

Improving Cardiorenal Outcomes in Diabetes:
Mechanisms and Medications

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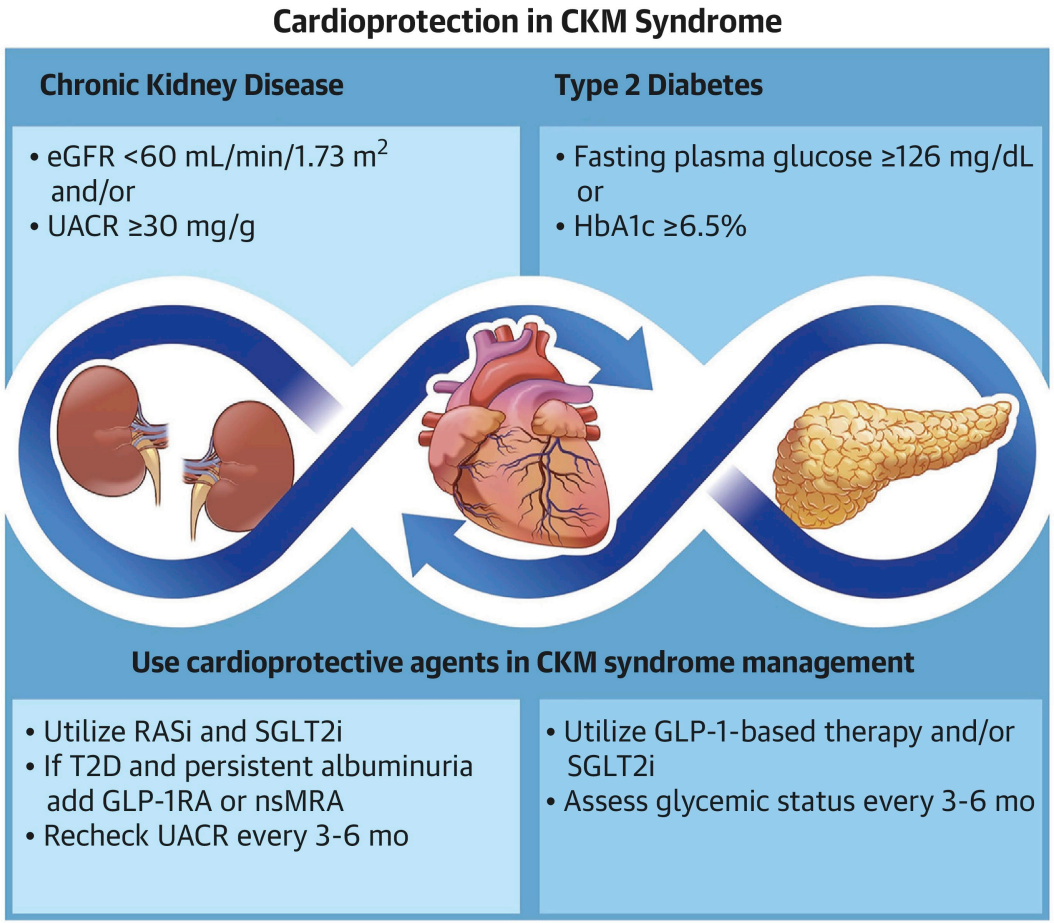
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Objectives

- Recognize CKM and cardiorenal risk in patients with type 2 diabetes
- Identify patients at risk using CKM staging and PREVENT equations
- Apply current evidence-based CKM and diabetes guideline recommendations
- Select glucose-lowering therapies with cardiovascular and renal benefit
- Optimize BP, lipid, and kidney protection
- Review and implement cardiovascular-kidney-metabolic syndrome-appropriate treatment algorithms

HOT OFF THE PRESS!

CENTRAL ILLUSTRATION: 2026 ACC Cardiovascular-Kidney-Metabolic-Syndrome Guideline-at-a-Glance



Panjrath GS, et al. JACC. 2026;10.1016/j.jacc.2026.05.008.

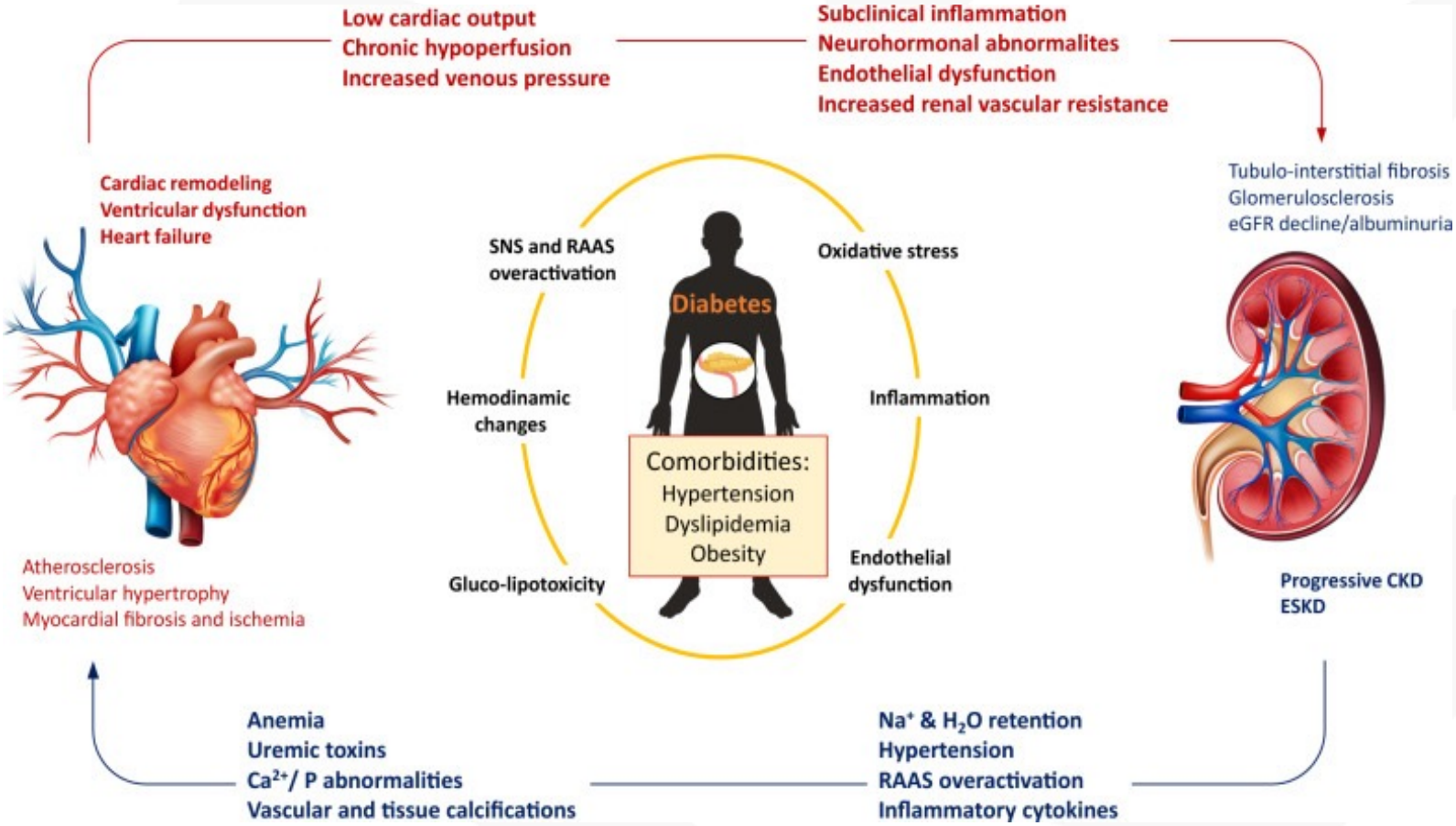
Cardiorenal Effects of Diabetes - A Public Health Issue

- Cardiovascular disease is the #1 cause of death
- Approximately 1 in 3 American adults with diabetes are affected by CKD.
- Albuminuria is a strong predictor of cardiovascular events
- Around 25-40% of people with diabetes will develop heart failure
- Early intervention prevents CKM progression

NIH. Fast Facts on Kidney Disease, 2024.
CDC. Chronic Kidney Disease, Diabetes, and Heart Disease, 2024.

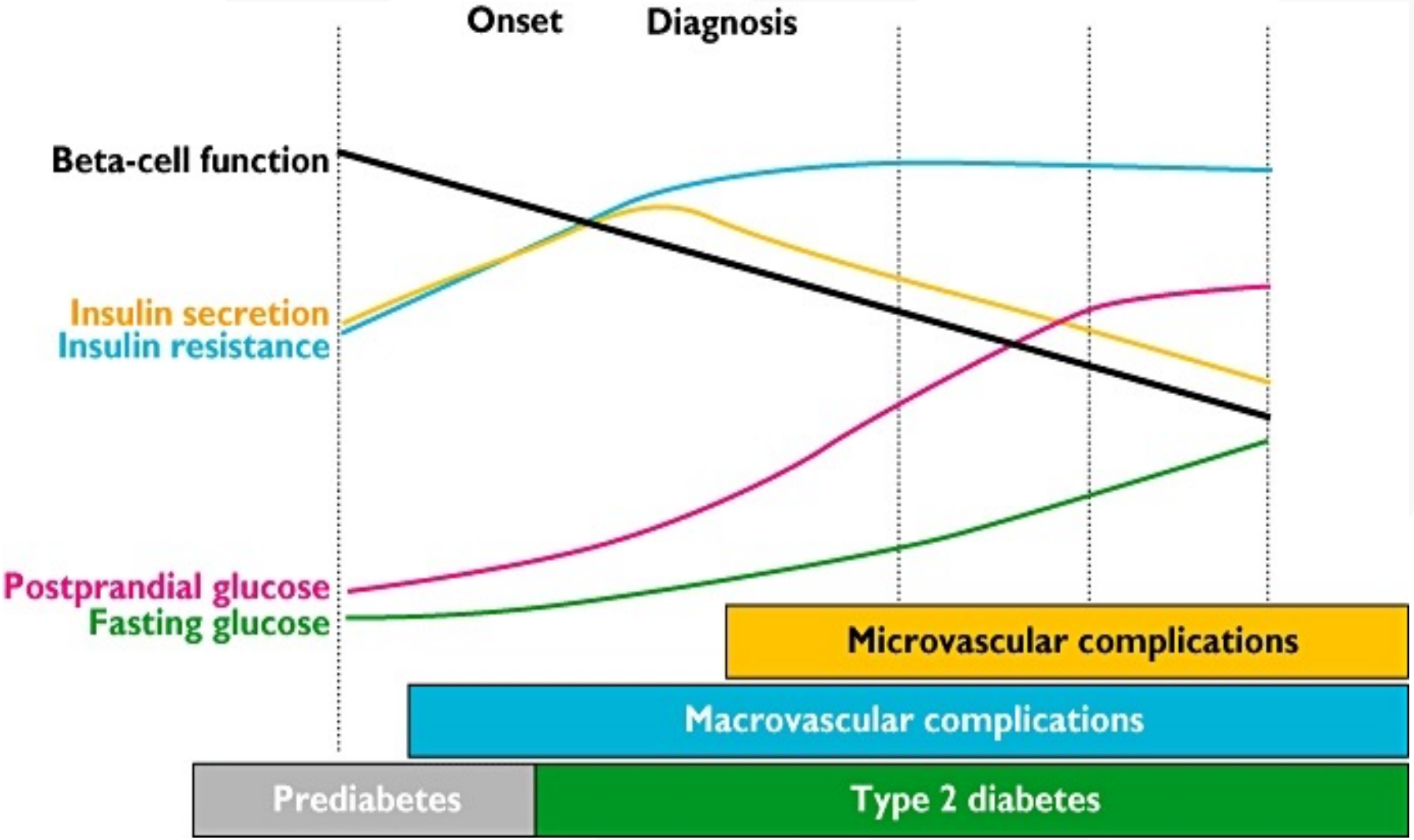
The Cardio-renal-metabolic Continuum

Risk factors → T2D → Albuminuria → CKD → HF → ASCVD → Kidney failure



Marassi M, Fadini GP. The cardio-renal-metabolic connection: a review of the evidence. Cardiovasc Diabetol. 2023 Jul 31;22(1):195. Licensed under Creative Commons.

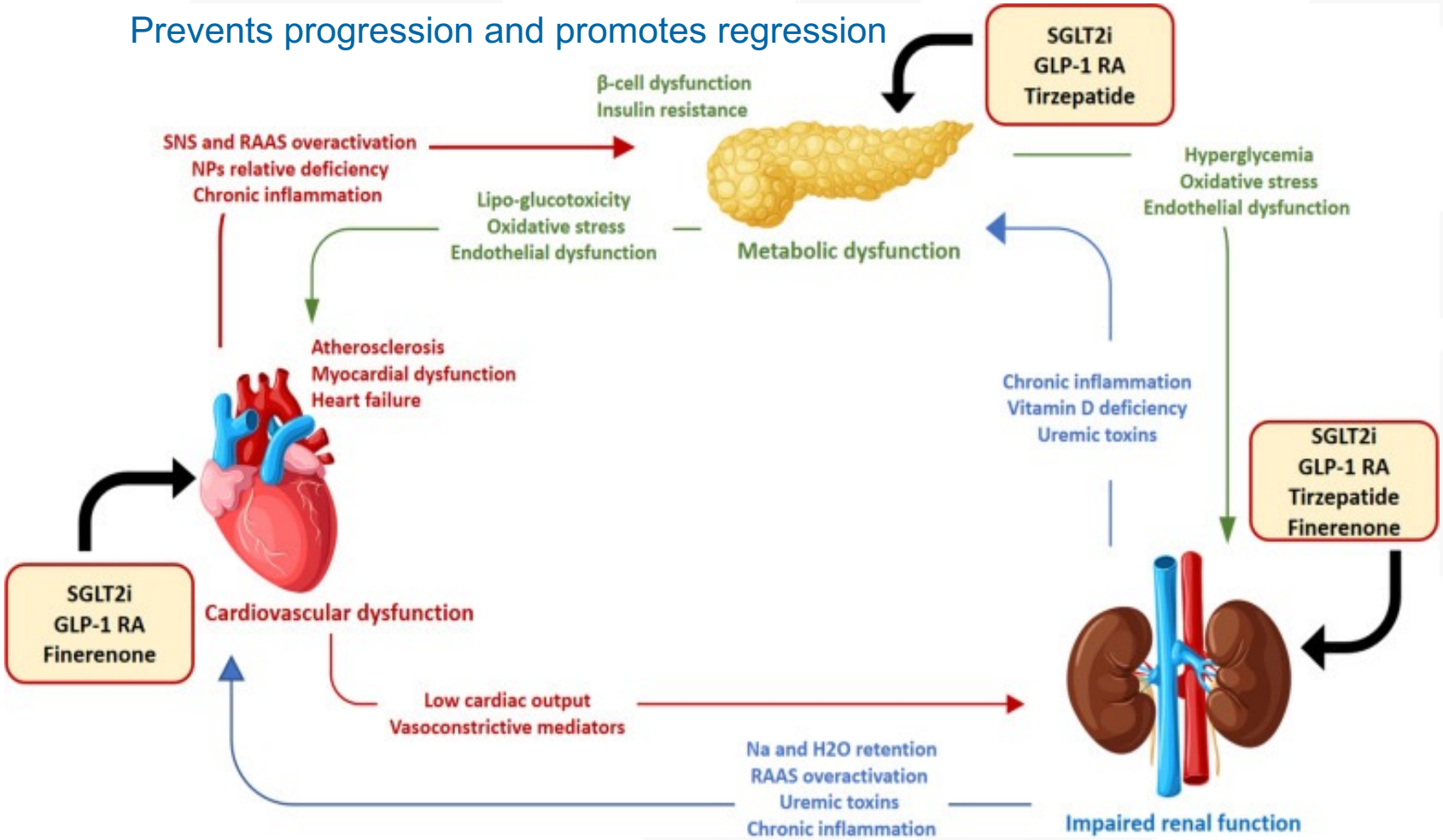
Natural History of Type 2 Diabetes



Piya, M.K., Tahrani, A.A., & Barnett, A.H. (2010). Emerging treatment options for type 2 diabetes. *British Journal of clinical pharmacology, 70(5), 631-44.*

CKM Syndrome Overview

- Integrates CV, kidney, and metabolic risk
- Applies to all adults with diabetes
- Staging guides therapy intensity
- Prevents progression and promotes regression



Marassi M, Fadini GP. The cardio-renal-metabolic connection: a review of the evidence. Cardiovasc Diabetol. 2023 Jul 31;22(1):195. Licensed under Creative Commons.

Top 10 Take-Home Messages

1. Cardiovascular-Kidney-Metabolic Syndrome Staging: Cardiovascular-kidney-metabolic (CKM) syndrome staging is recommended for youths and adults to prevent CKM stage progression, to tailor therapy to absolute risk, to reduce cardiovascular events and loss of kidney function across the life course, and to promote CKM stage regression through lifestyle changes and weight loss.

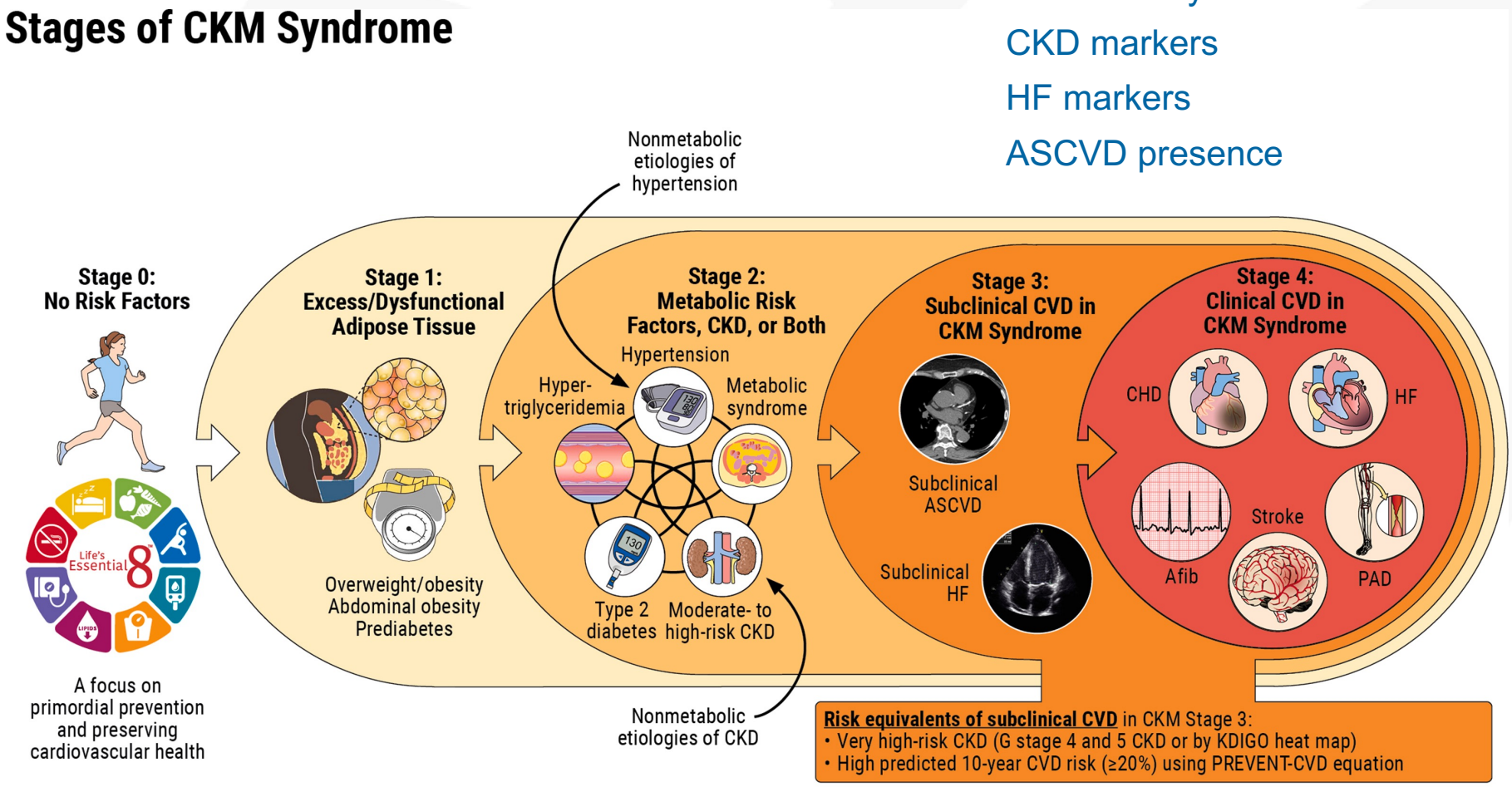


Stages of CKM Syndrome

Takeaway #1

Stages 0–4 based on:

- PREVENT risk
- Metabolic dysfunction
- CKD markers
- HF markers
- ASCVD presence



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Lifestyle Modifications for all

- Healthy eating
- Weight management
- ≥150 min/week exercise
- Smoking cessation
- Sleep optimization
- Vaccinations
- DSME



Top 10 Take-Home Messages

2.Quantify Risk Using the PREVENT Equations:
Individuals at risk for cardiovascular disease (CVD) (CKM syndrome stage 0-3) should have their risk quantified with the PREVENT (Predicting Risk of Cardiovascular Disease EVENTs) equations to estimate 10- and 30-year risk for atherosclerotic cardiovascular disease (ASCVD), heart failure (HF), and total CVD.

- PREVENT-CVD 10-year risk ≥20% is 1 criterion for CKM syndrome Stage 3.
- PREVENT-CVD 10-year risk ≥7.5% further informs the prioritization of pharmacotherapies for the treatment of CKM syndrome (e.g. blood pressure, GLP1, RA, SGLT2).

Quantifying Risk: PREVENT Equations

Takeaway #2: PREVENT calculator

Estimates 10- & 30-year risk for ASCVD, HF, and total CVD

PREVENT ≥20% = CKM Stage 3

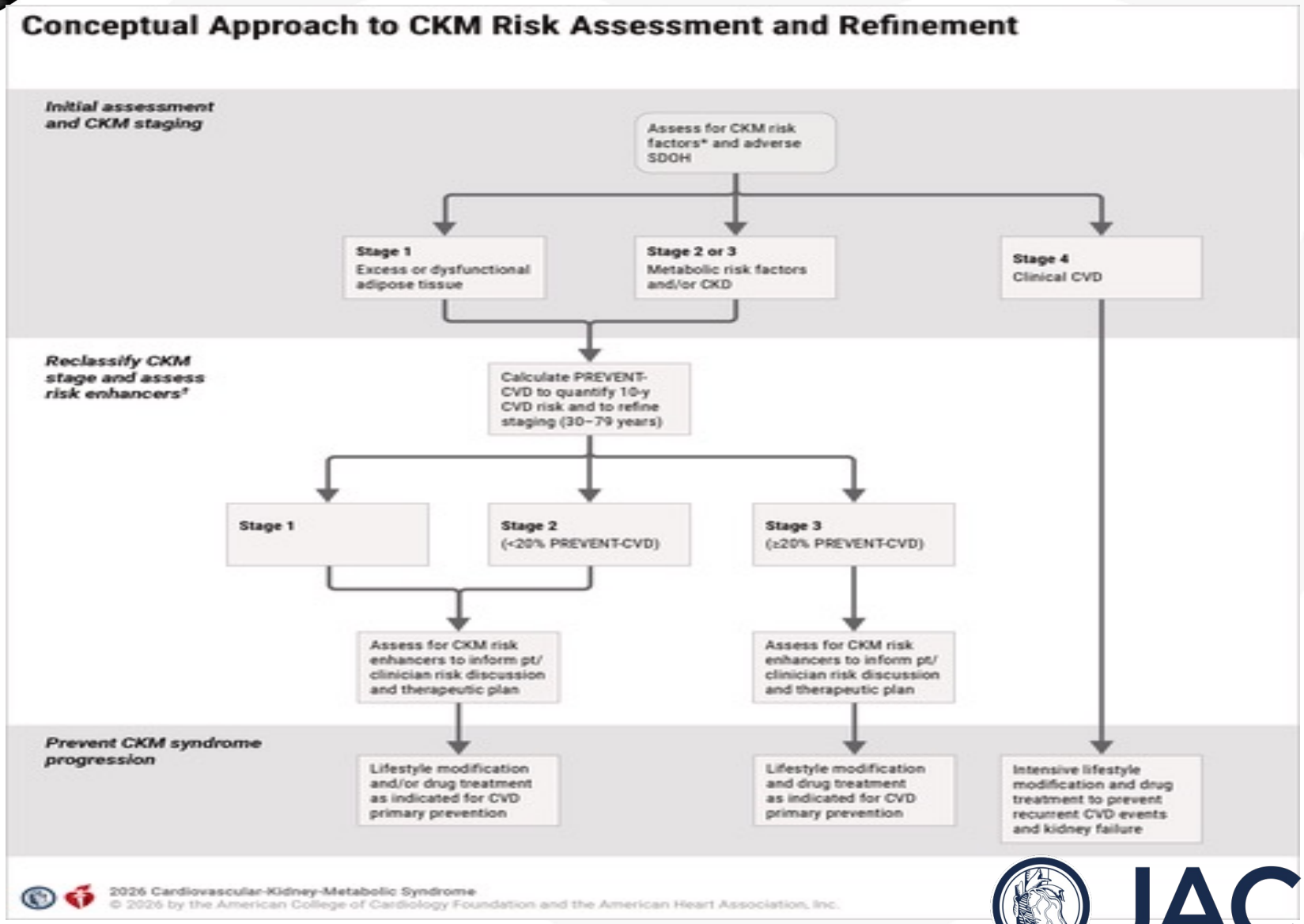
PREVENT ≥7.5% = prioritize GLP-1 RA, SGLT2i, and BP therapy

NEW CUTOFFS FOR CV RISK CATEGORIES

PREVENT-ASCVD 10-Year Risk	Risk Category
<3%	Low
3% to <5%	Borderline
5% to <10%	Intermediate
≥10%	High

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Treatment Algorithm



Chiadi E. Ndumele et al. *JACC* 2026; 87:e1889-e2007.

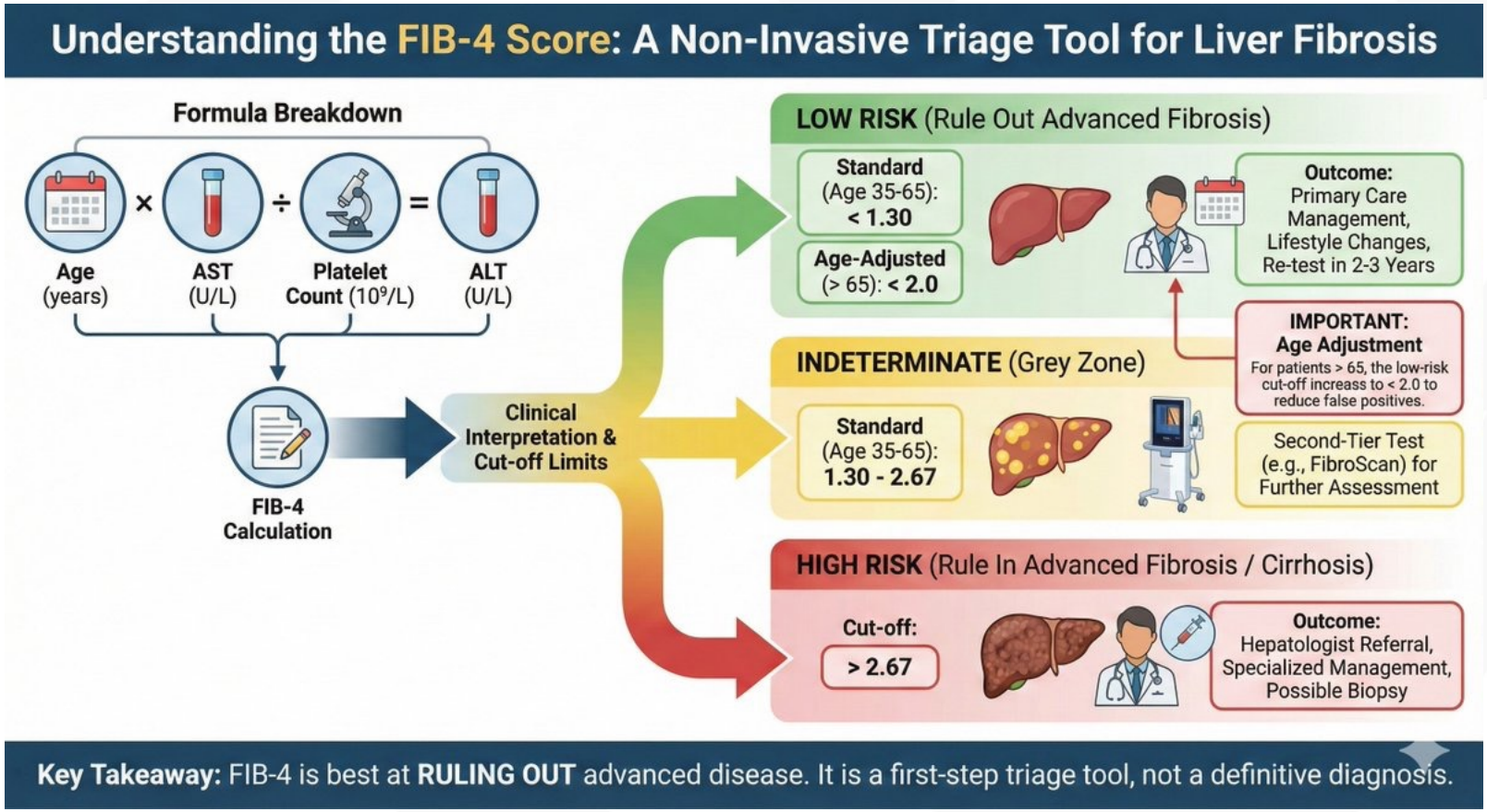
Risk Enhancers for CKM Syndrome	
Personal medical history	Chronic inflammatory or autoimmune conditions (eg, rheumatoid arthritis, SLE, HIV/AIDS)[4,11]
	Sleep disorders (eg, obstructive sleep apnea)[16]
	Poor psychological health (eg, depression, anxiety)[17]
	Sex-specific risk factors (eg, premature menopause age <40 y, adverse pregnancy outcomes, polycystic ovarian syndrome, erectile dysfunction)[2]
SDOH[1]	Lower socioeconomic status
	Higher burden of adverse individual- and place-based SDOH (Section 3.2)
Inflammation[13]	Elevated high-sensitivity C-reactive protein (≥2.0 mg/L if measured)
Family history[14]	Diabetes
	Kidney failure
Demographic[15]	Increased risk groups (eg, self-identified race or ethnicity of South Asian, American Indian, Pacific Islander)*

Adapted with permission from Ndumele et al.[5] Copyright 2023 American Heart Association Inc.

Top 10 Take-Home Messages

3.Routinely Assess for CKM Risk Factors: Routine assessments for metabolic risk factors and kidney function are recommended among all adults, as well as selected assessments for pre-HF, metabolic dysfunction–associated steatotic liver disease (MASLD), and obstructive sleep apnea (OSA) in subsets of individuals.

Screening for Liver Fibrosis using FIB-4 Index



CKM-Focused Assessment in Diabetes

Takeaway #3

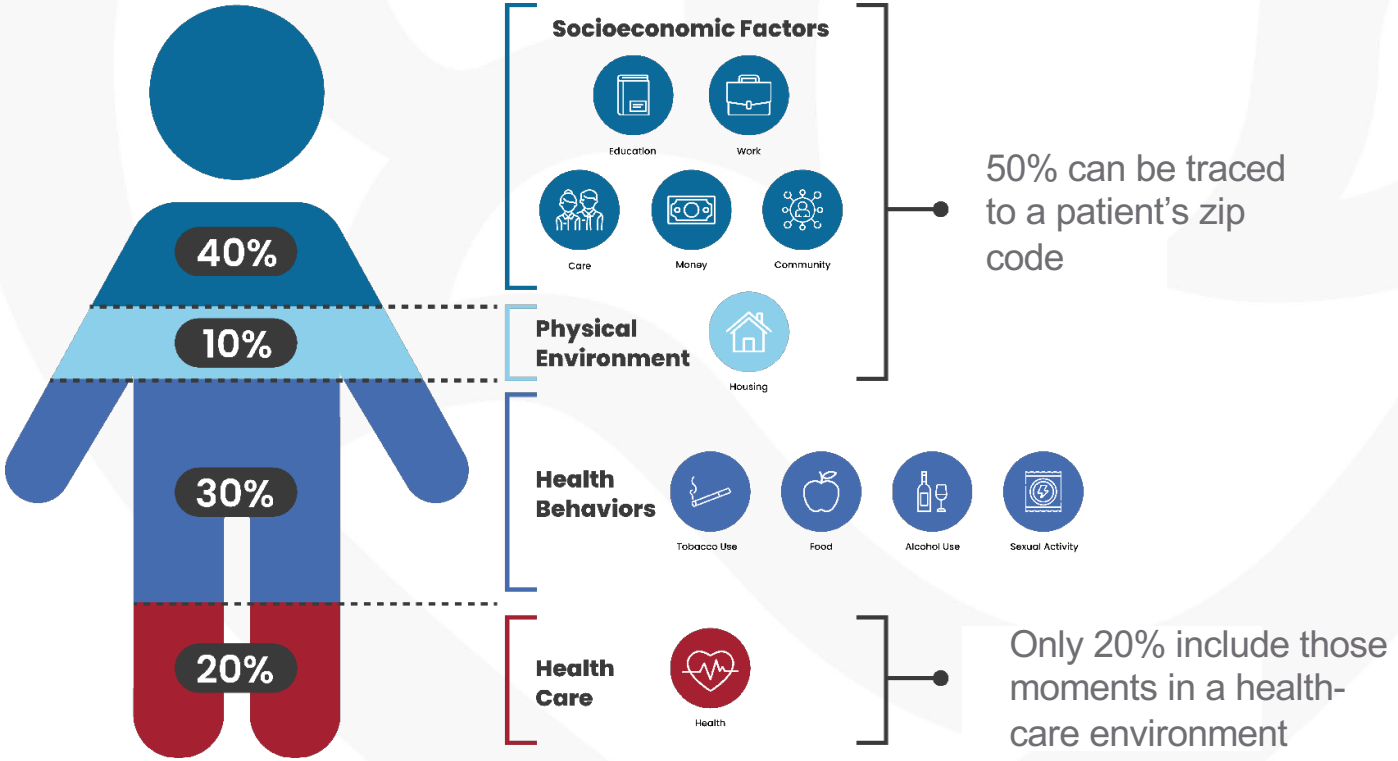
Annual assessment

- eGFR
- UACR
- BP
- Lipids
- A1C
- Weight/BMI
- HF symptoms
- ASCVD history
- MASLD risk
- Sleep apnea screening

Top 10 Take-Home Messages

4. Evaluate and Address Social Determinants of Health: Routine assessments for social determinants of health (SDOH) that are closely linked with the development of CKM syndrome and its complications are recommended. Addressing adverse SDOH when identified is a key component of holistic care for CKM syndrome.

Factors that influence Health Outcomes



Top 10 Take-Home Messages

5. Emphasize Interdisciplinary Care With a CKM Coordination Point Person: Use of interdisciplinary care models for those with overlap among the CKM conditions of type 2 diabetes (T2D), chronic kidney disease (CKD), and CVD is recommended to facilitate patient-centered care. The need for a point person is emphasized, to coordinate efforts of the CKM interdisciplinary team, to facilitate implementation of evidence-based care and guideline-directed medical therapy (GDMT), and to support patients and clinicians.

Interdisciplinary Care

Takeaway #5

INTERDISCIPLINARY CARE – WHO IS ON THE TEAM?

Primary Care
- Early identification
- CKD surveillance
- HTN management
- DM management

Nephrology
- Risk Stratification
- Advanced CKD management
- KRT education when appropriate

Cardiology
- ASCVD management
- HF management
- Cardiorenal optimization

Endocrinology
- Complex DM management
- Weight-loss therapies
- Cardiometabolic risk reductions

Clinical Pharmacist
- Medication optimization
- Adverse effect monitoring
- Medication adherence support

Dietician
- Sodium guidance
- Protein counseling weight management

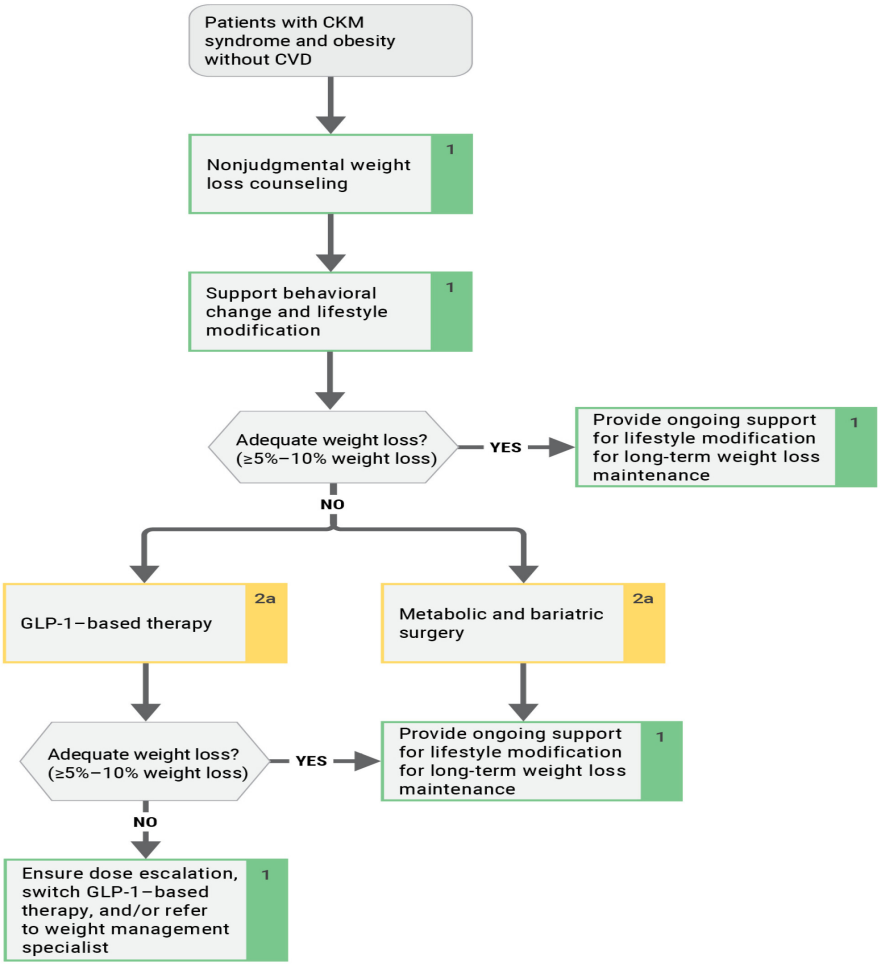
Nurse Care Coordinator
- Follow-up
- Lab testing monitoring
- Patient education

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Top 10 Take-Home Messages

6. Assess and Treat Overweight and Obesity: Assessments for overweight/obesity and abdominal adiposity with both body mass index (BMI) and waist circumference are recommended to characterize risk related to excess adiposity. Overweight and obesity should be addressed to prevent CKM syndrome progression and to promote CKM syndrome regression. Support for lifestyle modification is emphasized, with adjunctive use of obesity pharmacotherapies and metabolic and bariatric surgery as needed to facilitate weight loss.

Management of Obesity in CKM Syndrome Stages 1–3



2026 Cardiovascular-Kidney-Metabolic Syndrome
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Chiadi E. Ndumele. Circulation. 2026 AHA/ACC/ADA/ASN Guideline for the Prevention, Detection, Evaluation, and Management of Cardiovascular-Kidney-Metabolic Syndrome: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines, Volume: 154, Issue: 4, Pages: e50-e158, DOI: (10.1161/CIR.0000000000001453)

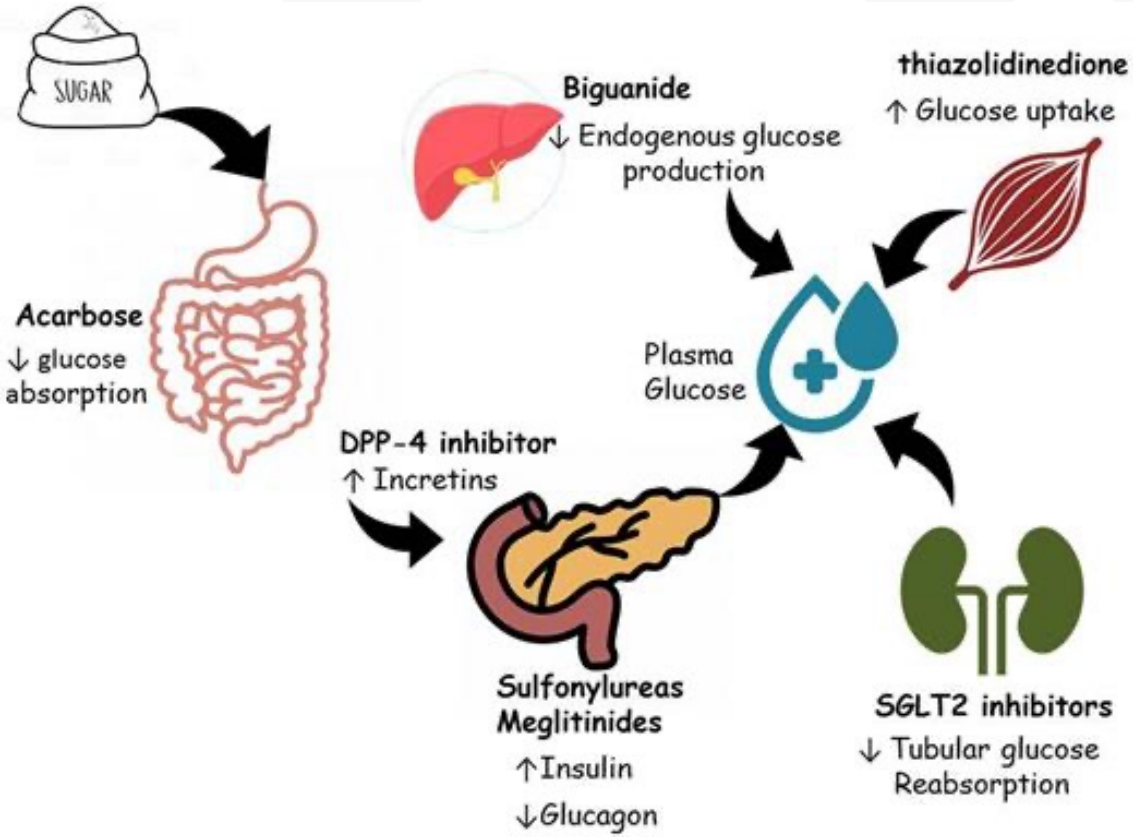
Top 10 Take-Home Messages

7. Utilize Cardioprotective Antihyperglycemic Therapies in Diabetes: Among patients with T2D with CVD or at increased risk for CVD, in addition to lifestyle modification, weight management, and risk factor control, utilization of cardioprotective antihyperglycemic GDMT is recommended, including sodium–glucose cotransporter-2 inhibitors (SGLT2i), glucagon-like peptide-1 (GLP-1)–based therapy, or both, to improve cardiovascular and kidney outcomes. The choice of agent should be guided by clinical comorbidities such as CKD, ASCVD, HF, obesity, severe hyperglycemia, and MASLD.

Glucose-Lowering Therapy Has Changed

Medication selection based on:

- ASCVD
- CKD
- HF
- Obesity
- Hypoglycemia risk



SGLT2 Inhibitors

Takeaways #7 & #8 · Benefits

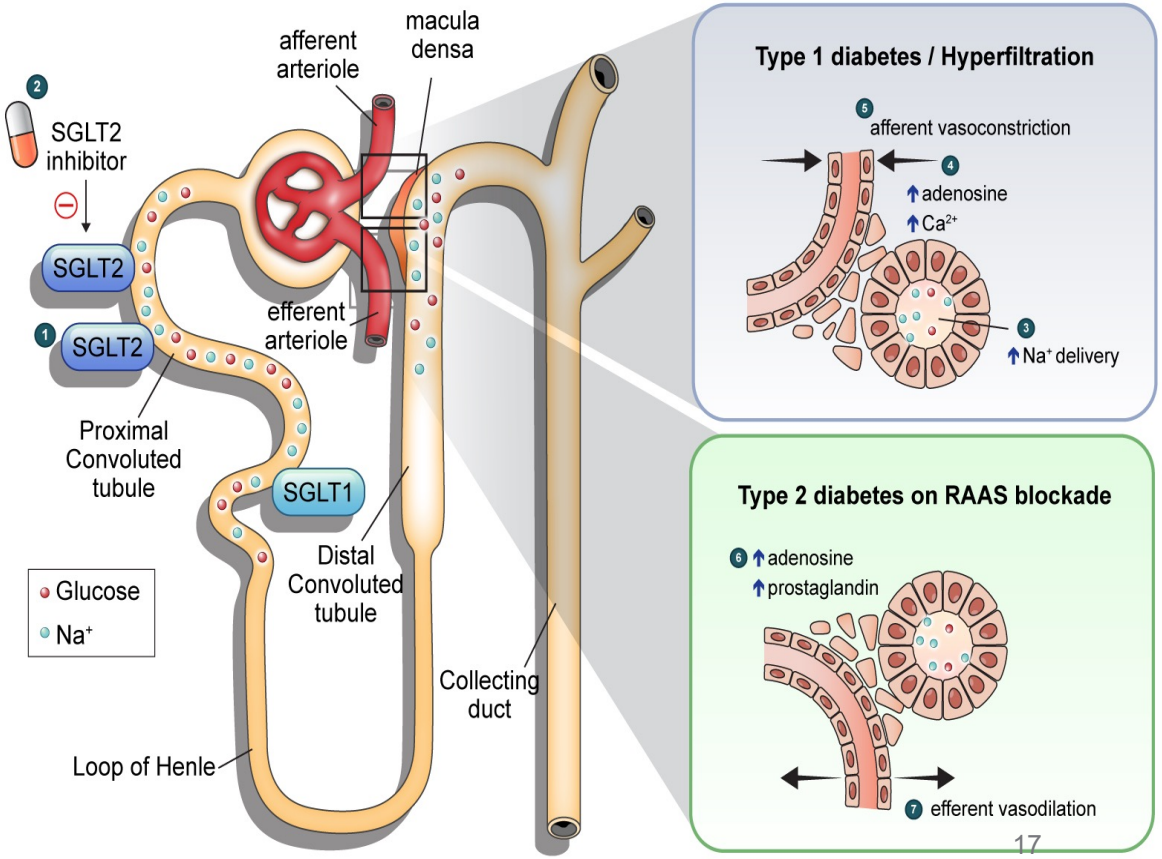
↓ HF hospitalization

↓ CKD progression

↓ CV mortality

↓ Weight

↓ BP



GLP-1 Receptor Agonists

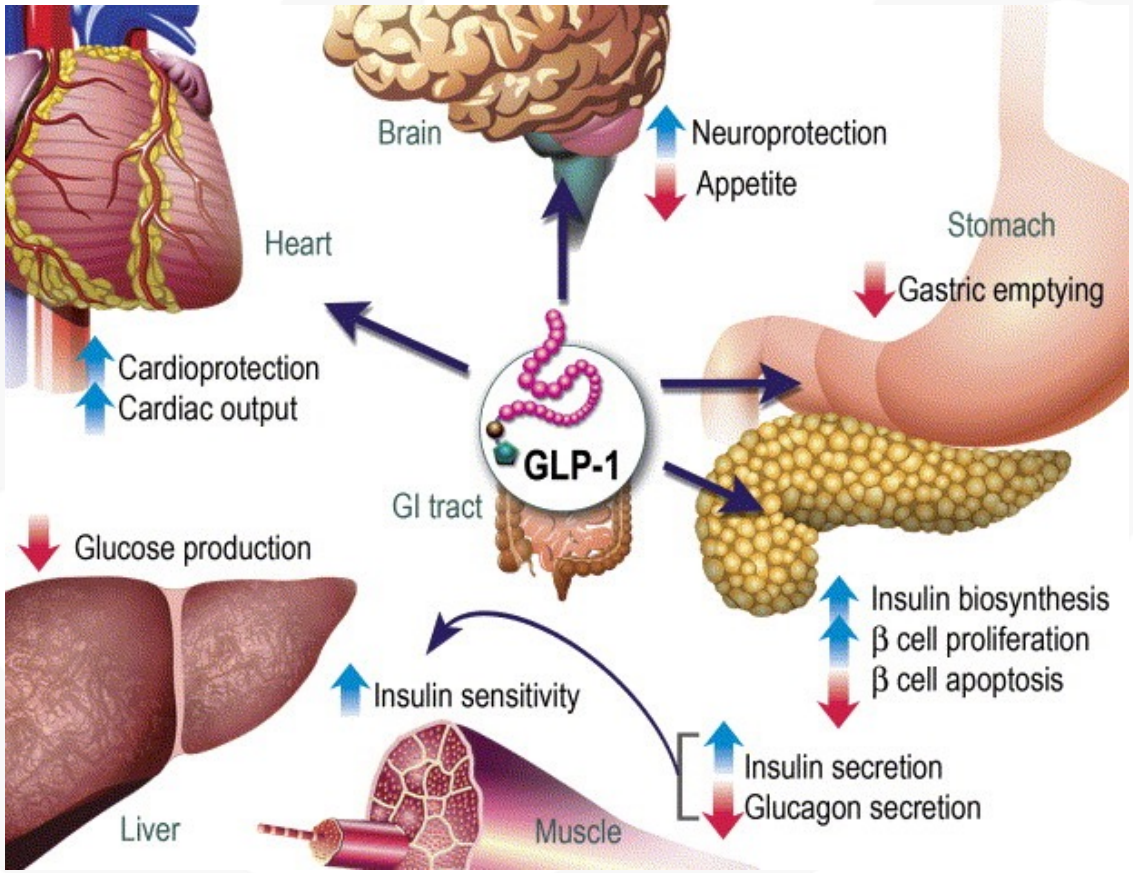
Takeaway #7 · Benefits

↓ MACE

↓ Weight

↓ A1C

↓ Albuminuria



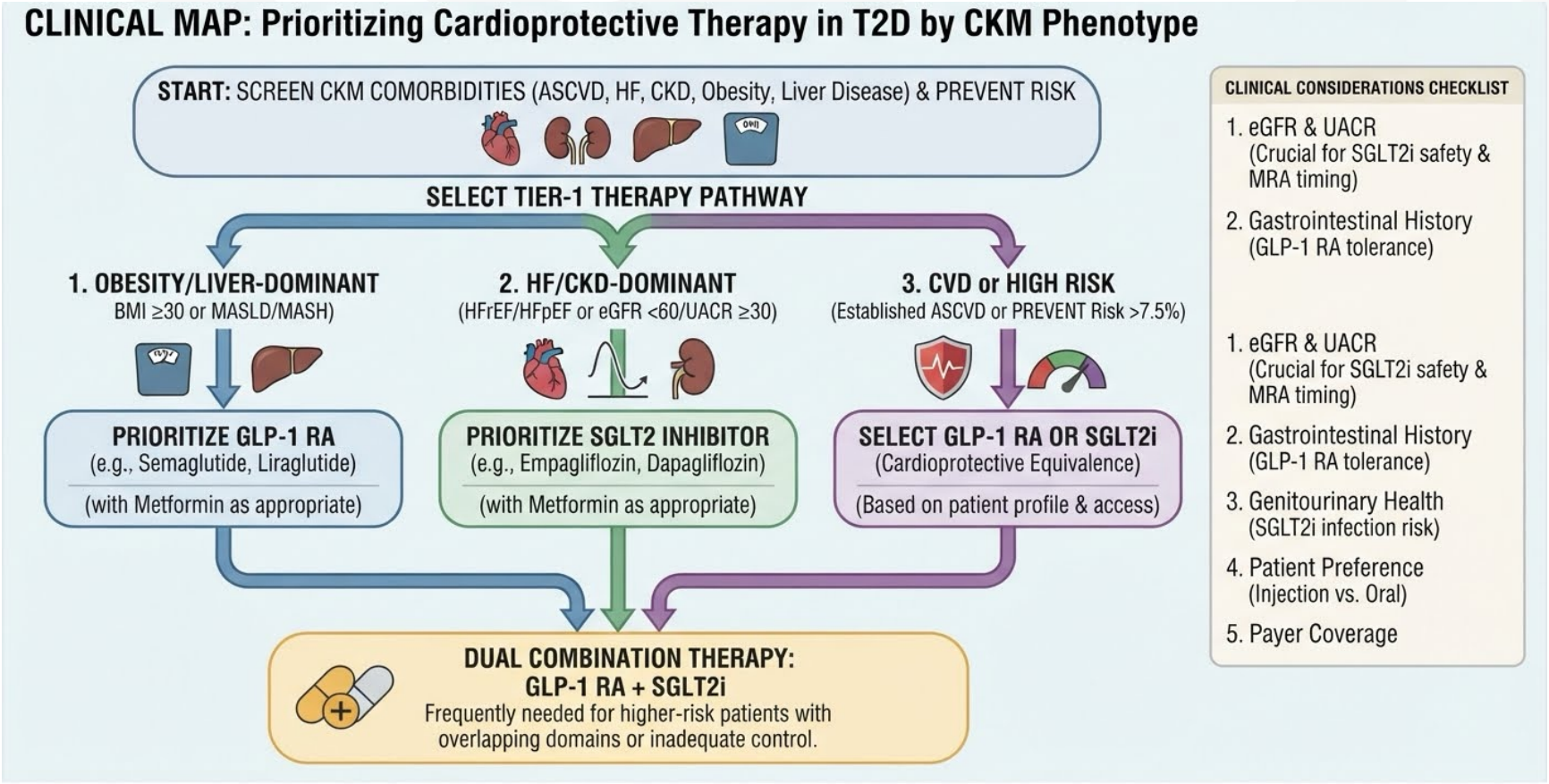
Medication Selection Algorithm

CKD → SGLT2i

ASCVD → GLP-1 RA and/or SGLT2i

HF → SGLT2i

Obesity/liver-dominant → GLP-1 RA



Source: Adapted from ADA/ACC Consensus Guidelines on CKM Health.

Top 10 Take-Home Messages

8. Assess for CKD and Utilize Kidney Protective Agents: Use of both estimated glomerular filtration rate (eGFR) and urine albumin-to-creatinine ratio (UACR) is recommended to characterize CKD and guide the use of kidney-protective agents to confer both cardiovascular and kidney benefits. For patients with CKD and T2D or CKD and albuminuria, renin-angiotensin system inhibitors (RASi) and SGLT2i should be used as first-line therapy. If albuminuria persists among patients with CKD and T2D, nonsteroidal mineralocorticoid receptor antagonist (MRA) or a GLP-1–based therapy should be added for further kidney and cardiovascular protection.

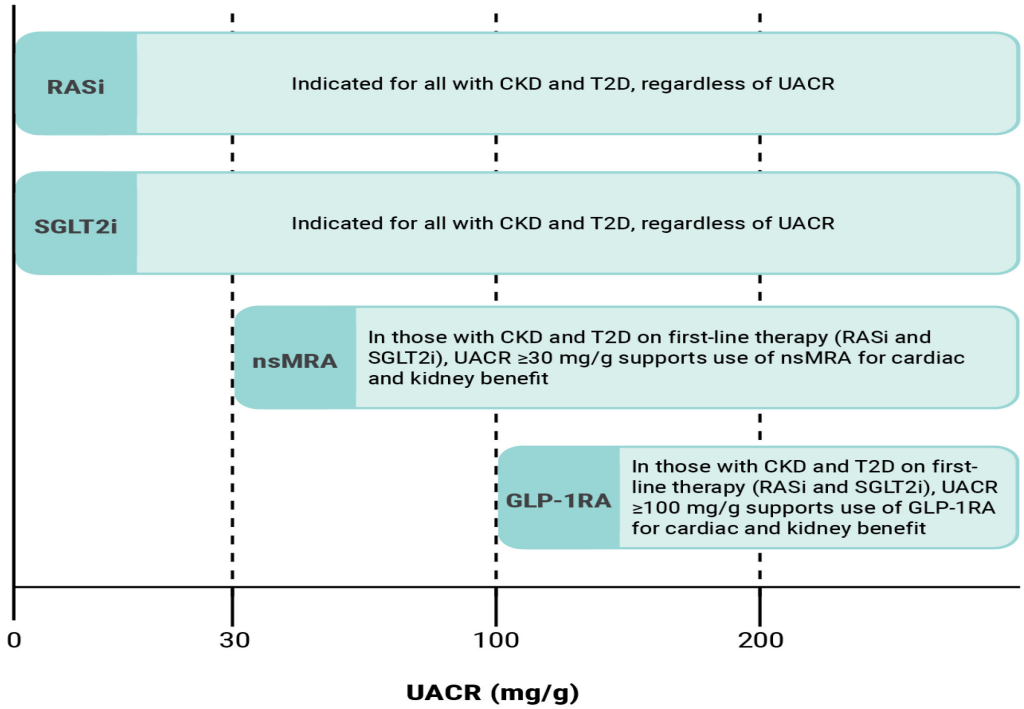
Stages of CKD

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

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

Figure 11.1—Risk of CKD progression, cardiovascular disease risk, and mortality; frequency of visits; and referral to nephrology according to GFR and albuminuria. The numbers in the boxes are a guide to the frequency of screening or monitoring (number of times per year). Green reflects no evidence of CKD by estimated GFR or albuminuria, with screening indicated once per year. For monitoring of prevalent CKD, suggested monitoring varies from once per year (yellow) to four times or more per year (i.e., every 1–3 months [deep red]) according to risks of CKD progression and CKD complications (e.g., cardiovascular disease, anemia, and hyperparathyroidism). These are general parameters based only on expert opinion and underlying comorbid conditions, and disease state must be taken into account, as should the likelihood of impacting a change in management for any individual. CKD, chronic kidney disease; GFR, glomerular filtration rate. Adapted from de Boer et al. (1).

Cardiovascular and Kidney Protective Therapies in CKD With Type 2 Diabetes Using UACR



Chiadi E. Ndumele. Circulation. 2026 AHA/ACC/ADA/ASN Guideline for the Prevention, Detection, Evaluation, and Management of Cardiovascular-Kidney-Metabolic Syndrome: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines, Volume: 154, Issue: 4, Pages: e50-e158, DOI: (10.1161/CIR.0000000000001453)

Top 10 Take-Home Messages

9. Address CKM Risk Factors in Patients With ASCVD: Management of ASCVD should emphasize CKM syndrome comorbidities, including obesity treatment through lifestyle modification, pharmacotherapy, and, when appropriate, metabolic and bariatric surgery; the use of cardioprotective antihyperglycemic agents for T2D; and the use of kidney-protective agents for CKD to reduce the risk for adverse cardiovascular events and loss of kidney function

Mitigating CV Risk in Diabetes

Lifestyle Foundation

Healthy eating pattern
Weight management
At least 150 minutes/week moderate exercise
Smoking cessation
Sleep optimization
Vaccinations
Diabetes self-management education

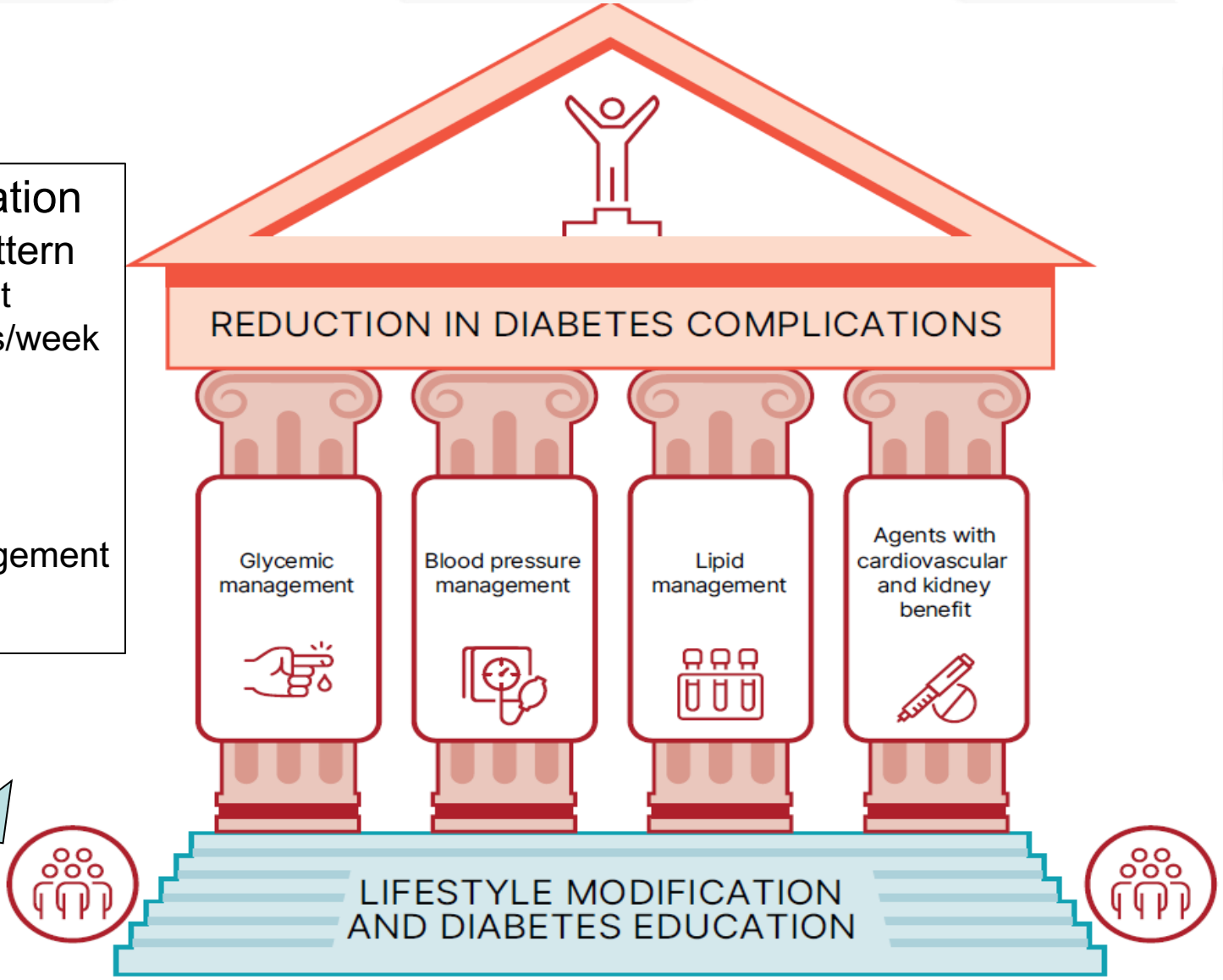


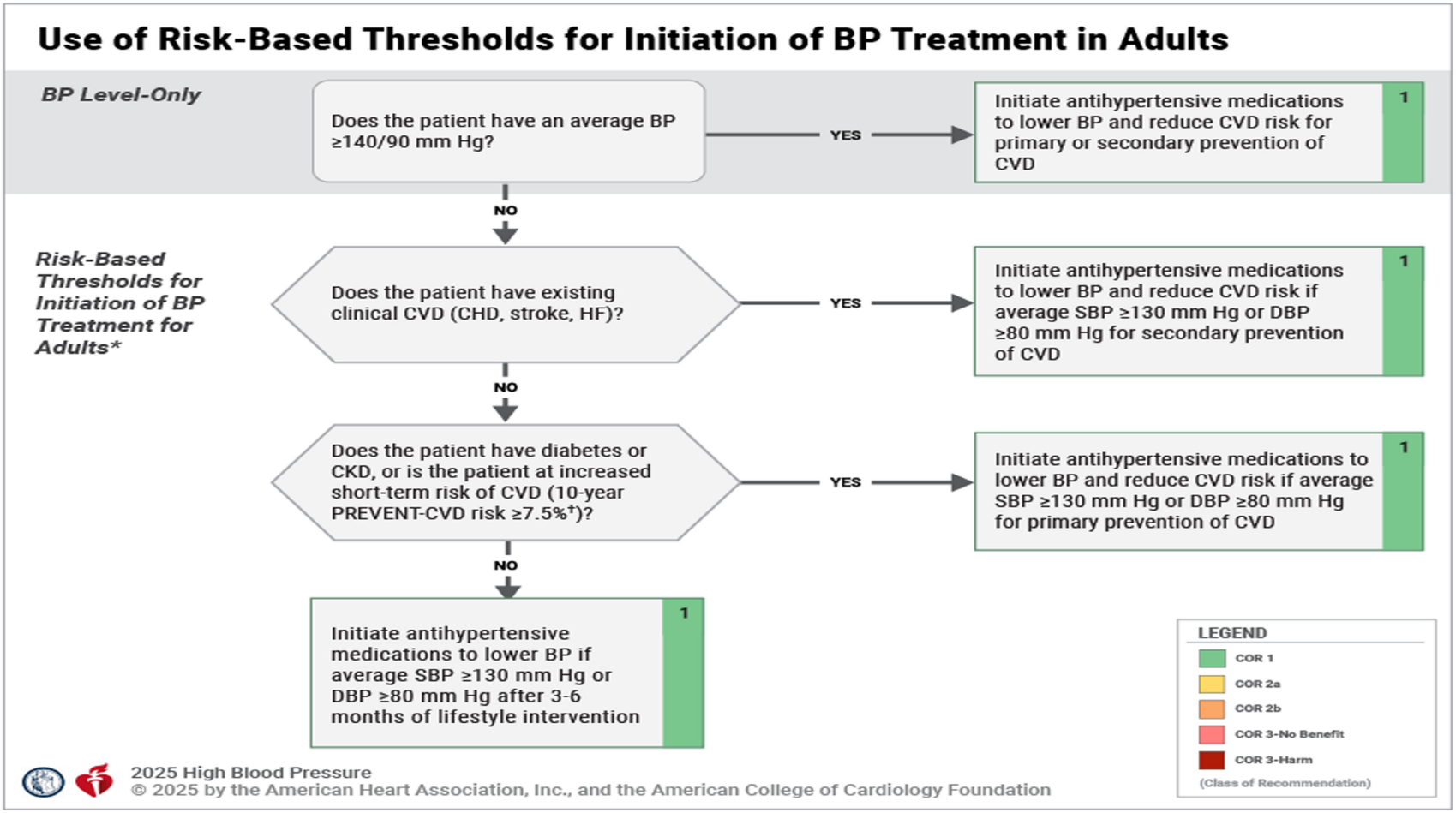
Figure 10.1—Multifactorial approach to reduction in risk of diabetes complications.

Blood Pressure Management

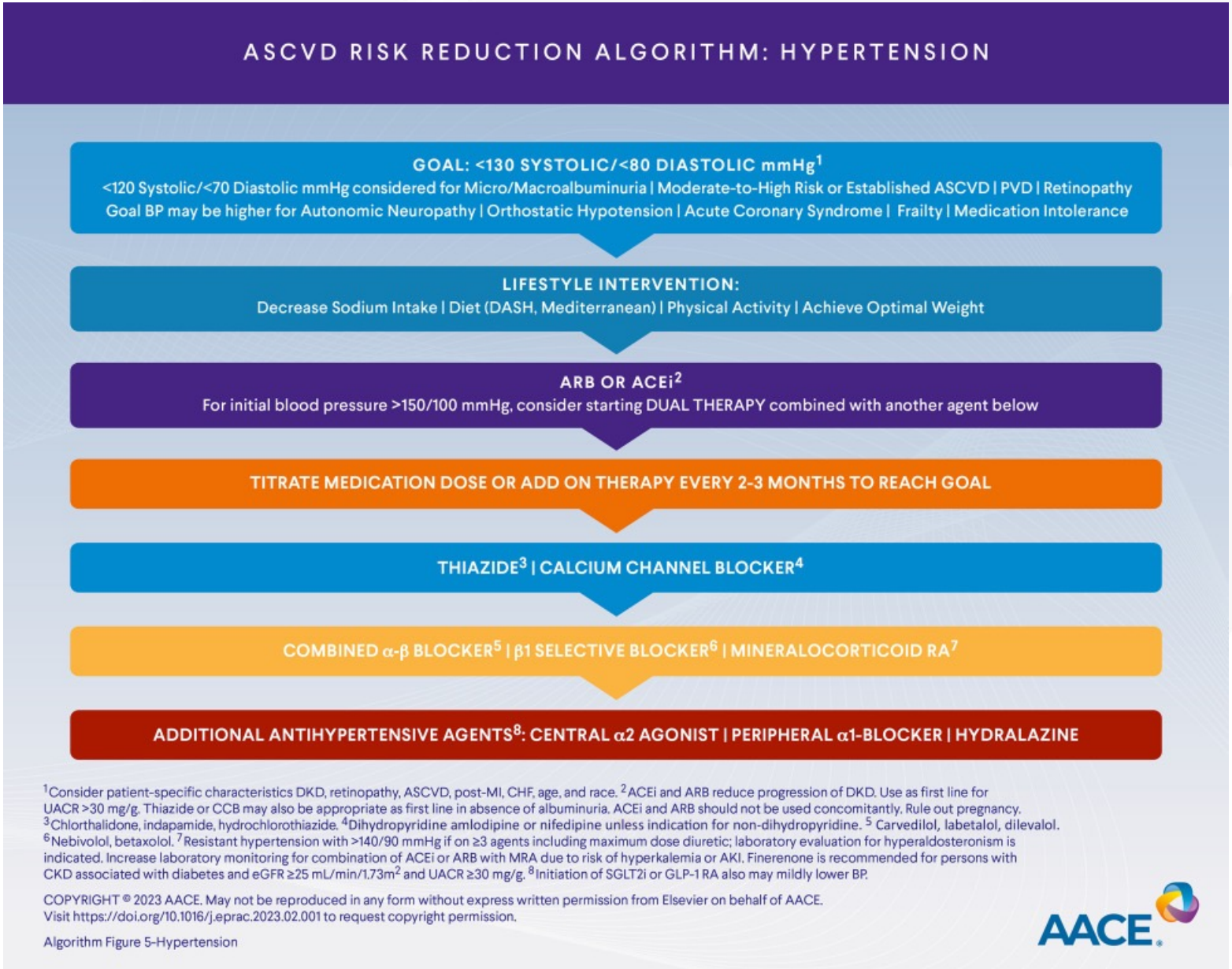
Target <130/80

ACEi/ARB for albuminuria

Avoid ACEi + ARB combo



ASCVD Risk Reduction: Hypertension



[1]Consider patient-specific characteristics DKD, retinopathy, ASCVD, post-MI, CHF, age, and race. [2]ACEi and ARB reduce progression of DKD. Use as first line for UACR >30 mg/g. Thiazide or CCB may also be appropriate as first line in absence of albuminuria. ACEi and ARB should not be used concomitantly. Rule out pregnancy. [3]Chlorthalidone, indapamide, hydrochlorothiazide. [4]Dihydropyridine amlodipine or nifedipine unless indication for non-dihydropyridine. [5] Carvedilol, labetalol, dilevalol. [6]Nebivolol, betaxolol. [7]Resistant hypertension with >140/90 mmHg if on ≥3 agents including maximum dose diuretic; laboratory evaluation for hyperaldosteronism is indicated. Increase laboratory monitoring for combination of ACEi or ARB with MRA due to risk of hyperkalemia or AKI. Finerenone is recommended for persons with CKD associated with diabetes and eGFR ≥25 mL/min/1.73m^2 and UACR ≥30 mg/g. [8]Initiation of SGLT2i or GLP-1 RA also may mildly lower BP.

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Algorithm Figure 5-Hypertension

AACE

Lipid Management

50% without CV risk factors with atherosclerosis by age 50

High-intensity statin

Add ezetimibe or PCSK9 for very high risk

Lipid management for primary prevention of atherosclerotic cardiovascular disease events in people with diabetes in addition to healthy behavior modification

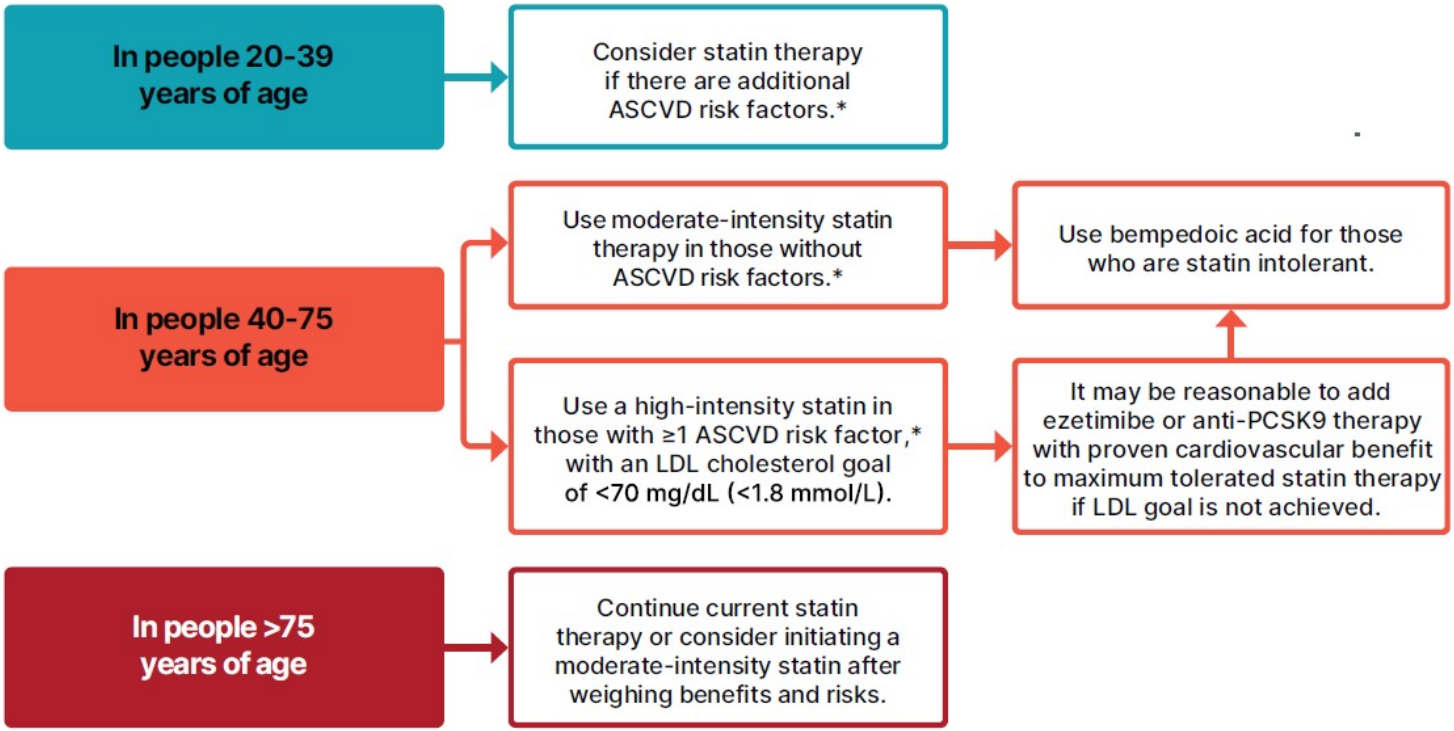


Figure 10.3—Recommendations for primary prevention of atherosclerotic cardiovascular disease (ASCVD) in people with diabetes using cholesterol-lowering therapy. *ASCVD risk factors include older age, hypertension, dyslipidemia, smoking, chronic kidney disease, or obesity. Adapted from "Standards of Care in Diabetes—2024 Abridged for Primary Care Professionals" (315).

Top 10 Take-Home Messages

10. Address CKM Risk Factors in Patients With HF: CKM factors should be incorporated into HF management. For heart failure with reduced ejection fraction (HFrEF), emphasize the cardiovascular and kidney benefits of RASi (angiotensin receptor-neprilysin inhibitors [ARNI], angiotensin-converting enzyme inhibitors [ACEi], angiotensin II receptor blockers [ARB]) and SGLT2i as part of quadruple therapy with beta blockers and steroidal MRAs. For heart failure with mildly reduced ejection fraction (HFmrEF)/heart failure with preserved ejection fraction (HFpEF), use SGLT2i as first-line GDMT, add GLP-1–based therapies in patients with obesity or other CKM risk factors, and consider nonsteroidal MRAs in those with T2D and CKD to reduce adverse cardiovascular events and loss of kidney function.

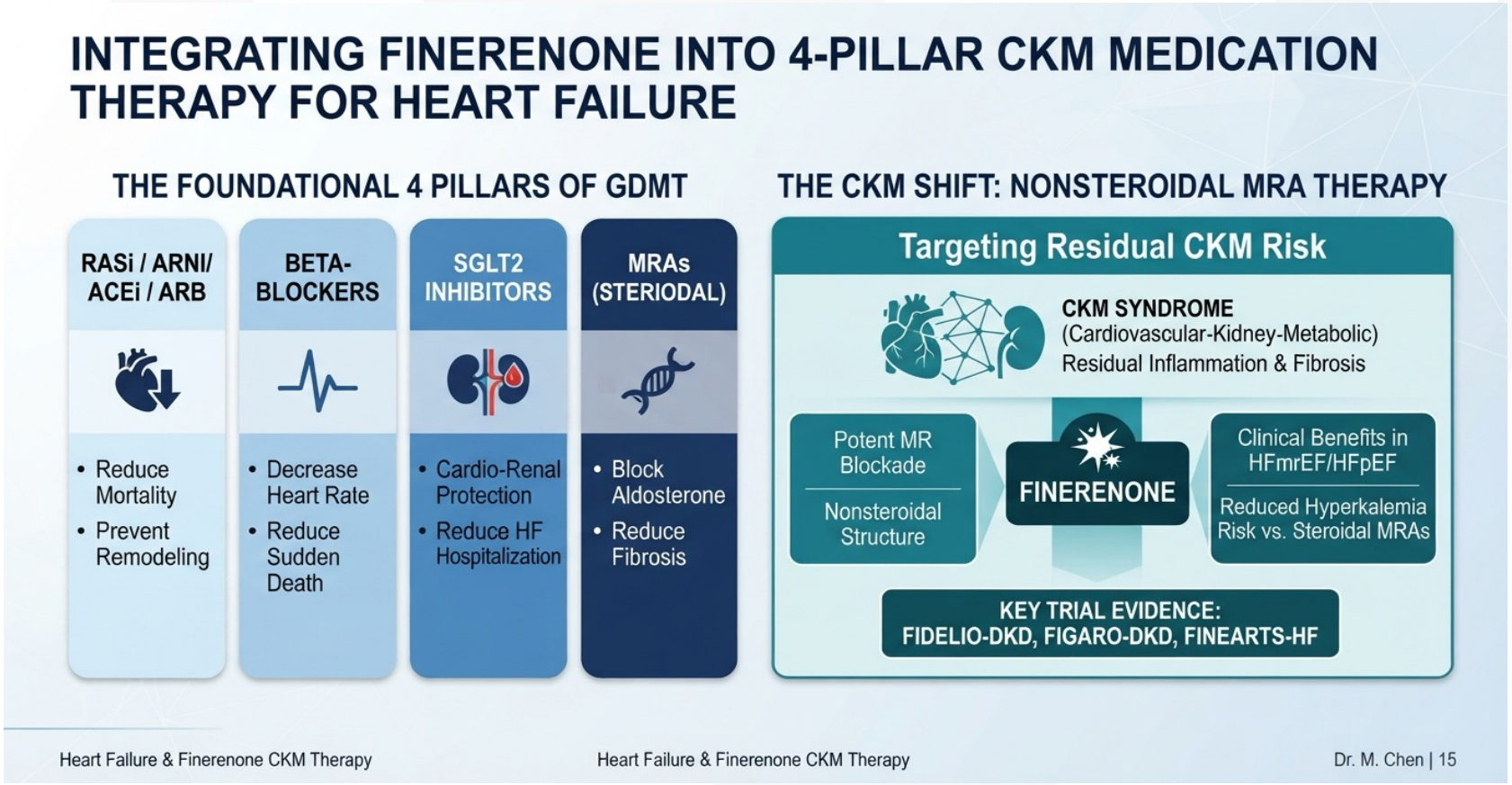
Heart Failure Management

Takeaway #10

Pre-HF risk calculation

HFpEF/HFmrEF → SGLT2i

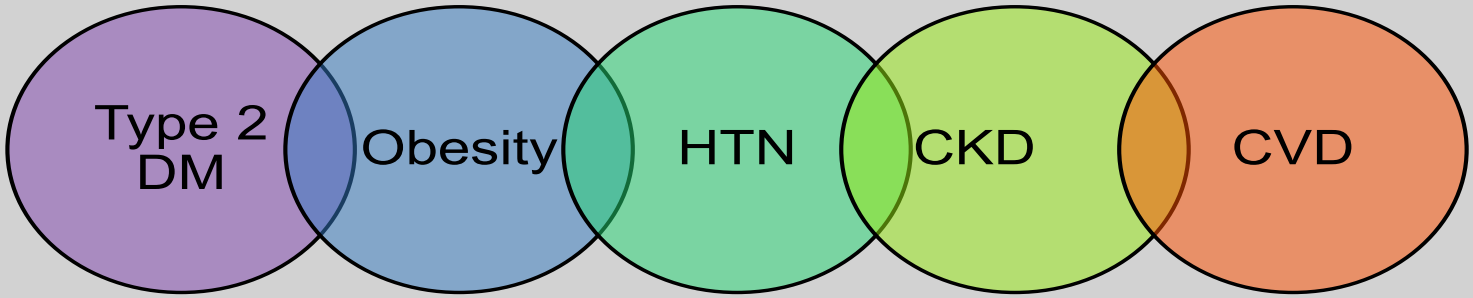
HFrEF → ARNI/ACEi/ARB + BB + MRA + SGLT2i



Heart Failure & Finerenone CKM Therapy

The CKM Lens of Care

Cardio-Kidney –Metabolic Syndrome



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Clinical Pearls

Screen annually

Albuminuria predicts CV risk

Use SGLT2i early

Use GLP-1 RA for ASCVD/obesity

Don’t wait for A1C to worsen

Screening

Cardiometabolic clinic scorecard

Optimized Patient Care Scorecard

When striving to improve target outcomes and optimize therapeutic agents to reduce cardiovascular risk, this form can help clinicians identify potential opportunities or highlight goals that have been achieved in an individual's care plan. It may be customized to organizational workflow and additional reference material can be found here: Optimized GDMT in the Setting of CKM Syndrome.

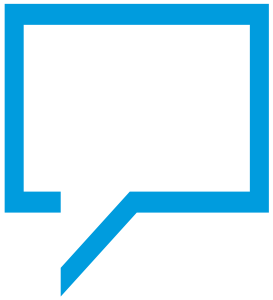
Patient | Date of Birth | Visit Date

	Labs & Testing	Result	Date	Standard Goal[1]	Notes
Glycemic Management	HbA1c			< 7%	
	Time in Range			> 70% TIR	
	Time Below Range			< 4% time <70 mg/dL < 1% time <54 mg/dL	
Cardiovascular Risk	LDL-C			□ < 55 mg/dL □ < 70 mg/dL	
	BP			< 130/80 mmHg	
	BNP/NTproBNP			Screen for HR/prevent worsening	
	LP(a)			Screen for high risk	
Kidney Risk	eGFR			Screen for/prevent decline in eGFR	
	UACR			Screen/reduce ≥30% (if uACR ≥300)	
Liver Risk	Fib-4			Screen for liver disease	
Weight Management	Weight			If indicated, reduction of □ 5% □ 10%	
	BMI			< 25 kg/m²	
	Waist Circumference			women < 35 in men < 40 in	

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QUESTIONS & ANSWERS



Methodist Health System

THANK YOU FOR JOINING US IN THIS COURSE!







