**Screening for type 2 diabetes mellitus**

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**INTRODUCTION** — Diabetes is one of the major causes of early illness and death worldwide. Type 2 diabetes affects approximately 8 percent of the United States population, with as many as 25 to 40 percent of those with diabetes undiagnosed [[1,2](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/1,2)]. Worldwide, the prevalence of type 2 diabetes is estimated at 6.4 percent in adults, varying from 3.8 to 10.2 percent by region; rates of undetected diabetes may be as high as 50 percent in some areas [[3,4](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/3,4)].

Type 2 diabetes accounts for over 90 percent of patients with diabetes. Because of the associated microvascular and macrovascular disease, diabetes accounts for almost 14 percent of United States health care expenditures, at least one-half of which are related to complications such as myocardial infarction, stroke, end-stage renal disease, retinopathy, and foot ulcers [[5](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/5)]. Numerous other factors also contribute to the impact of diabetes on quality of life and economics. Diabetes is associated with a high prevalence of affective illness [[6](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/6)] and adversely impacts employment, absenteeism, and work productivity [[7](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/7)].

This topic will discuss the evidence and recommendations related to screening asymptomatic patients for type 2 diabetes mellitus. Screening pregnant women for gestational diabetes and the evaluation of patients with signs and symptoms of diabetes (polydipsia, polyuria, blurred vision, paresthesias, or unexplained weight loss) is discussed separately. Additionally, the prevention of type 2 diabetes in patients with impaired glucose tolerance (IGT) is discussed separately. (See "Diabetes mellitus in pregnancy: Screening and diagnosis" and "Clinical presentation and diagnosis of diabetes mellitus in adults" and "Prevention of type 2 diabetes mellitus".)

**RATIONALE FOR SCREENING** — The following five criteria define the optimal conditions for screening for any disorder [[8](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/8)]:

●The disorder is an important public health problem

●An early asymptomatic stage exists

●There is a suitable screening test

●An accepted treatment is available

●Early treatment during the asymptomatic stage improves the long-term outcome

Although it has not been firmly established that screening for type 2 diabetes and earlier intervention improve long-term outcomes, type 2 diabetes would appear to meet most of these requirements (see 'Effectiveness of screening' below):

●Diabetes is one of the major causes of early illness and death worldwide, and the global prevalence continues to rise. (See "Risk factors for type 2 diabetes mellitus", section on 'Lifetime risk/prevalence'.)

●A relatively long asymptomatic period exists [[9-11](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/9-11)].

●Several screening tests exist, including glycated hemoglobin (A1C), fasting plasma glucose, or a two-hour oral glucose tolerance test (OGTT). While there is debate over which is the optimal screening test, each can successfully diagnose asymptomatic cases of diabetes [[2,12](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/2,12)]. (See 'Screening tests' below.)

●Well-established treatments for type 2 diabetes and prevention of its complications exist:

•Treatment of hyperglycemia reduces the progression of microvascular disease, including retinopathy, nephropathy, and neuropathy. The Diabetes Control and Complications Trial (DCCT) demonstrated that intensive glycemic control in patients with type 1 diabetes reduced the risk of microvascular disease and slowed the progression from early to moderate diabetic microvascular disease [[13](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/13)]. The United Kingdom Prospective Diabetes Study (UKPDS) showed that improved glycemic control, over time, has a similar impact on microvascular progression in patients with type 2 diabetes [[14](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/14)]. (See "Glycemic control and vascular complications in type 1 diabetes mellitus" and "Glycemic control and vascular complications in type 2 diabetes mellitus".)

•Early identification of diabetes allows interventions to prevent or limit cardiovascular disease, such as use of statins at lower lipid thresholds and lower targets for blood pressure control than for nondiabetic patients, preferentially using angiotensin-converting enzyme inhibitors or angiotensin receptor blockers. (See "Overview of medical care in adults with diabetes mellitus" and "Treatment of hypertension in patients with diabetes mellitus".)

●Interventions for prediabetes can prevent or delay the onset of diabetes.

•Lifestyle intervention programs, aimed at weight loss and increased activity levels, and metformin and other medications reduce the risk of type 2 diabetes in patients with impaired glucose tolerance (IGT) [[15,16](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/15,16)]. (See "Prevention of type 2 diabetes mellitus".)

**SCREENING TESTS** — Tests that can be used to screen for type 2 diabetes are measurement of fasting plasma glucose, a glycated hemoglobin (A1C), and a two-hour plasma glucose during an oral glucose tolerance test (OGTT) (table 1). However, because of its inconvenience, OGTT is not commonly used for screening, except in pregnant women. (See "Diabetes mellitus in pregnancy: Screening and diagnosis", section on 'Screening methods'.)

Glucose intolerance exists along a spectrum, and the definition of type 2 diabetes is usually defined by setting a threshold for one or more of the proposed screening tests along this continuum. The sensitivity and specificity of fasting plasma glucose and A1C as screening tests vary according to the population tested and the threshold used to define diabetes. Defining a reference standard for diabetes as a two-hour blood glucose >200 mg/dL (11.1 mmol/L) during an OGTT, the specificity of a fasting plasma glucose ≥126 mg/dL (7.0 mmol/L) was greater than 95 percent and the sensitivity was approximately 50 percent [[17](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/17)]. Specificity and sensitivity may be lower for people over the age of 65. Using the same reference standard, the specificity and sensitivity of an A1C ≥6.5 percent were reported as 79 and 44 percent, respectively [[18](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/18)]. Although the moderate specificity reported for A1C could be seen as a problem for a screening test, the presence of diabetic retinopathy correlated better with A1C ≥6.5 percent than with fasting plasma glucose or OGTT criteria and might even support an argument that A1C is a better reference standard.

**Blood glucose** — Although there are no specific cut-points, a variety of complications and an increased disease burden occur more commonly in patients whose blood glucose is at the higher end of the continuum. An Expert Committee on the Diagnosis and Classification of Diabetes Mellitus defined three categories (normal, increased risk for diabetes, and diabetes mellitus) based upon results of a fasting plasma glucose concentration, A1C, or two-hour OGTT (75 g glucose load) [[12,19,20](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/12,19,20)] (see 'Hemoglobin A1C' below and "Clinical presentation and diagnosis of diabetes mellitus in adults"):

●**Normal** – Fasting plasma glucose <100 mg/dL (5.6 mmol/L). Fasting is defined as no caloric intake for at least eight hours.

●**Increased risk for diabetes** (sometimes referred to as "prediabetes") (table 2):

•**Impaired glucose tolerance** (IGT) – Two-hour plasma glucose value during a 75 g OGTT between 140 and 199 mg/dL (7.8 to 11.0 mmol/L)

•**Impaired fasting glucose** (IFG) – Fasting plasma glucose 100 to 125 mg/dL (5.6 to 6.9 mmol/L)

•**Hemoglobin A1C**– A1C 5.7 to 6.4 percent

●**Diabetes mellitus** – The diagnosis of diabetes, based on one of the following findings, must be confirmed on a subsequent day by repeat measurement, repeating the same test for confirmation (table 1) (see "Clinical presentation and diagnosis of diabetes mellitus in adults", section on 'ADA criteria'):

•Fasting plasma glucose ≥126 mg/dL (7.0 mmol/L)

•A1C ≥6.5 percent

•Two-hour plasma glucose ≥200 mg/dL (11.1 mmol/L) during an OGTT

•Random (or "casual") plasma glucose ≥200 mg/dL (11.1 mmol/L) in the presence of symptoms

Patients with diabetes mellitus are at increased risk for both microvascular and macrovascular disease. The diagnostic glucose levels were selected based upon the attendant risk for developing the relatively specific, long-term complication of retinopathy. Those with impaired fasting plasma glucose are at increased risk for macrovascular disease (myocardial infarction, stroke, peripheral vascular disease), but generally not for microvascular disease (retinopathy, neuropathy, and nephropathy), unless they go on to develop diabetes.

**Hemoglobin A1C** — In a 2009 consensus report, an International Expert Committee recommended that a glycated hemoglobin (A1C) level ≥6.5 percent be used to diagnose diabetes [[12](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/12)], subsequently affirmed by the American Diabetes Association (ADA) [[21](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/21)]. The ADA identified 5.7 to 6.4 percent, confirmed with a repeat A1C measurement, as increased risk for developing diabetes (table 2). (See "Clinical presentation and diagnosis of diabetes mellitus in adults", section on 'ADA criteria'.)

The A1C assay has several advantages over glucose testing, including increased patient convenience (since no special preparation or timing is required for the A1C test) and correlation of A1C levels with retinopathy. However, it should be used with caution in certain populations. (See "Estimation of blood glucose control in diabetes mellitus", section on 'Glycated hemoglobin'.)

**Urine glucose** — Measurement of urine glucose is not recommended for screening, due to its insensitivity in detecting type 2 diabetes [[22](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/22)]. Additionally, since glucosuria can result from defects in renal tubular function (eg, type 2 [proximal] renal tubular acidosis or in familial renal glucosuria [[23](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/23)]), patients with glucosuria require blood testing (A1C, fasting plasma glucose, or two-hour OGTT) to confirm a diagnosis of diabetes. (See "Urinalysis in the diagnosis of kidney disease" and "Etiology and diagnosis of distal (type 1) and proximal (type 2) renal tubular acidosis".)

**RISK FACTORS** — Identifying risk factors for diabetes may help to target specific patient groups for screening. Risk factors for diabetes include the following (see "Risk factors for type 2 diabetes mellitus"):

●Age ≥45 years

●Overweight (body mass index [BMI] ≥25 kg/m2). The risk with increased weight is also a continuum, with significantly increased risk for obese individuals (eg, BMI ≥30 kg/m2)

●Diabetes mellitus in a first-degree relative

●Sedentary lifestyle

●High-risk ethnic or racial group (eg, African American, Hispanic, Native American, Asian American, and Pacific Islanders)

●History of gestational diabetes mellitus

●Hypertension (blood pressure ≥140/90 mmHg)

●Dyslipidemia (serum high-density lipoprotein cholesterol concentration ≤35 mg/dL [0.9 mmol/L]and/or serum triglyceride concentration ≥250 mg/dL [2.8 mmol/L])

●A1C ≥5.7 percent, impaired glucose tolerance (IGT) or impaired fasting glucose (IFG)

●Polycystic ovary syndrome

●History of vascular disease

**Calculating a risk score** — Scoring systems for risk factor assessment have been investigated as a strategy to guide screening, but most have not been validated in diverse populations, and they are not in widespread use. The majority of available risk assessment tools involve simple questionnaires about important diabetes risk factors (eg, age, weight, family history of diabetes, personal history of hypertension, physical activity). A score is assigned for each risk factor, and the total score used to identify individuals for laboratory screening. Depending upon the cut-point used, sensitivity and specificity for predicting undiagnosed diabetes are approximately 80 and 70 percent, respectively [[24-28](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/24-28)].

Since risk factors may not simply be additive, ideally a risk score should be based on a calculator incorporating weighted factors according to regression analyses. One risk calculator, the FINRISK, incorporates factors of age, BMI, waist circumference, hypertension, activity, diet, family history, and history of glucose intolerance. In one study, this calculator performed the best of those models evaluated that incorporated only noninvasive measures (eg, did not include laboratory testing) [[29](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/29)]. The aROC (area under the ROC curve, plotting sensitivity of the test against its false-positive rate) for this model was 0.85, with an aROC of 0.5 indicating a random guess and an aROC of 1.0 representing perfect discrimination. This model is one of the two endorsed by the Canadian Medical Association to identify people to be screened.

More complex models using risk factor assessment combined with laboratory testing have been devised to predict the likelihood of developing type 2 diabetes. These models are reviewed elsewhere. (See "Risk factors for type 2 diabetes mellitus", section on 'Prediction models'.)

**EFFECTIVENESS OF SCREENING** — Randomized trials have not demonstrated that screening for diabetes improves important health outcomes (eg, microvascular complications, cardiovascular disease, and mortality). This may be due to the length of follow-up in the trials. The long-term complications of diabetes would be expected to require more than a decade of diabetes to develop; thus, trials may not demonstrate improvements in morbidity or mortality associated with the complications of diabetes, as they may not have followed patients for enough time. Additional trials examining morbidity and quality-of-life issues between screen-detected diabetes and diagnosis through routine clinical care are needed.

A 2015 systematic review including two randomized trials evaluating screening for diabetes found no evidence that screening improved mortality after 10 years of follow-up [[30](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/30)]. The largest randomized trial (n = 15,408 patients) evaluated screening for type 2 diabetes in patients at increased risk (based on age, gender, body mass index (BMI), family and smoking history, use of steroids and antihypertensives) in 33 general practices in the United Kingdom [[31](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/31)]. Patients were randomly assigned to three arms: screening followed by intensive multifactorial treatment (targeting glucose, blood pressure, and lipid control) for those diagnosed with diabetes; screening followed by routine care of diabetes; and a no-screening control group. No difference in overall mortality (10.50 and 9.89 deaths per 1000 person-years, respectively, hazard ratio [HR] 1.06, 95% CI 0.90-1.25) was found after a median follow-up of 9.6 years. There was also no difference in diabetes-related mortality, cardiovascular mortality, cancer mortality, or other causes of death. Data on long-term microvascular complications (eg, retinopathy, kidney disease) and coronary heart disease events were not reported. Limitations of this trial include a low overall prevalence of newly diagnosed diabetes (3 percent of screened population) and the lack of data on outcomes in patients with screen-detected diabetes compared with patients diagnosed through routine clinical care.

**Cost-effectiveness models** — Cost-effectiveness analyses have suggested that diabetes screening in older adults is cost effective. As an example, in a computer simulation model, eight screening strategies were compared with a no-screening control strategy in a simulated population of 325,000 people aged 30 years without diabetes [[32](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/32)]. The benefits of early detection for all screening strategies included a reduced incidence of myocardial infarction and microvascular complications and an increase in quality-adjusted life years (QALYs) over 50 years of age. The most cost-effective strategies were those that started screening between the ages of 30 and 45 years, with screening repeated every three to five years. However, the reliability of these results is in question because the model assumed perfect performance and compliance with treatment recommendations and no adverse effects of treatment and, thus, may not be representative. Real-world implementation of an intensive lifestyle intervention, similar to that provided in the Diabetes Prevention Program trial, is challenging and requires ongoing counseling and support. (See "Prevention of type 2 diabetes mellitus", section on 'Diabetes Prevention Program'.)

In other cost-effectiveness analyses, screening targeted to individuals with hypertension was more cost effective than universal screening [[33](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/33)], and screening for impaired glucose tolerance (IGT) (prediabetes) and undiagnosed type 2 diabetes, followed by intervention (lifestyle or pharmacologic), was more cost effective than no screening [[34](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/34)]. In one model, the most cost-effective strategy was targeted screening at age 55 to 75 years [[33](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/33)]. For example, the cost per QALY for targeted screening at age 55, compared with no screening, was estimated as USD $34,375. This falls within the generally accepted QALY threshold of USD $50,000 to 100,000 for a screening intervention. As with all screening strategies, the appropriateness and quality of follow-up care for those diagnosed is critically important in considering cost effectiveness. (See "A short primer on cost-effectiveness analysis", section on 'Interpretation'.)

**SCREENING RECOMMENDATIONS BY EXPERT GROUPS** — The two approaches to screening that are usually recommended are either to screen the entire population above a certain age or targeted screening geared to individuals identified as "high risk" based upon multiple risk factors.

**American Diabetes Association** — The American Diabetes Association (ADA) recommends testing at three-year intervals for diabetes or prediabetes in all adults with body mass index (BMI) ≥25 kg/m2 (or ≥23 kg/m2 in Asian Americans) and one or more additional risk factors for diabetes using either A1C, fasting plasma glucose, or two-hour OGTT [[2](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/2)]. In individuals without risk factors, the ADA recommends that testing begin at age 45 years. If the screening test is positive, diabetes should be confirmed according to ADA criteria (table 1). If the screening test is negative, repeat testing every three years is reasonable. (See 'Risk factors' above.)

**US Preventive Services Task Force** — 2015 guidelines from the US Preventive Services Task Force (USPSTF) recommend screening for abnormal glucose as part of cardiovascular risk assessment in adults aged 40 to 70 years who are overweight or obese [[35](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/35)]. The optimal interval for screening is unknown. The USPSTF suggests screening every three years based on limited evidence.

**The Canadian Task Force on Preventive Health Care** — The Canadian Task Force on Preventive Health Care (CTFPHC) recommends using a validated risk calculator to identify people at high risk for diabetes [[36](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/36)]. They recommend not routinely screening individuals at low to moderate risk for diabetes and screening individuals at increased risk with A1C, to be repeated every three to five years for those at high risk and yearly for those at very high risk.

**Centers for Disease Control and Prevention** — The Centers for Disease Control and Prevention (CDC) in the United States suggests screening by fasting glucose, OGTT, or A1C testing for individuals 45 years or older or those with risk factors, including overweight, first-degree relative with diabetes, high-risk ethnic group, history of gestational diabetes, or sedentary lifestyle.

**National Institute for Health and Care Excellence (NICE)** — In the United Kingdom, guidelines issued in 2012 recommend risk assessment using a self-assessment questionnaire or risk-assessment tool for diabetes for adults aged 40 and above, younger adults in high-risk ethnic groups, those with a BMI >30 kg/m2, or with comorbidities including hypertension or cardiovascular disease [[37](https://www.uptodate.com/contents/screening-for-type-2-diabetes-mellitus/abstract/37)]. Such individuals would be offered testing with either a fasting plasma glucose or A1C and provided with a program for lifestyle change based on the findings. A flow chart of these recommendations is shown (algorithm 1).

**A SUGGESTED APPROACH** — For adults with hypertension or hyperlipidemia, as well as for those aged 40 to 70 years with a body mass index (BMI) ≥25 kg/m2, we suggest screening for type 2 diabetes as part of cardiovascular risk assessment. (See 'US Preventive Services Task Force' above.)

When convenient, we recommend screening using fasting plasma glucose (measured in a laboratory rather than using a fingerstick sample with a meter). Simultaneously ordering an A1C is a reasonable option, especially in patients with the highest risk of diabetes (eg, those with multiple risk factors or abnormal glucose metabolism). (See "Risk factors for type 2 diabetes mellitus", section on 'Abnormal glucose metabolism'.)

When obtaining a fasting specimen is inconvenient, we recommend screening using an A1C. Abnormal results require a repeat test to confirm the diagnosis of diabetes (table 1). (See "Clinical presentation and diagnosis of diabetes mellitus in adults", section on 'Asymptomatic'.)

In patients with symptoms that could be due to diabetes, a random plasma glucose should also be ordered. (See "Clinical presentation and diagnosis of diabetes mellitus in adults", section on 'Symptoms of hyperglycemia'.)

In interpreting screening results and determining appropriate follow-up, the following criteria are suggested (see "Clinical presentation and diagnosis of diabetes mellitus in adults", section on 'ADA criteria' and "Clinical presentation and diagnosis of diabetes mellitus in adults", section on 'WHO criteria'):

●A fasting plasma glucose value <100 mg/dL (5.6 mmol/L) or A1C <5.7 percent should be considered normal. We suggest retesting at three-year intervals.

●For those with borderline results (fasting plasma glucose 100 to 125 mg/dL or A1C 5.7 to 6.4 percent) we suggest follow-up every one to two years.

●The diagnosis of diabetes is confirmed if two consecutive A1C levels are ≥6.5 percent, two consecutive fasting plasma glucose levels are ≥126 mg/dL (7.0 mmol/L), or if both the A1C and fasting plasma glucose are above their diagnostic thresholds (table 1).

●If A1C and fasting plasma glucose are discordant, the test that is diagnostic of diabetes should be repeated to confirm the diagnosis.

Appropriate management of patients meeting the criteria for diagnosis of diabetes or increased risk for diabetes (table 2) is discussed elsewhere. (See "Prevention of type 2 diabetes mellitus", section on 'Lifestyle modification' and "Prevention of type 2 diabetes mellitus", section on 'Pharmacologic therapy' and "Overview of medical care in adults with diabetes mellitus" and "Initial management of blood glucose in adults with type 2 diabetes mellitus".)

Screening programs can potentially cause harm if they provide a sense of false reassurance. Individuals with a sedentary lifestyle or poor dietary habits are at high risk for developing obesity and diabetes later in life, even if they are not yet overweight. Evidence suggests that weight maintenance is much easier to achieve than weight loss, and therefore, all patients should be counseled to maintain at least moderate physical activity and good dietary habits, which also have other health benefits. Ideally, individuals should have at least 150 minutes of exercise weekly equal to or greater than brisk walking (90 to 100 steps per minute). (See "Prevention of type 2 diabetes mellitus", section on 'Lifestyle modification' and "The benefits and risks of exercise", section on 'Exercise prescription'.)

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**SOCIETY GUIDELINE LINKS** — Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Diabetes mellitus in adults".)

**INFORMATION FOR PATIENTS** — UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

●Basics topics (see "Patient education: Type 1 diabetes (The Basics)" and "Patient education: Type 2 diabetes (The Basics)" and "Patient education: Hemoglobin A1C tests (The Basics)" and "Patient education: Preventing type 2 diabetes (The Basics)")

●Beyond the Basics topics (see "Patient education: Diabetes mellitus type 1: Overview (Beyond the Basics)" and "Patient education: Diabetes mellitus type 2: Overview (Beyond the Basics)")

**SUMMARY AND RECOMMENDATIONS**

●For adults with hypertension or hyperlipidemia, as well as for those aged 40 to 70 years with a body mass index (BMI) ≥25 kg/m2, we suggest screening for type 2 diabetes as part of cardiovascular risk assessment (**Grade 2C**). (See 'A suggested approach' above.)

●A fasting plasma glucose and/or a glycated hemoglobin (A1C) are the preferred screening tests. The diagnosis of diabetes is confirmed if two consecutive A1C levels are ≥6.5 percent, two consecutive fasting plasma glucose levels are ≥126 mg/dL (7.0 mmol/L), or if both the A1C and fasting plasma glucose are above their diagnostic thresholds (table 1). (See 'A suggested approach' above.)

●We suggest retesting at three-year intervals when the fasting plasma glucose value is <100 mg/dL(5.6 mmol/L) or A1C <5.7 percent (**Grade 2C**). We suggest follow-up testing every one to two years when the fasting plasma glucose is 100 to 125 mg/dL (5.6 to 7.0 mmol/L) or A1C is 5.7 to 6.4 percent (**Grade 2C**). (See 'A suggested approach' above.)

●All patients should be counseled related to smoking cessation, diet, and exercise, but patients meeting the diagnostic criteria for diabetes (table 1) or increased risk for diabetes (table 2) should receive particularly intensive lifestyle counseling. Indications for pharmacologic intervention are reviewed separately. (See "Overview of medical care in adults with diabetes mellitus" and "Initial management of blood glucose in adults with type 2 diabetes mellitus" and "Prevention of type 2 diabetes mellitus", section on 'Lifestyle modification' and "Prevention of type 2 diabetes mellitus", section on 'Pharmacologic therapy'.)

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