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Diabetes Mellitus

Over the past 30 years, the number of adults diagnosed with diabetes has grown nearly 4-fold.[1] This increase is closely linked to the rise in the number of people who are overweight or obese. Given the magnitude of the diabetes and obesity epidemics, as many as one-third of adults could have diabetes by the year 2050.[1] Early diagnosis and intervention could help stem this tide.

The Importance of Detecting Prediabetes

Prediabetes almost always precedes type 2 diabetes. Studies have shown that taking action during prediabetes can reduce the incidence of diabetes. Action can take the form of lifestyle changes such as weight loss and increased physical activity. Metformin can also be used. These steps can significantly reduce the number of cases of type 2 diabetes.[2] Thus, early detection of prediabetes is critical.

Diabetes Screening Guidelines

Guidelines recommend that people with risk factors for prediabetes or type 2 diabetes (Table) be screened.[3] At-risk individuals with normal glucose levels should be screened every 3 years.[3] People with 2 or more risk factors may be screened every year.[3]

Table. Risk Factors for Prediabetes and Type 2 Diabetes[3]

Age ≥45 years
Cardiovascular disease
Family history of type 2 diabetes
BMI ≥30 or BMI 25 to <30 plus additional risk factors
Physical inactivity
Asian, African American, Hispanic, Native American, or Pacific Islander ethnicity
Abnormal lipids: HDL-C <35 mg/dL and/or triglyceride level >250 mg/dL
IGT, IFG, and/or metabolic syndrome
PCOS, acanthosis nigricans, or NAFLD diagnosis
Blood pressure >140/90 mm Hg
Previous diagnosis of gestational diabetes
Delivery of baby weighing >9 pounds

What is Prediabetes?

The American Diabetes Association defines prediabetes as any of these conditions[4]:

- Impaired fasting glucose (100 to 125 mg/dL)
- Impaired glucose tolerance (140 to 199 mg/dL at 2 hours after 75 g glucose)
- Elevated hemoglobin A1c (5.7% to 6.4%)

Management Options

Management options for patients at high risk of type 2 diabetes include[4]:

- Weight loss of 7% of body weight
- Moderate physical activity (such as walking at a 3 mile per minute pace) of at least 150 minutes a week
- Consideration of metformin therapy, especially for those with BMI >35 kg/m^2, aged <60 years old; and women with prior gestational diabetes
- Follow-up counseling
- Testing at least once a year for diabetes
- Screening for, and treatment of, cardiovascular disease risk factors
- Diabetes self-management education and support programs

Antipsychotic therapy for schizophrenia and/or severe bipolar disease
Chronic glucocorticoid exposure
Sleep disorders[a] plus glucose intolerance[b]

IGT, impaired glucose tolerance; IFG, impaired fasting glucose; PCOS, polycystic ovary syndrome; NAFLD, nonalcoholic fatty liver disease.

[a] Includes obstructive sleep apnea, chronic sleep deprivation, and night-shift occupation.

[b] Hemoglobin A1C >5.7%, IGT, or IFG on previous testing.

A Diabetes Risk Tool

A diabetes risk tool has been created to help evaluate people for some of the risk factors listed above.[5] It provides a risk score that quantitates the likelihood of developing type 2 diabetes within 8 years. It's based on:

- Fasting glucose level
- Lipid measurements
- Body mass index (BMI)
- Blood pressure
- Parental history of diabetes

A higher score suggests a need for preventive therapy.

Diagnosis of Diabetes and Prediabetes

For many years, only blood glucose and/or oral glucose tolerance tests were recommended by guidelines. However, testing for hemoglobin A1c is now also widely used. It measures the amount of glucose bound to hemoglobin. It's high when the average blood glucose level is high over the preceding 2 to 3 months.

Blood glucose and oral glucose tolerance tests are sensitive. But they reflect only short-term glucose levels. They also require fasting or glucose loading and give variable results during stress and illness.

The hemoglobin A1c test doesn't require fasting or glucose loading. Guidelines recommend its use for screening for prediabetes and diagnosing diabetes because it[6]:

- Estimates average glucose levels over a longer term than glucose testing
- Changes less than glucose levels during stress and illness
- Is more specific than glucose testing for identifying people at increased risk

The Diabetes Belt

The percentage of adults with diabetes has grown fastest in Southern and Appalachian states. Scientists call this the "diabetes belt." About 38% more people inside the belt have a diabetes diagnosis than people outside it.[7] Scientists think that obesity and inactivity account for much of this trend.

Diabetes and Ethnicity

Members of some racial and ethnic groups are more likely to have diabetes than others. Half of all Hispanic people and African American women will develop diabetes in their lifetime.[1]

Racial/Ethnic Group	% of Adults with Diabetes[1]
Native American	15.9
African American	13.2
Hispanic	12.8
Asian American	9.0
Non-Hispanic White	7.6

Despite its value, hemoglobin A1c is not a perfect test. Results are inaccurate in conditions that change red cell turnover. Such conditions include anemia and malaria. Additionally, hemoglobin A1c doesn't measure postprandial plasma glucose excursions. These have been linked to increased risk for problems with blood vessels and the heart.

Results from glucose and hemoglobin A1c tests don't always agree. So many doctors use both. Together they identify more people with prediabetes than does either test alone.[8,9]

How the Laboratory Can Help

Quest Diagnostics offers tests for blood glucose, glucose tolerance, and hemoglobin A1c. You can find out more about them here. Quest also offers a test to determine the diabetes risk score: Diabetes Risk Panel with Score. It can be ordered with or without the Cardio IQ® report and can be used to:

- Diagnose prediabetes
- Assess risk for developing type 2 diabetes within 8 years
- Identify people who could benefit from lifestyle changes and/or medication

It includes fasting glucose level, lipid measurements, and hemoglobin A1c. It also includes an 8-year risk score for developing type 2 diabetes. The score is based on test results and clinical and family history data. It's calculated by adding points for each risk parameter. This test can be used for people 30 to 79 years of age.

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