

# Hemoglobin A1c

## Diabetes and mortality marker

**Reference range (% of total hemoglobin):**

Pre-diabetes/Increased risk: 5.7-6.1%

Diabetes: >6.5%

**Methodology:**

Roche Cobas Integra

**Specimen required:**

Whole blood (EDTA-lavender top-blue)

**Stability:**

28 days

## Background

Diabetes is at epidemic proportions. According to the Centers for Disease Control (CDC), there are currently more than 29 million people in the US, roughly 9.3% of the total population, living with diabetes. Out of that population, only 21 million people have actually been diagnosed. That means more than 8 million people in the US are living with undiagnosed diabetes. Pre-diabetes, a state of increased risk in developing diabetes, affects an estimated 86 million people of US adults, age 20 and older (1).

Diabetes is the seventh leading cause of death in the US. The prevalence is similar to other developed nations with rising obesity as a leading cause. Diabetes is a major cause of heart disease and stroke. It is the leading cause of kidney failure, blindness and non-traumatic lower limb amputations.

## Hemoglobin A1c Defined

Hemoglobin A1c measures the average serum glucose level for the preceding two to three months on an applicant. It is considered the gold standards in diabetes diagnostic testing and monitoring. The test itself is stable and not affected by glycolysis. Hemoglobin A1c is formed when glucose in the blood binds to hemoglobin to form a glycated hemoglobin complex.

Hemoglobin A1c has been approved by the FDA and current criteria by the American Diabetes Association (ADA) recommend utilizing A1c testing

for both pre-diabetes and diabetes. Pre-diabetics have a much greater chance of developing diabetes in the near future and should be aggressively monitored in the clinical setting (2).

## Correlation and Study Results

Hemoglobin A1c levels correlate closely with the severity of diabetes and can be used to monitor therapy. One prospective clinical study of 1,253 patients revealed that hemoglobin A1c and body mass index were the only significant predictors of new onset diabetes (3). Another leading study, EPIC-Norfolk, of over 10,000 individuals revealed that hemoglobin A1c was an independent predictor of coronary heart disease, cardiovascular disease and total mortality (4). Cardiovascular and total mortality risk increased as hemoglobin A1c concentrations increased from 5% to 6.9%. Any increase of hemoglobin A1c of one percentage point was associated with a 20% to 39% increase in cardiovascular disease and mortality. Low hemoglobin A1c may also be a predictor for all-cause mortality even in adults without diabetes (5).

## Recommended Testing Guidelines

It is recommended that hemoglobin A1c be utilized as a screening test, as part of the initial insurance panel.

Screening with hemoglobin A1c is an effective way of testing for applicants who are at increased risk of mortality because of pre-diabetes or diabetes.

## References

- 1) [http://www.cdc.gov/diabetes/pubs/pdf/ndfs\\_2011.pdf](http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf)
- 2) [http://care.diabetesjournals.org/content/36/Supplement\\_1/S11.full\\_2013](http://care.diabetesjournals.org/content/36/Supplement_1/S11.full_2013)
- 3) Edelman et al; Utility of Hemoglobin A1C in Predicting Diabetes Risk; J Gen Intern Med; 2004; 19(12): 1175—1180
- 4) K. Khaw et al ; Association of Hemoglobin A1c with Cardiovascular Disease and Mortality in Adults: The European Prospective Investigation into Cancer in Norfolk; *Ann Intern Med.* 2004;141:413-420.
- 5) A. Carson; Low Hemoglobin A1C and Risk of All-Cause Mortality Among US Adults Without Diabetes; *Circ Cardiovasc Qual Outcomes.* 2010;3:661-667