

**Information for:**

**CRP Semi-Quantitative Rapid Test**

**(WHOLE BLOOD/Serum/Plasma)**

**CCRP-C43**

Prepared by: Tom Chen

Approved by: Ethan Ye

Version: 02

Issue Date: 2016.06.30

**Table of contents**

1	BACKGROUND.....	3
1.1	Test Principle.....	3
1.2	Illustrations.....	3
1.3	Storage .....	5
1.4	Stability .....	5
1.5	Description of Test Methods.....	5
1.5.1	GENERAL REMARKS .....	5
1.5.2	RECEIVING INSPECTION AND CONTROL OF RAW MATERIALS.....	5
1.6	Composition of Product.....	5
1.7	Manufacturing Procedure .....	5
2	PERFORMANCE CHARACTERISTICS .....	6
2.1	Analytical Sensitivity.....	6
2.2	Interfering Substances.....	8
2.3	Cross reactivity .....	11
2.4	Whole blood Evaluation .....	12
2.5	Dose Hook Effect .....	18
2.6	Negative Conversion Study.....	19
2.7	Between Day Reproducibility .....	21
2.8	Between Lot Reproducibility.....	24
2.9	Accelerate Stability Study .....	27
2.10	Specimen stability study .....	30
2.11	Clinical Date.....	33
2.12	Read time flex.....	34
2.13	Sample Flex.....	35
2.14	Temperature flex.....	38
3.	Bibliography .....	40

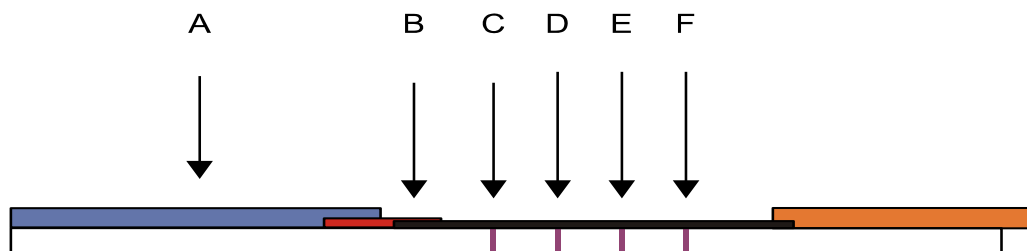
## **1 BACKGROUND**

C - reactive protein (CRP) in patient's sera has been found in association with acute infections, necrotic conditions and a variety of inflammatory disorders. There is a strong correlation between serum levels of CRP and the onset of the inflammatory process. Monitoring the levels of CRP in patient's sera indicates the effectiveness of treatment and the assessment of patient recovery. It is used in particular to differentiate bacterial infections from virus infections.

### **1.1 Test Principle**

The CRP Test is an immunochromatographic test, based on two specific antibodies against human CRP. The concentration-dependent formation of test lines allows a rapid semi-quantitative determination of CRP in whole blood samples. The tip of the test is dipped into the test sample which is diluted with buffer solution. The sample now moves through the test from bottom to top. If the test sample contains CRP, it attaches to the first anti-CRP antibody which is conjugated with a red gold colloidal for color marking. The red CRP antibody-gold complex, together with the sample liquid, diffuses through the membrane that is pre dispensed with lines of different amounts of the second anti-CRP antibody. The CRP-antibody-gold complex is immobilized by the antibodies coated on the membrane leading to the formation of color lines. The number of lines depends on the CRP concentration in the sample. The more CRP is contained in the sample, the more color lines become visible. The control line serves as a procedural control and indicates that sufficient volume of specimen has been added and membrane wicking has occurred.

### **1.2 Illustrations**



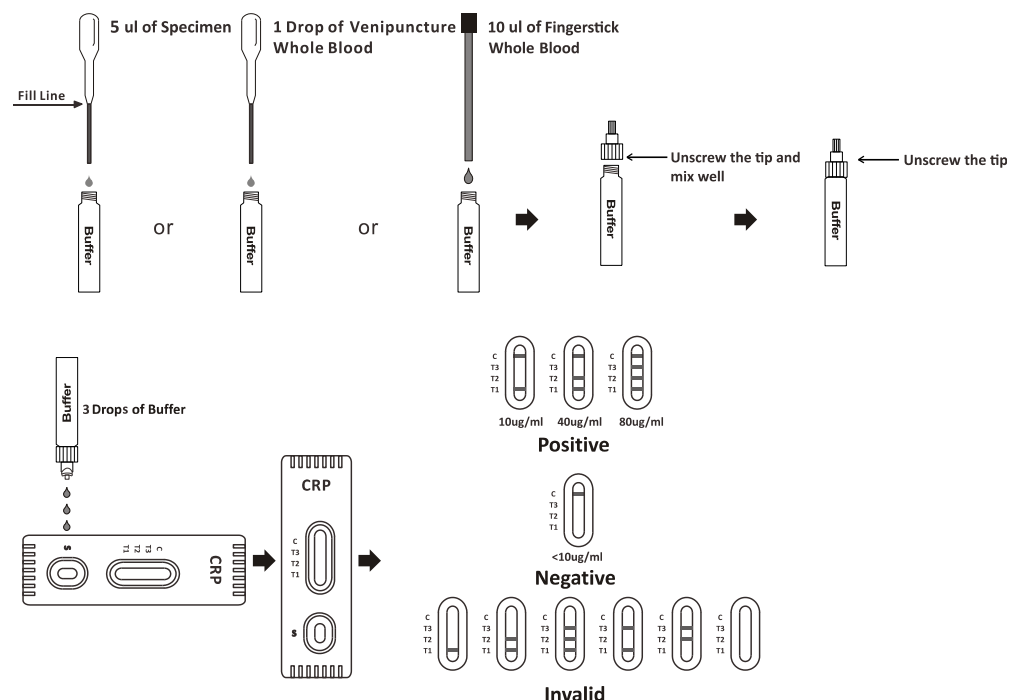
**Figure 1: Test Principle**

As shown in illustration above, the specimen (A) migrates via capillary action along the membrane to react with the colored conjugate (B). CRP antibody present in the specimen binds to the conjugate, forming a colored antibody-antigen complex. The CRP antibody immobilized in the test zone of the membrane captures the test region (C), (D) and (E). The formation of a

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

visible colored line in the test region (C) indicates CRP level is 10mg/L at least. The formation of a visible colored line in the test region (D) indicates CRP level is 40mg/L at least. The formation of a visible colored line in the test region (E) indicates CRP level is 80mg/L at least. The absence of a colored line in the test zones suggests a negative result. In the reference zone of the membrane, immobilized reagents capture colored conjugate regardless of test specimen composition. The resulting visible colored band (F) confirms control line.

**Figure 2: Interpretation of Results**



**POSITIVE:** One color line appears in the control region (C). One color line appears in the test region (T) at least.

Test line(T)	Semi quantitative result
Only T1 appears	CRP level is 10mg/L at least
Only T1 and T2 appear	CRP level is 40mg/L at least
T1,T2 and T3 appear	CRP level is above 80 mg/L

**NEGATIVE:** One color line appears in the control region (C). No apparent purple line appears in the test region (T). Negative result showed: There was not CRP in the sample, or the content of CRP below the detectable range.

Test line (T)	Semi quantitative result
No line	CRP level is lower than 10mg/L

**INVALID:** C line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test cassette. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

### 1.3 Storage

Store the test at 2-30°C. Freezing must be avoided.

### 1.4 Stability

The test is stable through the expiration date printed on the sealed pouch. The test must remain in the sealed pouch until use. DO NOT FREEZE. Do not use beyond the expiration date.

### 1.5 Description of Test Methods

#### 1.5.1 GENERAL REMARKS

The Quality Control department performs testing according to written procedures. Testing equipment is checked prior to use and calibrated at scheduled frequencies.

#### 1.5.2 RECEIVING INSPECTION AND CONTROL OF RAW MATERIALS

A sample batch of each raw material (chemicals, packaging and labeling) is inspected/tested (where applicable) for suitability and functionality. Primary packaging is inspected for correct dimensions, cleanliness and suitability. Only QC "APPROVED" raw material is employed for production.

### 1.6 Composition of Product

- |                         |                             |
|-------------------------|-----------------------------|
| A) Goat anti-Rabbit IgG | B) CRP antibody             |
| C) Rabbit IgG           | D) Adhesive plastic backing |
| E) Membrane             | F) Label Pad                |
| G) Absorbent pad        | H) Sample pad               |
| I) Plastic cassette     | J) Sample dropper           |
| K) Package insert       |                             |

### 1.7 Manufacturing Procedure

- Coat the gold conjugated recombinant CRP antibody on the label pad.

- b) Use the sprayer to dispense Goat anti-mouse IgG and CRP antibody onto the membrane.
- c) Assemble the membrane, label pad, absorbent pad and sample pad on the plastic backing.
- d) Use the cutter to cut the plastic backing into strips of selected size.
- e) Lay the strip into the plastic cassette, pack the cassette and a desiccant packet into a pouch and seal the pouch.
- f) Test the cassette according to the QC procedure and release the finished product.

## **2 PERFORMANCE CHARACTERISTICS**

### **2.1 Analytical Sensitivity**

All testes were tested with concentrations of 0mg/l, 3mg/l, 10mg/l, 40mg/l, 80mg/l and 200mg/l. Each sample was run in replicate of five with 3 lots of different format and with visual at 5-8 minutes after sample application. Results are presented in Table below.

**Table: Analytical Sensitivity Study**

Concentration	CRP15100001-T			CRP15100002-T			CRP15100003-T		
	5mins			5mins			5mins		
0mg/l	.*	-	-	-	-	-	-	-	-
3mg/l	-	-	-	-	-	-	-	-	-
10mg/l	+**	+	+	+	+	+	+	+	+
40mg/l	++	++	++	++	++	++	++	++	++
80mg/l	+++	+++	+++	+++	+++	+++	+++	+++	+++
200mg/l	+++	+++	+++	+++	+++	+++	+++	+++	+++
Concentration	CRP15100001-T			CRP15100002-T			CRP15100003-T		

# CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

	8mins			8mins			8mins		
0mg/l	~*	-	-	-	-	-	-	-	-
3mg/l	-	-	-	-	-	-	-	-	-
10mg/l	+**	+	+	+	+	+	+	+	+
40mg/l	++	++	++	++	++	++	++	++	++
80mg/l	+++	+++	+++	+++	+++	+++	+++	+++	+++
200mg/l	+++	+++	+++	+++	+++	+++	+++	+++	+++

Note: “~” mean negative result

“\*\*” mean positive result:

“+” mean only T1 line appears

“++” mean only T1 and T2 appear

“+++” mean T1, T2 and T3 appear

**Conclusion:** As indicated in the table above: all specimens with CRP concentration equal or higher than 10mg/l show positive results. The analytical sensitivity of CRP Semi-Quantitative Rapid Test (Whole Blood/Serum/Plasma) is 10mg/l.

## 2.2 Interfering Substances

Analytes were spiked into negative plasma and serum pools (ELISA confirmed) and 10mg/l CRP positive plasma and serum specimens (ELISA confirmed) at the concentrations listed. The specimens were tested in triplicate with visual interpretations occurring at 5 and 8 minutes after specimen application. Results are presented in Table below.

**Table: Interfering Substance Results**

Analytes	Conc.	CRP15100001-T											
		Serum						Plasma					
		Negative			10mg/l			Negative			10mg/l		
Ascorbic acid	200mg/l	-*	-	-	+**	+	+	-	-	-	+	+	+
Hemoglobin	1000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Gentistic acid	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Oxalic acid	60mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Bilirubin	1000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
acetoaminophen	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Aspirin	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Methanol	10%	-	-	-	+	+	+	-	-	-	+	+	+
Creatine	200mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Albumin	2000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Caffeine	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Analytes	Conc.	CRP15100002-T											



**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

		Serum						Plasma					
		Negative			10mg/l			Negative			10mg/l		
Ascorbic acid	200mg/l	-*	-	-	+**	+	+	-	-	-	+	+	+
Hemoglobin	1000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Gentistic acid	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Oxalic acid	60mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Bilirubin	1000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
acetoaminophen	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Aspirin	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Methanol	10%	-	-	-	+	+	+	-	-	-	+	+	+
Creatine	200mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Albumin	2000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Caffeine	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Analytes	Conc.	CRP15100003-T											
		Serum						Plasma					
		Negative			10mg/l			Negative			10mg/l		
Ascorbic acid	200mg/l	-*	-	-	+**	+	+	-	-	-	+	+	+
Hemoglobin	1000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Gentistic acid	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

Oxalic acid	60mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Bilirubin	1000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
acetoaminophen	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Aspirin	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Methanol	10%	-	-	-	+	+	+	-	-	-	+	+	+
Creatine	200mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Albumin	2000mg/dl	-	-	-	+	+	+	-	-	-	+	+	+
Caffeine	20mg/dl	-	-	-	+	+	+	-	-	-	+	+	+

Note: “\*” mean negative result

“\*\*” mean positive result

**Conclusion:** No substances showed any interference with the test. There were no obvious differences among the 3 lots of products at 5 minutes and 8 minutes.



### 2.3 Cross reactivity

HAV+, HIV+, HBV+, HCV+, HEV+, Syphilis+, HAMA+, RF+, MONO+, CMV+, Rubella+, TOXO+, AFP, CEA specimens as confirmed by ELISA and clinical diagnosis and the specimens which were prepared by spiking the 20mg/ml CRP into the previous specimens at 1:1 were tested with the CRP Semi-Quantitative Rapid Test Cassette (Whole Blood/Serum/Plasma) occurred at 5 minutes after specimen application. Results were presented in Table below.

**Table: Cross-Reactivity Results**

Treatment	CCRP-C43																	
	CRP15100001-T						CRP15100002-T						CRP15100003-T					
	Negative			10mg/ml			Negative			10mg/ml			Negative			10mg/ml		
HAV+	-*	-	-	+++	+	+	-	-	-	+	+	+	-	-	-	+	+	+
HIV+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
HBV+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
HCV+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
HEV+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
Syphilis+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
HAMA+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
RF+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
MONO+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
Rubella+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
TOXO+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
CMV+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

AFP+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+
CEA+	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	+	+

Note: “\*”mean negative result

**Conclusion:** There is no cross-reaction with HAV+, HBsAg+, HIV+, HCV+, HEV+, Syphilis+, HAMA+, RF+, H.pylori+, MONO+, Rubella+, TOXO+, CMV+ and AFP at 8 minutes.

## 2.4 Whole blood Evaluation

### 2.4.1 Anticoagulant study:

**Method:** To test the samples collected from 10 volunteers with CRP Semi-Quantitative Rapid Test (Serum/plasma/Whole blood) respectively. From each healthy volunteer, 4 kinds anticoagulant are used to collect whole blood samples. Namely K2EDTA treated whole blood, Sodium treated whole blood and Sodium / Lithium heparin treated whole blood was collected respectively. And half of each whole blood was treated by spiking the 20mg/ml into the whole blood samples at 1:1. At the same time, all the whole blood and paired plasma will be tested. One test was run for each sample, and read the result at 5minutes and 8 minutes.

\*Direction for testing:

For serum/plasma/whole blood: transfer 5 µL of the serum or plasma specimens or 1 drop of whole blood (approximately 10µl) into the dilution tube with buffer, and then add 3drops of mixture in sample well after mixing the sample sufficiently.

**Results:**

**Lot1#CRP15100001-T**

Item	Time	K2EDTA	Sodium citrate	Sodium heparin	Lithium heparin
------	------	--------	----------------	----------------	-----------------

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

		Neg.		10mg/ml		Neg.		10mg/ml		Neg.		10mg/ml		Neg.		10mg/ml	
		P	WB	P	WB	P	WB	P	WB	P	WB	P	WB	P	WB	P	WB
1	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
2	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
4	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
5	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
6	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
7	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
8	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
9	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
10	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear

**Lot2# CRP15100002-T**

Item	Time	K <sub>2</sub> EDTA				Sodium citrate				Sodium heparin				Lithium heparin			
		Neg.		10mg/ml		Neg.		10mg/ml		Neg.		10mg/ml		Neg.		10mg/ml	
		P	WB	P	WB	P	WB	P	WB	P	WB	P	WB	P	WB	P	WB
1	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
2	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
4	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
5	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
6	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
7	5mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	20mins	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--	---	---	+--	+--
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

8	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
9	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
10	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear

**Lot3# CRP15100003-T**

Item	Time	K <sub>2</sub> EDTA				Sodium citrate				Sodium heparin				Lithium heparin			
		Neg.		10mg/ml		Neg.		10mg/ml		Neg.		10mg/ml		Neg.		10mg/ml	
		P	WB	P	WB	P	WB	P	WB	P	WB	P	WB	P	WB	P	WB
1	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
2	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear



**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

3	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
4	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
5	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
6	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
7	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
8	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	20mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
9	5mins	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-	---	---	+-	+-

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

	20mins	---	---	++	++	---	---	++	++	---	---	++	++	---	---	++	++
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
10	5mins	---	---	++	++	---	---	++	++	---	---	++	++	---	---	++	++
	20mins	---	---	++	++	---	---	++	++	---	---	++	++	---	---	++	++
	Background	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear

\*Remark: WB means Whole blood.

**Conclusion:** The result showed no difference among different anticoagulant tube to collect whole blood samples in this study

### 2.5 Dose Hook Effect

A CRP strong positive specimen (CRP-P1#:3120mg/l) was diluted to the following concentrations: 1:2, 1:16, 1:64, 1:128, 1:300, 1:600, 1:1000 with the same negative plasma, respectively. The samples were run in triplicate in all lots of material and results were determined visually at 5 and 8 minutes.

### Results

CRP-P1#						
Specimen Dilution	CRP15100001-T		CRP15100002-T		CRP15100003-T	
	5'	8'	5'	8'	5'	8'
	T3/T2/T1	T3/T2/T1	T3/T2/T1	T3/T2/T1	T3/T2/T1	T3/T2/T1
Original	10/10/10	10/10/10	10/10/10	10/10/10	10/10/10	10/10/10

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

1:2	10/10/10	10/10/10	10/10/10	10/10/10	10/10/10	10/10/10
1:16	9/10/10	9/10/10	9/10/10	9/10/10	9/10/10	9/10/10
1:64	1/7/10	1/8/10	1/7/10	1/8/10	1/7/10	1/8/10
1:128	1/1/9	1/2/9.5	1/1/9	1/2/9.5	1/1/9	1/2/9.5
1:300	1/1/7	1/1/8	1/1/7	1/1/8	1/1/7	1/1/8
1:600	1/1/1	1/1/2	1/1/1	1/1/2	1/1/1	1/1/2
1:1000	1/1/1	1/1/1	1/1/1	1/1/1	1/1/1	1/1/1
Negative	1	1	1	1	1	1

**Note:**

According to the color card, 1~3 was considered negative and >3~10 was considered positive.

**Conclusion:**

Results show there is no dose hook effect for the CRP Semi-Quantitative Rapid Test.

### 2.6 Negative Conversion Study

10 clinically proven negative samples were tested in duplicate, in test with and without temperature stressing( storing tests for two days at 4℃, 25℃,45℃ and -20℃ prior to running tests) to evaluate possible conversion to positive results. The operators read the results at 5 and 8 minutes after sample addition.

**Results:**

CRP15100001-T		N1	N2	N3	N7	N12	N25	N67	N77	N80	N95
4℃	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
25℃	5'	-	-	-	-	-	-	-	-	-	-

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

	8'	-	-	-	-	-	-	-	-	-	-
45°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
-20°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
CRP15100002-T		N1	N2	N3	N7	N12	N25	N67	N77	N80	N95
4°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
25°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
45°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
-20°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
CRP15100003-T		N1	N2	N3	N7	N12	N25	N67	N77	N80	N95
4°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
25°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

45°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-
-20°C	5'	-	-	-	-	-	-	-	-	-	-
	8'	-	-	-	-	-	-	-	-	-	-

### Conclusion:

The results were consistent between tests with and without temperatures stress. In this experiment, none of the samples tested converted from negative to positive results in the 5-8 minutes read time.

### 2.7 Between Day Reproducibility

Negative, 10mg/l, 40mg/l and 80mg/l serum and plasma specimens were run individually on ten separate days using the same lots of reagents and cassettes. Results were read visually as positive or negative at 5 and 8 minutes after specimen application. Results are presented in Table below.

**Table: Between Day Reproducibility Results**

**LOT: CRP15100001**

Day			1	2	3	4	5	6	7	8	9	10
Negative	Serum	5mins	.*	-	-	-	-	-	-	-	-	-
		8mins	-	-	-	-	-	-	-	-	-	-
	Plasma	5mins	-	-	-	-	-	-	-	-	-	-
		8mins	-	-	-	-	-	-	-	-	-	-
	Serum	5mins	-	-	-	-	-	-	-	-	-	-
		8mins	-	-	-	-	-	-	-	-	-	-
	Plasma	5mins	-	-	-	-	-	-	-	-	-	-
		8mins	-	-	-	-	-	-	-	-	-	-
	Serum	5mins	-	-	-	-	-	-	-	-	-	-
		8mins	-	-	-	-	-	-	-	-	-	-
	Plasma	5mins	-	-	-	-	-	-	-	-	-	-
		8mins	-	-	-	-	-	-	-	-	-	-

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

<b>10mg/l</b>	<b>Serum</b>	<b>5mins</b>	<b>***</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
		<b>8mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
	<b>Plasma</b>	<b>5mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
		<b>8mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
	<b>Serum</b>	<b>5mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
		<b>8mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
	<b>Plasma</b>	<b>5mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
		<b>8mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
	<b>Serum</b>	<b>5mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
		<b>8mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
	<b>Plasma</b>	<b>5mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
		<b>8mins</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>
<b>40mg/l</b>	<b>Serum</b>	<b>5mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
		<b>8mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
	<b>Plasma</b>	<b>5mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
		<b>8mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
	<b>Serum</b>	<b>5mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
		<b>8mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
	<b>Plasma</b>	<b>5mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
		<b>8mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
	<b>Serum</b>	<b>5mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
		<b>8mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
	<b>Plasma</b>	<b>5mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
		<b>8mins</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
<b>80mg/l</b>	<b>Serum</b>	<b>5mins</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>	<b>+++</b>

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

		8mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
	plasma	5mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
		8mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
	Serum	5mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
		8mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
	plasma	5mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
		8mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
	Serum	5mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
		8mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
	plasma	5mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
		8mins	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++

Note: “\*” mean negative result,

“\*\*\*” mean positive result

“+” mean only T1 line appears

“++” mean only T1 and T2 appear

“+++” mean T1, T2 and T3 appear

**Conclusion:** Test results showed that the performances were consistent over the ten days period.

## 2.8 Between Lot Reproducibility

Negative, 10mg/l, 40mg/l and 80mg/l CRP positive specimens were run in replicates of ten in three separate lots of products. Results were read as positive or negative at 5 and 8 minutes after specimen application. Results were presented in Table below.

**Table: Between Lot Reproducibility Results**

Lot: CRP15100001-T								
Specimen s	Negative		10mg/l		40mg/l		80mg/l	
	5'	8'	5'	8'	5'	8'	5'	8'
1	-*	-	+**	+	++	++	+++	+++
2	-	-	+	+	++	++	+++	+++
3	-	-	+	+	++	++	+++	+++
4	-	-	+	+	++	++	+++	+++
5	-	-	+	+	++	++	+++	+++
6	-	-	+	+	++	++	+++	+++
7	-	-	+	+	++	++	+++	+++
8	-	-	+	+	++	++	+++	+++



**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

9	-	-	+	+	++	++	+++	+++
10	-	-	+	+	++	++	+++	+++
Lot: CRP15100002-T								
Specimens	Negative		10mg/l		40mg/l		80mg/l	
	5'	8'	5'	8'	5'	8'	5'	8'
1	-	-	+	+	++	++	+++	+++
2	-	-	+	+	++	++	+++	+++
3	-	-	+	+	++	++	+++	+++
4	-	-	+	+	++	++	+++	+++
5	-	-	+	+	++	++	+++	+++
6	-	-	+	+	++	++	+++	+++
7	-	-	+	+	++	++	+++	+++
8	-	-	+	+	++	++	+++	+++
9	-	-	+	+	++	++	+++	+++
10	-	-	+	+	++	++	+++	+++
Lot: CRP15100003-T								
Specimens	Negative		10mg/l		40mg/l		80mg/l	
	5'	8'	5'	8'	5'	8'	5'	8'
1	-	-	+	+	++	++	+++	+++

---

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

---

2	-	-	+	+	++	++	+++	+++
3	-	-	+	+	++	++	+++	+++
4	-	-	+	+	++	++	+++	+++
5	-	-	+	+	++	++	+++	+++
6	-	-	+	+	++	++	+++	+++
7	-	-	+	+	++	++	+++	+++
8	-	-	+	+	++	++	+++	+++
9	-	-	+	+	++	++	+++	+++
10	-	-	+	+	++	++	+++	+++

Note: “\*” mean negative result

“\*\*” mean positive result:

“+” mean only T1 line appears

“++” mean only T1 and T2 appear

“+++” mean T1, T2 and T3 appear

**Conclusion:** Test results showed that the performances were consistent between the three lots of test cassettes.

## 2.9 Accelerate Stability Study

Accelerated Stability of the CRP Semi-Quantitative Rapid Test Cassette (Whole Blood/Serum/Plasma) was evaluated using samples from three different batches. These were placed in an incubator with the temperature calibrated at 55°C. Relative humidity (RH) calibrated at about 60%. Some performance study would be tested at 0, 7, 14, 21, 28, 35, 42 days according to Arrhenius Plot for 55°C,. See Table in below. Test cassettes were assayed using negative, 3mg/l, 10mg/l, 40mg/l and 80mg/l CRP positive standard sample. Testing at each specific time interval consisted of 3 replicates for each specimen. The tests were performed according to the package insert. Results are presented in Table below.

### Arrhenius Formula:

$$\ln K = -E_a/RT + \ln A$$

“K” mean Rate constant

“R” mean Gas constant

“A” mean Arrhenius constant

“E<sub>a</sub>” mean Activation energy

“T” mean Temperature in Kelvin

**Table: Time line for Accelerate Stability Study**

Day Temp.	0day	7days	14 days	21 days	28 days	35 days	42 days	56 days	77 days	84 days
55°C	√	√	√	√	√	√	√			

**Table: 55°C Accelerated Stability Summary**

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

Day	Specimen	Lot		
		CRP15100001-T	CRP15100002-T	CRP15100003-T
0	Negative	3-	3-	3-
	3mg/l	3-	3-	3-
	10mg/l	3+	3+	3+
	40mg/l	3++	3++	3++
	80mg/	3+++	3+++	3+++
7	Negative	3-	3-	3-
	3mg/l	3-	3-	3-
	10mg/l	3+	3+	3+
	40mg/l	3++	3++	3++
	80mg/	3+++	3+++	3+++
14	Negative	3-	3-	3-
	3mg/l	3-	3-	3-
	10mg/l	3+	3+	3+
	40mg/l	3++	3++	3++
	80mg/	3+++	3+++	3+++
21	Negative	3-	3-	3-
	3mg/l	3-	3-	3-

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

	10mg/l	3+	3+	3+
	40mg/l	3++	3++	3++
	80mg/	3+++	3+++	3+++
28	Negative	3-	3-	3-
	3mg/l	3-	3-	3-
	10mg/l	3+	3+	3+
	40mg/l	3++	3++	3++
	80mg/	3+++	3+++	3+++
35	Negative	3-	3-	3-
	3mg/l	3-	3-	3-
	10mg/l	3+	3+	3+
	40mg/l	3++	3++	3++
	80mg/	3+++	3+++	3+++
42	Negative	3-	3-	3-
	3mg/l	3-	3-	3-
	10mg/l	3+	3+	3+
	40mg/l	3++	3++	3++
	80mg/	3+++	3+++	3+++

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

**Note:** “\*” mean all the three results were negative

“\*\*” mean all the three results were positive:

“+” mean only T1 line appears

“++” mean only T1 and T2 appear

“+++” mean T1, T2 and T3 appear



**Conclusion:** CRP Semi-Quantitative Rapid Test Cassette (Whole Blood/Serum/Plasma) was stable at 55°C for 42 days. These data were plotted on an Arrhenius Plot and the shelf life of this product was determined to be at least 24 months from the data of manufacture.

### 2.10 Specimen stability study

#### Method:

Stability of the collected serum/plasma specimens was evaluated with CRP Semi-Quantitative Rapid Test. These serum/plasma specimens were placed in a refrigerator with the temperature at 2~8°C. and -20°C. A series of stability tests were performed at 0, 1, 2, 3, 4, 5, 6, 7days @2~8°C, and 0day, 7days, 14days, 21days, 28days, 2moths, 3months, 6months @-20°C. Test Cassettes were assayed using negative, low titer, middle titer and high titer positive specimens. Testing at each specific time interval consisted of triplicates for each specimen. The tests were performed according to the directions for use.

#### Results:

To be performed the tests with serum/Plasma specimens to be stored at different condition, respectively.

1.Stability results at2~8 °C																								
Day Specimen	0			1 day			2days			3days			4days			5days			6days			7days		
NS-021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	
NS-025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	-	
NS-101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NS-102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	-	

# **CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

																		/+						
NS-115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NS-150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-- /+	- /+	-	-	FP	-
NP-001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	- /+	-	-	-
NP-002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	- /+	-	-	-	-
NP-003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	FP	-	-
NP-004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NP-005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	- /+	-	-	- /+	-	-	-	FP	-
10mg/l	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	- /+	+	+	- /+	+	- /+	- /+
40mg/l	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
80mg/l	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Comment: “-“ means negative results;

“+” means positive results;

“-/+” means questionable results;

”FP” means false positive results.

1. Stability results at -20 °C																								
Da y Specime n	0			7 day			14days			21days			28days			2moths			3months			6months		
NS-021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

---

NS-025	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NS-101	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NS-102	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NS-115	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NS-150	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NP-001	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NP-002	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NP-003	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NP-004	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
NP-005	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
10mg/l	+	+	+	+	+	+	+	+	+	+	+	+	+	+										
40mg/l	+	+	+	+	+	+	+	+	+	+	+	+	+	+										
80mg/l	+	+	+	+	+	+	+	+	+	+	+	+	+	+										

Comment: “-“means negative results;

“+”means positive results;

Conclusion:

According to above stability study results, there are correctly results for CRP Semi-Quantitative Rapid Test to be performed with serum and/or plasma specimens to be stored at 2-8°C for up to 3 days, respectively. The test stored at -20°C will continue until September 2016.



### 2.11 Clinical Data

The specimen correlation used a specimen number (n) equal to 271 (All the samples were collected from the Chinese hospital, which were confirmed using Elisa kit: Clinical CRP positive serum/plasma specimens from Chinese hospital: 169; Clinical CRP negative serum/plasma specimens from Chinese hospital: 102), Specimens were rated as either positive or negative at 5 minutes. Do not interpret the results after 8 minutes. Results were presented in table below.

Method		EIA				Total
		Negative	Positive			
CRP Semi-Quantitative Rapid Test Cassette	Result	0-10 mg/l	10-40 mg/l	40-80 mg/l	≥80 mg/l	
	0-10mg/l	99	1	0	0	100
	10-40mg/l	3	52	1	0	56
	40-80mg/l	0	3	25	5	33
	≥80mg/l	0	0	3	79	82
Total		102	56	29	84	271

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

% Relative Accuracy	97.1%	92.9%	86.2%	94.0%	98.5%
		99.4%			

Relative sensitivity:  $168/169=99.4\%$  (CI\*: 96.7%~100%)

Relative specificity:  $99/(99+3)=97.1\%$  (CI\*: 93.9%~98.1%)

Relative Accuracy:  $(99+168)/(99+3+169)=98.5\%$  (CI\*: 91.6%~99.4%) \*95% Confidence Interval

### Conclusion:

The sample correlation results show that the relative sensitivity of the CRP Semi-Quantitative Rapid Test cassette (Whole Blood/Serum/Plasma) is 99.4%, and the relative specificity is 97.1% and the overall accuracy is 98.5% to be compared with a commercial available EIA result..

### 2.12Read time flex

Negative, CRP 10mg/l positive, CRP 40mg/l positive and CRP 80mg/l positive standards had been tested according to the directions for use in replicates of 3. The test was rated as positive or negative at 3, 5, 10, 15, 20, 30minutes, 1 hour, 2 hours, 8 hours, and 24 hours.

### Results:

Time	Lot 1:CRP15100001-T				Lot 2: CRP15100002-T				Lot3: CRP15100003-T			
	Neg.	10mg/l	40mg/l	80mg/l	Neg.	10mg/l	40mg/l	80mg/l	Neg.	10mg/l	40mg/l	80mg/l
3min	-	+	++	++-	-	+	++	++-	-	+	++	++-
5min	-	+	++	+++	-	+	++	+++	-	+	++	+++

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

8min	-	+	++	+++	-	+	++	+++	-	+	++	+++
15min	-	++	+++	+++	-	++	+++	+++	-	++	+++	+++
20min	-	++	+++	+++	-	++	+++	+++	-	++	+++	+++
30min	-	+++	+++	+++	-	+++	+++	+++	-	+++	+++	+++
1 h	+	+++	+++	+++	+	+++	+++	+++	+	+++	+++	+++
2hs	+	+++	+++	+++	+	+++	+++	+++	+	+++	+++	+++
8hs	+	+++	+++	+++	+	+++	+++	+++	+	+++	+++	+++
24hs	+	+++	+++	+++	+	+++	+++	+++	+	+++	+++	+++

Note: '-' means the negative result,

'+' means the positive result:

"+" mean only T1 line appears

"++" mean only T1 and T2 appear

"+++" mean T1, T2 and T3 appear

### Conclusion:

This study demonstrated the ability of the assay to give correct results with the prescribed read time of 5-8 minutes. For the samples tested, the result remained consistent over a 8min period.

### 2.13 Sample Flex

Negative, CRP 10 mg/l positive CRP 40 mg/l positive and CRP 80 mg/l positive standards were run in replicates of 3 using sample level at 5ul, 10ul, 25ul, 40ul of sample into 4, 5 and 6 drops of whole blood buffer and add 1, 2, 3, 4 drops of solution. All results were read as positive or negative at 5 minutes after sample application. (1drop of buffer is about 40ul, 1 drop of solution is about 40ul)

# CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

## For Serum/Plasma:

Volume (Sample)	Volume (solution)	Neg (S/P) (T1)	CRP 10mg/L (S/P) (T1/T2/T3)			CRP 40mg/L (S/P) (T1/T2/T3)			CRP 80mg/L (S/P) (T1/T2/T3)		
5ul	1 drop	-	-	-	-	-	-	-	+++	+++	+++
	2 drops	-	++	++	++	+++	+++	+++	+++	+++	+++
	3 drops	-	++	++	++	+++	+++	+++	+++	+++	+++
	4 drops	-/+	+++	+++	+++	+++	+++	+++	+++	+++	+++
10ul	1 drop	-	-	-	-	++	++	++	++	++	++
	2 drops	-	++	++	++	+++	+++	+++	+++	+++	+++
	3 drops	-/+	+++	+++	+++	+++	+++	+++	+++	+++	+++
	4 drops	-/+	+++	+++	+++	+++	+++	+++	+++	+++	+++
25ul	1 drop	-/+	+++	+++	+++	+++	+++	+++	+++	+++	+++
	2 drops	+	+++	+++	+++	+++	+++	+++	+++	+++	+++
	3 drops	+	+++	+++	+++	+++	+++	+++	+++	+++	+++
	4 drops	+	+++	+++	+++	+++	+++	+++	+++	+++	+++

Remark: '-' means the negative result, '+' means the positive result.

"+" mean only T1 line appears

"++" mean only T1 and T2 appear

"+++" mean T1, T2 and T3 appear

"/" represented that the solution was not enough;

# CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

⊕ ⊕⊕ ⊕⊕⊕ represented that the flooding occurred in the test.

## For Whole Blood:

Volume (Sample + Buffer)	Volume (solution)	CRP15100001-T									
		Neg (WB) (T1)	CRP 10mg/L (whole blood) (T1/T2/T3)			CRP 40mg/L (whole blood) (T1/T2/T3)			CRP 80mg/L (whole blood) (T1/T2/T3)		
5ul	1 drop	-	-	-	-	-	-	-	+-	+-	+-
	2 drops	-	+-	+-	+-	+-	+-	+-	++	++	++
	3 drops	-	++	++	++	++	++	++	++	++	++
	4 drops	⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕
10ul	1 drop	-	-	-	-	+-	+-	+-	+-	+-	+-
	2 drops	-	+-	+-	+-	++	++	++	++	++	++
	3 drops	⊕	++	++	++	++	++	++	+++	+++	+++
	4 drops	⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕
25ul	1 drop	⊕	++	++	++	++	++	++	+++	+++	+++
	2 drops	+	+++	+++	+++	+++	+++	+++	+++	+++	+++
	3 drops	+	+++	+++	+++	+++	+++	+++	+++	+++	+++
	4 drops	⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕	⊕⊕⊕

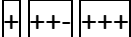
Remark: '-' means the negative result, '+' means the positive result.

"+" mean only T1 line appears

“++”mean only T1 and T2 appear

“+++”mean T1, T2 and T3 appear

“/” represented that the solution was not enough;

 represented that the flooding occurred in the test.

### **Conclusion:**

For serum/Plasma: These data indicated the ability of the test to yield a correct result using 5ul sample into 1ml whole blood buffer and adding 3 drops of the solution, thus allowing a comfort zone for sample application.

For Whole Blood: These data indicated the ability of the test to yield a correct result using 10ul sample into 1ml whole blood buffer and adding 3 drops of the solution, thus allowing a comfort zone for sample application.

### **2.14 Temperature flex**

The required amount of test cassette (20 tests each lot at each temperature), negative and positive standards were stored at 4°C, 25°C, 30°C, 37°C, -20°C for one hour to equilibrate. The products were tested according to the direction for use, except the products were run at each equilibrated temperature. Each condition was run in replicates of 3. The tests were rated as positive or negative at the 5 and 8 minutes.

### **Results:**

Treatment temperature(°C)	Lot#: CRP15100001-T							
	Negative		CRP 10mg/L		CRP 40 mg/L		CRP 80 mg/L	
	5min	8min	5min	8min	5min	8min	5min	8min

**CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)**

4°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
25°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
30°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
37°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
-20°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
Treatment temperature(°C)	Lot#: CRP15100002-T							
	Negative		CRP 10mg/L		CRP 40 mg/L		CRP 80 mg/L	
	5min	8min	5min	8min	5min	8min	5min	8min
4°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
25°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
30°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
37°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
-20°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
Treatment temperature(°C)	Lot#: CRP15100003-T							
	Negative		CRP 10mg/L		CRP 40 mg/L		CRP 80 mg/L	
	5min	8min	5min	8min	5min	8min	5min	8min
4°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
25°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
30°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
37°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++

## CRP SEMI-QUANTITATIVE RAPID TEST (WHOLE BLOOD/SERUM/PLASMA)

-20°C	3/3 -	3/3 -	3/3 +	3/3 +	3/3 ++	3/3 ++	3/3+++	3/3+++
-------	-------	-------	-------	-------	--------	--------	--------	--------

### Conclusion:

The product can yield correct results when tested with the samples stored from 4°C to 37°C and -20°C for one hour. It can accommodate a wide fluctuation of test temperature.

### 3. Bibliography

1. Morley JJ, Kushner (1982) Serum C-reactive protein levels in disease. In: Kushner I, Volanakis JE, Gewurz H, eds. C-reactive protein and the plasma protein response to tissue injury. Ann. NY Acad. Sci. 389: 406-417.
2. Peltola HO (1982) C-reactive protein for rapid monitoring of infections of the central nervous system. Lancet: 980-983.
3. Macy EM, Hayes TE and Tracy RP (1997) Variability in the measurement of C-reactive protein in healthy subjects: implications for reference intervals and epidemiological applications. Clin. Chem. 43, 52-58.

