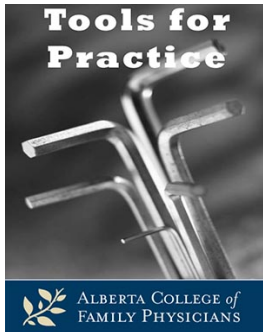


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Reviewed: July 27, 2016
Evidence Updated: New evidence
Bottom Line: Slight change
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Hemoglobin A1c for the Diagnosis of Type 2 Diabetes

Clinical Question: What are the advantages and disadvantages of using hemoglobin A1c (A1c) as a diagnostic test for Type 2 diabetes mellitus?

Bottom-line: Hemoglobin A1c can be used to diagnose diabetes. Controversy remains around the best cut-off, but $\geq 6.5\%$ is most commonly recommended. Different tests to diagnosis diabetes (A1c, fasting plasma glucose, and oral glucose tolerance tests) may give inconsistent results, so it is recommended the same test be used for retesting to confirm a diagnosis.

Evidence:

- No single test represents a gold-standard to diagnose diabetes.¹
- Agreement between A1c, fasting plasma glucose (FPG), and oral glucose tolerance testing (OGTT) is poor.²
 - A1c $\geq 6.5\%$ misses 47% of cases of diabetes diagnosed by FPG (≥ 7 mmol/L) and 63% of diabetes by OGTT (≥ 11.1 mmol/L).
 - In some studies, A1c diagnosed more diabetes than OGTT.³⁻⁵
 - Notably, FPG also misses 46% of diabetes diagnosed by OGTT.
- Predicting complications of diabetes:
 - Microvascular: A1c as good as FPG or OGTT.^{6,7}
 - Macrovascular: A1c better than FPG,^{8,9} and similar to OGTT.⁸
- Diagnostic cut-off of $\geq 6.5\%$.
 - Best cut-off for prediction of complications varied from ≥ 5.8 to $\geq 7.3\%$.⁶⁻⁹
 - Cut-off for black individuals ($\geq 5.5\%$)¹⁰ may be lower than Asian or white patients.
 - Lower A1c improves sensitivity, but decreases specificity.
 - Example: Sensitivity (compared to FPG) improved from 53% to 73% when decreasing the threshold from $\geq 6.5\%$ to $\geq 6.1\%$.²

Context:

- All major guidelines¹¹⁻¹³ now include A1c $\geq 6.5\%$ in the diagnostic criteria for diabetes.

- Positive results (FPG, OGTT or A1c) should be confirmed by presence of symptomatic hyperglycemia, or by repeating the same test on a different day.¹¹
- Although previously the preferred diagnostic test for diabetes, FPG:
 - Requires patient compliance with fasting.
 - Has high variability within the same individual.^{11,14}
- Other considerations for A1c:
 - Does not require fasting and has less variability in the same individual than FPG.¹⁴
 - More expensive.
 - Not reliable in certain medical conditions (e.g. anemia, hemoglobinopathies).¹⁵

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Tools for Practice is a biweekly article summarizing medical evidence with a focus on topical issues and practice modifying information. It is coordinated by G. Michael Allan, MD, CCFP and the content is written by practising family physicians who are joined occasionally by a health professional from another medical specialty or health discipline. Each article is peer-reviewed, ensuring it maintains a high standard of quality, accuracy, and academic integrity. If you are not a member of the ACFP and would like to receive the TFP emails, please sign up for the distribution list at <http://bit.ly/signupfortfp>. Archived articles are available on the ACFP website.

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