Brown Clinic Northridge
511 14th Ave. NE
Watertown, SD

Brown Clinic
506 First Ave. SE
Watertown, SD

BROWN CLINIC
LABORATORY PROCEDURE MANUAL

PROCEDURE: C-Reactive Protein

PURPOSE:
The C-Reactive Protein Flex® reagent cartridge used on the Dimension® clinical chemistry system is an *in vitro* diagnostic test intended for the quantitative determination of CRP in **serum** and **plasma**.

PRINCIPLE:
C-Reactive Protein is one of the "acute phase" proteins, the serum or plasma levels of which rise during a general, unspecific response to infections, tissue injury and non-infectious inflammatory processes such as rheumatoid arthritis, cardiovascular disease and peripheral vascular disease. CRP is synthesized in liver and is normally present as a trace constituent of serum or plasma. In various disease states resulting in tissue injury, infection or inflammation, CRP values may rise above normal to 2 to 50 mg/dL within four to eight hours after an acute event.[1] Since elevated CRP values are always associated with pathological changes, the CRP assay provides useful information for the diagnosis, therapy, and monitoring of inflammatory diseases.[2,3,4] Increases in CRP values are non-specific and should not be interpreted without a complete clinical history. When using CRP to assess risk of cardiovascular and peripheral vascular disease, measurements should be compared to previous values. Measurement of CRP by high sensitivity assays may add to the predictive value of other markers used to assess the risk of cardiovascular and peripheral vascular disease.[5-11]

The CRP method is based on a particle enhanced turbidimetric immunoassay (PETIA) technique. Synthetic particles coated with antibody to C-Reactive Protein (AbPR) aggregate in the presence of C-Reactive Protein in the sample. The increase in turbidity which accompanies aggregation is proportional to the C-Reactive Protein concentration. The concentration is determined by means of a mathematical function.

$$\text{CRP} + \text{AbPR} \longrightarrow \text{Aggregate (absorbs at 340 nm)}$$

INSTRUMENT, REAGENTS & SUPPLIES:
Reagents

Wells[a]	Form	Ingredient	Concentration[b]	Source
1-3	Liquid	Anti-CRP coated particle[c] Buffer Microbial inhibitors		Goat
4-6	Liquid	Buffer Microbial inhibitors		
7,8	Liquid	Buffer		

Polyethylene Glycol (PEG) 1.3 mmol/L
Microbial Inhibitors

a. Wells are numbered consecutively from the wide end of the cartridge.
b. Nominal value per test at manufacture.
c. Particle concentration may vary from lot to lot.

Precautions: Used cuvettes contain human body fluids; handle with appropriate care to avoid skin contact and ingestion.

Irritant: contains Mixture of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-2-one (3:1)

May cause sensitization by skin contact
Avoid contact with skin
Wear suitable gloves

Safety Data Sheets (SDS/MSDS) can be found at www.siemens.com/healthcare
For *in vitro* diagnostic use

Reagent Preparation: All reagents are liquid and ready to use.

REAGENT STORAGE & STABILITY:

Store at 2 - 8°C.

Expiration: Refer to carton for expiration date of individual unopened reagent cartridges. Sealed cartridge wells on the instrument are stable for 30 days. Once wells 1–6 have been entered by the instrument, they are stable for 72 hours. Wells 7-8 are stable for 30 days.

SPECIMEN REQUIREMENTS:

Serum and plasma can be collected using recommended procedures for collection of diagnostic blood specimens by venipuncture.

Follow the instructions provided with your specimen collection device for use and processing

Complete clot formation should take place before centrifugation.

Repeat freeze and thaw cycles should be avoided.

Samples should be free of particulate matter.

Very lipemic or frozen samples which become turbid after thawing, must be clarified by centrifugation before testing.

EDTA, Lithium Heparin, potassium oxalate and sodium fluoride concentrations in blood collection tubes do not interfere with this method.

Each laboratory should determine the acceptability of its own blood collection tubes and serum separation products. Variations in these products may exist between manufacturers and, at times, from lot to lot.

Specimen:

- patient preparation: no patient preparation required
- specimen type: serum or heparinized plasma
- stability: Separated samples are stable for eight hours at room temperature
  Refrigerated samples are stable up to 72 hours.
  Samples stored at -20 degrees C are stable up to 6 months if frozen with 24 hours of collection

CONTROLS:
At least once daily run solutions at two levels of a quality control material with known concentrations.

For further details, refer to your Dimension® system manual. The result obtained should fall within limits defined by the day-to-day variability of the system as measured in the user's laboratory. If the results fall outside the laboratory's acceptable limits, follow the procedure in the quality control policy.

PROCEDURE:

Materials Needed:

CRP Flex® reagent cartridge, Cat. No. DF37

Materials Needed but not Provided:

CRP Calibrator, Cat. No. DC30

Quality Control Material

Test Steps

Sampling, reagent delivery, mixing, separation, processing and printing of results are automatically performed by the Dimension® system. For details of this processing, refer to your Dimension® system manual.

Test Conditions

Sample Size:	3 µL
Reagent 1 Volume:	284 µL
Reagent 2 Volume:	107 µL
Reagent 3 volume:	20 µL
Diluent Volume:	66µL
Test Temperature:	37°C
Wavelength:	340 and 700 nm
Type of Measurement:	bichromatic rate

Calibration

The general calibration procedure is described in your Dimension® system manual (see also Appendix B). The following information should be considered when calibrating the CRP method:

Assay Range:	0.2-12.00 mg/dL [2-120 mg/L]
Reference Material:	CRP Calibrator (Cat. No. DC30)
Calibration Levels:	0.5, 2.0, 4.0, 7.00, 11.00 mg/dL [5, 20, 40, 70, 110 mg/L]
Calibration Scheme:	Five levels in duplicate
Calibration Frequency:	Every new reagent cartridge lot Every 60 days for any one lot For each new lot of Flex reagent cartridges After major maintenance or service, if indicated by quality control results As indicated in laboratory quality control procedures When required by government regulations
Assigned Coefficients:	C0 = -48.3 C1 = 541.6 C2 = -3.4 C3 = 28.0 C4 = 0.5

Back-up Testing :

Refer to Brown Clinic Backup Policy

INTERPRETATION:
Results of this test should always be interpreted in conjunction with the patient's medical history, clinical presentation and other findings.

EXPECTED VALUES:
Expected values for healthy individuals as noted in the literature are typically less than or equal to 0.9 mg/dL [9 mg/L].[9,10]

As CRP is a nonspecific indicator for a wide range of disease processes and as the reference intervals are affected by many factors that may differ for each population studied, each laboratory should establish its own reference interval for CRP as performed on the Dimension® clinical chemistry system.

REPORTING:
The instrument automatically calculates and prints the concentration of CRP in mg/dL [mg/L] using the calculation scheme illustrated in your Dimension® system manual.

LIMITATIONS:
The CRP method will flag samples with CRP greater than 12 mg/dL [120 mg/L] with an error code and these samples should be repeated with dilution.

Manual dilutions: Make appropriate dilutions with Purified Water or Level 1 Calibrator to obtain result within the assay range. Enter dilution factor. Reassay. Resulting readout is corrected for dilution.

Autodilution (AD):Refer to your Dimension® Operator's Guide

C-reactive protein results less than 0.2 mg/dL [2 mg/L] should be reported as "less than 0.2 mg/dL [2 mg/L]" instead of the numerical value.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up. Refer to your Dimension® system manual.

Analytical Specificity

For Known Interfering Substances section refer to package insert.

For Known Non-Interfering Substance refer to package insert.

For Additional Technical Information refer to package insert.

Reference: CRP Flex® reagent cartridge insert sheet PN 717179.001 Issue Date 3-9-2015

Origination Date: 9-10-07
Date of Implementation: 9-10-10
****
Written By: ____Lori Murray MT(ASCP)_____ Date: _7-13-10_____

Approved By: _____Aaron Shives, MD_____ Date: ___10/21/2017_____
Laboratory Director

REVIEW - REVISION SUMMARY DOCUMENTATION

Date	By	Revision Summary
07/10	Lori Murray	New format
5/1/15	Heather Hall	Updated information to package insert dated 2-13-2009
1-15-16	Sam Legg	Updated Risk and Safety per package insert dated 3-9-15
10/17/17	Heather Hall	Modified backup process