Screening and diagnosis of type 2 diabetes with HbA_{1c}

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Clinical question

Is hemoglobin A_{1c} (HbA_{1c}) testing appropriate for screening and diagnosis of type 2 diabetes mellitus?

Evidence

- Agreement between HbA_{1c} and fasting plasma glucose (FPG) or oral glucose tolerance testing (OGTT) is poor:
  -25% to 27% agreement for HbA_{1c} and FPG[1,2];
  -22% to 33% agreement for HbA_{1c} and OGTT.[1,3,4]
- Some studies find HbA_{1c} (≥6.5%) would diagnose *less* diabetes than OGTT[1,5,6] (eg, HbA_{1c} missed 60% of the cases OGTT diagnosed[6]); some find HbA_{1c} (≥6.5%) would diagnose *more* diabetes than OGTT[2-5] (eg, OGTT missed 35% of the cases HbA_{1c} diagnosed[4]).
- In predicting outcomes of diabetes, HbA_{1c}
  -performs as well as and often better than FPG[7-10] and
  -might be similar to OGTT, but evidence is lacking[7,9];
  HbA_{1c} levels for best prediction vary by study.[7-10]
- Using a diagnostic cutoff of HbA_{1c} ≥6.5%:
  -Higher HbA_{1c} improves specificity; lower improves sensitivity.
  -One study found HbA_{1c} of ≥6.5% had a sensitivity and specificity of 44% and 79%, respectively.[11]
  -While some data suggest the cutoff could be lower,[12-14] consistency is lacking,[5] and racial differences do exist.[15]

Context

- Although FPG has been the preferred diagnostic test for diabetes for years, it requires patient compliance with fasting and has high intraindividual variability.[7,16]
- Agreement between FPG and OGTT is also poor.[17,18]
- HbA_{1c} is more expensive and not reliable in certain conditions (eg, hemoglobinopathies),[19] but does not require fasting and has less intraindividual variability than FPG.[7]
- Recent American,[20] WHO,[21] and Canadian Task Force on Preventive Health Care (CTFPHC)[22] recommendations include HbA_{1c} of ≥6.5% for screening and diagnosis.
  -Screening and diagnostic tests are the same in diabetes.[20]
  -Positive results (FPG, OGTT, or HbA_{1c}) should be confirmed with repeat testing using the same test.[20]

Bottom line

An HbA_{1c} cutoff of ≥6.5% can be used to screen for and diagnose type 2 diabetes. Controversy persists around appropriate cutoffs and agreement with other tests.

Implementation

There is no evidence that screening adults at low or moderate risk of diabetes will improve outcomes; low-quality evidence suggests that screening high-risk adults could reduce complications.[22] The CTFPHC recently published new guidance on screening for diabetes, identifying HbA_{1c} as the preferred test. The CTFPHC recommends using a validated risk calculator (preferably FINDRISC[23]) to identify adults at high or very high risk. High-risk adults should be screened with HbA_{1c} every 3 to 5 years; those at very high risk should be screened annually. FINDRISC[23] requires consideration of diet, exercise, and body weight, so using these risk calculators offers opportunities to discuss other risk factors.

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The opinions expressed in this Tools for Practice article are those of the authors and do not necessarily mirror the perspective and policy of the Alberta College of Family Physicians.

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