



A1cNow™ Performance Summary Revised June 2003

Background

A1cNow™ is a single-use, disposable monitor for the quantitative measurement of %A1C (A1C) in fingerstick or venous whole blood samples. With one drop of blood and just three simple steps, the test can be performed in a physician's office or by the patient at home. Once diluted sample is added to the monitor, there are no further steps, and results are available in about 8 minutes. The monitor performs over 25 internal chemical and electronic quality control checks with each test, including checks for potential hardware or software errors, and potential reagent strip errors. An error code is reported in place of a result if any quality check does not pass.

The A1cNow test is certified by the National Glycohemoglobin Standardization Program (NGSP) and therefore traceable to the DCCT. Further, the test is factory calibrated with a set of blood samples that have been quantitated by an NGSP certified laboratory using an NGSP certified method. Since in-field calibration is neither needed nor possible, the user cannot alter the accuracy of the test. Allowing for the normal variation seen with all laboratory methods, a 7% A1C on A1cNow will thus be, on average, the same as a 7% A1C on other instruments that are also calibrated to NGSP standards.

Accuracy (Estimated Bias as per NCCLS EP-9)

A clinical study was performed in 2002 to evaluate A1cNow accuracy, as defined by estimated bias. Two hundred eighty-six people (most with diabetes) were enrolled in this study that evaluated three manufacturing lots of A1cNow. Untrained users performed fingersticks on themselves to perform the A1cNow test. A venous blood sample was also collected from each person, and was tested by an NGSP-certified laboratory method for A1C. The two answers were then compared, with the following results.

- (1) The regression line for 286 test comparisons had a slope and intercept of 0.988 and 0.168, respectively, with a correlation coefficient ("r") of 0.93.
- (2) Using the slope and intercept values from the regression equation, an average bias at 6%, 7%, 9% and 11% A1C was calculated as follows:

A1cNow Average Bias

| Reference %A1C | Calculated %A1C | %Bias |
|------------------------------|-----------------|--------------|
| 6 | 6.10 | +1.7 |
| 7 | 7.08 | +1.1 |
| 9 | 9.06 | +0.7 |
| 11 | 11.04 | +0.3 |
| Overall Average Bias: | | +0.95 |

The table shows that the overall average accuracy of A1cNow is 99% for this study. This means that a true 7% A1C will read, on average, between 6.9% and 7.1%. These results, similar to a previous study, support the accuracy of A1cNow calibration and underscore the benefit of a factory-calibrated test that cannot undergo calibration alteration in the field.

Precision

To evaluate precision, two clinical samples (one approximately 6% A1C and the other approximately 9% A1C) were each tested four times per day over 20 days, yielding 80 results per level. This is the established NGSP precision protocol, as well as the NCCLS precision protocol (EP-5A), and statistical analysis of the data demonstrated percent coefficients of variation (%CVs) of 4.02% for the low level and 3.88% for the high level.

For reference purposes, the College of American Pathology (CAP) reports %CV's of about 2% to 8% for A1C¹ from proficiency testing by laboratories around the US. CAP data include between-laboratory variability as well as the above factors. Between-laboratory variability, however, is not expected to be significant for A1cNow since it is factory-calibrated and cannot be altered in the field.

Total Error

Total error is a concept that combines both accuracy and precision. Total error is used by the NGSP to describe a test's accuracy, and it is closely related to the probable error for a single laboratory result. An NGSP certified method must provide a result that is within 1 %A1C of the "true" result at least 95% of the time.

The NGSP total error protocol requires that 40 samples spanning the test's dynamic range be analyzed by the system that is seeking certification (i.e., A1cNow). These results are then compared to results obtained when the same samples are analyzed by the NGSP (the "true" results). When A1cNow was tested using this protocol, the data showed that A1cNow results were within -0.8 to +0.6 %A1C of the established limits. This means that A1cNow performed better than the certification criteria. A bias plot of A1cNow total error is shown below, followed by a graph of A1cNow results compared to the NGSP results.

