510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE ONLY TEMPLATE

A. 510(k) Number:
k042227

B. Purpose for Submission:
New device

C. Analyte:
Troponin I

D. Type of Test:
Qualitative

E. Applicant:
Alfa Scientific Designs, Inc.

F. Proprietary and Established Names:
Instant-View® Troponin I Serum Test (Cassette)
Instant-View® Troponin I Serum Test (Dip Strip)
Instant-View® Troponin I Whole Blood/Serum test (Cassette)

G. Regulatory Information:

1. Regulation section:
   21 CFR 862.1215, Creatine phosphokinase/creatine kinase or isoenzymes test system
2. Classification:
   Class II
3. Product Code:
   MMI
4. Panel:
   75

H. Intended Use:

1. Intended use(s):
   See Indications for Use

2. Indication(s) for use:
   The Instant-View® Troponin I Test is an immunoassay for the rapid qualitative detection of cardiac troponin I (cTnI) in human whole blood or serum at a cutoff level of 1.5 ng/mL. It provides an aid in the diagnosis of myocardial infarction in emergency room, point-of-care, and hospital setting.

The Instant-View® Troponin I Test provides a qualitative result rather than information about change in the level of cTnI with single testing. Serial testing should be performed to determine a temporal change in the level of cTnI. If desired, a quantitative method should be used to quantitate the concentration of cTnI. Clinical consideration and professional judgement should be applied when making a diagnosis decision based on this test result.

3. Special condition for use statement(s):
   Prescription Use

4. Special instrument Requirements:
   none

I. Device Description:

The Instant-View® Troponin I Serum Test (Cassette) consists of a kit containing 25 individually pouched cassettes with droppers; the Instant-View® Troponin I Serum Test (Dip Strip) consists of 50 individually pouched strips; and the Instant-View® Troponin I Whole Blood/Serum test (Cassette) consists of 25 individually pouched cassettes with droppers.

J. Substantial Equivalence Information:

1. Predicate device name(s):
   VBL Serum Troponin I Test by Vancouver Biotech Ltd.

2. Predicate K number(s):
   k023505

3. Comparison with predicate:

Similarities		
Item	**Device**	**Predicate**
Analyte measured	Cardiac Troponin I	Same
Type of test	Qualitative	Same
Capture antibody	Mouse anti cTnI	Same
Conjugate type	Colloidal gold coupled with mouse anti-cTnI	Same
Assay read time	15 minutes	Same
Differences		
Item	**Device**	**Predicate**
Sample type	Serum or whole blood	Serum
Sample volume	4 drops serum or whole blood (about 160-200 µL	3 drops serum (about 120-160 µL

K. Standard/Guidance Document Referenced (if applicable):

NCCLS M29-A

L. Test Principle:

The assay is a double antibody chromatographic lateral flow immunoassay. The test strip in the device consists of (1) a burgundy-colored conjugate pad containing colloidal gold coupled with mouse anti-cTnI antibodies, and (2) a nitrocellulose membrane containing a test line (T line) and a control line (C line). The T line is coated with mouse anti-cTnI antibodies and the C line is coated with goat anti-mouse antibodies. When cTnI is present in the specimen, the T line will become a burgundy-colored band. If cTnI is not present or present below the detectable level, no T line will develop. The C line should always appear as a burgundy-colored band regardless of the presence of cTnI. The C line serves as an internal qualitative control of the test system to indicate that an adequate volume of specimen has been applied and the liquid migration occurred.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Three physician's office laboratories (POLs) and one medical reference laboratory were provided with two panels of samples spiked with purified cTnI. One person at each site participated in the study. One panel contained eighty (80) blind-labeled whole blood samples and the other, eighty (80) blind-labeled serum samples. Samples in each panel consisted of four evenly distributed groups with cTnI at four different concentrations, 0, 0.1, 1.5, and 10 ng/mL. The results obtained by the test demonstrated an agreement of 100% within run as well as between sites for spiked whole blood samples, and an agreement more than 98% for spiked serum samples.

Whole Blood Panel	**cTnI Concentration (ng/ml) and Test Result**								**Agreement Within Run**
	0		0.1		1.5		10		
	-	+	-	+	-	+	-	+	
Site I	20	0	20	0	0	20	0	20	100%
Site II	20	0	20	0	0	20	0	20	100%
Site III	20	0	20	0	0	20	0	20	100%
Site IV	20	0	20	0	0	20	0	20	100%
Agreement Between Sites	100%		100%		100%		100%		

Serum Panel	**cTnI Concentration (ng/ml) and Test Result**								**Agreement Within Run**
	0		0.1		1.5		10		
	-	+	-	+	-	+	-	+	
Site I	20	0	19	1	0	20	0	20	98.8%
Site II	20	0	20	0	0	20	0	20	100%
Site III	20	0	20	0	0	20	0	20	100%
Site IV	19	1	20	0	0	20	0	20	98.8%

Agreement Between Sites	98.8%	98.8%	100%	100%	

b. Linearity/assay reportable range:
Recovery studies were performed with normal human serum supplemented with purified human cardiac troponin I to yield concentrations of 0, 1.5, and 3 ng/mL. The samples were tested using the test in 6 replicates. As shown in the data table below, an agreement of 100% was observed between the expected and the observed results at each cTnI concentration.

cTnI added (ng/mL)	**Test Results**		**Agreement with Expected Results**
	Negative	**Positive**	
0	6	0	100%
1.5	0	6	100%
3	0	6	100%

c. Traceability (controls, calibrators, or method):
500 clinically confirmed serum samples, 150 negative and 150 positive based on WHO criteria were tested with this device, the predicate method (k023505), and a quantitative ELISA troponin I assay (k013062).

d. Detection limit:
See assay cutoff below (f)

e. Analytical specificity:
The following potentially interfering substances did not appear to interfere or cross-react with cardiac troponin I determinations in the test up to the levels shown below:

Analyte	**Test Level**
Biotin	200 ng/ml
Bilirubin	1 mg/ml
Hemoglobin	2 mg/ml
Rabbit skeletal muscle troponin C	2.5 µg/ml
Human cardiac troponin T	2.5 µg/ml
Human skeletal muscle troponin T	2.5 µg/ml
Human skeletal muscle troponin I	2.5 µg/ml
Cholesterol	8 mg/ml
Triglyceride	12.5 mg/ml

In vitro testing of the following commonly-used drugs revealed no interference within the normal therapeutic range:

Analyte (10 µg/ml Final Concentration)		
Acetaminophen	Chloramphenicol	Nifedipine
Acetylsalicylic acid	Cinnarizine	Nystatin
Adenine	Cyclophosphamide	Oxazepam
Allopurinol	Cyclosporine	Oxytetracycline
Ambroxol	Digitonin	Propanolol
Ampicillin	Digoxin	Theophylline
Asorbic Acid	Dopamine	L-Thyroxine
Atenolol	Erythromycin	Urea
Atropine	Gentisic Acid	Uric Acid
Caffeine	Isoproterenol	
Captopril	Isosorbide dinitrate	

The labeling contains the following statements regarding HAMA interference: Human serum samples containing unusually high titers of certain antibodies, such as human anti-mouse or human anti-rabbit antibodies (HAMA or HARA), may influence the test results. The test has been optimized to minimize interference from HAMA-containing specimens; nevertheless complete elimination of this interference from all patient specimens cannot be guaranteed. Patient samples may contain human anti-mouse antibodies (HAMA) which are capable of giving falsely elevated or depressed results with assays that utilize mouse monoclonal antibodies.

f. Assay cut-off:

The analytical sensitivity/cutoff of this device was determined with 2 panels, one for serum samples and one for whole blood samples. Each consists of 40 members evenly distributed into 4 groups, ten (10) samples in each group. The 4 groups were spiked with cTnI at four different levels: 1.5, 1.3, 1.1, and 0.9 ng/mL, separately.

For the serum panel, this device detected all 10 samples at 1.5 ng/mL level as positive, detected 7 out of 10 at 1.3 ng/mL, 5 out of 10 at 1.1 ng/mL, and 3 out of 10 at 0.9 ng/mL. For the whole blood panel, this device detected all 10 samples at 1.5 ng/mL as positive, detected 6 out of 10 at 1.3 ng/mL, 5 out of 10 at 1.1 ng/mL, and 3 out of 10 at 0.9 ng/mL. The analytical sensitivity/cutoff of this device is 1.5 ng/mL cTnI.

Serum Panel		Troponin I Sample Concentration (ng/ml)			
		1.5	1.3	1.1	0.9
Test Result	Positive (+)	10	7	5	3
	Negative (-)	0	3	5	7
Total		10	10	10	10

Whole Blood Panel		Troponin I Sample Concentration (ng/ml)			
		1.5	1.3	1.1	0.9
Test Result	Positive (+)	10	6	5	3
	Negative (-)	0	4	5	7

Total	10	10	10	10

2. Comparison studies:

a. Method comparison with predicate device:

A total of 300 clinically confirmed serum samples, 150 positive and 150 negative, were tested with this device, the predicate device, and a quantitative ELISA Troponin I assay for comparison. The results from the predicate device were that, out of the 150 positive specimens, 147 were tested positive, 1 weak positive, and 2 negative; and out of the 150 negative specimens, 144 were tested negative and 6 positive. This device obtained similar results to the predicate device. Out of the 150 confirmed positive specimens, 147 tested positive, 2 weak positive, and 1 negative; and out of the 150 confirmed negative specimens, 144 tested negative and 6 positive. The ELISA test with a cut-off of 1.5 mg/dL, detected 149 positive out of the 150 positive specimens and 146 negative out of the 150 negative specimens. Compared with the ELISA test, the agreement was 97.4% (149/153) for positive results and 95.9% (141/147) for negative results. The overall agreement was 96.7% (290/300).

		ELISA Assay Results			
Assay Values		**Positive (≥1.5ng/ml)**	**Negative (<1.5 ng/ml)**	**Total**	**Agreement**
INSTANT-VIEW®	**Positive**	149	6	155	97.4%
	Negative	4	141	145	95.9%
	Total	153	147	300	96.7%

b. Matrix comparison:

The Instant-View® Troponin I Serum Test (Cassette) and Instant-View® Troponin I Serum Test (Dip Strip) are intended for use with serum samples only. The Instant-View® Troponin I Whole Blood/Serum test (Cassette) is intended for use with whole blood or serum samples. The anticoagulant recommended for whole blood samples is citrate. All whole blood studies were performed using citrate whole blood. In one of the studies, three physician's office laboratories (POLs) and one medical reference laboratory were provided with two panels of samples spiked with purified cTnI. One panel contained 80 blind-labeled whole blood samples and the other, 80 blind-labeled serum samples. Samples in each panel consisted of four evenly distributed groups with cTnI at four different concentrations, 0, 0.1, 1.5, and 10 ng/mL. The results obtained by the test demonstrated an agreement of 100% within run as well as between sites for spiked whole blood samples, and an agreement of more than 98% for spiked serum samples. The zero level was not

spiked. All results for the zero level whole blood samples were negative and agreed with the zero level serum samples which also produced all negative results. In addition, the studies performed to demonstrate the assay cutoff were performed with both serum and whole blood. The results showed agreement between whole blood and serum (see Assay Cutoff section above). In another study, venous blood was drawn from 21 healthy volunteers and whole blood samples were tested. All 21 samples produced negative results.

3. Clinical studies:
   a. *Clinical sensitivity:*
      See method comparison above.

   b. *Clinical specificity:*
      See method comparison above.

   c. *Other clinical supportive data (when a and b are not applicable):*

4. Clinical cut-off:
   The test is designed to yield a positive result for cTnI concentrations ≥ 1.5 ng/mL. See assay cut-off above.

5. Expected values/Reference range:
   Sera specimens from 150 confirmed negative patients were tested. 144/150 or 96 % were negative when tested by this device.

N. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.