Predicting Diabetes: Using the Fasting Glucose, A1c, or OGTT

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Diabetes in control

Which test is the most accurate?...

Fasting glucose and glycated hemoglobin (HbA1c) levels may both be useful in predicting diabetes, according to the results of population-based analyses.

Elizabeth Selvin, PhD, MPH, from the Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland, writes, “Although ... HbA1c is now recommended to diagnose diabetes, its test performance for diagnosis and prognosis is uncertain.” “Our objective was to assess the test performance of HbA1c against single and repeat glucose measurements for diagnosis of prevalent diabetes and for prediction of incident diabetes.”

The study sample consisted of 12,485 participants enrolled in the Atherosclerosis Risk in Communities (ARIC) Study and a subpopulation of 691 participants in the Third National Health and Nutrition Examination Survey (NHANES III) who had repeated glucose test results available.

For detection of prevalent diabetes against a single fasting glucose level of 126 mg/dL or more, the sensitivity of an HbA1c level of at least 6.5% was 47%, and the specificity was 98% (area under the receiver operator characteristic curve [AUC], 0.892). Against fasting glucose measurements of 126 mg/dL or more repeated at an interval of 3 years, the sensitivity of an HbA1c level of at least 6.5% improved to 67%, whereas the specificity was still high at 97% (AUC, 0.936).

In NHANES III, findings were similar with use of fasting glucose measurements repeated 2 weeks apart. For groups based on age, body mass index, and race, HbA1c had consistent accuracy. The 10-year risk for diagnosed diabetes was 88% for persons with a fasting glucose level of at least 126 mg/dL and an HbA1c level of at least 6.5% at baseline vs. 55% for those persons with a fasting glucose level of at least 126 mg/dL and an HbA1c level of 5.7% to less than 6.5%.

The study authors write, “HbA1c performs well as a diagnostic tool when diabetes definitions that most closely resemble those used in clinical practice are used as the gold standard.” “The high risk of diabetes among initially undiagnosed persons with both elevated fasting glucose and HbA1c suggests a dual role for fasting glucose and HbA1c for prediction of diabetes.”

“In conclusion, we found HbA1c performs best when more stringent glucose criteria are used to define diabetes (i.e., fasting glucose ≥126 mg/dl on two separate occasions), similar to clinical practice,” the study authors conclude. “Our data support current recommendations for use of HbA1c in the diagnosis of diabetes and demonstrate that an HbA1c cut-off of 6.5% is highly specific and may be reasonably sensitive in the context of evidence linking HbA1c to risk of long-term microvascular and macrovascular outcomes in nondiabetic adults. We also found that HbA1c and fasting glucose both strongly predict subsequent risk of diagnosed diabetes but the very high risk observed for persons with both elevated fasting glucose and HbA1c suggests a dual role for fasting glucose and HbA1c for prediction of diabetes.”

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