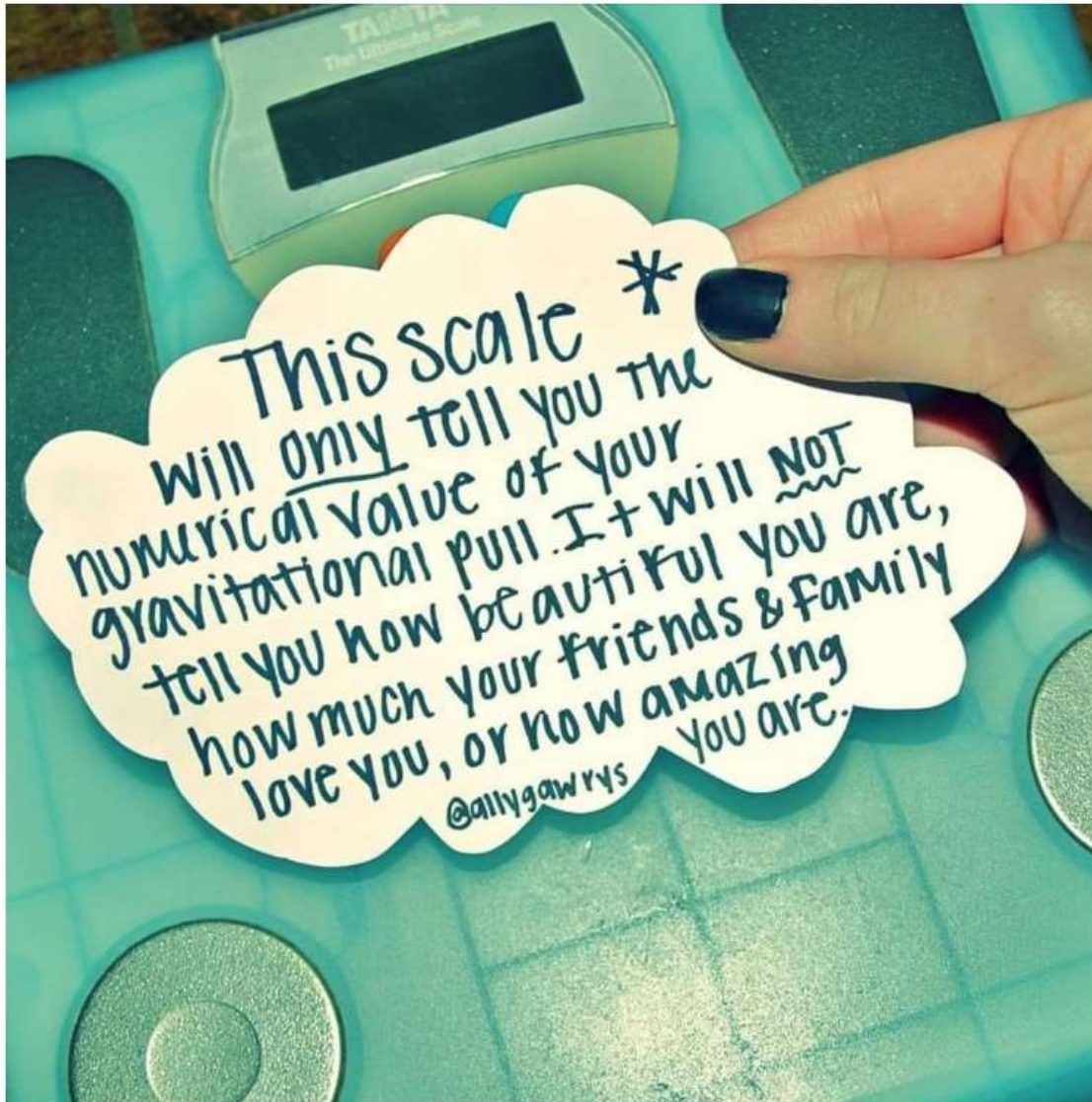
Maximum dose

8. Obesity and Weight Management for Prevention & Treatment of Type 2 Diabetes

- ▶ Use person-centered, nonjudgmental language that fosters collaboration between individuals and health care professionals, including person-first language.
- ▶ *Once a year, calculate BMI and assess weight trajectory to inform approach*
- ▶ Be sensitive and allow for privacy when weighing
- ▶ Individuals with diabetes and overweight or obesity may benefit from modest or larger magnitudes of weight loss of 10% or greater



Weight is a Heavy Issue



GLP-1 RAs Approved for Weight Loss

- ▶ Liraglutide packaged as Victoza and Saxenda
- ▶ Same active ingredient:
 - ▶ Victoza 1.8 mg (diabetes)
 - ▶ Saxenda 3 mg (wt loss)
 - ▶ 6% wt loss, \$1619 a month
- ▶ Semaglutide packaged as Ozempic and Wegovy
 - ▶ Ozempic 2mg (diabetes)
 - ▶ Wegovy 2.4mg (wt loss)
 - ▶ 6% wt loss, \$1619 a month
- ▶ Both FDA approved as treatment option for chronic wt management in addition to reduced calorie diet and physical activity.
- ▶ Approved for use in adults with a
 - ▶ BMI of ≥ 30 or
 - ▶ BMI of ≥ 27 or greater who have hypertension, type 2



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

- ▶ Avoid if personal or family history of medullary thyroid cancer
- ▶ Start at lower dose and titrate
- ▶ Eat smaller *nourishing* meals to reduce nausea
- ▶ Avoid high fat meals -
- ▶ Reconsider nausea as feeling full
- ▶ Store extra pens in fridge
- ▶ Avoid in combo with DPP-4 inhibitors
- ▶ Report any sudden abdominal pain or pancreatitis symptoms
- ▶ Ask about recent eye exam
 - ▶ Potential increase in diabetes retinopathy



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



Common Oral Diabetes Meds

Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors “Glucoretic” Decreases glucose reabsorption in kidneys	Canagliflozin* (Invokana)	100 - 300 mg 1x daily	Side effects: hypotension, UTIs, genital infections, increased urination, weight loss, ketoacidosis. Heart Failure, CV & Kidney Protection: 1st line therapy for Heart Failure (HF), Kidney Disease (CKD), Cardiovascular Disease, before or with metformin. Considerations: See Package Insert (PI) for GFR cut-offs, dosing. Limited BG lowering effect if GFR < 45, still benefits kidneys & heart at lower GFR. If CKD & GFR ≥20, use SGLT-2 to reduce CVD, HF, preserve renal function. (ADA/EASD) Benefits: SGLT-2s* reduce BG, CV death & HF, slow CKD. Lowers A1c 0.6% -1.5%.
	Dapagliflozin* (Farxiga)	5 - 10 mg 1x daily	
	Empagliflozin* (Jardiance)	10 - 25 mg 1x daily	
	Ertugliflozin (Steglatro)	5 – 15 mg 1x daily	
	Bexagliflozin (Brenzavvy)	20 mg 1x daily	

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		Yes w/ Diabetes	Yes
Bexagliflozin (Brenzavvy)	Yes		Yes w/Diabetes	Yes

Mr. J - What are Your Recommendations?

Mr. J Profile

67 yr old with newly type 2.

History of stroke, BMI 26.

Meds: Metoprolol, metformin,
lovastatin 20mg.

Labs:

- ▶ A1c 9.3%
- ▶ LDL 136 mg/dl
- ▶ Triglycerides 260mg/dl
- ▶ GFR 58, UACR 32
- ▶ B/P 142/79
- ▶ Liver enzymes in normal range



Self-Care Skills

- ▶ Goes to gym 2-3 times a week
- ▶ Plays golf on occasion.
- ▶ Eats out 2 times a week.
- ▶ Met with RD, signed up for DSMES.
- ▶ Add SGLT-2i

10. Cardiovascular Disease and Risk Management

- ▶ Atherosclerotic cardiovascular disease (ASCVD) and Heart Failure are leading causes of morbidity and mortality in diabetes.
- ▶ ASCVD includes:
 - ▶ coronary heart disease (CHD),
 - ▶ cerebrovascular disease, or
 - ▶ peripheral arterial disease
- ▶ \$37.3 billion in cardiovascular-related spending per year



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

A diagram shaped like a classical temple. The pediment (roof) is green and contains a gold icon of a person with arms raised. Below the pediment is a green horizontal band with the title 'REDUCTION IN DIABETES COMPLICATIONS'. This band is supported by four gold columns. Each column has a white rectangular panel in the middle, containing text and an icon. The columns rest on a blue and white striped base labeled 'LIFESTYLE MODIFICATION AND DIABETES EDUCATION'. Two circular icons, each showing a group of people, are positioned on the left and right sides of the base.

10. Cardiovascular Disease and Risk Management: *Standards of Care in Diabetes—2023* **FREE**

REDUCTION IN DIABETES COMPLICATIONS

Glycemic Management



Blood Pressure Management



Lipid Management



Agents with Cardiovascular and Kidney Benefit*



LIFESTYLE MODIFICATION AND DIABETES EDUCATION

Assess ASCVD and Heart Failure Risk Yearly

- ▶ Duration of diabetes
- ▶ BMI
- ▶ Hypertension
- ▶ Dyslipidemia
- ▶ Smoking
- ▶ Family history of premature coronary disease
- ▶ Chronic kidney disease – presence of albuminuria



Treat modifiable risk factors as described in ADA guidelines.

Poll Question

- ▶ RJ is a healthy 52 yr old with diabetes. RJ takes an ACE Inhibitor, insulin and a statin. According to ADA Standards of Care 2023, what is the blood pressure target for RJ?
- ▶ A. Less than 120/70
- ▶ B. Less than 130/80
- ▶ C. Less than 140/90
- ▶ D. Less than 135 /85



BP and Diabetes Targets – New 2023

▶ **BP target <130/80** **(if it can be safely attained)**



- ▶ Confirm systolic BP ≥ 130 or diastolic BP ≥ 80 using multiple readings, including measurements on a separate day, to diagnose hypertension.
- ▶ If BP $\geq 180/110$, can be diagnosed at single visit
- ▶ BP target based on ind assessment, shared decision making and potential adverse effects
- ▶ Monitor BP at home and at each visit
- ▶ During pregnancy, with previous history of HTN
 - ▶ B/P Target of 110 -135/85

Studies Demonstrate Benefits

- ▶ The Systolic Blood Pressure Intervention Trial (SPRINT) demonstrated that treatment to a target systolic BP of <120
 - ▶ decreases cardiovascular event rates by 25% in high-risk patients
 - ▶ although people with diabetes were excluded from this trial



- ▶ The Strategy of Blood Pressure Intervention in the Elderly Hypertensive Patients (STEP) trial included
 - ▶ nearly 20% of people with diabetes decreased cardiovascular events with treatment to a BP target of <130

Cost vs Benefit of Treating HTN

- ▶ Consider potential adverse effects of BP medications
 - ▶ Hypotension, syncope, falls, acute kidney injury, and electrolyte abnormalities
 - ▶ Older people, those with chronic kidney disease, and frailty have been shown to be at higher risk
 - ▶ People with orthostatic hypotension, substantial comorbidity, functional limitations, or polypharmacy higher risk and may prefer relaxed B/P targets to enhance quality of life.



HTN Lifestyle Treatment Strategies

- ▶ If BP > 120/80, start with lifestyle
- ▶ DASH Diet
- ▶ Weight loss if indicated
- ▶ Sodium intake <2,300mg/day
- ▶ Eat more fruits & veggies (8-10 a day)
- ▶ Low fat dairy products (2-3 servings/day)
- ▶ Limit alcohol 1-2 drinks a day
- ▶ Increase activity level



BP Treatment in addition to Lifestyle

- ▶ **First Line B/P Drugs if 130/80 +**
 - ▶ With albuminuria* or ASCVD
 - ▶ Start either ACE or ARB
 - ▶ No albuminuria - Any of the 4 classes of BP meds can be used:
 - ▶ ACE Inhibitors, ARBs, thiazide-like diuretics or calcium channel blockers.
 - ▶ Avoid ACE and ARB at same time
 - ▶ Multiple Drug Therapy often required
- ▶ **If B/P $\geq$ 160 /100 start 2 drug combo**

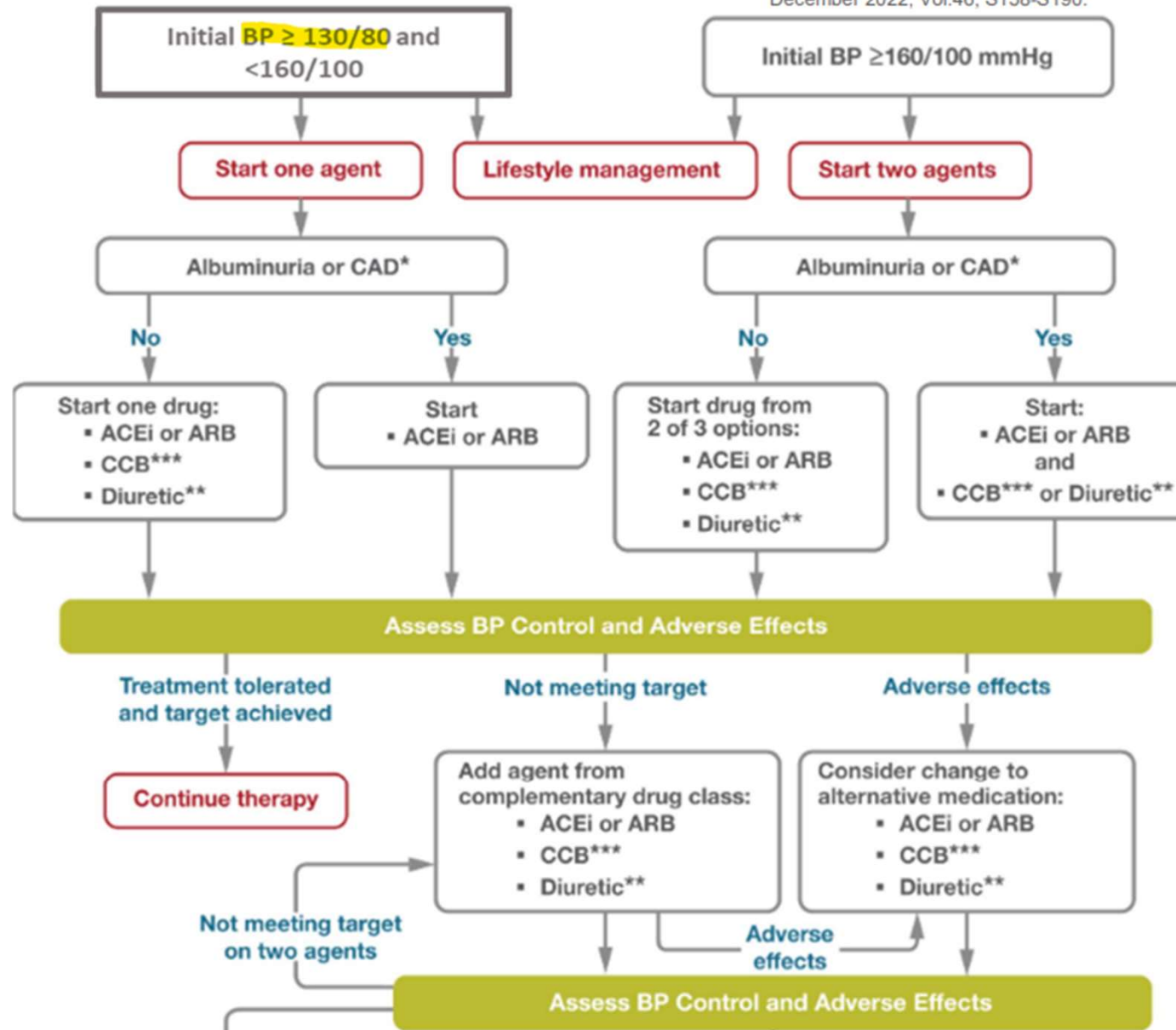


*Albuminuria =
Urinary albumin
creatinine ratio
of 30+

Recommendations for the Treatment of Confirmed Hypertension in People With Diabetes



ADA 2023 Standards of Diabetes Care
December 2022, Vol.46, S158-S190.



BP Goal



BP Goal based on risk

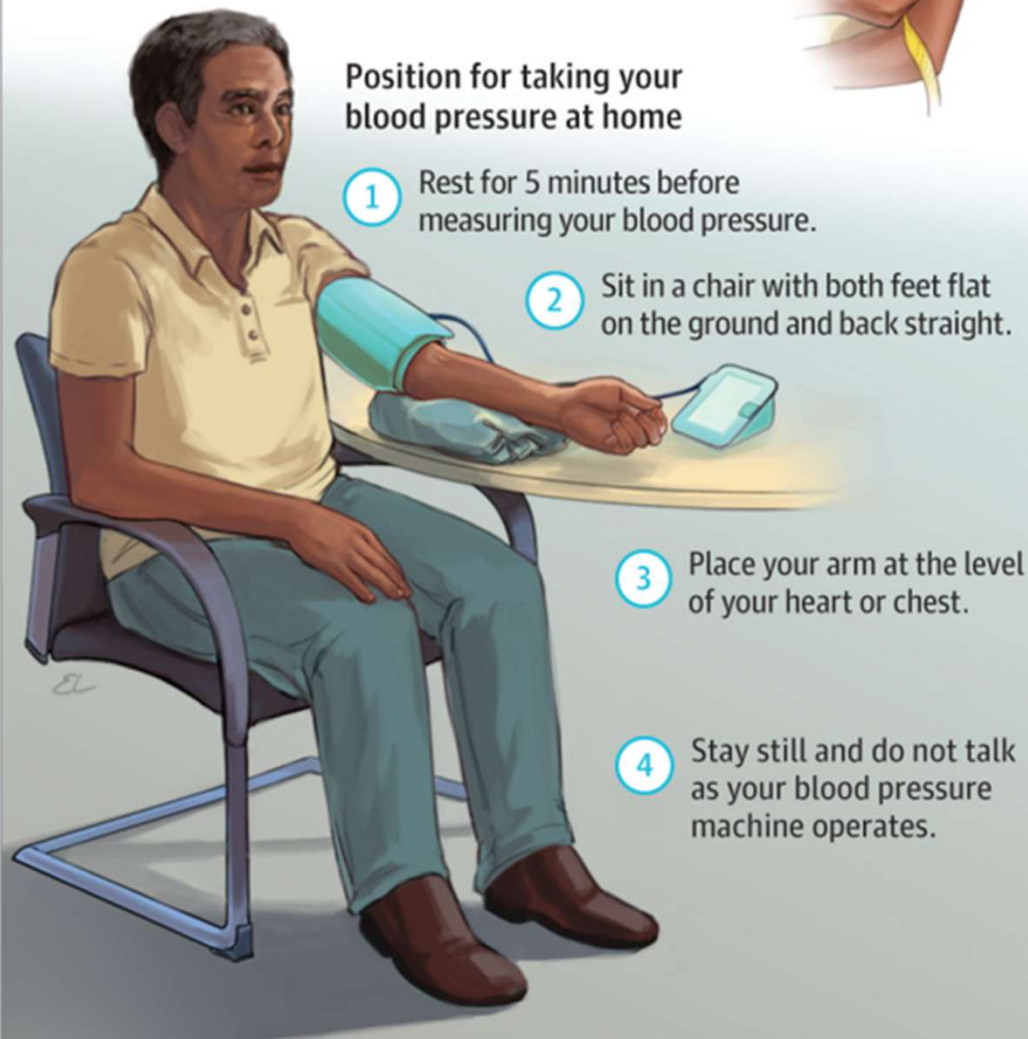
- ▶ Measure B/P at every routine clinical visit.
- ▶ All people with diabetes and HTN need to monitor BP at home.
- ▶ If B/P elevated, confirm B/P using multiple readings, including measurements on a separate day, to diagnose HTN

Choosing the correct blood pressure cuff size

Measure the circumference of your upper arm with a cloth measuring tape midway between the elbow and shoulder. Choose a cuff size that includes this measurement.



Position for taking your blood pressure at home



Measure your blood pressure in the morning right after you wake up or in the evening before you go to bed.

Try to measure your blood pressure at the same time every day.

Poll Question

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

- A. LDL less than 100 mg/dL.
- B. Lower LDL by 30%.
- C. LDL target of 65 mg/dL or less.
- D. Determine LDL target based on ASCVD risk.



New for 2023

Lipid Goals – Primary Prevention

- ▶ For people with diabetes aged 40–75 at higher cardiovascular risk*
 - ▶ (*LDL >100, HTN, Smoke, CKD, albuminuria, family hx ACSVD),
 - ▶ **High-intensity statin** therapy is recommended
 - ▶ **Reduce LDL cholesterol by at least 50% of baseline**
AND
 - ▶ **Target LDL cholesterol <70 mg/dL.**
- ▶ **LDL cholesterol still 70+?**
 - ▶ it may be reasonable to add ezetimibe (Zetia) or a PCSK9 inhibitor to maximum tolerated statin therapy.



Lipid and HTN Meds Cheat Sheets

Cholesterol Medications

LDL Lowering Medications

Class / Action	Generic / Trade Name	Usual Daily Dose Range	LDL % Lowering	Considerations
"Statins" HMG- CoA Reductase Inhibitors Inhibits enzyme that converts HMG-CoA to mevalonate - limits cholesterol production	Atorvastatin / Lipitor*	10 – 80 mg	20- 60	Lowers TGs 7-30% Raise HDL 5-15% Take at night. Side effects: weakness, muscle pain, elevated glucose levels. Review package insert for specific dosing adjustments based on drug, food interactions (ie grapefruit).
	Fluvastatin / Lescol* Lescol XL	20 – 80 mg 80 mg	20- 35	
	Lovastatin* Mevacor Altoprev XL	20 - 80 mg 10 - 60 mg	20- 45	
	Pravastatin / Pravachol*	10 - 80 mg	20- 45	
	Rosuvastatin / Crestor	5 – 40 mg	20- 60	
	Simvastatin / Zocor*	20 – 80 mg	20- 55	
	Pitavastatin / Livalo	2 – 4 mg		
Bile Acid	Cholestyramine/	4 to 16 g per day	Lower LDL	May raise TG levels.

New Lipid Lowering Medications

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

PCSK9 Inhibitors Lipid Medications

Proprotein convertase subtilisin/kexin type 9

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

Antihypertensive Medications

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

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

Website: <https://diabetesed.net/coach-bevs-diabetes-cheat-sheets/>

On CDCES Coach App too

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

Statin Therapy

► Moderate intensity (lowers LDL 30-50%)

- atorvastatin (Lipitor) 10-20mg
- rosuvastatin (Crestor) 5-10mg
- simvastatin (Zocor) 20-40mg
- pravastatin (Pravachol) 40 – 80mg
- lovastatin (Mevacor) 40 mg
- fluvastatin (Lescol) XL 80mg
- pitavastatin (Livalo) 1-4mg

► High intensity statins (lowers LDL 50%):

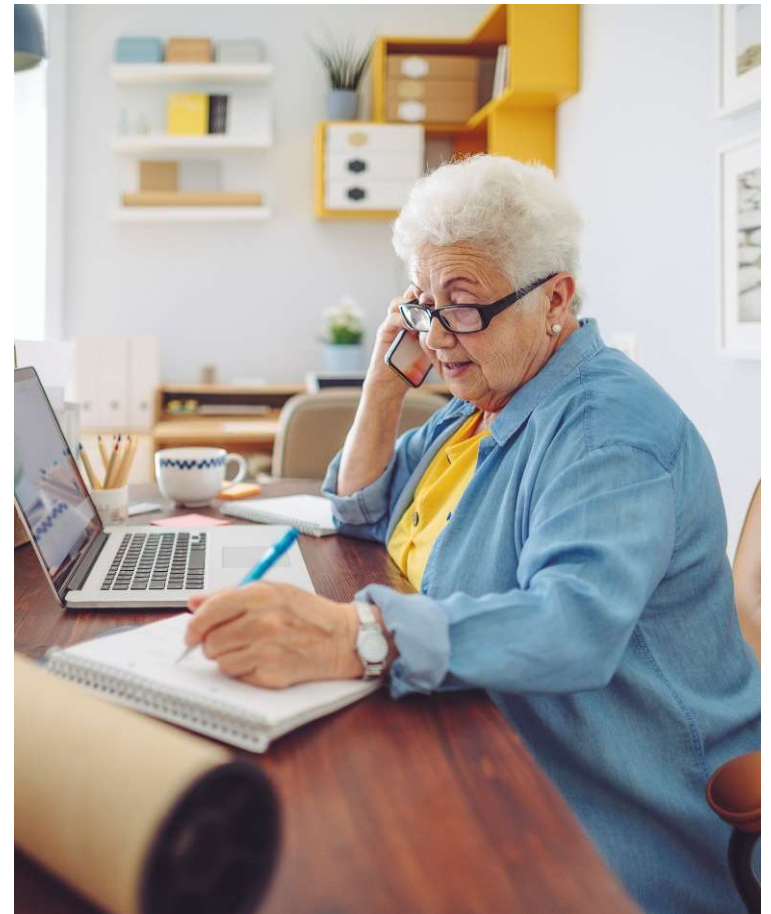
- atorvastatin (Lipitor) 40-80mg
- rosuvastatin (Crestor) 20-40mg



New for 2023

Lipid Goals for People *with* ASCVD

- ▶ For people of all ages with diabetes and atherosclerotic cardiovascular disease:
 - Add high-intensity statin to lifestyle therapy.
 - **Reduce LDL cholesterol by 50% or greater from baseline with LDL cholesterol goal of <55.**
 - Addition of ezetimibe or a PCSK9 inhibitor with proven benefit is recommended if goal is not achieved on maximum tolerated statin therapy.



New for 2023

Lipid Therapy in Diabetes by Age

- ▶ All ages 20+ *with* ASCVD, add high-intensity statin to lifestyle
- ▶ 20–39 and additional ASCVD risk factors
 - ▶ may be reasonable to initiate statin therapy in addition to lifestyle.
- ▶ 40–75 years
 - ▶ Moderate to high intensity statin based on risk (see previous slides)
- ▶ 75 years or older and already on statin
 - ▶ it is reasonable to continue statin treatment.
- ▶ 75 years or older
 - ▶ it may be reasonable to initiate moderate-intensity statin therapy after discussion of potential benefits and risks.

Lipid Monitoring and Lifestyle Treatment Strategies

▶ Lipid Goals

- ▶ HDL >40
- ▶ Triglycerides <150

Monitoring:

If **not** taking statins and underage of 40.

- check at time of diagnosis and every 5 yrs.

On statin

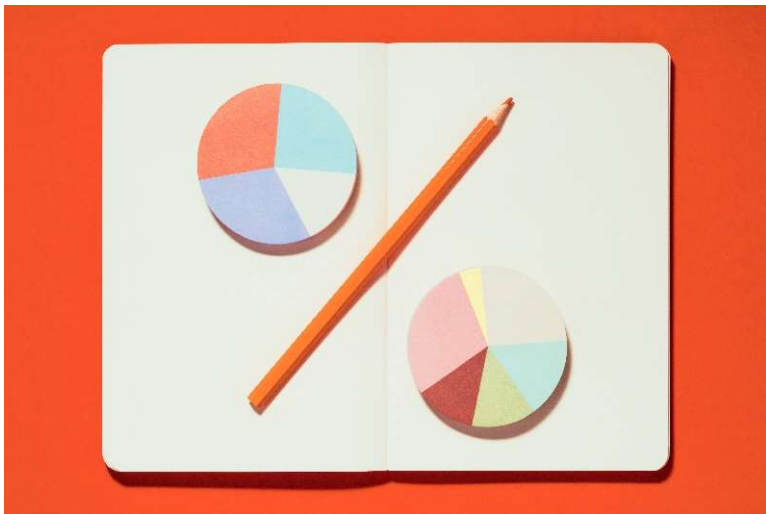
Monitor lipids at diagnosis and yearly.

Monitor lipids 4-12 weeks after statin dose adjustment.

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

Do Statins Work?

- ▶ Meta-analyses, including data from over 18,000 people with diabetes from 14 randomized trials of statin therapy (mean follow-up 4.3 years).



- ▶ Statin therapy demonstrated
 - ▶ 9% proportional reduction in all-cause mortality and
 - ▶ 13% reduction in vascular mortality for each 39 mg/dL reduction in LDL cholesterol

10 - ADA Antiplatelet Agents

- ▶ Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes and a history of atherosclerotic cardiovascular disease.
 - ▶ Aspirin therapy dose (75–162 mg/day)
 - ▶ Increased bleeding risk
- ▶ Aspirin may be considered as a primary prevention strategy in diabetes (usually over age 50) with increased CV risk (family history of premature ASCVD, hypertension, dyslipidemia, smoking, or CKD/albuminuria)
 - ▶ Requires comprehensive discussion w/ person on benefits versus increased risk of bleeding.
 - ▶ Aspirin allergy, consider different agent



Mr. J - What are Your Recommendations?

Mr. J Profile

67 yr old with type 2. History of stroke, BMI 26.

Meds: Metoprolol, metformin, lovastatin 20mg.

Labs:

- ▶ A1c 7.9%
- ▶ LDL 136 mg/dl
- ▶ Triglycerides 260mg/dl
- ▶ GFR 58, UACR 32
- ▶ B/P 142/79
- ▶ Liver enzymes in normal range

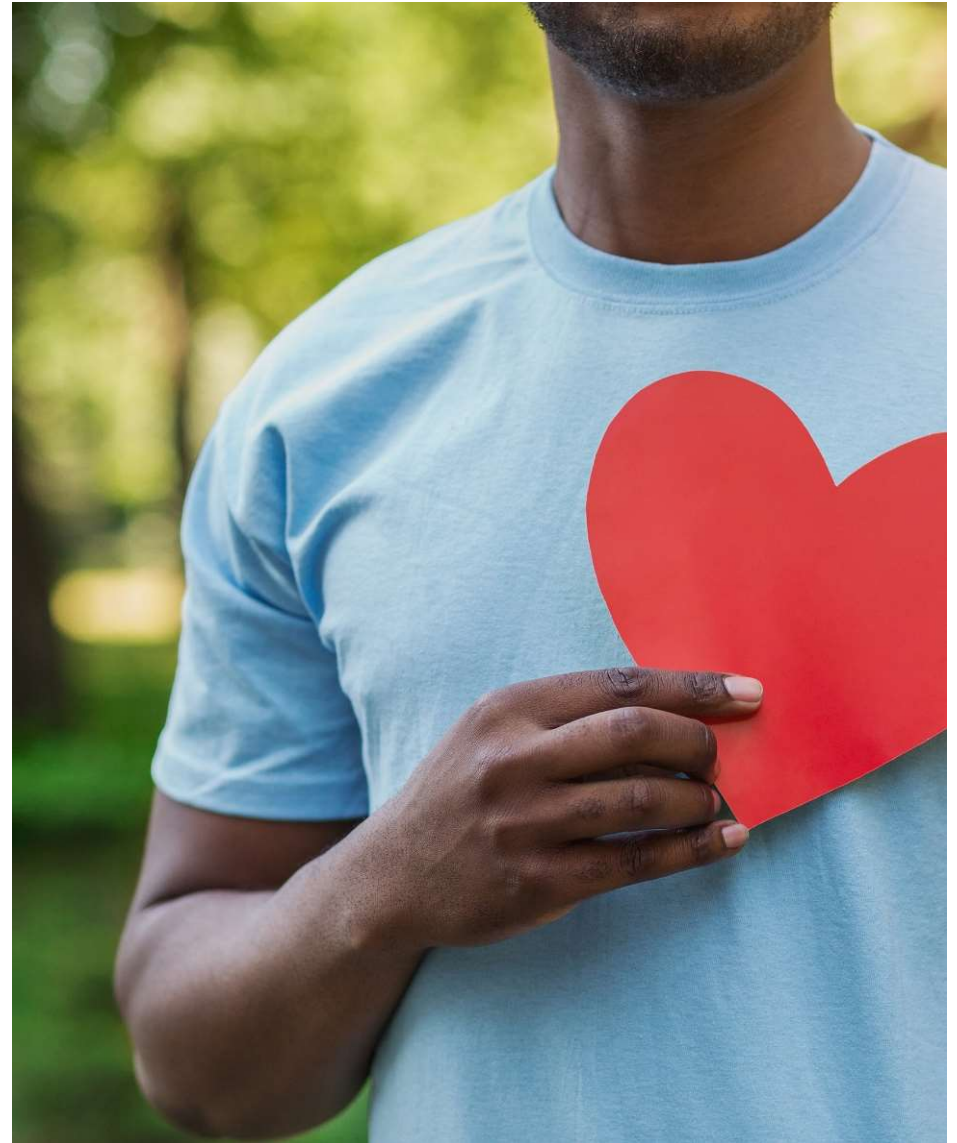


Self-Care Skills

- ▶ Goes to gym 2-3 times a week
- ▶ Plays golf on occasion.
- ▶ Eats out 2 times a week.
- ▶ Met with RD, signed up for DSMES.
- ▶ Adding SGLT-2i
- ▶ Increase Statin
- ▶ Add Aspirin
- ▶ Add ACE or ARB
- ▶ Consider GLP-1 RA

Diabetes Meds Lower CV Risk

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



Coronary Vessel Disease Meds

- ▶ In those with known CVD,:
 - ▶ Get blood glucose to goal
 - ▶ Statin therapy
 - ▶ B/P Med (ACE or ARB)
 - ▶ Aspirin (or another agent)
 - ▶ **Diabetes Meds that significantly decrease CV events:**
 - ▶ *SGLT-2i's
 - Empagliflozin (Jardiance), canagliflozin (Invokana), dapagliflozin (Farxiga)
 - ▶ *GLP-1 RA's
 - Semaglutide (Ozempic), liraglutide (Victoza), dulaglutide (Trulicity)



Poll Question

- ▶ PL is newly diagnosed with type 2. A1c is 7.9. GFR is 63. UACR 26 mg/g. History of CHF. According to 2023 ADA Standards, what med along with lifestyle should be started first?
 - a. Only Metformin, since A1c is close to target.
 - b. SGLT-2 inhibitor
 - c. Sulfonylurea
 - d. GLP-1 or Metformin



New 2023 Standard 11 - Chronic Kidney Disease and Risk Management

- ▶ Optimize glucose and B/P Control to protect kidneys
- ▶ Screen Urine Albumin Create ratio (UACR) & GFR
 - ▶ Type 2 at dx then yearly
 - ▶ Type 1 with diabetes for 5 years, then yearly
 - ▶ If urinary albumin ≥ 300 and GFR 30–60 monitor 1-4 times a year to guide therapy.
- ▶ Treat hypertension with ACE or ARB and for elevated albumin-to-creatinine ratio of 30 -299.
- ▶ Monitor serum creat and K+
 - ▶ if on ACE, ARB or diuretics

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

NEW 2023

Standard 11 – Protect Kidneys

- ▶ Diabetes with a
 - GFR ≥ 20 and
 - UACR ≥ 200 mg/g
- ▶ Start SGLT2 to reduce chronic kidney disease progression and cardiovascular events.
- ▶ If type 2 diabetes and established Chronic Kidney Disease (CKD)
 - ▶ Start nonsteroidal mineralocorticoid receptor antagonist (finerenone) and/or GLP-1 RA recommended for cardiovascular risk reduction.



Kidney Goals and MNT

- ▶ In people with chronic kidney disease with UACR ≥ 300 mg/g
- ▶ Goal is a reduction of 30% or greater in mg/g urinary albumin to slow chronic kidney disease progression
- ▶ **Nutrition Recommendations**
- ▶ For people with non–dialysis-dependent stage 3 or higher chronic kidney disease
 - ▶ dietary protein intake aimed to a target level of 0.8 g/kg body weight per day.
- ▶ For those on dialysis,
 - ▶ consider higher levels of dietary protein intake since protein energy wasting is a major problem in some individuals on dialysis





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- ▶ Thank you!
- ▶ Please email or call us with any questions.
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- ▶ www.diabetesed.net
- ▶ 530-893-8635