Cardiovascular Disease and Diabetes
ADA Standards 2023

DiabetesEd.net

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DiabetesEd.net Website Orientation

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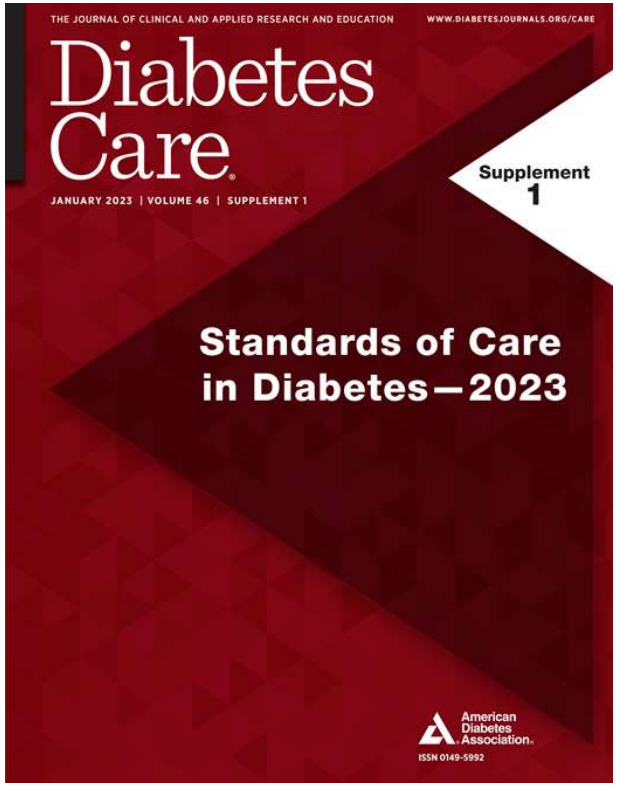
Coach Bev has no conflict of interest

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

Standards & Resources



9. Pharmacologic Approaches to Glycemic Treatment: *Standards of Care in Diabetes—2023*

FREE

Nuha A. ElSayed; Grazia Aleppo; Vanita R. Aroda; Raveendhara R. Bannuru; Florence M. Brown; Dennis Bruemmer; Billy S. Collins; Marisa E. Hilliard; Diana Isaacs; Eric L. Johnson; Scott Kahan; Kamlesh Khunti; Jose Leon; Sarah K. Lyons; Mary Lou Perry; Priya Prahalad; Richard E. Pratley; Jane Jeffrie Seley; Robert C. Stanton; Robert A. Gabbay; on behalf of the American Diabetes Association

Abstracts | View article | PDF

Topics: diabetes mellitus, type 1, diabetes mellitus, type 2, glucose, insulin, hypoglycemia

Diabetes Care December 2022, Vol.46, S140-S157. doi:https://doi.org/10.2337/dc23-S009

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

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Nuha A. ElSayed; Grazia Aleppo; Vanita R. Aroda; Raveendhara R. Bannuru; Florence M. Brown; Dennis Bruemmer; Billy S. Collins; Sandeep R. Das; Marisa E. Hilliard; Diana Isaacs; Eric L. Johnson; Scott Kahan; Kamlesh Khunti; Mikhail Kosiborod; Jose Leon; Sarah K. Lyons; Mary Lou Perry; Priya Prahalad; Richard E. Pratley; Jane Jeffrie Seley; Robert C. Stanton; Robert A. Gabbay; on behalf of the American Diabetes Association

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Topics: atherosclerosis, cardiovascular death, cardiovascular diseases, cardiovascular system, diabetes mellitus, type 2

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11. Chronic Kidney Disease and Risk Management: *Standards of Care in Diabetes—2023*

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Nuha A. ElSayed; Grazia Aleppo; Vanita R. Aroda; Raveendhara R. Bannuru; Florence M. Brown; Dennis Bruemmer; Billy S. Collins; Marisa E. Hilliard; Diana Isaacs; Eric L. Johnson; Scott Kahan; Kamlesh Khunti; Jose Leon; Sarah K. Lyons; Mary Lou Perry; Priya Prahalad; Richard E. Pratley; Jane Jeffrie Seley; Robert C. Stanton; Robert A. Gabbay; on behalf of the American Diabetes Association

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This course is a part of our LEVEL 2 Series.

Course Objectives

1. The impact of insulin resistance & hyperglycemia on vessel disease.
2. State the complications & factors associated with vascular disease.
3. List management goals to reduce the risk of vascular disease.
4. Discuss strategies to promote health.

Poll question 1

- What is the relationship between diabetes and cardiovascular disease?

A. Diabetes is associated with a lower rate of congestive heart failure.

B. Diabetes is associated with decreased incidence of heart attack and stroke

C. People with diabetes are destined to get CV complications.

D. People with diabetes can decrease their risk of a CV event

Cardiovascular Disease is the Leading Cause of Death in Diabetes

Good news is that ASCVD mortality is decreasing.

- What can we do to decrease ASCVD?
  - Address individual risk factors
  - Address multiple risk factors simultaneously

Poll question 2

- Which of the following Cardiovascular Conditions are associated with diabetes?

A. Congestive Heart Failure

B. Hypervasodilation

C. Acanthosis Nigricans

D. CardioNephritis

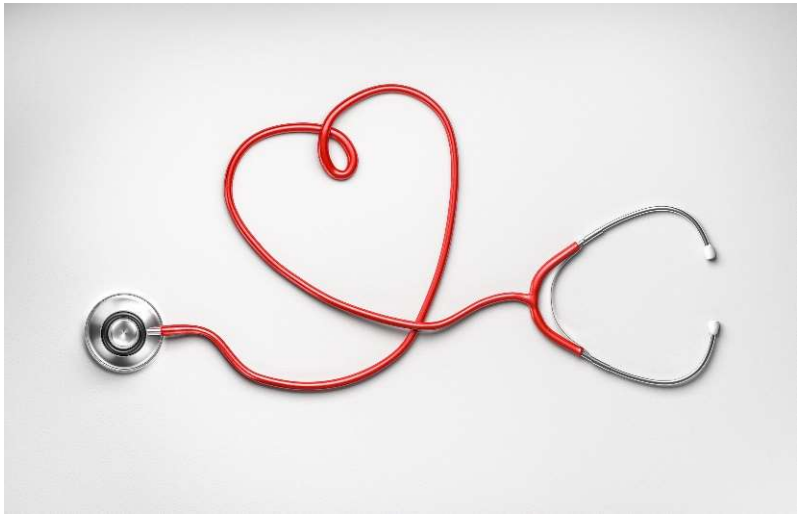
Heart Disease & DM = 3-5xs Risk

- CHF
  - 7.9 % w/ diabetes vs.
  - 1.1 % no diabetes
- Heart attack
  - 9.8 % w/ diabetes vs.
  - 1.8 % no diabetes
- Coronary heart disease
  - 9.1 % w/ diabetes vs.
  - 2.1 % no diabetes
- Stroke
  - 6.6 % w/ diabetes vs.
  - 1.8 % no diabetes

AACE Website

Atherosclerotic Cardiovascular Disease (ASCVD)

- ASCVD is defined as:
  - Coronary heart disease
  - Cerebrovascular disease
  - Peripheral arterial disease



- Targets
  - 64% of ind's met A1c targets
  - 70% achieved BP targets
  - 57% met LDL target
  - In total, 23% met all targets

- Largest contributor to direct and indirect costs - $37.3 billion/year
- Rates of heart failure hospitalization are 2x higher in people with diabetes

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.

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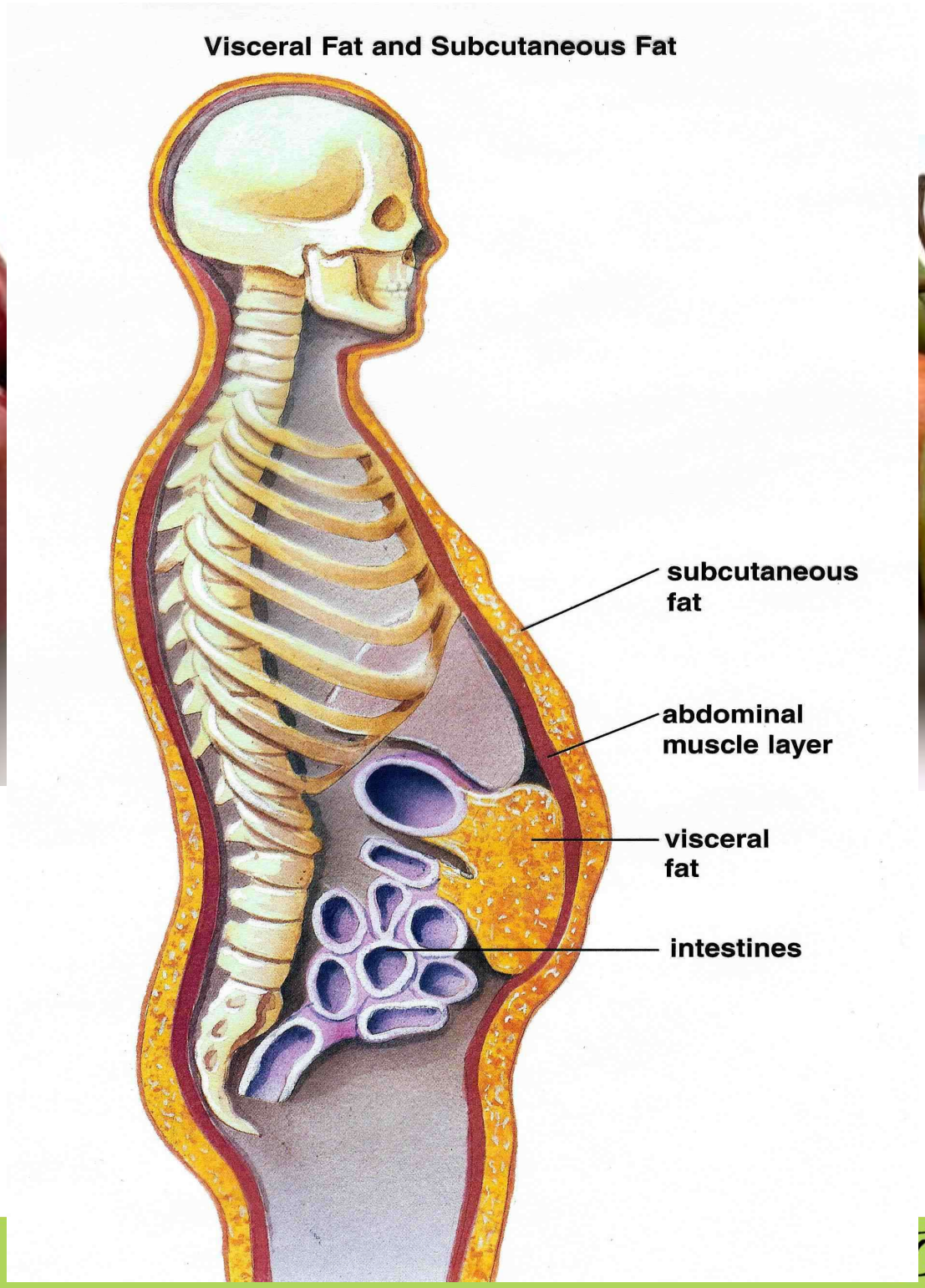
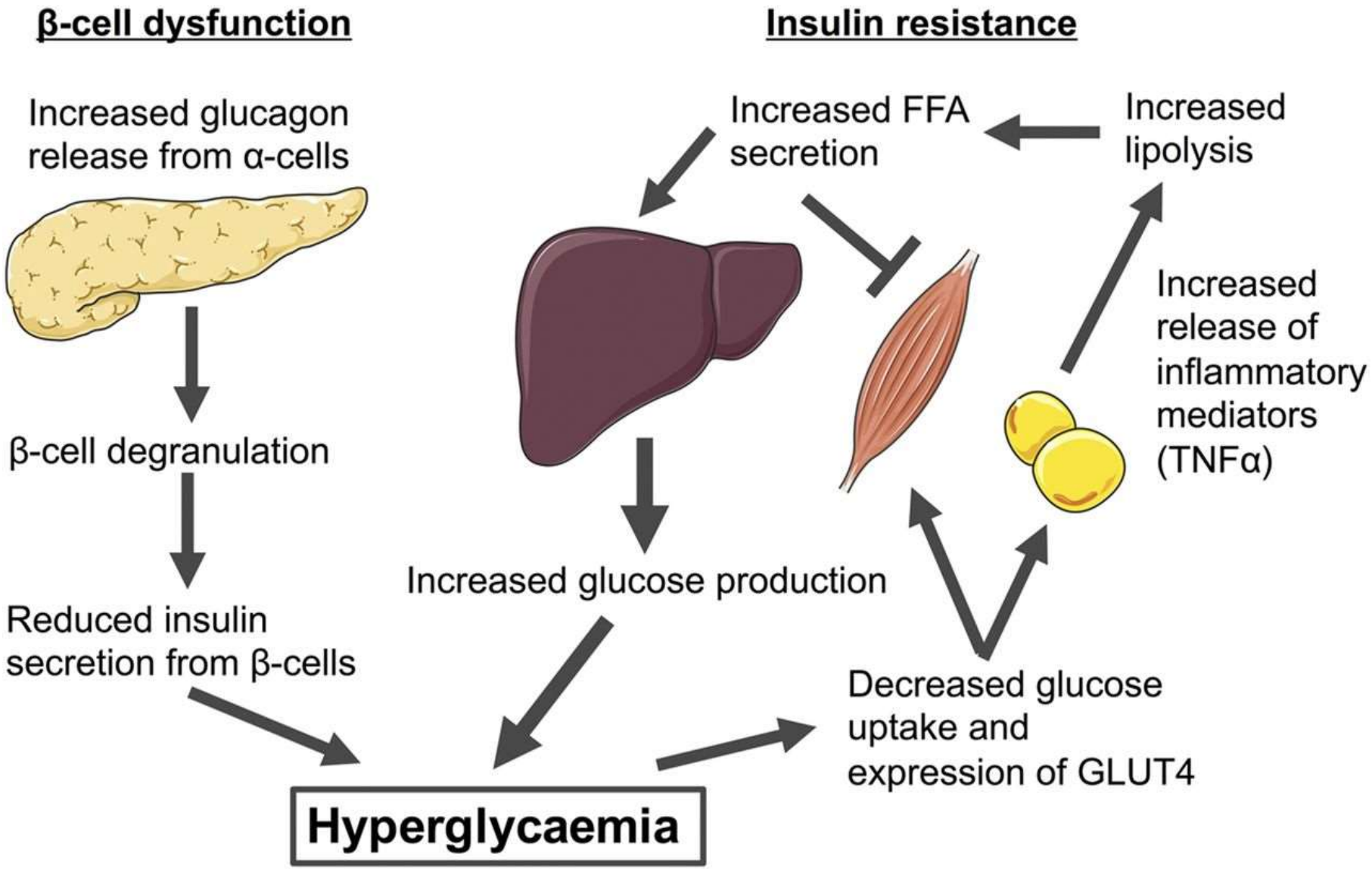
Insulin Resistance is the Seed

- Muscles are insulin resistant
  - Building muscle decreases insulin resistance
- Fat cells become more insulin resistant
  - Leads to more Free Fatty Acids and Triglycerides
  - More vascular inflammation
- Liver and Pancreas becomes fatty
  - Losing weight and activity helps improve



Diabetes Education SERVICES

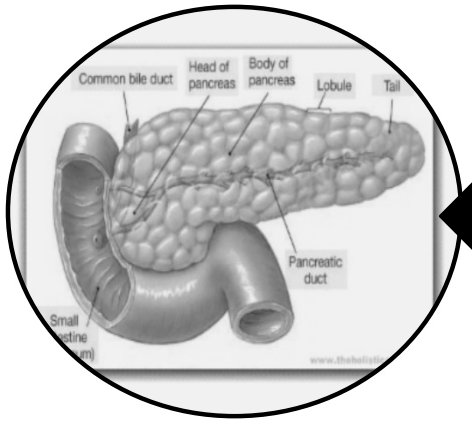
Insulin Resistance



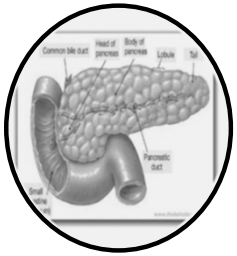
Poll question 3

- Which of the following BEST describes insulin resistance?
  a. Visceral adipose tissue.
  b. Excessive triglyceride levels
  c. Lack of sufficient insulin receptors on fat and muscle cells.
  d. Down regulation of Glut-4 transporters

Natural History of Diabetes



Yes!



NO

Healthy

FBG <100

Random <140

A1c <5.7%

Prediabetes

FBG 100-125

Random 140 - 199

A1c ~ 5.7- 6.4%

50% working pancreas

Diabetes

FBG 126 +

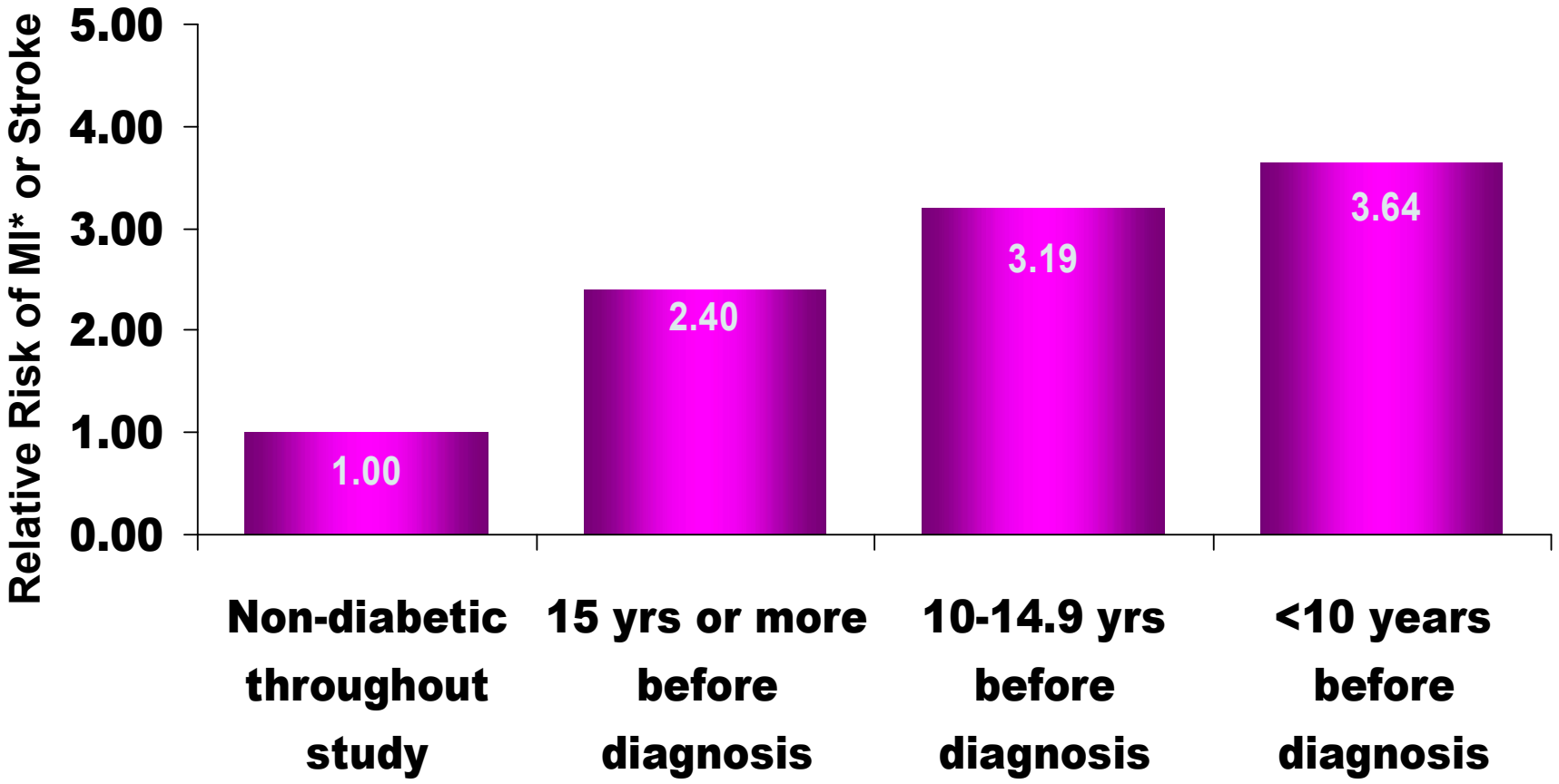
Random 200 +

A1c 6.5% or +

20% working pancreas

Development of type 2 diabetes happens over years or decades

Risk of CVD Is Elevated prior to Diagnosis of Type 2 Diabetes

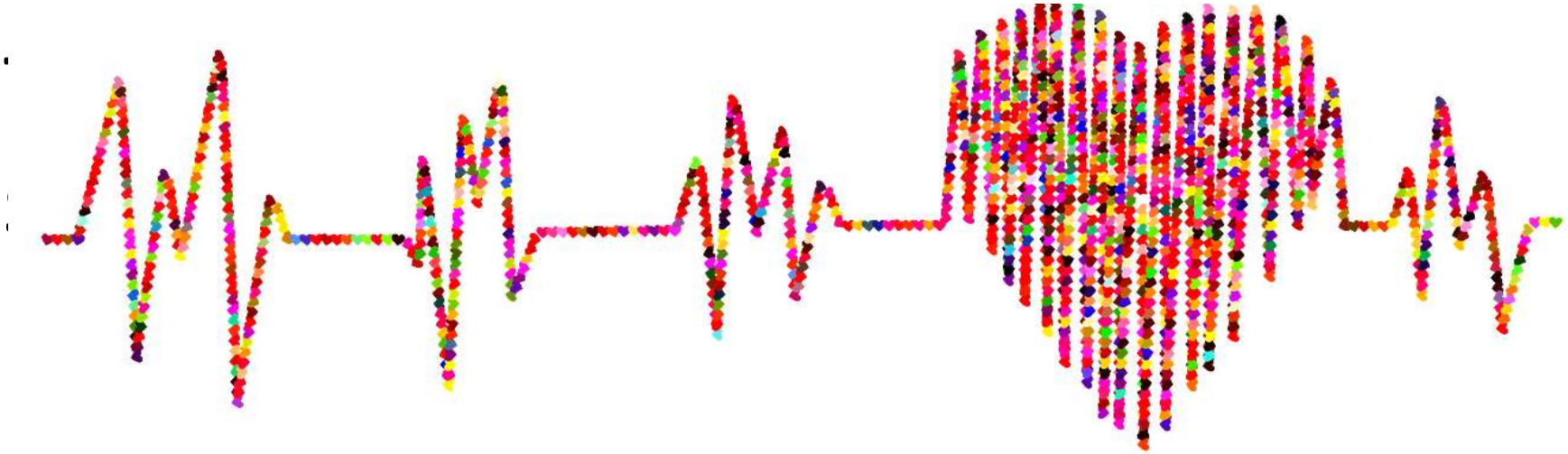


*MI = myocardial infarction. Nurses Health Study

Adapted from: Hu F, et al. *Diabetes Care.* 2002;25:1129-1134.

3. PreDiabetes Matters

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



Standards of Medical Care in Diabetes - 2022

Cardio Metabolic Risk -
5 Hypers -

- Hyperinsulinemia (resistance)
- Hyperglycemia
- Hyperlipidemia
- Hypertension
- Hyper”waistline”emia (35” women, 40” men)

Manifestations of Insulin Resistance

Stroke and Heart Attack

- Pain or discomfort in your arms, back, jaw, neck, or stomach
- Shortness of breathing
- Sweating
- Nausea
- Light-headedness

Make sure people with diabetes know the signs and seek immediate help.

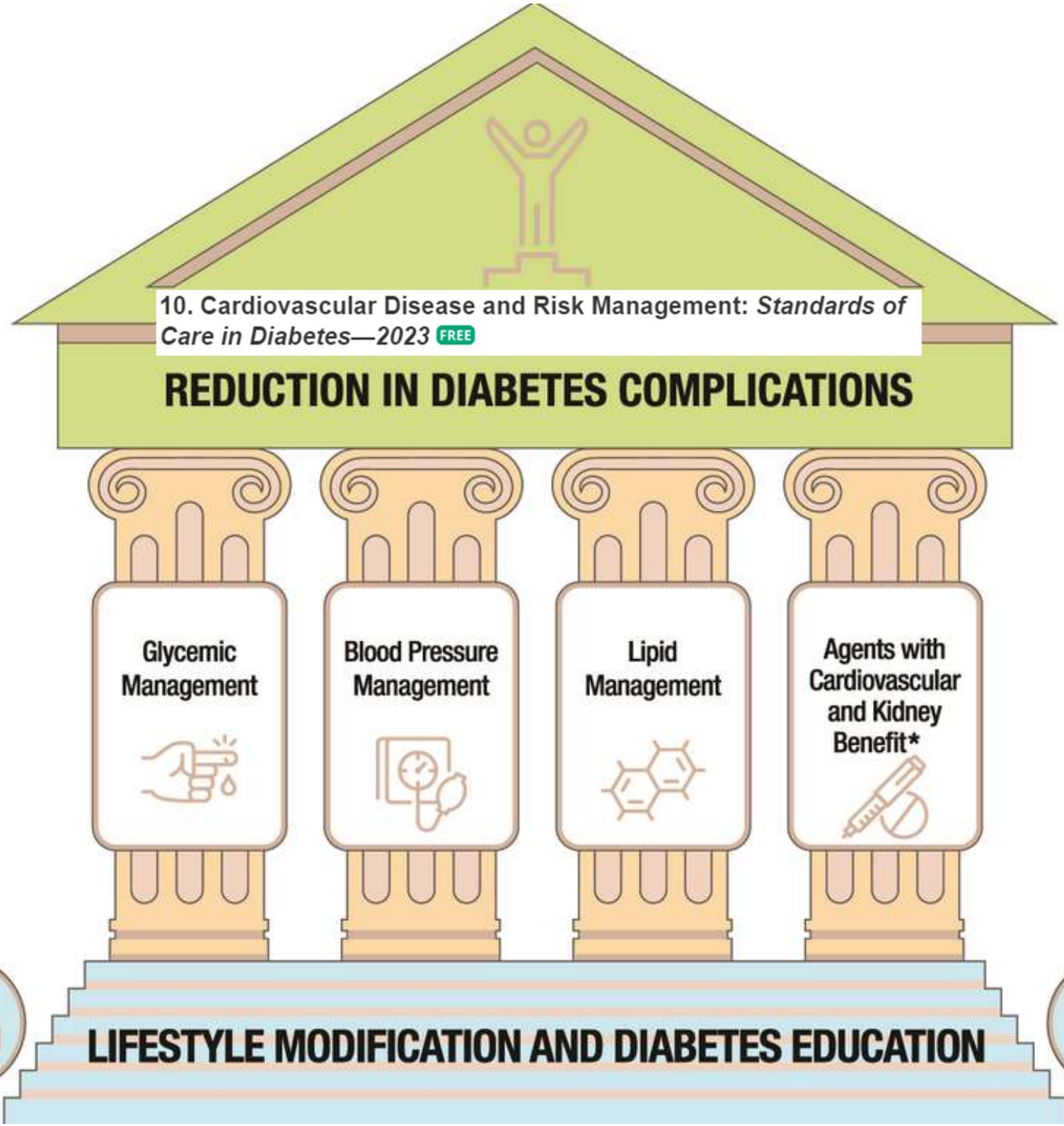
People with diabetes may not experience intense chest or jaw pain during heart attack due to neuropathy.

What is Type 2 Diabetes?

- Complex metabolic disorder ….
  (Insulin resistance and deficiency)

with social, behavioral and environmental risk factors unmasking the effects of genetic susceptibility.

New Diagnosis?
Call 800 – DIABETES to request "Getting Started Kit"
www.Diabetes.org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REDUCTION IN DIABETES COMPLICATIONS
Glycemic Management
Blood Pressure Management
Lipid Management
Agents with Cardiovascular and Kidney Benefit*
LIFESTYLE MODIFICATION AND DIABETES EDUCATION

ABC's of Diabetes - 2023

- A1c less than 7% (individualize)
  - Pre-meal BG 80-130
  - Post meal BG <180
  - AGP - 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 50%, LDL <70
  - If 40+ with ASCVD, decrease 50%, LDL <55
  - Triglycerides <150, HDL> 40

Discouraged with diabetes

It's Worth IT! You are Worth IT!

- Legacy Effect
- For participants of DCCT and UKPDS
  - long lasting benefit of early intensive BG control prevents
    - Macrovascular complications
      - 42% reduction in CV disease
      - 57% reduction in nonfatal MI, Stroke or CVD death
    - Microvascular complications
    - Even though their BG levels increased
  - Message – Catch early and Treat aggressively

Clinical Inertia Happens

- Reassess every 3-6 months

- CV guidelines are for Type 1 and Type 2 nonpregnant Adults
- For Peds, Level 2 Tots to Teen Course or review ADA Standard 14

AR with Type 2 in Clinic

- 62 yrs old, A1c 10.6%.
- 100 units glargine plus metformin 1000mg BID.
- BMI 39, B/P 138/78
- LDL 148, Trig 282
- UACR 319 mg/g, GFR 49
- Other Meds: atorvastatin 20mg, metoprolol, Flonase

- Daily habits / Hx
  - Mostly sedentary, takes care of mom
  - Dad died at 53 of MI
  - BMI was 43 last year
  - Skips meds sometimes
  - Sleep 5-6 hours a night
  - Doesn't drink, smokes ½ pack a day
  - Eats fast food 4-6 times a week

Standard 11 – CardioRenal Connection

- Albuminuria associated with ASCVD
- Optimize glucose and BP to protect kidneys and prevent ASCVD
- Screen Urine Albumin Creatinine 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 ACEI or ARB and for elevated albumin-to-creatinine ratio of 30 or greater.
- 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

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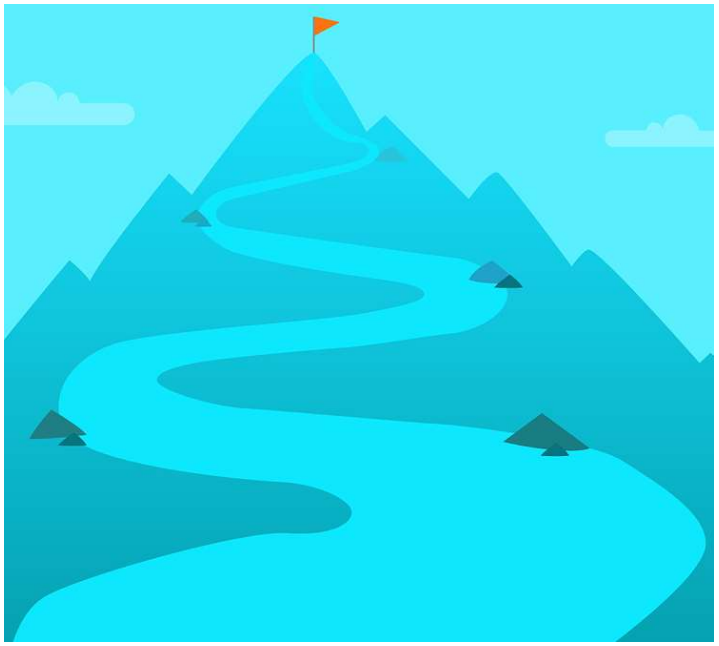
Reducing Vascular Risk Factors For Type 1 and Type 2

- Modifiable
  - Sleep
  - Smoking
  - Oral Care
  - Weight
  - Dietary Habits
  - Glucose
  - Blood Pressure
  - Lipids
  - UACR



- Make small, achievable goals. We are in this for the long run.

Where do We Start?

Get at least 7 hours of sleep a night – Check for sleep apnea

Poll Question 4

- Which of the following is the best recommendation to protect cardiovascular health?

A. Avoid all fast foods

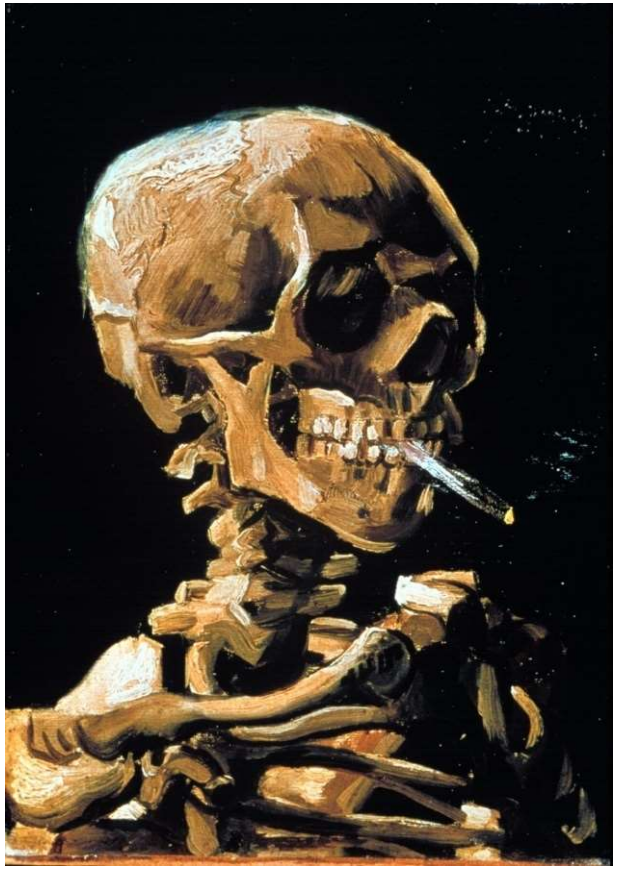
B. Stop smoking

C. Keep B/P as low as possible

D. Eliminate sugar from diet

Smoking and Diabetes

Smoking increases risk of diabetes 30%



- Ask at every visit
- Assess
- Advise
- Assist with stop smoking
- Arrange for referrals
- Organize your clinic

DASH Diet – Dietary Approaches to Stop Hypertension

- The DASH diet emphasizes vegetables, fruits and low-fat dairy foods — and moderate amounts of whole grains, fish, poultry, nuts.
- Pt recommendations
  - Eat lots of whole grains, fruits, vegetables and low-fat dairy products.
  - Also includes some fish, poultry and legumes, and encourages a small amount of nuts and seeds a few times a week.
  - Red meat, sweets and fats in small amounts.
  - Focus on low saturated fat, cholesterol, total fat.

Mediterranean Diet Pyramid

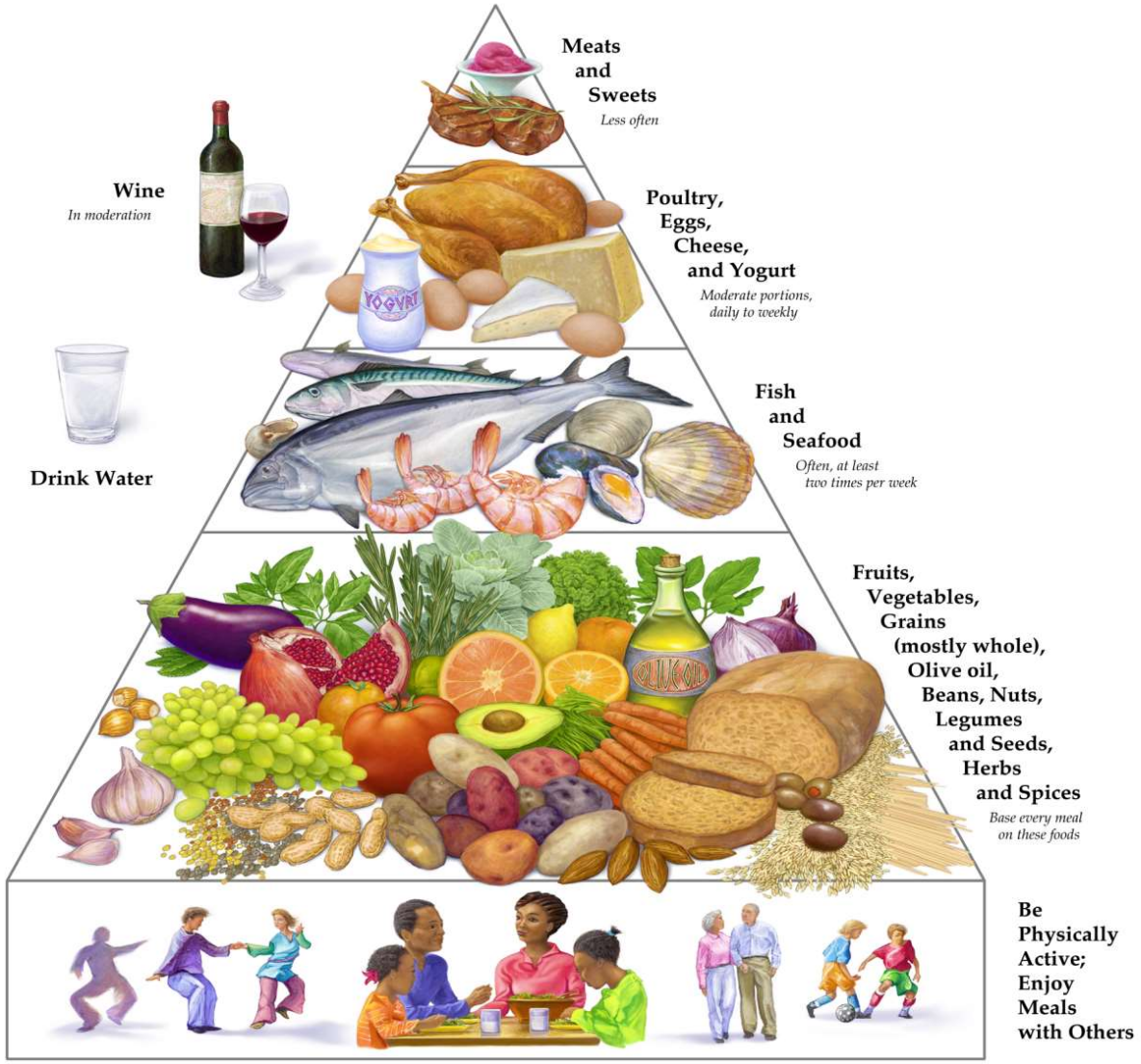


Illustration by George Middleton

Benefits of Exercise and Diabetes

- Increase muscle glucose uptake 5-fold
- Glucose uptake remains elevated for 24 - 48 hours (depending on exercise duration)
- Increases insulin sensitivity in muscle, fat, liver.
- Reduce CV Risk factors (BP, cholesterol, A1c)
- Maintain wt loss
- Contribute to well being
- Muscle strength
- Better physical mobility

AR with Type 2 in Clinic

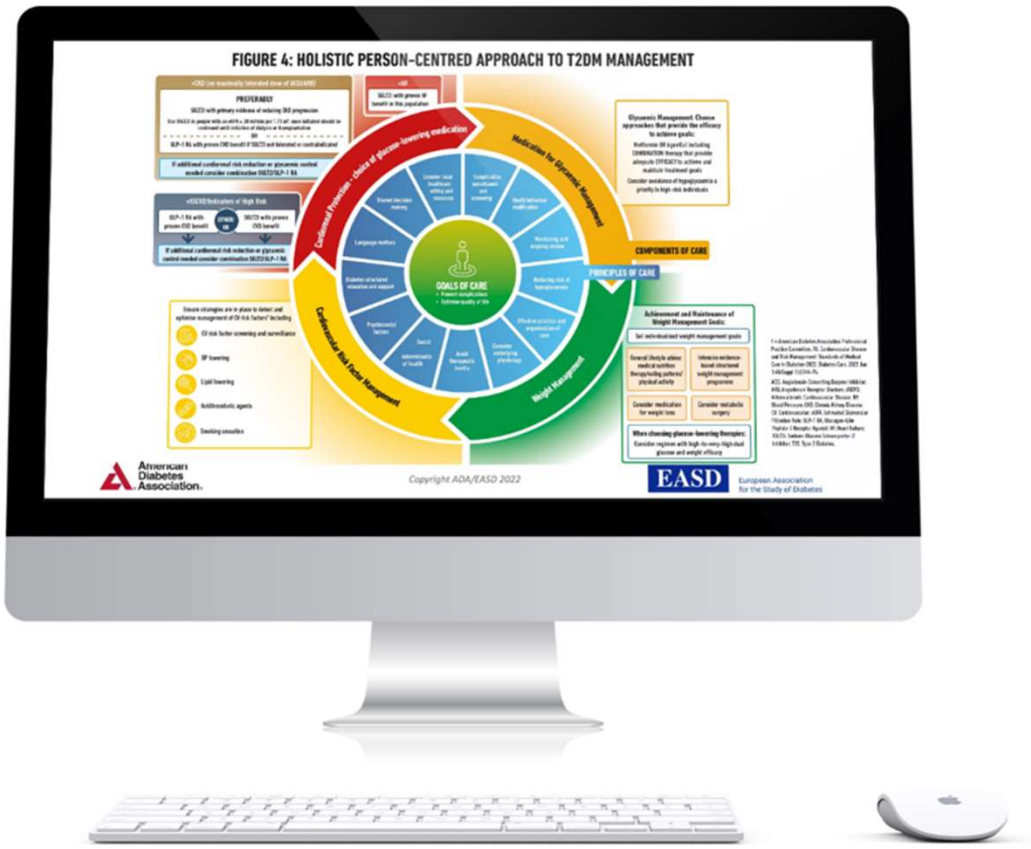
Behavior Changes Goals collaboration:

- Walk after dinner 3 times a week
- Eat fast food 3 times a week
- Make appointment with RD/ DSME
- Take medications everyday
- Consider starting Chantix to decrease smoking

- Daily habits / Hx
  - Mostly sedentary, takes care of mom
  - Dad died at 53 of MI
  - BMI was 43 last year
  - Sleep 5-6 hours a night
  - Doesn't drink, smokes ½ pack a day
  - Eats fast food 4-6 times a week

Section 9 Updates - 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



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- 100 units glargine plus metformin 1000mg BID.
- BMI 39, B/P 138/78
- LDL 148, Trig 282
- UACR 319, GFR 49
- Other Meds: atorvastatin 20mg, metoprolol, Flonase

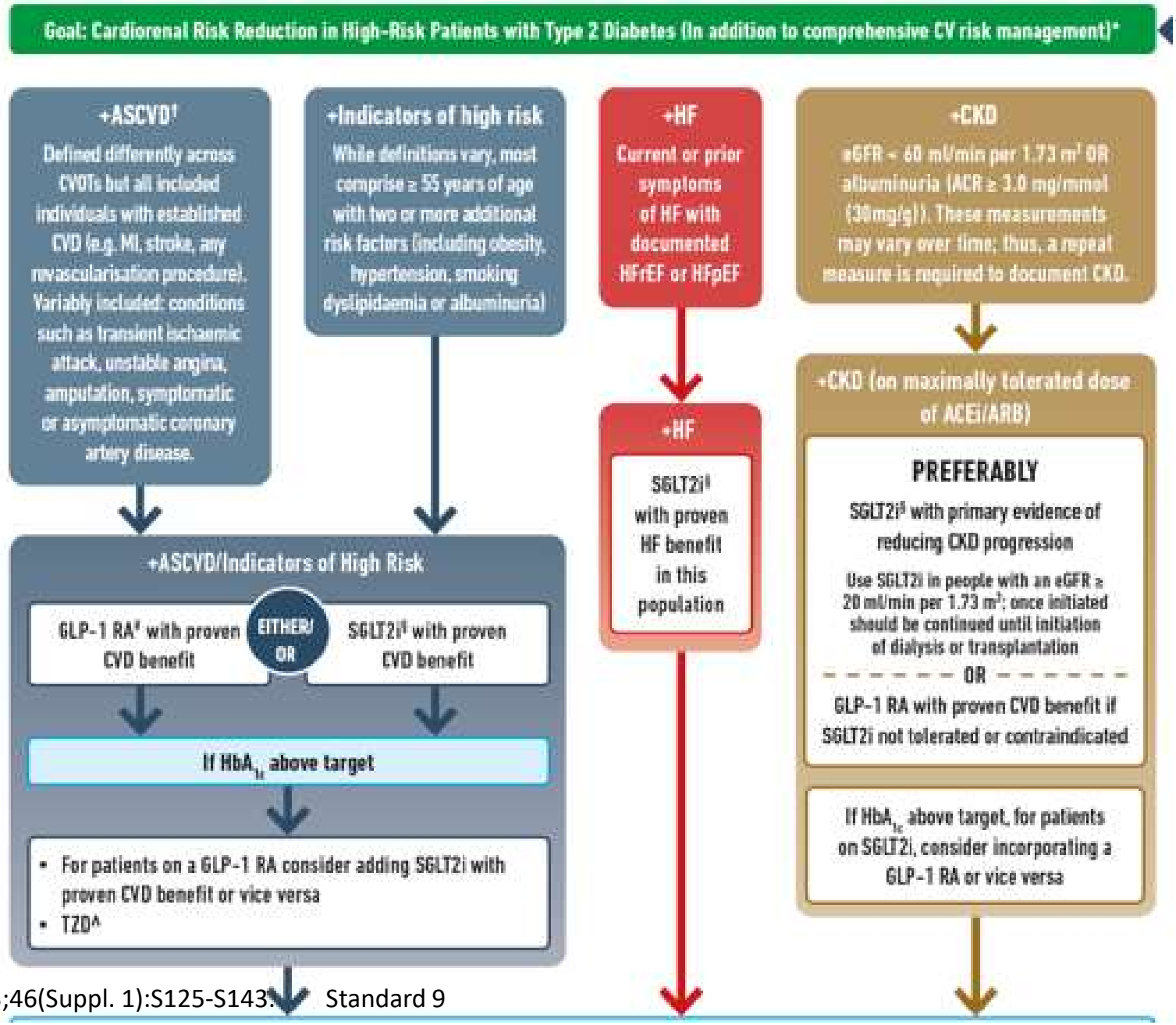
- What class of meds is AR on?
- Any meds missing?

Meds -AR with Type 2 in Clinic

- 62 yrs old, A1c 10.6%.
- 100 units Glargine plus metformin 1000mg BID.
- BMI 39, B/P 138/78
- LDL 148, Trig 282
- UACR 319, GFR 49
- Other Meds: atorvastatin 20mg, metoprolol, Flonase

- What class of meds?
  - Insulin
  - Biguanide
  - Statin
  - Beta blocker for?
- Any med(s) missing?
  - CV and renal protection
  - Glucose improvement

High Risk or Establish CVD, CKD, HF



Diabetes Care 2023;46(Suppl. 1):S125-S143 Standard 9

Common Oral Diabetes Meds

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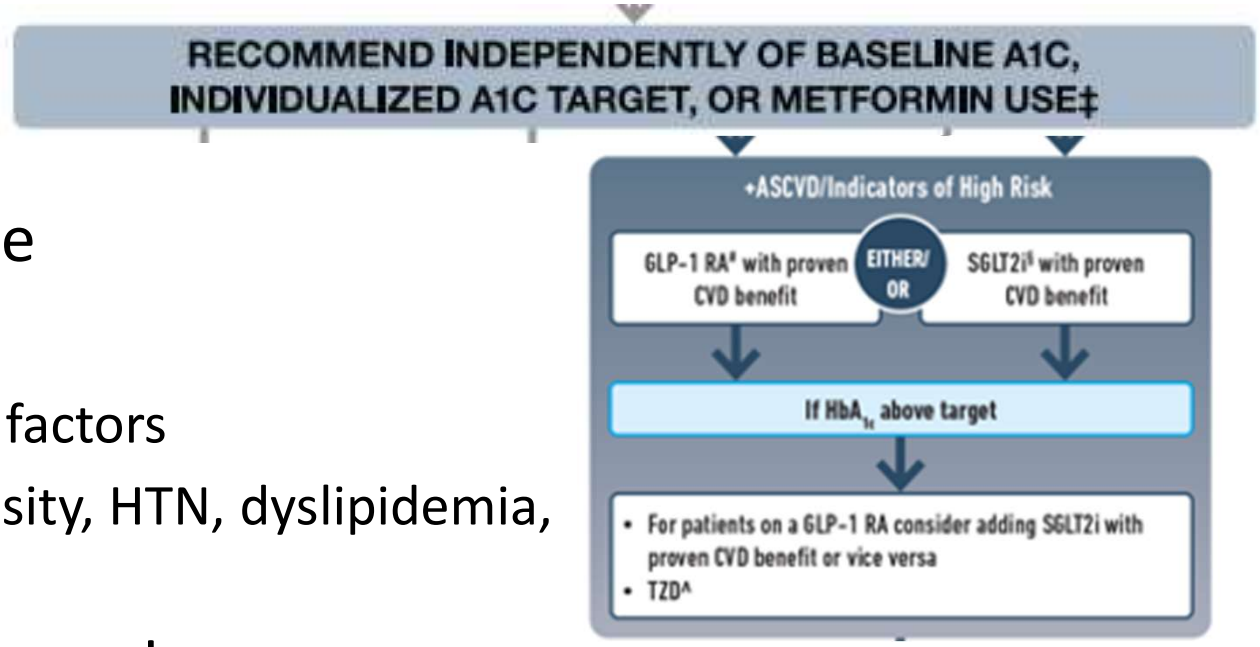
Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides • Decreases hepatic glucose output • First line med at diagnosis of type 2	metformin (Glucophage) Riomet (liquid metformin)	500 - 2550 mg (usually BID w/ meal) 500 - 2550 mg 500mg/5mL	**Side effects:** nausea, bloating, diarrhea, B12 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

Atherosclerotic Cardiovascular Disease

- ASCVD risk
  - Established CV disease
  - High CV Risk
    - 55+ with 2 or more risk factors
    - Risk factors include obesity, HTN, dyslipidemia, albuminuria, smoking
  - Most effective meds based on Cardiovascular Outcomes Trials (CVOT)
    - GLP-1 RAs - Semaglutide (Ozempic), liraglutide (Victoza), dulaglutide (Trulicity)
    - SGLT2i - Empagliflozin (Jardiance), canagliflozin (Invokana), dapagliflozin (Farxiga)



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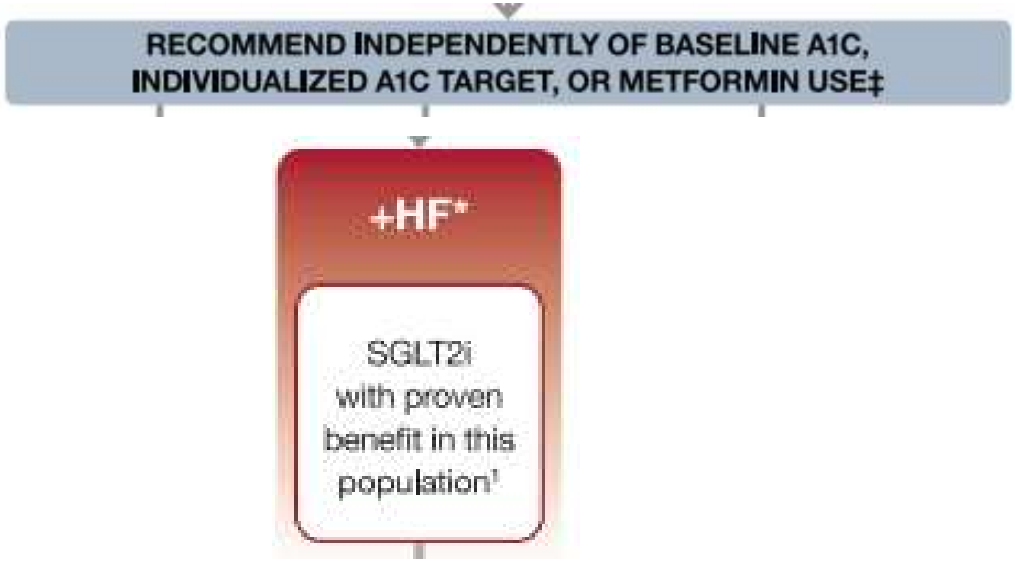
GLP-1 & GIP Receptor Agonists

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 acheive 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.

Heart Failure



Proven benefit: All SGLT-2*i*

- If HF or reduced Ejection Fraction (rEF) and Left Ventricular Ejection Fraction (LVEF) <45%
- Empagliflozin FDA approved for preserved Ejection Fraction
- SGLT-2 inhibitor if eGFR is adequate (>20 to start, may continue until ESRD)
- Avoid TZD
- If using a DPP4 inhibitor, avoid saxagliptin and alogliptin

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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

Common Oral Diabetes Meds

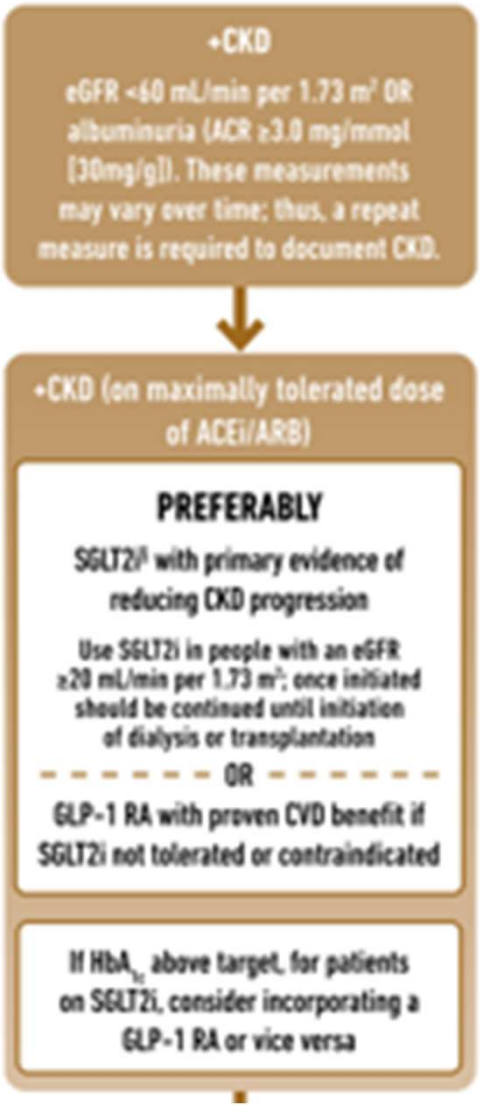
Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors "Glucoretic" • Decreases glucose reabsorption in kidneys	Canagliflozin* (Invokana)	100 - 300 mg 1x daily	**Side effects:** hypotension, UTIs, genital infections, increased urination, weight loss, ketoacidosis. **Heart Failure, 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. †Approved for peds, 10 yrs +. Lowers A1C 0.6% to 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	No	Yes w/ Diabetes	Yes
Bexagliflozin (Brenzavvy)	Yes	NA	NA	NA

Chronic Kidney Disease (CKD)

- Preferably use SGLT2i with evidence of reducing CKD progression
  - Canagliflozin (Invokana), dapagliflozin (Farxiga), empagliflozin (Jardiance)
  - Discontinue with initiation of dialysis or transplantation.
- If can't tolerate, use GLP-1 RA with proven CVD benefit to reduce CV Event Risk
  - Semaglutide (Ozempic), liraglutide (Victoza), dulaglutide (Trulicity)



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Meds to Protect Kidneys and CVD

- 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.

11. Chronic Kidney Disease and Risk Management: *Standards of Care in Diabetes—2023* FREE

Finerenone

New nonsteroidal MRAs for Type 2 and Chronic Kidney Disease

Nonsteroidal Selective Mineralocorticoid Antagonist

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

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

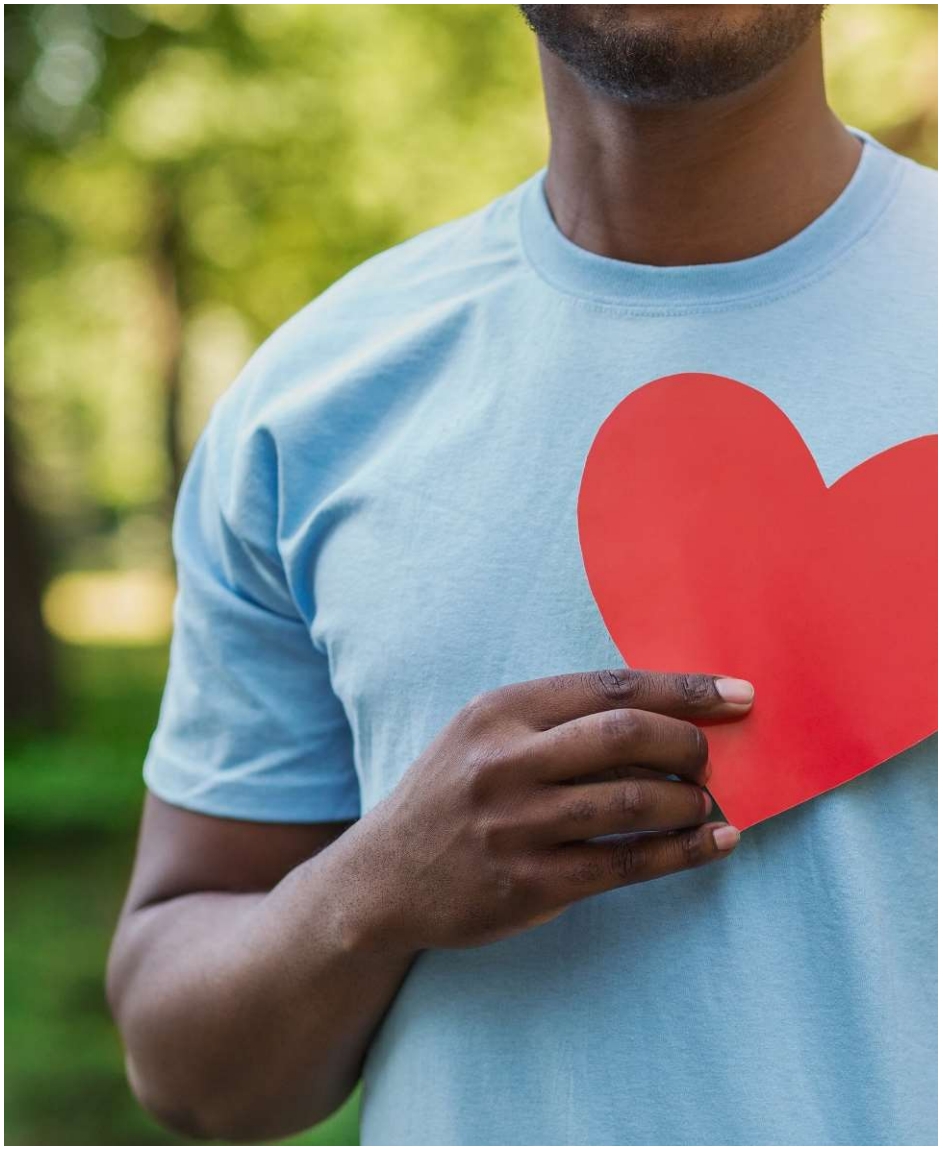
Contributor: Diana Isaacs, PharmD, BCPS, BCACP, BC-ADM, CDCES, FADCES, FCCP 2022

See Diabetes Cheat Sheets – Medications Cheat Sheets

11. Chronic Kidney Disease and Risk Management: *Standards of Care in Diabetes—2023*

Diabetes Meds Lower CV Risk

- If diabetes plus ASCVD risk factors or history:
  - SGLT-2s & GLP-1s reduce risk for major CV events
  - Add ACE*i* or ARB if hypertension + albuminuria
  - Statin therapy if 40+
  - Consider aspirin therapy if 50+
  - Post MI, continue beta blockers for 3 years.



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.
  - Requires comprehensive discussion w/ person on benefits versus increased risk of bleeding.
  - Aspirin allergy, consider different agent

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

Poll Question 5

- RJ is 62, smokes and has a family hx of early heart attack. According to ADA Standards of Care 2023, what is the blood pressure target for RJ?
- A. 120/70
- B. 140/90
- C. 135 /85
- D. 130/80

BP and Diabetes Targets – New for 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 ≥ 180/110, can be diagnosed at single visit
- BP target based on individual assessment, shared decision making and potential adverse effects
- Monitor BP at home and at each visit
- During pregnancy, with previous history of HTN
  - BP Target of 110 -135/85

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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

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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

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BP Treatment in addition to Lifestyle

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

*Albuminuria = Urinary albumin creatinine ratio of 30+

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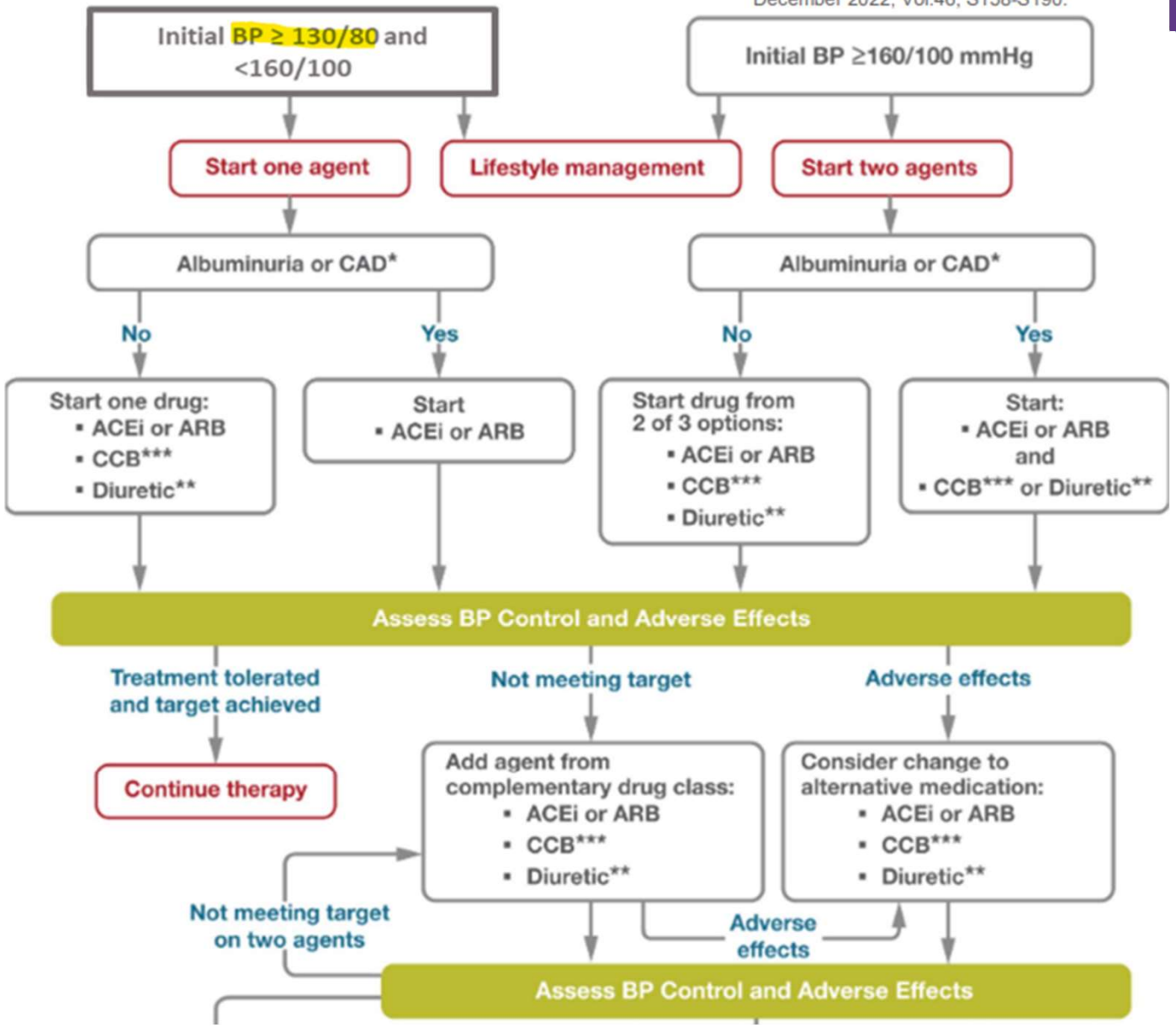
Recommendations for the Treatment of Confirmed Hypertension in People With Diabetes

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



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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.

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BP & Lipid Meds Cheat Sheet

Antihypertensive Medications

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

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

AntiHypertensive Medications

ACE and ARBs are preferred therapy if experiencing 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

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	captopril /Capoten*†	12.5 - 100 mg	2-3 x a day	
	Enalopril/ Vasotec*†	2.5 - 40 mg	1-2 x a day	
	Fosinopil / Monopril†	10- 40 mg	1 x a day	
	Lisinopril *† Prinivil Zestril	 10 – 40 mg 10 - 40 mg		
	Ramipril / Altace*†	2.5 – 10 mg		
	Moexipril / Univasc†	3.75 - 15 mg		
	Perindopril/Aceon‡ Perindopril/ Indapamide combo (Coversyl)	2-16 mg 2 - 8 mg 0.625 - 2.5 mg		
	Quinapril /Accupril†	5 – 40 mg		
	Trandolapril/ Mavik Trandolapril/ Verapamil combo (TARKA)	1.0 – 4 mg 1-4 mg 180 to 240 mg		

Angiotensin Receptor Blockers

ARBs -Angiotensin Receptor Blockers **Action -**Block AT-I receptor which reduces aldosterone secretion and vasoconstriction	Azilsartan/Edarbi	40 - 80 mg	1 x daily	Try to take same time each day **Side effects**- Can cause dizziness, drowsiness, diarrhea, hyperkalemia, hypotension. †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
	Azilsartan/ Chlorthalidone combo (Edarbyclor)	40 mg 12.5 - 25 mg		
	Candesartan/Atacand†	8 – 32 mg		
	Eprosartan/Teveten†	400 - 600 mg		
	Irbesartan/ Avapro†	75 – 300 mg		
	Losartan / Cozaar*†	25 – 100 mg		
	Olmesartan / Benicar†‡ Tribenzor (triple combo)	20 – 40 mg		
	Telmisartan / Micardis	20 – 80 mg		
	Valsartan / Diovan†‡ Exforge HCT (triple combo)	80 – 320 mg		
	Valsartan/ Nebivolol combo (Byvalson)	80 mg 5 mg		

Beta Blockers

Beta Blockers are commonly prescribed as an add-on to other B/P meds for people with DM. Beta Blockers are beneficial for persons w/ concurrent cardiac problems and prevention of recurrent MI and heart failure. Caution in DM since Beta Blockers can cause hyperglycemia and mask hypoglycemia induced tachycardia (but do not block hypoglycemia related dizziness and sweating). Monitor B/P, heart rate, lipids and glucose.

Beta Blockers *β1- Selective* **Action:** Blockade β1 receptors & reduce cardiac output & kidney renin activation.g	Acebutolol / Sectral*	200 – 800 mg	2 x daily	Side Effects: Usually CNS related including sedation, dizziness, lightheaded . Watch for bradycardia, hypotension, depression and sexual dysfunction. Check heart rate each visit, adjust dose if HR <50. Can cause heart block – review package insert for drug-drug interactions. Watch for exercise intolerance. When stopping beta blockers, taper dose gradually. Use cautiously at lowest dose. †These meds are also available as a combo w/ low dose HCTZ (hydrochlorothiazide).
	Atenolol / Tenormin* Atenolol with Chlorthalidone/ Tenoretic	25 – 100 mg 50 -100 mg 25 mg	1 x daily 1 x daily 1 x daily	
	Betaxolol / Kerlone	5 – 10 mg	2 x daily	
	Bisoprolol/ Zebeta†	2.5 – 10 mg		
	Metoprolol tartate/Lopressor*†	25 – 100 mg	1 x daily	
	Metoprolol succinate / Toprol XL	25 - 100 mg		
	Nebivolol/Bystolic Nebivolol with Valsartan/ Byvalson	5 to 40 mg 5 mg 80 mg		
Beta Blockers *Non Selective* **Action**: Blockades β1 & β2	Nadolol / Corgard* Nadolol with Bendroflumethiazide	40 - 120 mg 40-80 mg 5 mg	1 x daily	
	Penbutolol / Levatol	10 - 40 mg	1 x daily	
	Pindolol / Visken	10 – 40 mg	2 x daily	
	Propanolol / Inderal* Inderal LA (extended)	40 – 160 mg 60 – 180 mg	2 x daily 1 x daily	
	Timolol / Blocadren*	10 – 60 mg	2 x daily	

AR with Type 2 in Clinic

- 62 yrs old, A1c 10.6%.
- 80 units glargine plus metformin 1000mg BID.
- BMI 39, B/P 138/78
- LDL 148, Trig 282
- UACR 319, GFR 49
- Other Meds: atorvastatin 20mg, metoprolol, Flonase

- Med adjustments
  - Added SGLT-2 or GLP-1 RA
    - Dapagliflozin 10mg (Farxiga)
    - Semaglutide (Ozempic)
      0.5mg up to 2.0mg (next)
  - Reduce basal glargine insulin by 10 units if am BG less than 100.
  - Continue metformin and other meds
  - Add aspirin 81mg, add ACEi or ARB

New for 2023
Lipid Goals – Primary Prevention

- For people with diabetes aged 40–75 at higher cardiovascular risk*

*55+ with 2 or more risk factors: BMI 30+, HTN, dyslipidemia, albuminuria, smoking

  - **High-intensity statin** therapy is recommended
  - **Reduce LDL cholesterol by at least 50% of baseline**

    AND
  - **Target LDL cholesterol <70 mg/dL.**

- **If LDL cholesterol 70 +**
  - it may be reasonable to add ezetimibe or a PCSK9 inhibitor to maximum tolerated statin therapy.

Triglyceride goal < 150
HDL goal > 40

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Statin Dosing

High Intensity:
Lowers LDL ≥50%

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

Moderate Intensity:
Lower LDL 30-<50%

- Lipitor (atorvastatin)
  - 10-20mg
- Crestor (rosuvastatin)
  - 5-10mg
- Zocor (Simvastatin)
  - 20-40mg
- Pravachol (pravastatin)
  - 40 – 80mg
- Mevacor (lovastatin) 40 mg
- Lescol (fluvastatin) XL 80mg
- Livalo (pitavastatin) 2-4mg

*****If person can't tolerate intended statin dose, use maximally tolerated dose**

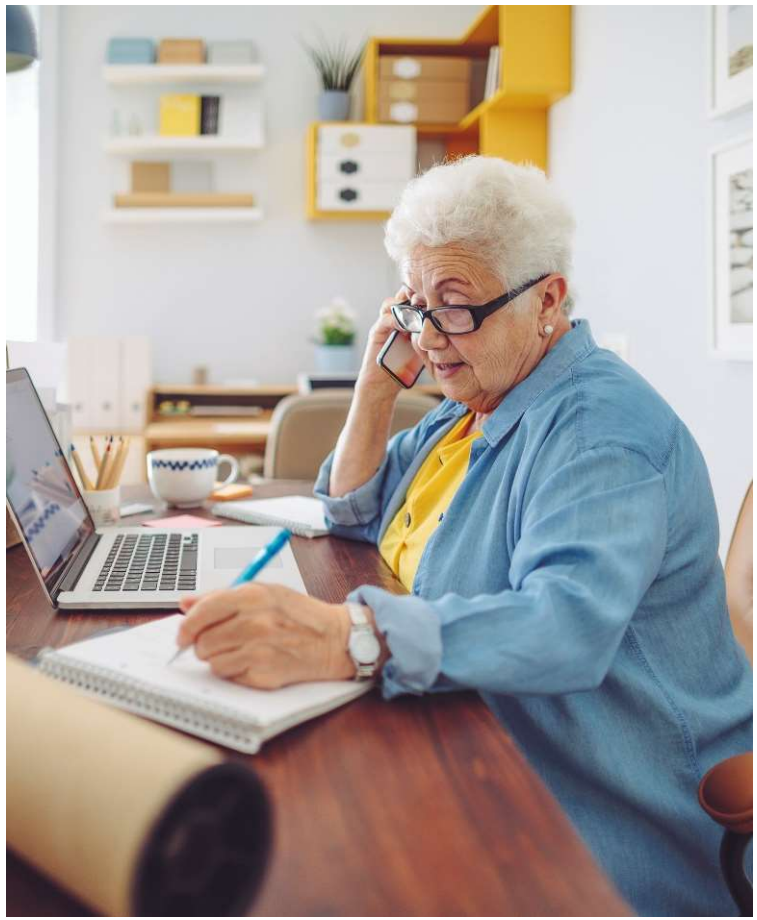
Cholesterol Medications

LDL Lowering Medications

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

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 in recommended if goal is not achieved on maximum tolerated statin therapy.



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PCSK9 Inhibitors Lipid Medications

Proprotein convertase subtilisin/kexin type 9

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

From Meds Cheat Sheet Page – Diabetesed.net

2023 Lipid Therapy in Diabetes by Age Summary

- 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.

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

AR with Type 2 in Clinic

- 62 yrs old, A1c 7.6% ⇩
- 30 units Glargine ⇩ with metformin 1000mg BID.
- BMI 36 ⇩ B/P 128/84
- LDL 123 ⇩ Trig 172 ⇩
- UACR 212 ⇩ GFR 58 ⇧
- Original Meds
  atorvastatin 20mg
  metoprolol, Flonase

- Original meds
  - Insulin
  - Biguanide
  - Statin
  - Beta blocker
- New meds added
  - Aspirin
  - ACE*i* – lisinopril 20mg
  - GLP-1 RA **and** SGLT-2
    - Semaglutide (Ozempic)
    - Dapagliflozin (Farxiga)
    - Basal insulin reduced to 30 units
    - **Increased atorvastatin to 40mg**

ABC's of Diabetes - 2023

- A1c less than 7% (individualize)
  - Pre-meal BG 80-130
  - Post meal BG <180
  - AGP - 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 50%, LDL <70
  - If 40+ with ASCVD, decrease 50%, LDL <55
  - Triglycerides <150, HDL> 40

We can Make a Big Difference

- 62 yrs old, A1c 7.2% ⇩
- 30 units Glargine ⇩ with metformin 1000mg BID.
- BMI 36 ⇩ B/P 128/78 ⇩
- LDL 103 ⇩ Trig 172 ⇩
- UACR 212 ⇩ GFR 58 ⇧
- Other Adjust Needed?:
  - Increase atorvastatin
  - Meet with RD/RDN
  - Started Chantix

We can make a difference in moving care forward. Through behavior change coaching and advocating for best care, we can decrease risk.

Thank You

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