بسم الله الرحمن الرحیم

Diabetes Mellitus

Standards of Care in Diabetes—2025

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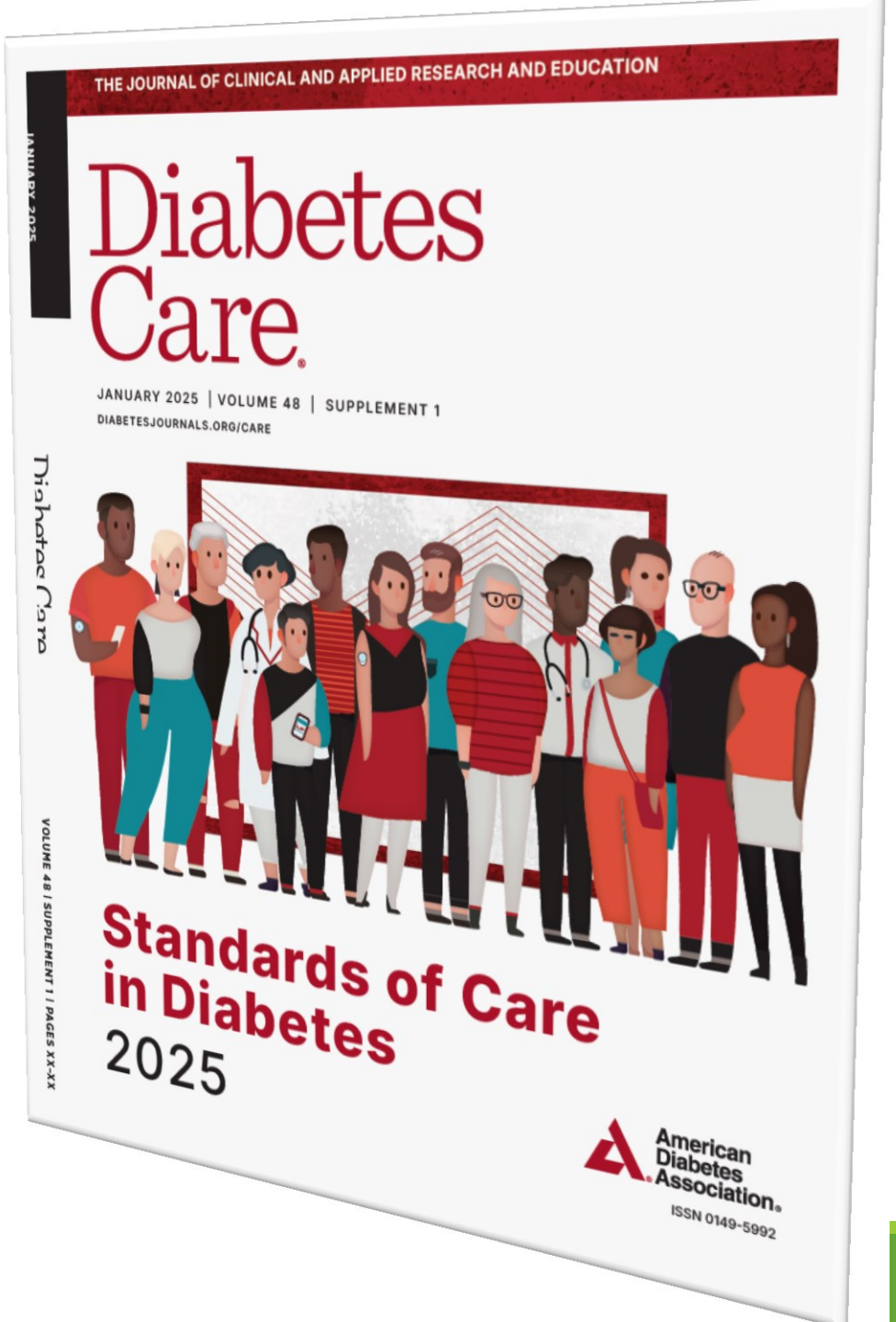


- *Diagnosis*
- *HISTORY*
- *Physical Examination*
- *LAB*
- *REFFERAL*
- *RF Management*

Assessment

Person-Centered Care Goals

Treat the patient, not the blood sugar.

Classification

Type 1 diabetes (due to autoimmune **β-cell destruction**, usually leading to absolute insulin deficiency, including latent autoimmune diabetes in adults)

Type 2 diabetes (due to a nonautoimmune progressive loss of adequate β-cell insulin secretion, frequently on the background of insulin resistance)

Specific types of diabetes due to **other causes**, e.g., monogenic diabetes syndromes, diseases of the **exocrine pancreas**, and **drug- or chemical-induced** diabetes.

GDM(diabetes diagnosed in the second or third trimester of pregnancy that was **not** clearly overt diabetes prior to gestation.

Type 1 Diabetes

Screening for **pre symptomatic** type 1 diabetes may be done by detection of autoantibodies to **insulin**, glutamic acid decarboxylase (**GAD**), islet antigen 2 (**IA-2**), or zinc transporter 8 (**ZnT8**). **B**

Autoantibody-based screening for presymptomatic type 1 diabetes should be offered to those with a **family history of type 1** diabetes or otherwise known elevated **genetic risk**. **B**

Having **multiple** confirmed islet autoantibodies is a risk factor for clinical diabetes. Testing for dysglycemia may be used to further forecast near-term risk.

When multiple islet autoantibodies are identified, **referral to a specialized** center for further evaluation and/or consideration of a clinical trial or approved therapy to potentially delay development of clinical diabetes should be considered. **B**

Flowchart for investigation of suspected type 1 diabetes in newly diagnosed adults, based on data from White European populations

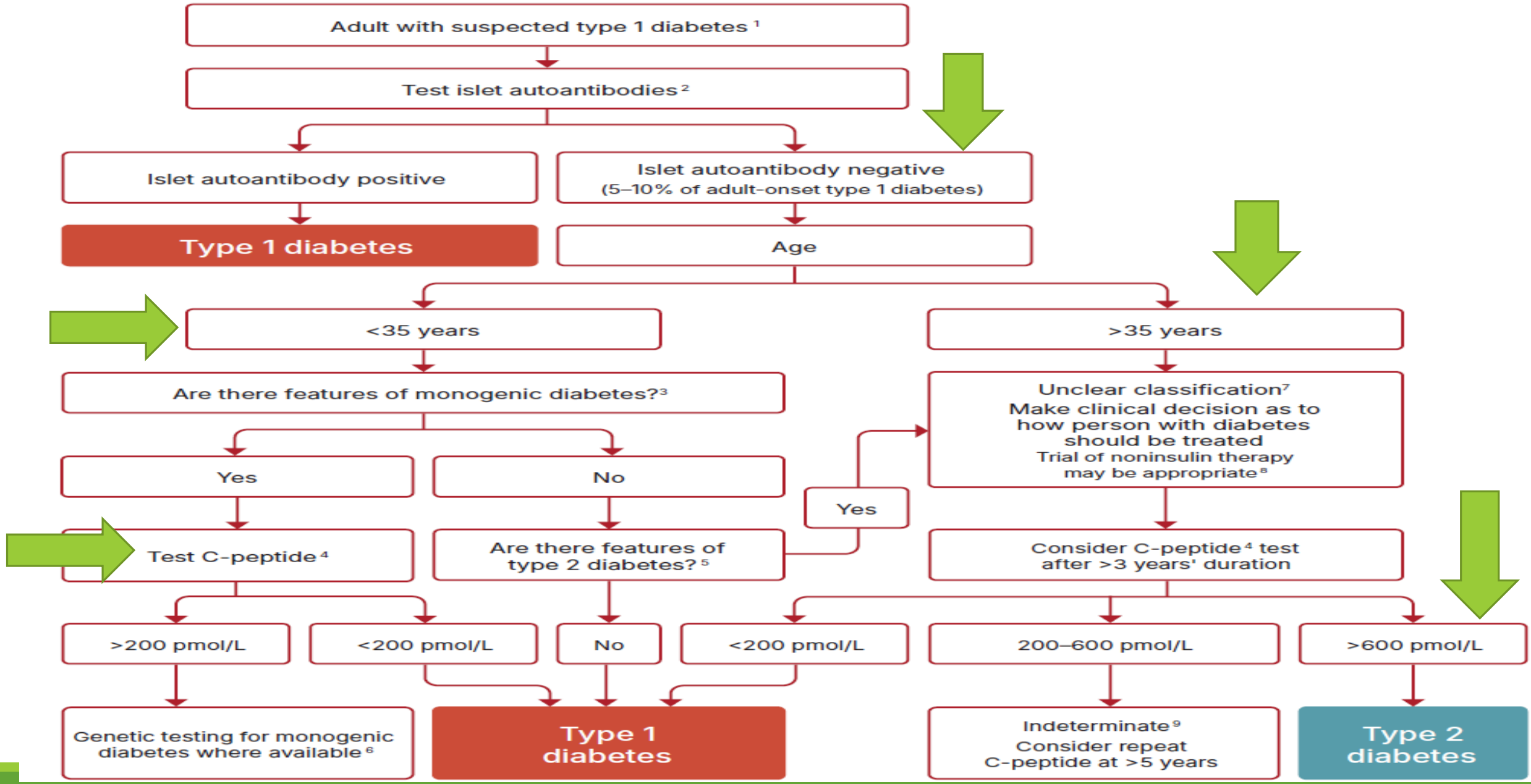


Table 2.5—Criteria for screening for diabetes or prediabetes in asymptomatic adults

1. Testing should be considered in adults with overweight or obesity (BMI ≥25 kg/m^2 or ≥23 kg/m^2 in individuals of Asian ancestry) who have one or more of the following risk factors:
   - First-degree relative with diabetes
   - High-risk race, ethnicity, and ancestry (e.g., African American, Latino, Native American, Asian American)
   - History of cardiovascular disease
   - Hypertension (≥130/80 mmHg or on therapy for hypertension)
   - HDL cholesterol level <35 mg/dL (<0.9 mmol/L) and/or triglyceride level >250 mg/dL (>2.8 mmol/L)
   - Individuals with polycystic ovary syndrome
   - Physical inactivity
   - Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans, metabolic dysfunction–associated steatotic liver disease)
2. People with prediabetes (A1C ≥5.7% [≥39 mmol/mol], IGT, or IFG) should be tested yearly.
3. People who were diagnosed with GDM should have testing at least every 1–3 years.
4. For all other people, testing should begin at age 35 years.
5. If results are normal, testing should be repeated at a minimum of 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.
6. Individuals in other high-risk groups (e.g., people with HIV, exposure to high-risk medicines, evidence of periodontal disease, history of pancreatitis) should also be closely monitored

GDM, gestational diabetes mellitus; IFG, impaired fasting glucose; IGT, impaired glucose tolerance.

Diagnosis and Classification of Diabetes:
Standards of Care in Diabetes - 2025. Diabetes Care 2025;48(Suppl. 1):S27-S49

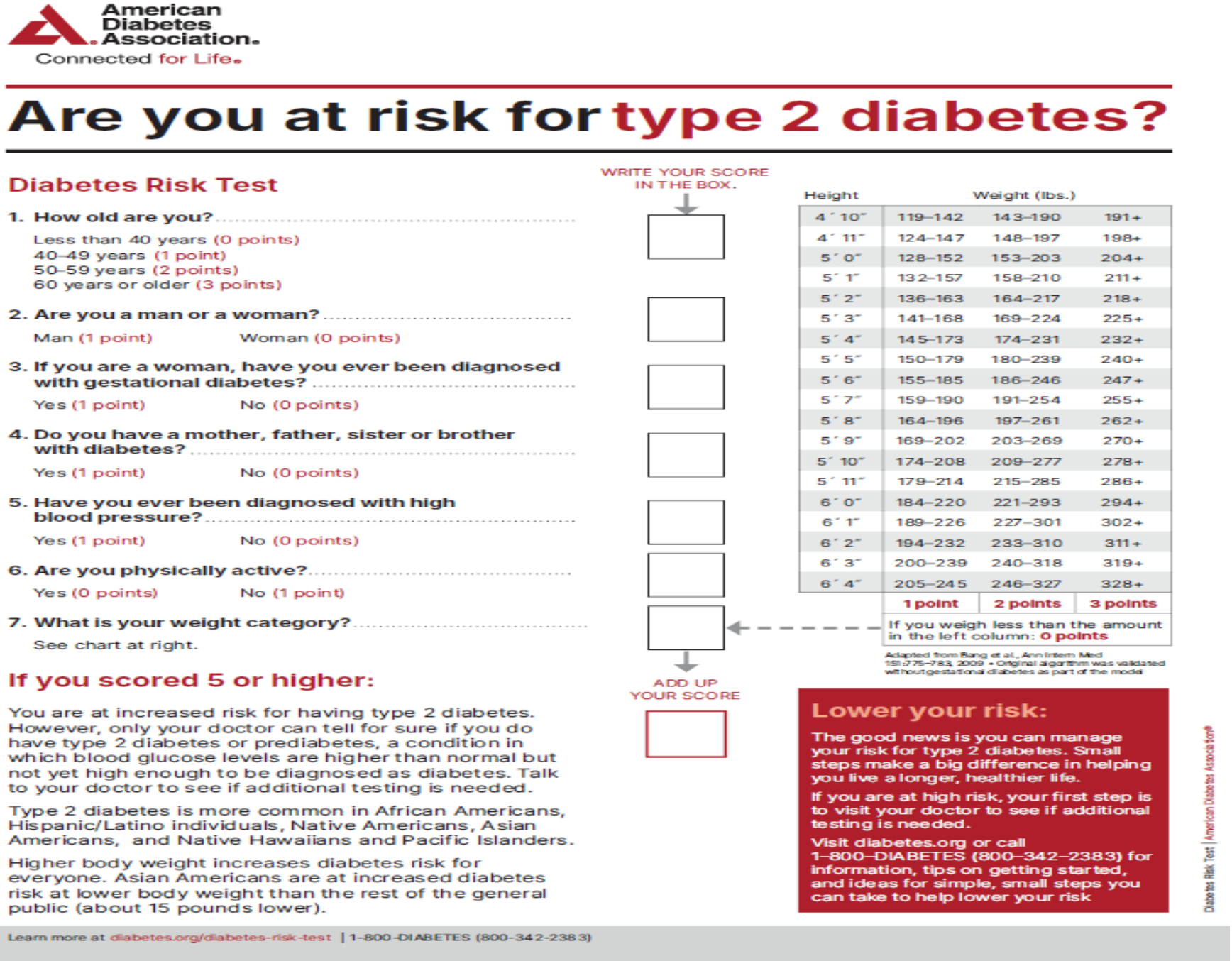


Figure 2.2—ADA risk test (diabetes.org/diabetes-risk-test).

Table 2.1—Criteria for the diagnosis of diabetes in nonpregnant individuals

A1C ≥6.5% (≥48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*
OR
FPG ≥126 mg/dL (≥7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*
OR
2-h PG ≥200 mg/dL (≥11.1 mmol/L) during OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*
OR
In an individual with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (≥11.1 mmol/L). Random is any time of the day without regard to time since previous meal.

DCCT, Diabetes Control and Complications Trial; FPG, fasting plasma glucose; OGTT, oral glucose tolerance test; NGSP, National Glycohemoglobin Standardization Program; WHO, World Health Organization; 2-h PG, 2-h plasma glucose. *In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal results from different tests which may be obtained at the same time (e.g., A1C and FPG), or the same test at two different time points.

Diagnosis and Classification of Diabetes:
Standards of Care in Diabetes - 2025. *Diabetes Care* 2025;48(Suppl. 1):S27-S49

Table 2.2—Criteria defining prediabetes in nonpregnant individuals

A1C 5.7–6.4% (39–47 mmol/mol)
OR
FPG 100 mg/dL (5.6 mmol/L) to 125 mg/dL (6.9 mmol/L) (IFG)
OR
2-h PG during 75-g OGTT 140 mg/dL (7.8 mmol/L) to 199 mg/dL (11.0 mmol/L) (IGT)

For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at the higher end of the range. FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test; 2-h PG, 2-h plasma glucose.

Diagnosis and Classification of Diabetes:
Standards of Care in Diabetes - 2025. *Diabetes Care* 2025;48(Suppl. 1):S27-49

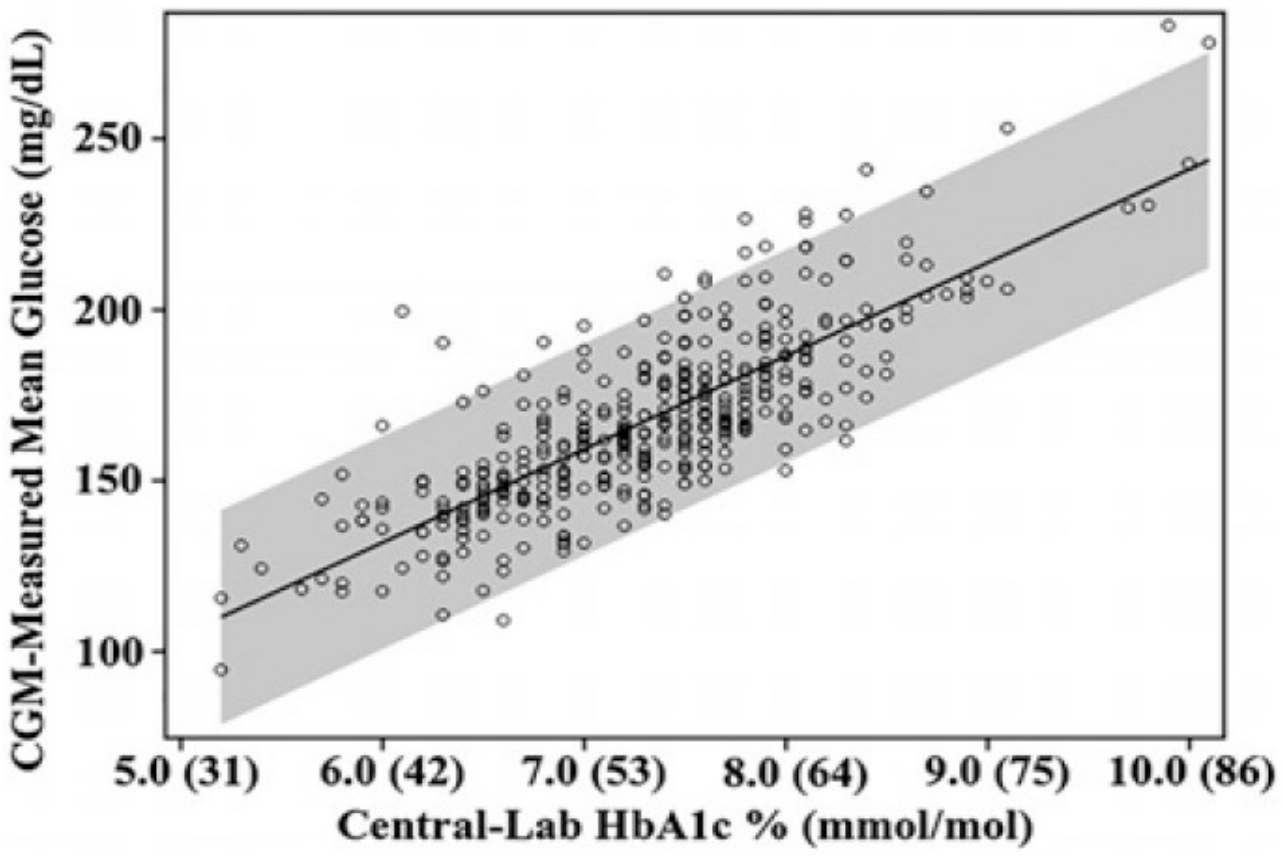
Falsely Increased HbA1C

- ✓ESRD (carbamylated Hb & uremic acidosis)
- ✓Hypertriglyceridemia
- ✓Hyperbilirubinemia
- ✓Iron deficiency anemia
- ✓Opiate addiction
- ✓Lead poisoning
- ✓Alcoholism
- ✓High dose of asprin

Falsely Decreased HbA1C

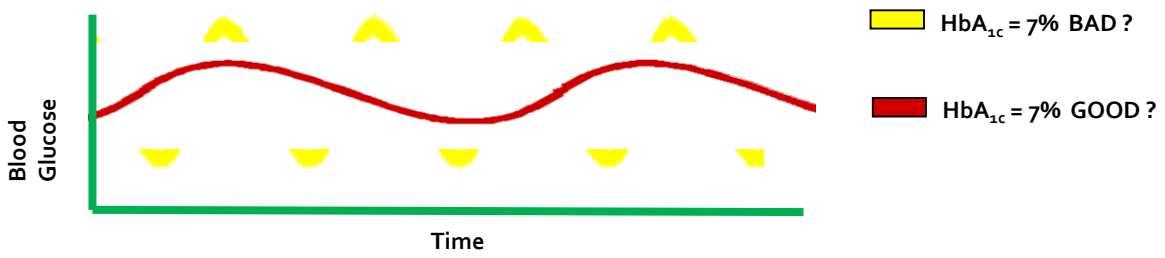
- Any condition → ↓ lifespan of the RBC
  - Hepatomegaly
  - Splenomegaly
- Pregnancy (second and third trimesters)
- Blood transfusion
- Phlebotomy
- Erythropoietin therapy
- Hemolytic anemia
- Sickle cell disease

Wide range of mean glucose concentration values that are possible for any HbA1c value.



Diabetes Care 2017;40:994–999

Are there glycemic metrics beyond HbA1c ?



Glycemic metrics beyond HbA1c ?

Other factors independent of HbA1c levels may add further metabolic burden and increase the risk of diabetic complications.

AGP Report

Name

MRN

GLUCOSE STATISTICS AND TARGETS

14 days
% Sensor Time

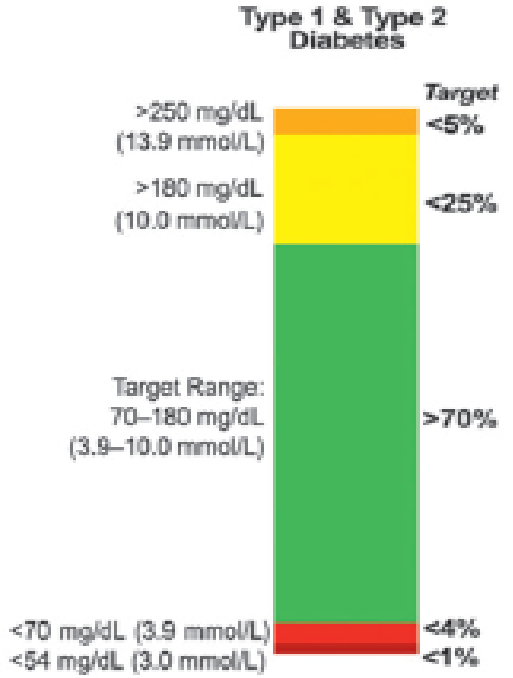
Glucose Ranges	**Targets** [% of Readings (Time/Day)]
Target Range 70–180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

Each 5% increase in time in range (70–180 mg/dL) is clinically beneficial.

Average Glucose
Glucose Management Indicator (GMI)
Glucose Variability

Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES



Goal: time in range of >70% with time below range <4%

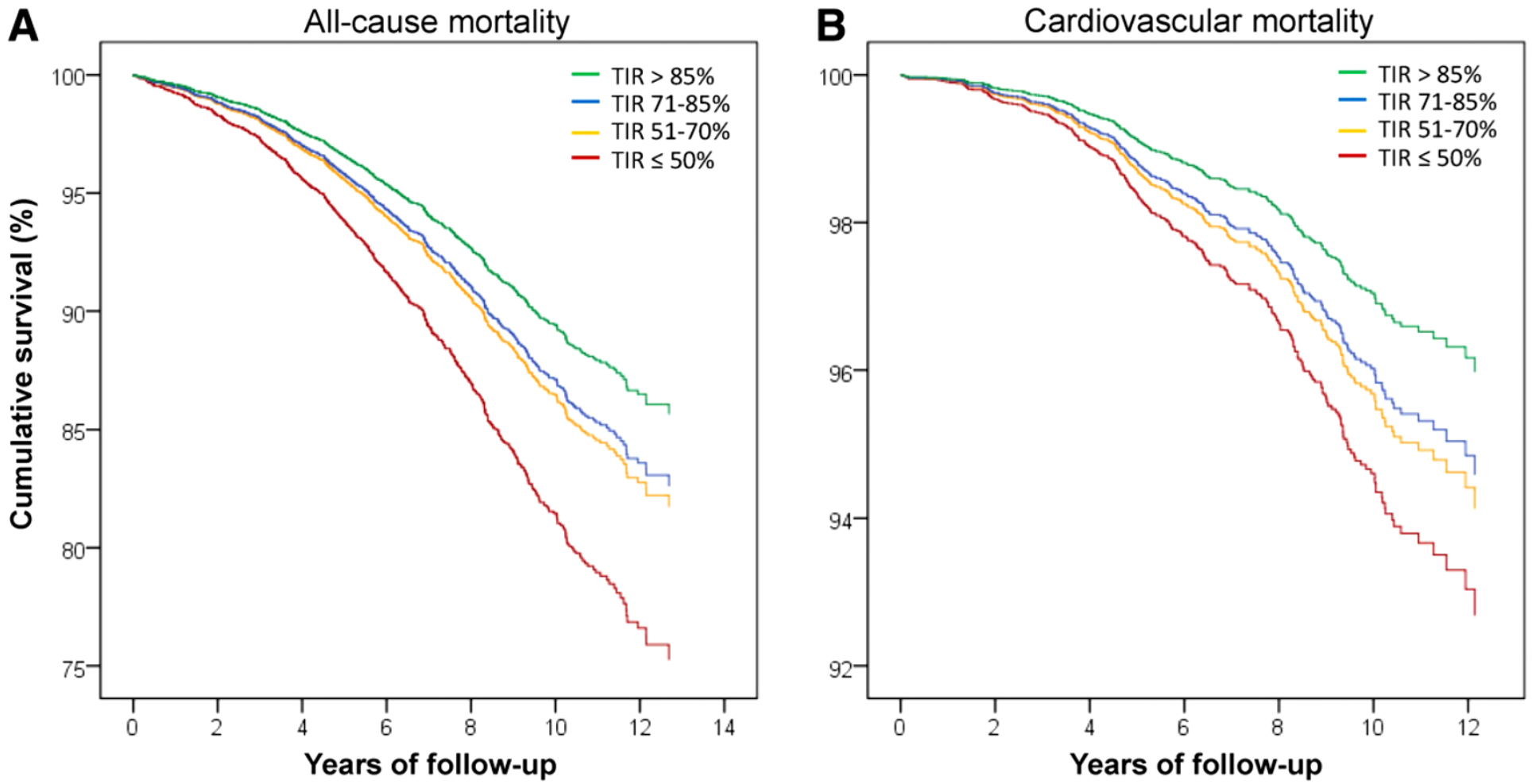
Table 6.2—CGM metrics for clinical care in nonpregnant individuals with type 1 or type 2 diabetes

Metric	Interpretation	Goals
Metrics for valid CGM wear		
Wear time	Number of days CGM device is worn	≥14-day wear for pattern management
Active percentage time	Percent of time CGM device is active	70% of time active out of 14 days
Glycemic metrics		
Mean glucose	Mean of glucose values	*
Glucose management indicator (GMI)	Calculated value approximating A1C (not always equivalent)	*
Glucose coefficient of variation (CV)	Spread of glucose values	≤36%†
TAR >250 mg/dL (>13.9 mmol/L)	Percent of time in level 2 hyperglycemia	<5% (most adults); <10% (older adults)
TAR 181–250 mg/dL (10.1–13.9 mmol/L)	Percent of time in level 1 hyperglycemia	<25% (most adults); <50% (older adults)‡
TIR 70–180 mg/dL (3.9–10.0 mmol/L)	Percent of time in range	>70% (most adults); >50% (older adults)
TBR 54–69 mg/dL (3.0–3.8 mmol/L)	Percent of time in level 1 hypoglycemia	<4% (most adults); <1% (older adults)§
TBR <54 mg/dL (<3.0 mmol/L)	Percent of time in level 2 hypoglycemia	<1%

CGM, continuous glucose monitoring; TAR, time above range; TBR, time below range; TIR, time in range. *Goals for these values are not standardized. †Some studies suggest that lower coefficient of variation targets (<33%) provide additional protection against hypoglycemia for those receiving insulin or sulfonylureas. ‡Goals are for level 1 and level 2 hyperglycemia combined. §Goals are for level 1 and level 2 hypoglycemia combined. Adapted from Battelino et al. (31).

- Time in range (TIR) is associated with the risk of **microvascular complications**, should be an acceptable end point for clinical trials moving forward, and can be used for **assessment of glycemic control**.

- Additionally, time below target (<70 and <54 mg/dL) and time above target (>180mg/dL) are useful parameters for reevaluation of the treatment regimen.


A
All-cause mortality
TIR > 85%
TIR 71-85%
TIR 51-70%
TIR ≤ 50%
Cumulative survival (%)
100
95
90
85
80
75
0
2
4
6
8
10
12
14
Years of follow-up
B
Cardiovascular mortality
TIR > 85%
TIR 71-85%
TIR 51-70%
TIR ≤ 50%
100
98
96
94
92
0
2
4
6
8
10
12
Years of follow-up

Case:

A 41-year-old male patient has been diagnosed with diabetes during routine tests.

He does not mention any other specific medical history.

FBS:175 mg/dl
HG A1C: 8 mmol/L

What medical history do you take from him?

What examinations and tests do you send to the patient?

What referrals do you send?

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

	Visit		
	Initial	Every follow-up	Annual
Past medical and family history			
Diabetes history			
• Characteristics at onset (e.g., age and symptoms and/or signs)	✓		
• Review of previous treatment plans and response	✓		
• Assess frequency, cause, and severity of past hospitalizations	✓		
Family history			
• Family history of diabetes in a first-degree relative	✓		
• Family history of autoimmune disorders	✓		
Personal history of complications and common comorbidities			
• Common comorbidities (e.g., obesity, OSA, and MASLD)	✓		✓
• High blood pressure or abnormal lipids	✓		✓
• Macrovascular and microvascular complications	✓		✓
• Hypoglycemia: awareness, frequency, causes, and timing of episodes	✓	✓	✓
• Presence of hemoglobinopathies or anemias	✓		✓
• Last dental visit	✓		✓
• Last dilated eye exam	✓		✓
• Visits to specialists			✓
• Disability assessment and use of assistive devices (e.g., physical, cognitive, vision and auditory, history of fractures, and podiatry)	✓	✓	✓
• Personal history of autoimmune disease	✓		
Surgical and procedure history			
• Surgeries (e.g., metabolic surgery and transplantation)	✓	✓	✓
Interval history			
• Changes in medical or family history since last visit		✓	✓

Table 6.4—Classification of hypoglycemia

	Glycemic criteria/description
Level 1	Glucose <70 mg/dL (3.9 mmol/L) and ≥54 mg/dL (3.0 mmol/L)
Level 2	Glucose <54 mg/dL (3.0 mmol/L)
Level 3	A severe event characterized by altered mental and/or physical status requiring assistance for treatment of hypoglycemia

Reprinted from Agiostratidou et al. (74).

Behavioral factors			
• Eating patterns and weight history	✓	✓	✓
• Assess familiarity with carbohydrate counting (e.g., type 1 diabetes or type 2 diabetes treated with MDI)	✓		✓
• Physical activity and sleep behaviors; screen for OSA	✓	✓	✓
• Tobacco, alcohol, and substance use	✓		✓
Medications and vaccinations			
• Current medication plan	✓	✓	✓
• Medication-taking behavior, including rationing of medications and/or medical equipment	✓	✓	✓
• Medication intolerance or side effects	✓	✓	✓
• Complementary and alternative medicine use	✓	✓	✓
• Vaccination history and needs	✓		✓
Technology use			
• Assess use of health apps, online education, patient portals, etc.	✓	✓	✓
• Glucose monitoring (meter/CGM): results and data use	✓	✓	✓

Continued on p. S63

Physical examination			
• Height, weight, and BMI; growth and pubertal development in children and adolescents	✓	✓	✓
• Blood pressure determination	✓	✓	✓
• Orthostatic blood pressure measures (when indicated)	✓		✓
• Fundoscopic examination (refer to eye specialist)	✓		✓
• Thyroid palpation	✓		✓
• Skin examination (e.g., acanthosis nigricans, insulin injection or insertion sites, and lipodystrophy)	✓	✓	✓
• Comprehensive foot examination	✓		✓
• Visual inspection (e.g., skin integrity, callous formation, foot deformity or ulcer, and toenails)*	✓	✓	✓
• Check pedal pulses and screen for PAD with ABI testing if a PAD diagnosis would change management	✓		✓
• Determination of temperature, vibration or pinprick sensation, and 10-g monofilament exam	✓		✓

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• Screen for depression, anxiety, diabetes distress, fear of hypoglycemia, and disordered eating	✓		✓
• Assessment for cognitive performance if indicated†	✓		✓
• Assessment for functional performance if indicated†	✓		✓
• Consider assessment for bone health (e.g., loss of height and kyphosis)	✓		✓
Laboratory evaluation			
• A1C, if the results are not available within the past 3 months	✓	✓	✓
• Lipid profile, including total, LDL, and HDL cholesterol and triglycerides‡	✓		✓^
• Liver function tests (i.e., FIB-4)‡	✓		✓
• Spot urinary albumin-to-creatinine ratio	✓		✓
• Serum creatinine and estimated glomerular filtration rate§	✓		✓
• Thyroid-stimulating hormone in people with type 1 diabetes‡	✓		✓
• Celiac disease in people with type 1 diabetes‖	✓		

Continued on p. S64

	Visit		
	Initial	Every follow-up	Annual
• Vitamin B12 if taking metformin for >5 years	✓		✓
• CBC with platelets	✓		✓
• Serum potassium levels in people with diabetes on ACE inhibitors, ARBs, or diuretics§	✓		✓
• Calcium, vitamin D, and phosphorous for appropriate people with diabetes	✓		✓

ABI, ankle brachial index; ARBs, angiotensin receptor blockers; CBC, complete blood count; CGM, continuous glucose monitor; FIB-4: fibrosis-4 index; MASLD, metabolic-associated steatotic liver disease; MDI, multiple daily injections; OSA, obstructive sleep apnea; PAD, peripheral arterial disease. *Should be performed at every visit in people with diabetes with sensory loss, previous foot ulcers, or amputations. †At 65 years of age or older. ‡May also need to be checked after initiation or dose changes of medications that affect these laboratory values (i.e., diabetes medications, blood pressure medications, cholesterol medications, or thyroid medications). ^In people without dyslipidemia and not on cholesterol-lowering therapy, testing may be less frequent. §May be needed more frequently in people with diabetes with known chronic kidney disease or with changes in medications that affect kidney function and serum potassium (see **Table 11.2**). ||In people with presence of gastrointestinal symptoms, signs, laboratory manifestations, or clinical suspicion suggestive of celiac disease.

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Referrals for initial care management:

- Cardiology , if indicated
- Eye exam for annual dilated eye exam
- Family planning for women of reproductive age
- Registered dietitian nutritionist .
- Diabetes self-management education and support
- Dentist for comprehensive dental and periodontal examination
- Mental health professional, if indicated.
- Audiology, if indicated.

In asymptomatic individuals, routine screening for coronary artery disease is not recommended, as it does not improve outcomes as long as ASCVD risk factors are treated.

Consider investigations for coronary artery :

- ✓ Atypical cardiac symptoms
- ✓ Signs or symptoms of associated vascular disease, including carotid bruits, TIA, stroke, claudication, or PAD
- ✓ ECG abnormalities (e.g., Q waves).

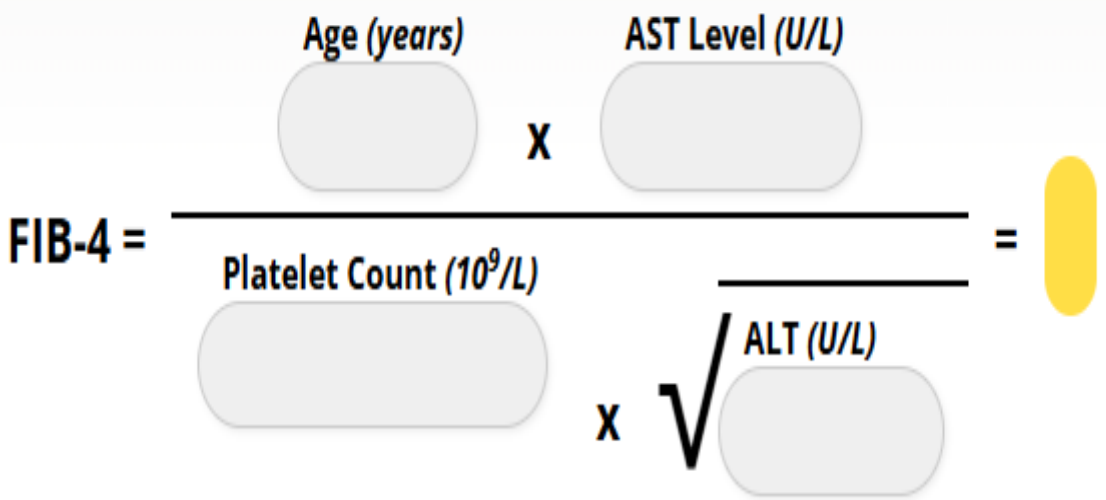
Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis

Adults with type 2 diabetes or prediabetes, particularly those with **obesity or cardiometabolic risk** factors or **established CVD**, should be screened/risk stratified for clinically significant **liver fibrosis** (defined as moderate fibrosis to cirrhosis) using a calculated fibrosis-4 index (FIB-4) :

- ✓ Age
- ✓ ALT
- ✓ AST
- ✓ PLT [mdcalc.com/calc/2200/ fibrosis4-fib-4-index-liver-fibrosis])

even if they have normal liver enzymes.

Fibrosis-4 (FIB-4) Calculator



http/tools.acc.org/ASCVD-Risk-Estimator-Plus

CKD-EPI Equations for GFR

Fibrosis-4 calculator (FIB-4)

BMI

Diabetes is associated with the development of NAFLD, including its more **severe manifestations of:**

Nonalcoholic steatohepatitis

Liver fibrosis

Cirrhosis

Hepatocellular carcinoma

The beneficial effects of **weight reduction** on MASH are well documented.

Higher incidences of **resolution of MASH and regression of liver fibrosis** have been observed with achievement of a weight reduction of 10% or more by means of **lifestyle modification** or with **bariatric metabolic surgery**.

Adults with diabetes or prediabetes with persistently **elevated plasma aminotransferase levels** for > 6 months and low FIB-4 should be evaluated for **other causes** of liver disease.

Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis

- Adults with type 2 diabetes or prediabetes, particularly with overweight or obesity, with NAFLD should be recommended **lifestyle changes** that promote weight loss, ideally within a structured **nutrition plan and physical activity** program for cardiometabolic benefits and histological improvement.
- For adults with **type 2 diabetes**, particularly with **overweight or obesity, with NAFLD**, consider using a **GLP-1 receptor agonist** with demonstrated benefits in NASH as an adjunctive therapy to lifestyle interventions for weight loss.
- **Pioglitazone or GLP-1 receptor agonists** are the preferred agents for the treatment of **hyperglycemia** in adults with type 2 diabetes **with biopsy-proven NASH** or those at high risk with clinically significant liver fibrosis using **noninvasive tests**.

Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis

In adults with type 2 diabetes and NAFLD, use of glucose-lowering therapies other than pioglitazone or GLP-1 receptor agonists may be continued as clinically indicated, but these therapies lack evidence of benefit in NASH.

Insulin therapy is the preferred agent for the treatment of hyperglycemia in adults with type 2 diabetes with decompensated cirrhosis.

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

Individualize care, targeting the following:

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

MASLD with F0-F1

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

Compensated cirrhosis

Decompensated cirrhosis

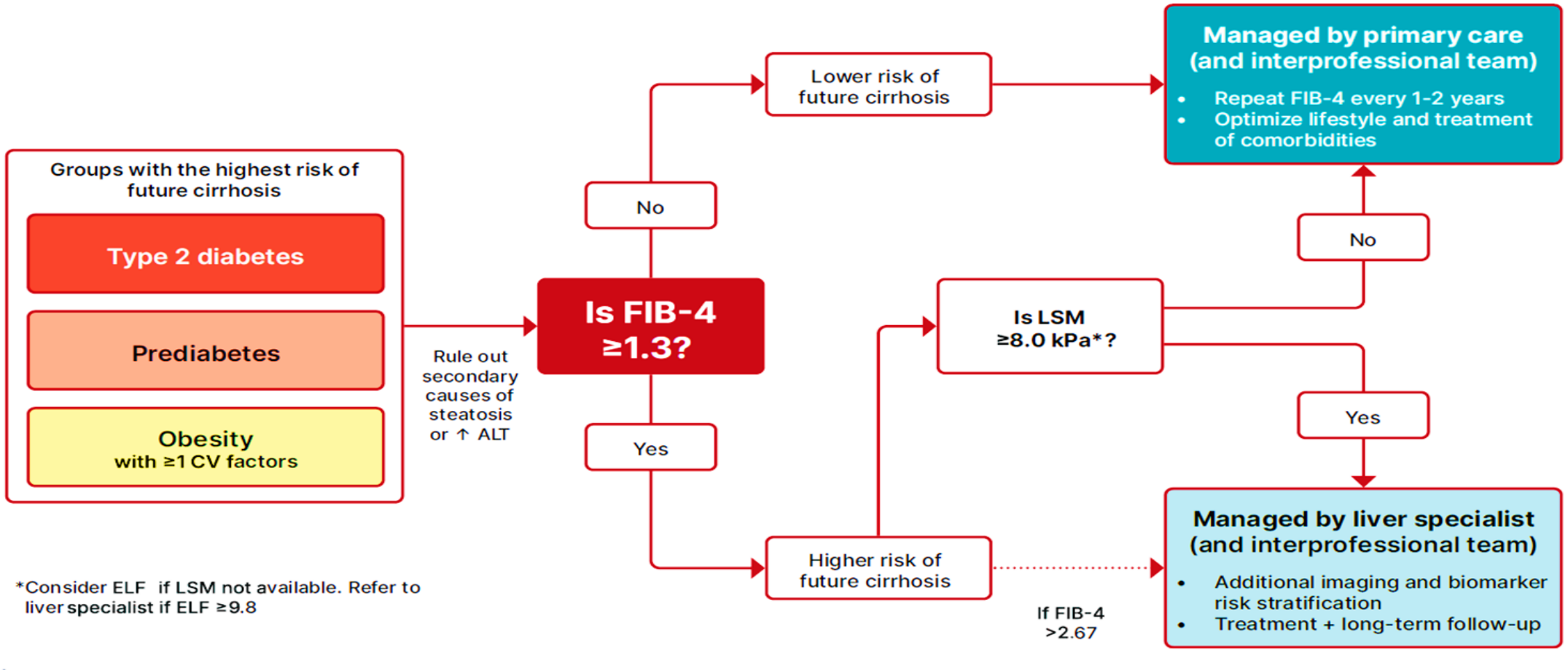
Obesity		MASH

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

Comprehensive Medical Evaluation and Assessment of Comorbidities: *Standards of Care in Diabetes – 2025*. *Diabetes Care* 2025;48(Suppl. 1):S59-S85

- Consider metabolic surgery in appropriate candidates as an option to treat NASH in adults with type 2 diabetes and to improve cardiovascular outcomes.
- Metabolic surgery should be used with caution in adults with type 2 diabetes with compensated cirrhosis from NAFLD and is **not** recommended in **decompensated** cirrhosis.

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



https://diabetesjournals.org/care/article/48/Supplement_1/S59/157568/4-Comprehensive-Medical-Evaluation-and-Assessment

- Adults with type 2 diabetes and NAFLD are at increase cardiovascular risk; therefore, comprehensive manager cardiovascular risk factors is recommended.
- **Statin** therapy is safe in adults with type 2 diabetes and compensated cirrhosis from NAFLD and should be initiated or continued for cardiovascular risk reduction as clinically indicated.
- Statin therapy should be used with caution and close monitoring in people with decompensated cirrhosis, given limited safety and efficacy data.

Bone Health

4.11 To reduce the risk of falls and fractures, glycemic management goals should be individualized for people with diabetes at a **higher risk of fracture**. **C** Prioritize use of glucose-lowering medications that are associated with low risk for hypoglycemia to avoid falls. **B**

4.12 Advise people with diabetes on their intake of calcium (1,000–1,200 mg/day) and vitamin D to ensure it meets the recommended daily allowance for those at risk for fracture, either through their diet or supplemental means. **B**

4.13 Antiresorptive medications and osteo **anabolic agents** should be recommended for older adults with diabetes who are at higher risk of fracture, including those with BMD with a T-score ≤ -2.0, history of fragility fracture, or elevated Fracture Risk Assessment Tool score (≥3% for hip fracture or ≥20% for major osteoporotic fracture). **B**

Table 4.4—Diagnostic assessment

Individuals who should receive BMD testing
People aged ≥65 years
Postmenopausal women and men aged ≥50 years with history of adult-age fracture or with diabetes–specific risk factors: • Frequent hypoglycemic events • Diabetes duration >10 years • Diabetes medications: insulin, thiazolidinediones, sulfonylureas • A1C >8% • Peripheral or autonomic neuropathy, retinopathy, nephropathy • Frequent falls • Glucocorticoid use

Bone Health

Antiresorptive medications and osteoanabolic agents should be considered for people with diabetes who have low bone mineral density with a T-score ≤ -2.0 or have experienced fragility fractures.

Cancer

Diabetes is associated with increased risk of cancers of the liver, pancreas, endometrium, colon/rectum, breast, and bladder .

The association may result from **shared risk factors** between type 2 diabetes and cancer (older age, obesity, and physical inactivity) but may also be due to diabetes-related factors, such as underlying disease physiology or diabetes treatments, although evidence for these links is scarce.

Patients with diabetes should be encouraged to undergo recommended **age- and sex appropriate cancer** screenings and to reduce their **modifiable cancer risk factors** (obesity, physical inactivity, and smoking).

Goals

After Diagnosis and Assessment

- ***DM Management:***

{Life style modification

Risk factors (lipid, BP)

Glycemic control

Treat the patient, not the blood sugar.

DM Management:

- **Life style modification:**
  - Medical nutrition therapy
  - Regular physical activity
  - Sufficient amounts of sleep
  - Smoking cessation
- **Lipid management**
- **BP control**
- **Antiplatelet agents**
- **Glycemic control**

Treat the patient, not the blood sugar.

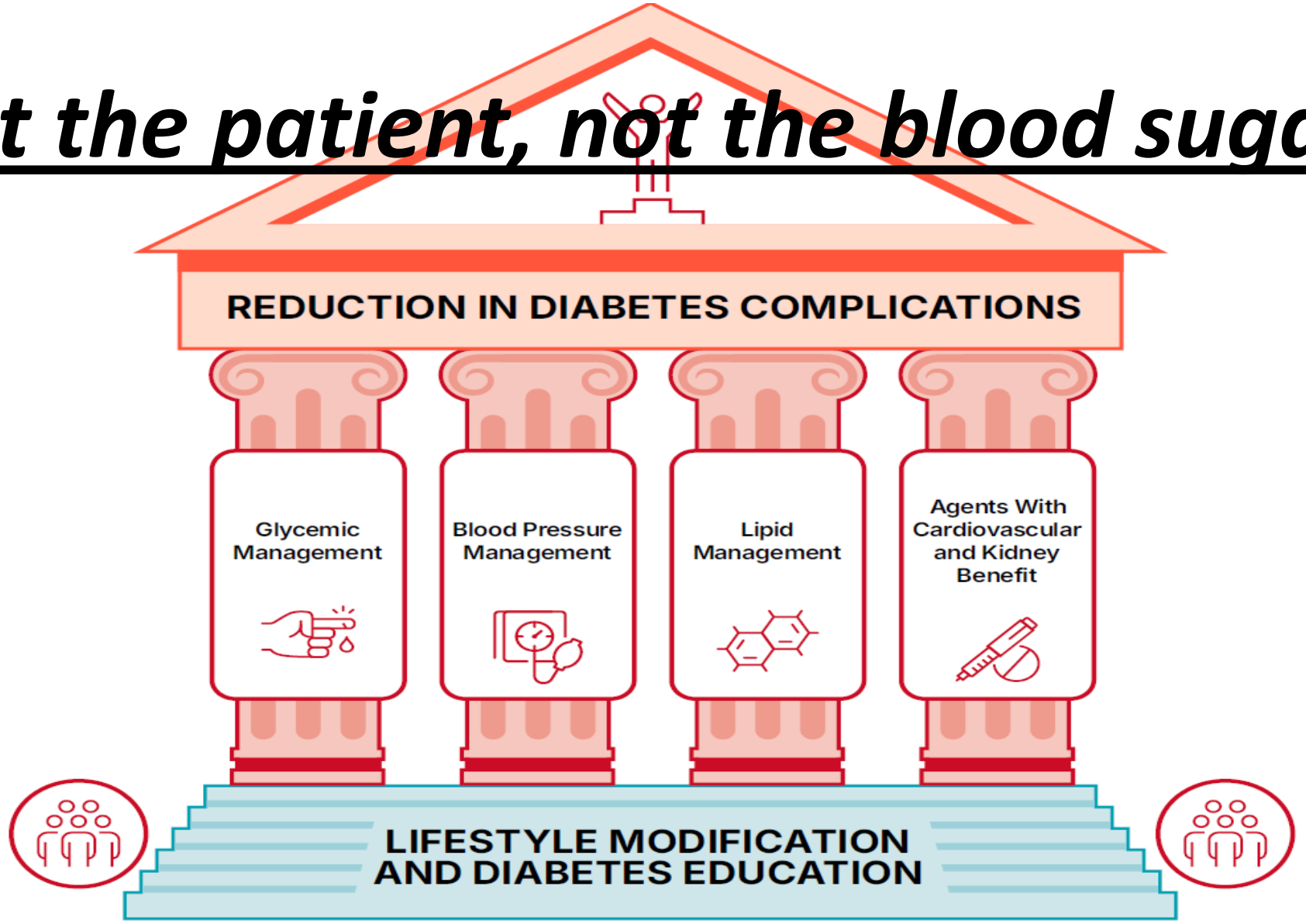
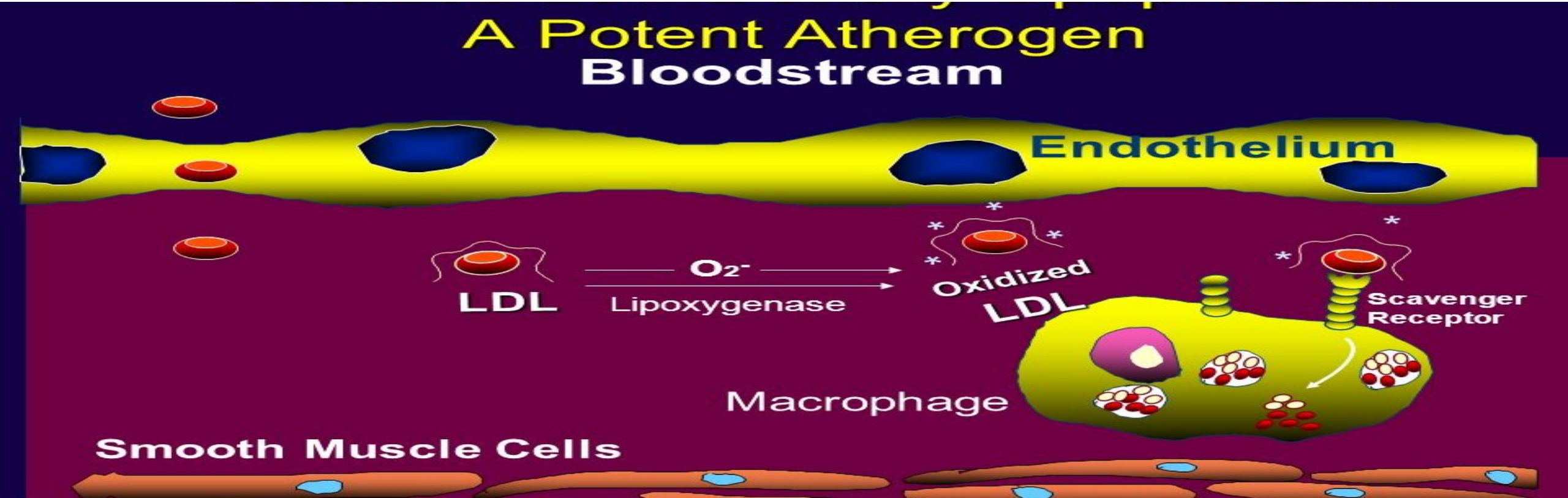


Figure 10.1—Multifactorial approach to reduction in risk of diabetes complications.

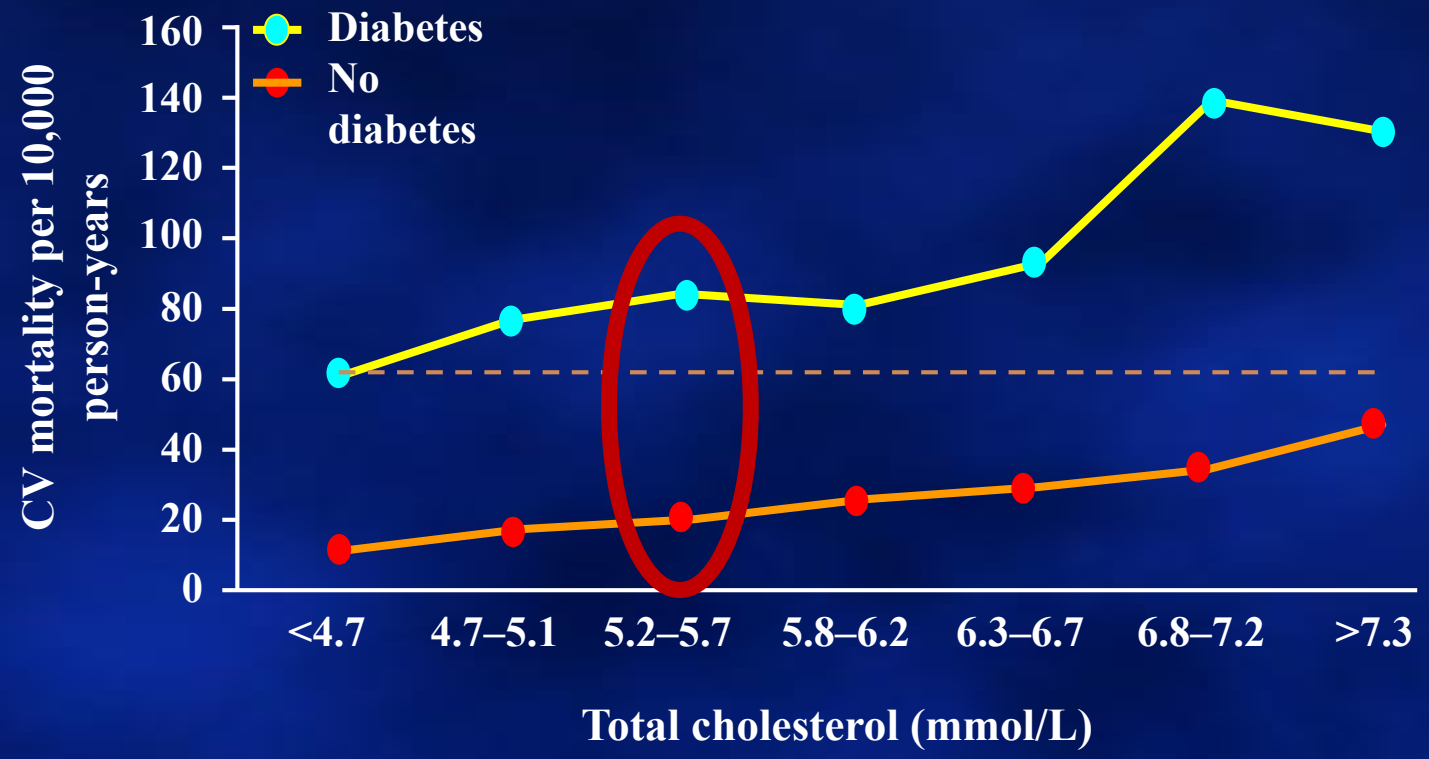
Lipid management

Plasma levels of LDL are increased in some but not all subjects.

an increase in small, dense LDLs which are particularly atherogenic.



Relationship between cholesterol and CVD mortality with and without diabetes



CV = cardiovascular

Adapted from Stamler J et al *Diabetes Care* 1993;16:434-444.

AMERICAN COLLEGE of CARDIOLOGY

ASCVD Risk Estimator Plus

Estimate Risk | Therapy Impact | Advice

10.1% Intermediate — Current 10-Year ASCVD Risk**

Lifetime ASCVD Risk: **69%** Optimal ASCVD Risk: **1.5%**

Do not show me this again

App should be used for primary prevention patients (those without ASCVD) only.

Current Age * 47
Age must be between 20-79

Sex * ✔ Male | Female

Race * ✔ White | African American | Other

Systolic Blood Pressure (mm Hg) * 128
Value must be between 90-200

Diastolic Blood Pressure (mm Hg) 86
Value must be between 60-130

Total Cholesterol (mg/dL) * 265
Value must be between 130 - 320

HDL Cholesterol (mg/dL) * 48
Value must be between 20 - 100

LDL Cholesterol (mg/dL) 145
Value must be between 30-300

History of Diabetes? * Yes | ✔ No

Smoker? * ✔ Current | Former | Never

On Hypertension Treatment? * Yes | ✔ No

On a Statin? Yes | ✔ No

On Aspirin Therapy? Yes | ✔ No

Lipid Management for Primary Prevention of Atherosclerotic Cardiovascular Disease Events in People With Diabetes in Addition to Healthy Behavior Modification

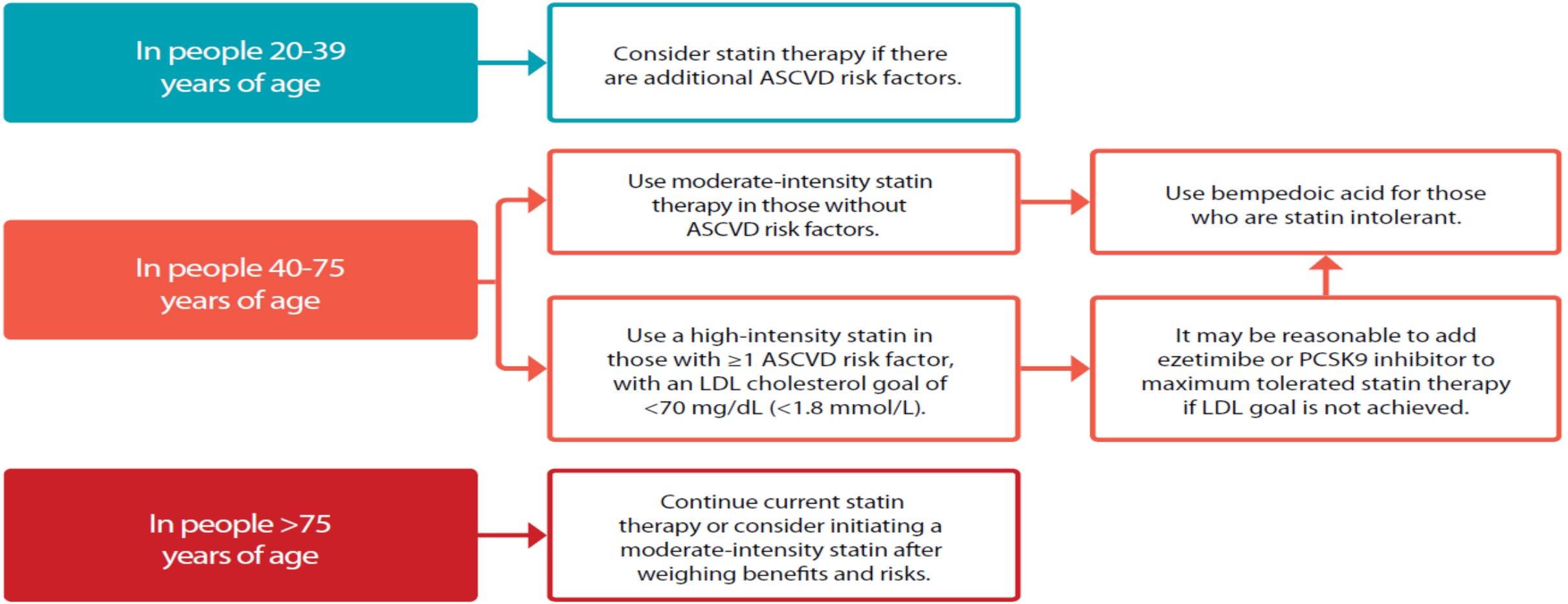


Figure 10.3—Recommendations for primary prevention of atherosclerotic cardiovascular disease (ASCVD) in people with diabetes using cholesterol-lowering therapy. Adapted from *"Standards of Care in Diabetes—2024* Abridged for Primary Care Professionals" (325).

For patients with diabetes aged 40–75 years without atherosclerotic cardiovascular disease, use statin therapy in addition to lifestyle therapy.

Risk category

- **High risk**

Diabetes

LDL<100

- ***Very high risk***

Diabetes with ≥1 risk factors (High blood pressure ,Smoking,Chronic kidney disease Albuminuria, Family history of premature ASCVD)

LDL< 70

- ***Extreme risk***

Established clinical ASCVD plus diabetes

LDL < 55

High-intensity statin therapy (lowers LDL cholesterol by ≥50%)	Moderate-intensity statin therapy (lowers LDL cholesterol by 30% to 50%)
Atorvastatin 40–80 mg	Atorvastatin 10–20 mg
Rosuvastatin 20–40 mg	Rosuvastatin 5–10 mg
	Simvastatin 20–40 mg
	Pravastatin 40–80 mg
	Lovastatin 40 mg
	Fluvastatin XL 80 mg
	Pitavastatin 2–4 mg

Statin Treatment (Secondary Prevention)

10.27 For people of all ages with diabetes and ASCVD, high-intensity statin therapy should be added to lifestyle therapy. **A**

10.28 For people with diabetes and ASCVD, treatment with high-intensity statin therapy is recommended to obtain an LDL cholesterol reduction of ≥50% from baseline and an LDL cholesterol goal of <55 mg/dL (<1.4 mmol/L). Addition of ezetimibe or a PCSK9 inhibitor with proven benefit in this population is recommended if this goal is not achieved on maximum tolerated statin therapy. **B**

10.29a For individuals who do not tolerate the intended statin intensity, the maximum tolerated statin dose should be used. **E**

10.29b For people with diabetes and ASCVD intolerant to statin therapy, PCSK9 inhibitor therapy with monoclonal antibody treatment, **A** bempedoic acid therapy, **A** or PCSK9 inhibitor therapy with inclisiran siRNA **E** should be considered as an alternative cholesterol-lowering therapy.

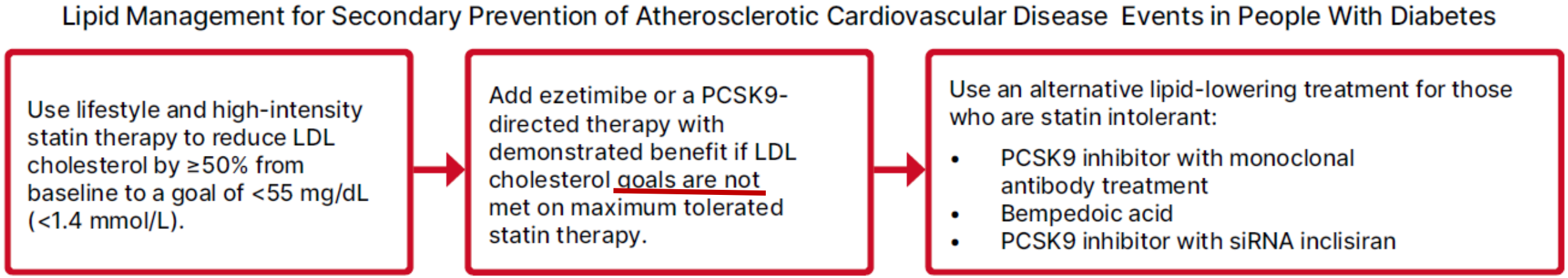


Figure 10.4—Recommendations for secondary prevention of atherosclerotic cardiovascular disease (ASCVD) in people with diabetes using cholesterol-lowering therapy. Adapted from *"Standards of Care in Diabetes—2024* Abridged for Primary Care Professionals" (325).

Other Lipid Targets

- Triglycerides
- Non-HDL-C: Total cholesterol minus HDL-C
- Non-HDL cholesterol may predict atherosclerotic CVD risk better than LDL-C alone[a,b]

a. Hoenig MR. *Vasc Health Risk Manag*. 2008;4:143-56.[18]
b. NLA website. 2014.[7]

Non–HDL-C targets are 30 mg/dL

higher than established LDL-C risk levels .

- Calculate non–HDL-C (total cholesterol minus HDL-C) in patients with:

1.Moderately elevated triglycerides (200 to 500 mg/dL)
2.Diabetes mellitus
3. and/or established CAD

LDL cholesterol is estimated by subtracting VLDL and HDL from the total cholesterol.

Valid only for the fasting state becomes increasingly **inaccurate** when TG levels are greater than **200** mg/dL Becomes **invalid** when TG levels are greater than **400** mg/dL.

Friedwald Equation:

$$LDL = TC - HDL - (TG / 5)$$

10.30 For individuals with fasting triglyceride levels> 500mg/dL , evaluate for secondary causes of hypertriglyceridemia and consider medical therapy to reduce the risk of pancreatitis. C

10.31 In adults with hypertriglyceridemia (fasting triglycerides >150 mg/dL or nonfasting triglycerides >175 mg/dL clinicians should address and treat lifestyle factors (obesity and metabolic syndrome), secondary factors (diabetes, chronic liver or kidney disease and/or nephrotic syndrome, and hypothyroidism), and medications that raise triglycerides. C

10.32 In individuals with ASCVD or other cardiovascular risk factors on a statin with managed LDL cholesterol but elevated triglycerides (150–499 mg/dL, the addition of icosapent ethyl can be considered to reduce cardiovascular risk. B

For individuals with fasting triglyceride levels >500 mg/dL , evaluate for secondary causes of hypertriglyceridemia and consider medical therapy to reduce the risk of pancreatitis.

In adults with moderate hypertriglyceridemia (fasting or nonfasting triglycerides 175–499 mg/dL clinicians should address and treat:

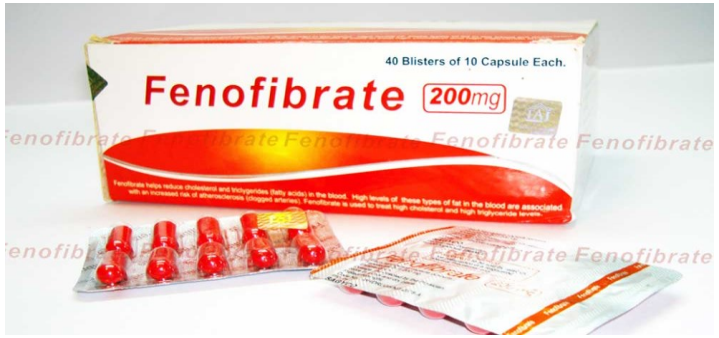
- lifestyle factors (obesity and metabolic syndrome)
- secondary factors (diabetes, chronic liver or kidney disease and/or nephrotic syndrome, and hypothyroidism)
- and medications that raise triglycerides

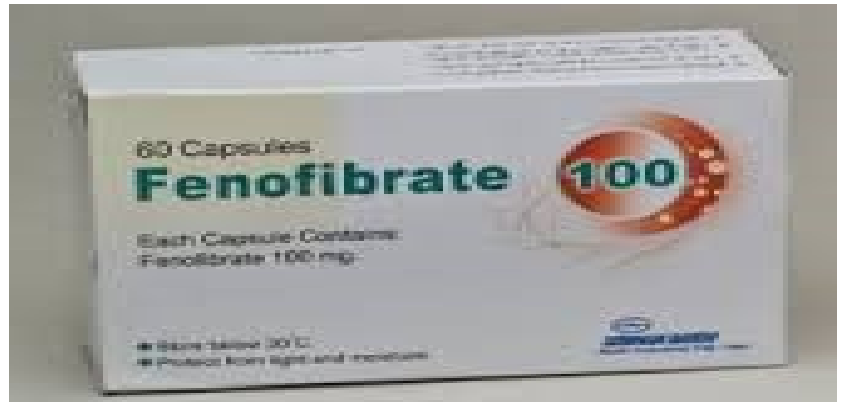
- For individuals with **established cardiovascular disease** or with risk **factors for cardiovascular disease** with elevated triglycerides (150–499mg/dL) after maximizing statin therapy, **icosapent ethyl** may be added to reduce cardiovascular risk.

It should be noted that data are lacking for other n-3 fatty acids, and results of the **REDUCE-IT trial** should not be extrapolated to other products.

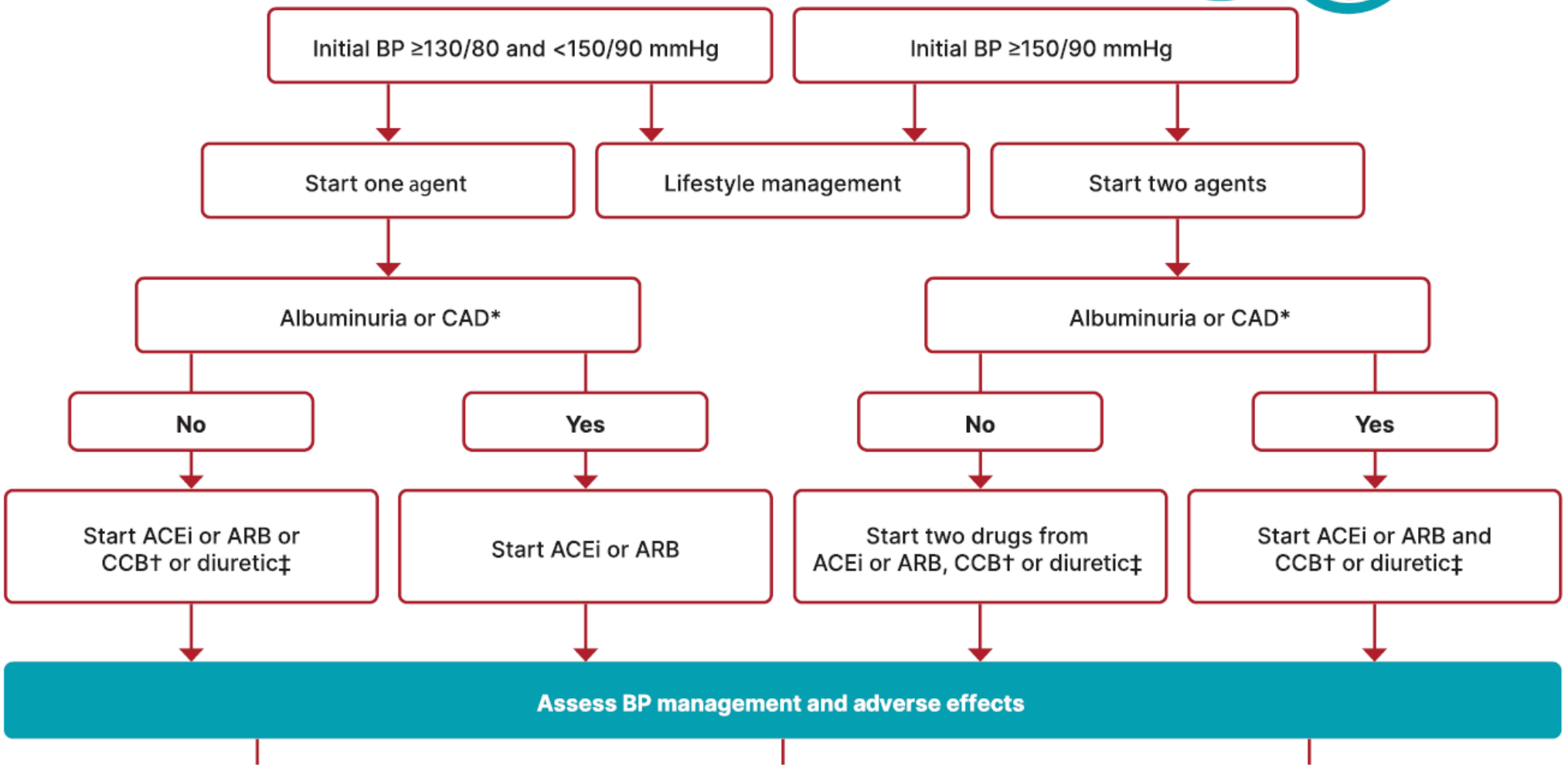
However, for levels **lower than 500** mg/dL, **statins** are **first-line therapy.**

Fibrates, fish oil should be considered if the triglyceride level is **higher than 500** mg/dL.





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



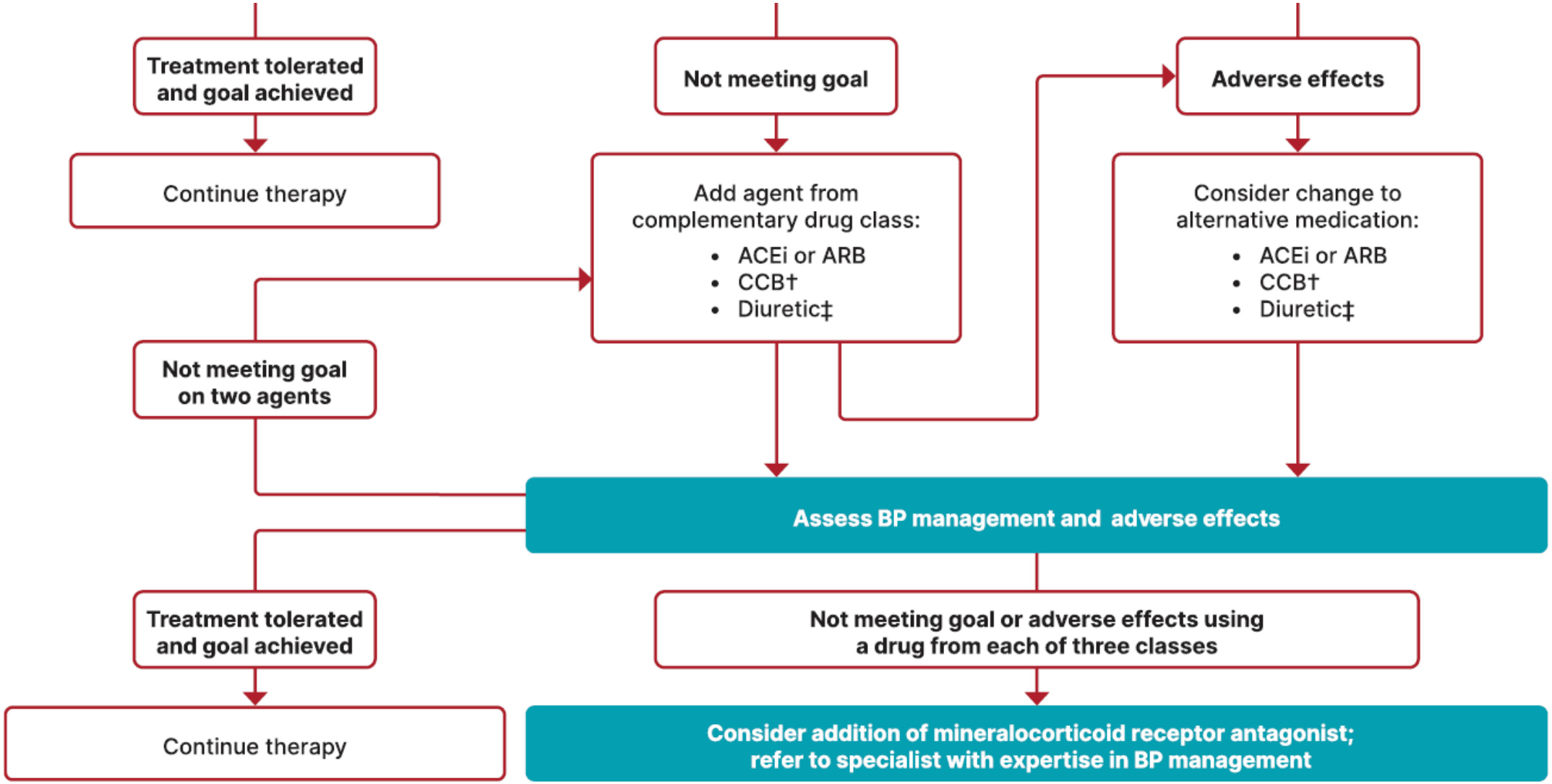
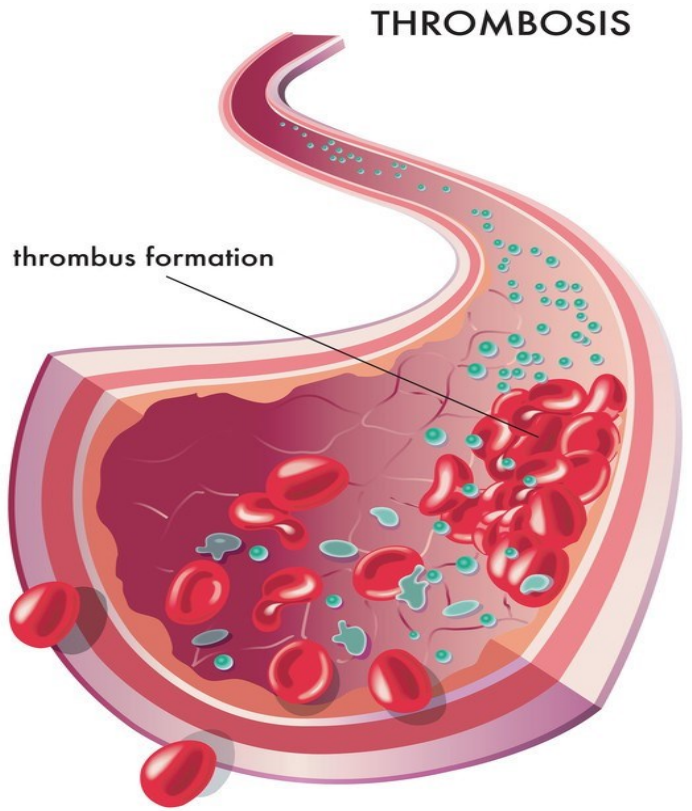

Treatment tolerated and goal achieved
Continue therapy
Not meeting goal
Add agent from complementary drug class:
• ACEi or ARB
• CCB†
• Diuretic‡
Adverse effects
Consider change to alternative medication:
• ACEi or ARB
• CCB†
• Diuretic‡
Not meeting goal on two agents
Assess BP management and adverse effects
Treatment tolerated and goal achieved
Continue therapy
Not meeting goal or adverse effects using a drug from each of three classes
Consider addition of mineralocorticoid receptor antagonist; refer to specialist with expertise in BP management

Figure 10.2—Recommendations for the treatment of confirmed hypertension in nonpregnant people with diabetes. *An ACE inhibitor (ACEi) or angiotensin receptor blocker (ARB) is suggested for the treatment of hypertension in people with coronary artery disease (CAD) or urine albumin-to-creatinine ratio 30–299 mg/g creatinine and is strongly recommended for individuals with urine albumin-to-creatinine ratio ≥300 mg/g creatinine. †Dihydropyridine calcium channel blocker (CCB). ‡Thiazide-like diuretic; long-acting agents shown to reduce cardiovascular events, such as chlorthalidone and indapamide, are preferred. BP, blood pressure. Adapted from de Boer et al. (21).

Treat the patient, not the blood sugar.

DM Management:

- **Life style modification:**
  - Medical nutrition therapy
  - Regular physical activity
  - Sufficient amounts of sleep
  - Smoking cessation
- **Lipid management**
- **BP control**
- **Antiplatelet agents**
- **Glycemic control**



Antiplatelet agents

❖ **Primary Prevention:**

Recommendations for using aspirin as primary prevention include both men and women **aged ≥50 years** with diabetes and at least one additional major risk factor (family history of premature ASCVD, hypertension, dyslipidemia, smoking, or CKD or albuminuria) who are not at increased risk of bleeding (e.g., **older age, anemia, or renal disease).**

Secondary prevention:

Aspirin therapy (**75–162**mg/day) as a **secondary prevention** strategy in those with **diabetes and a history of atherosclerotic** cardiovascular disease.

For people ***>70 years of age*** (with or without diabetes), the balance appears to have **greater risk than benefit** .

Thus, for primary prevention, the use of aspirin needs to be carefully considered and **generally may not be recommended**.

Aspirin **may be** considered in the context of high cardiovascular risk with low bleeding risk but ***generally not in older adults.***

Aspirin therapy for primary prevention may be considered in the context of

shared decision-making, which carefully weighs the cardiovascular benefits with the fairly comparable increase in risk of bleeding.

Antiplatelet Agents

Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes and a history of ASCVD.

The length of treatment with dual antiplatelet therapy using low-dose aspirin and a P2Y12 inhibitor in individuals with diabetes after an acute coronary syndrome or acute ischemic stroke/transient ischemic attack should be determined by an inter professional team approach that includes a cardiovascular or neurological specialist, respectively.

Antiplatelet Agents

Combination therapy with aspirin plus low-dose rivaroxaban should be considered for individuals with stable coronary and/or PAD and low bleeding risk to prevent major adverse limb and cardiovascular events.

Aspirin therapy (75–162 mg/day) may be considered as a **primary prevention** strategy in those with diabetes who are at increased cardiovascular risk, after a comprehensive discussion with the individual on the benefits versus the increased risk of bleeding.