Technical Dossier and Performance
pts Diagnostics A1CNow Self Check Test System

Trade Name
pts Diagnostics A1CNow Self Check

Device Description and Test Method
The A1CNow Self Check is an enabling technology that incorporates microelectronics, optics, and dry-reagent chemistry strips within a reusable, self-contained, integrated hand held monitor and a single-use test cartridge. An unmeasured whole blood mixture (diluted) is directly applied to the sample port, and results are displayed in numeric form on the Monitor's liquid crystal display after 5 minutes. Having no switches or buttons, the Monitor self-activates upon insertion of the Test Cartridge.

The A1CNow Self Check utilizes both immunoassay and chemistry technology to measure A1C and total hemoglobin, respectively. Upon the addition of a diluted blood sample, blue microparticles conjugated to anti-A1C antibodies migrate along the reagent strips. The amount of blue microparticles captured on the strips reflects the amount of A1C in the sample.

For the total hemoglobin (Hb) portion of the test, the sample diluent converts Hb to met-Hb. The intensity of met-Hb color measured on the reagent strips is proportional to the concentration of hemoglobin in the sample.

Intended Use
The A1CNow® Self Check test system provides quantitative measurement of the percent of glycated hemoglobin (% A1C) levels in capillary (fingerstick) blood samples. The test is for home use to monitor glycemic control in people with diabetes.

Analyte to be measured
Glycated Hemoglobin (HbA1c)

Functionality
High levels of blood glucose result in over-glycation of proteins throughout the body including hemoglobin. Hemoglobin A undergoes a slow glycation with glucose that is dependent on the time-average concentration of glucose over the 120-day life span of red blood cells. The most prevalent and well-characterized species of glycated hemoglobin A is A1C, making up approximately 3% to 6% of total hemoglobin in healthy individuals. The correlation of A1C (HbA1c) and blood glucose levels make it a useful method of monitoring long-term blood glucose levels in people with diabetes.

Intended User
A1CNow Self Check is intended to be used at home by diabetic patients.

Environment or place of use
A1CNow Self Check is intended to be used at home.

Single or Multiple Use
The A1CNow Self Check test cartridges are designed for single use only. The A1CNow Self Check monitor is intended for use with four (4) single use cartridges.

PTS Diagnostics 4600 Anson Boulevard / Whitestown, IN 46075 / USA / ptsdiagnostics.com / +1.317.870.5610

Quantitative / Qualitative
All results are reported in a quantitative manner.

Sample Types
The pts Diagnostics A1CNow Self Check cartridges use capillary whole blood.

Device Classification in Country of Origin
According to the US FDA, pts Diagnostics A1cNow Self Check kits are Class 2 medical devices.

Software to be Used with the In Vitro Diagnostic Product
The software within the analyzer provides a user interface for running tests and displaying test results to the user.

Product Components and Packaging
Primary Packaging:
Each test cartridge is individually packaged in a foil pouch.
Each Shaker is individually packaged in a foil pouch with a blood collector.

Secondary Packaging:
Each A1CNow Self Check Box contains one (1) A1CNOW Self Check Monitor, A1CNOW Self Check test cartridges (4) and Shaker Pouch with Blood Collector (4).

Example Cartridge

Example Shaker

Example Monitor

Catalog number: 3070 A1CNow Self Check 4-Test Kit (NGSP)
3071 A1CNow Self Check 4-Test Kit (IFCC)
3072 A1CNow Self Check 4-Test Kit (NGSP non-EU)

Performance Studies
Summary of preclinical and clinical studies
Precision/ Reproducibility
Precision testing was done under a specialized protocol. Following this protocol, two whole blood samples, one of approximately 6 %A1C (low), and one of approximately 9 %A1C (high), were tested over 20 days and four runs per day, for a total of 80 assays per level. The overall imprecision (including within-day and between-day) was 3.00% CV at the low level and 4.02% CV at the high level. This performance meets the requirements of NGSP certification.

A second study was performed at three clinical sites. Each site performed six (6) replicates of a low (5.2% and a high (8.6%) sample on each of five days (N=30 per level per site) with the following results:

Site	Level 1			Level 2		
	Mean	SD	CV	Mean	SD	CV
1	5.3	0.17	3.2%	8.6	0.43	5.0%
2	5.4	0.14	2.7%	8.4	0.52	6.2%
3	5.0	0.25	5.0%	8.9	0.49	5.5%
Combined	5.2	0.25	4.8%	8.6	0.52	6.1%

Expected Values (non-diabetic population)
The expected normal range for %A1C using the A1CNow system was determined by testing blood samples from 118 presumptively non-diabetic individuals (fasting glucose levels <127

mg/dL) across three US sites. The population included 33 males and 85 females, and an age range from 19 to 76, with a mean age of 43. The mean %A1C result was 5.2% ± 0.71% (1 SD).

Clinical evaluations:

Accuracy – Fingerstick Blood

Accuracy studies were conducted with 189 diabetic and non-diabetic subjects across three US sites. Fingerstick sampling was performed on each subject for testing with A1CNow+, and venous blood was collected from each subject for comparative testing using an NGSP-certified method. A1CNow+ results were compared to the NGSP reference results. The A1C results ranged from 5.0 %A1C to 12.8 %A1C, with a mean of 7.3 %A1C (reference results). Data analysis consisted of least squares linear regression (x = reference results), bias calculation, and Bland Altman limits. The data are provided below. The NGSP-certified method for all studies is the Tosoh A1c 2.2 Plus.

A1CNow+ Fingerstick Comparative Testing

N	189	Bias at 6% A1C (% difference)	5.89(- 1.83%)
Slope	1.02	Bias at 7% A1C (% difference)	6.91 (-1.29%)
y-intercept	- 0.23	Bias at 9% A1C (% difference)	8.95(- 0.56%)
r	0.95	Avg. % difference	- 1.23%

The results showed that the accuracy of A1CNow Self Check, with fingerstick samples was, on average, 99%. This means that, on average, a true 7 %A1C could read approximately 6.9 %A1C.

Performance by untrained users

Clinical studies were performed at three US sites with over 180 untrained people (most with diabetes). These study subjects read the instructions and then performed one A1CNow Self Check test on themselves. A venous blood sample was collected from each subject, and this sample was tested by an NGSP-certified laboratory method for %A1C. The two results were then compared.

n	188	Bias at 6% A1C (% difference)	6.02 (+ 0.33%)
Slope	0.99	Bias at 7% A1C (% difference)	7.01 (+ 0.14%)
y-intercept	0.08	Bias at 9% A1C (% difference)	8.99 (- 0.11%)
r	0.93	Avg. % difference	+ 0.12%

The results showed that untrained users could perform A1CNow Self Check testing on themselves with the same accuracy as trained individuals.

Accuracy – Venous Blood

Venous blood was collected from 110 diabetic subjects, and each sample was tested on one of three different lots. Aliquots of the venous samples were also tested by the NGSP-certified method, providing comparative results. Data analysis again consisted of least squares linear

regression (x = reference results), bias calculation and Bland-Altman limits. The data are provided below.

A1CNow+ Venous Comparative Testing

n	110	Bias at 6% A1C (% difference)	5.95 (-0.8%)
Slope	1.03	Bias at 7% A1C (% difference)	6.98 (-0.3%)
y-intercept	-0.24	Bias at 8% A1C (% difference)	8.01 (+0.1%)
r	0.97	Avg. % diff.	-0.30%

The results showed that the accuracy with venous sampling was, on average, 99.7%.

Analytic Sensitivity and Measuring Range

Calibration of the PTS Diagonistics A1CNow Self Check monitor is performed with a set of blood samples that have been value assigned by a National Glycohemoglobin Standardization Program (NGSP) certified laboratory using an NGSP reference method. Total Hb calibration values for those samples are obtained with a Total Hb analyzer (HemoCue® Haemoglobin Test System, HemoCue, Inc., Lake Forest, CA). The calibration of the A1CNow Self Check test is thus traceable to the NGSP and to an NGSP Certified Network reference method.

Studies were performed to evaluate the linearity of the A1CNow Self Check system across its dynamic range. Clinical samples representing low and high %A1C levels were identified, and were mixed in various proportions into nine preparations. These samples were tested in replicates of at least five (n = 5). The observed results were compared to the expected results and analyzed in terms of percent recovery. The test is linear for %A1C levels between 4% and 13%, and produces reliable results with hematocrits between 20% and 60% packed cell volume (PCV).

Analytic Specificity

INTERFERENT	TEST CONCENTRATION
Bilirubin(unconjugated)	20 mg/dL
Triglyceride	3000 mg/dL
Hemoglobin	500 mg/dL
Acetaminophen	80 µg/mL
Ascorbic acid	5 mg/dL
Ibuprofen	120 µg/mL
Acetylsalicylic acid	1 mg/mL
Glyburide(glibenclamide)	240 ng/mL
Metformin (1.1-dimenthyl-biguanide HCl)	25 µg/mL

Studies were performed to assess the effect of common test interferents, various common over-the-counter therapeutic agents, and oral antihyperglycemic agents commonly used to treat Type

II diabetes. Two levels of %A1C (low and high, approximately 4% and 10%, respectively) were tested. The studies showed no effect from any of these potential interferents at concentrations up to approximately 5-times their normal levels or therapeutic doses.

Studies showed no interference from modified hemoglobins, including labile glycated hemoglobin when tested at two levels of %A1C (low and high, approximately 5% and 11% respectively). The modified hemoglobins, and the levels evaluated, were: labile hemoglobin with 1400mg/mL glucose, carbamylated hemoglobin at a final concentration of 5 mM potassium cyanate, and acetylated hemoglobin at a final concentration of 14 mM acetylsalicylic acid.
There were mixed results from the testing of high levels of Hemoglobin F, Hemoglobin S, and Hemoglobin C. Unreliable results may be obtained from patients with elevated levels of variant hemoglobins.

High Dose Prozone Effect and Definition of Cut-Off Value
pts Diagnostics A1cNow Self Check is a quantitative assay that utilizes an inhibition assay format. Therefore, neither prozone effect nor cut-off values are applicable.