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

A. 510(k) Number:
k040579

B. Purpose for Submission:
Seeking 510(K) clearance for a new device

C. Analyte:
C-reactive protein

D. Type of Test:
Quantitative

E. Applicant:
CHOLESTECH CORP.

F. Proprietary and Established Names:
CHOLETECH LDX HIGH-SENSITIVITY C-REACTIVE PROTEIN (HS-CRP)

G. Regulatory Information:

1. Regulation section:
   21CFR §866.5270 -C-reactive protein immunological test system.
2. Classification:
   Class 2
3. Product Code:
   DCK
4. Panel:
   Immunology (82)

H. Intended Use:

1. Indication(s) for use:
   Cholestech LDX high sensitivity C-Reactive Protein (hs-CRP) is an in vitro diagnostic test for the Quantitative determination of CRP in whole blood or serum.
   Measurement of CRP is useful as an aid in the detection and evaluation of infection, tissue injury, inflammatory disorders and associated diseases.
2. Special condition for use statement(s):
   Prescription Use
3. Special instrument Requirements:
   Cholestech LDX Analyzer (k901900)

I. Device Description:

The Cholestech LDX System is a desk-top analyzer that utilizes dry chemistry cassettes and reflectance photometry to quantify substances in blood. Samples used for testing can be whole blood from a fingerstick (collected in a lithium heparin coated capillary tube), serum, or anticoagulated whole blood collected by venipuncture. The 50 µl sample is applied to a Cholestech LDX hs-CRP cassette. The cassette is then placed into the Cholestech LDX Analyzer where a unique system on the cassette separates the plasma from the blood cells. Plasma is then incubated with a colloidal gold anti-CRP conjugate. A lateral flow system transfers the gold conjugate through an anti-CRP antibody capture zone. Gold conjugate containing CRP is captured by the antibody while the rest of the gold conjugate is washed away. The signal in the capture zone is measured by the Cholestech LDX Analyzer. A brown (magnetic) stripe on each cassette contains the calibration information required for the Cholestech LDX Analyzer to convert the reflectance reading (% R) to hs-CRP concentration in mg/L.

J. Substantial Equivalence Information:

1. Predicate device name(s):
   Dade Behring N High Sensitivity CRP
2. Predicate K number(s):
   k991385
3. Comparison with predicate:

Cholestech LDX hs-CRP vs Dade Behring BN100 high sensitivity CRP		
Item	**Device**	**Predicate**
Indications for Use	Reactive Protein (hs-CRP) test is an in vitro diagnostic test for the quantitative determination of C-reactive protein (CRP) in whole blood or serum. Measurement of CRP is useful as an aid in the detection and evaluation of infection, tissue injury, inflammatory disorders and associated diseases.	N High Sensitivity CRP is an in vitro diagnostic assay intended for the quantitative determination of C-reactive protein (CRP) in human serum and heparin- and EDTA plasma by means of particle enhanced immunonephelometry using BN Systems. In acute phase response, increased levels of a number of plasma proteins, including C-reactive protein, are observed. Measurement of CRP is useful for the detection and evaluation of infection, tissue injury, inflammatory disorders and associated diseases
Instrument Required	LDX Analyzer	Dade Behring BN-100 Nephelometer
Technology	Lateral flow immunoassay utilizing colloidal gold particles coated with monoclonal	Agglutination of polystyrene particles coated with monoclonal antibodies detected by nephelometry

	antibodies detected by reflectance spectrophotometry.	
Assay Range	0.2 to 10 mg/L	0.175 to 11 mg/L up to 1100 mg/dL with sample dilution
Sample Type	Whole blood (capillary and venous) and serum	Serum or plasma

Cholestech LDX hs-CRP vs Dade Behring BN100 high sensitivity CRP		
Item	**Device**	**Predicate**
Calibration Requirements	No calibration performed by the user test information is encoded the magnetic stripe of the cassette and the stripe is read by the LDX Analyzer each time a cassette is run	Calibration required via the use of the N CRP Standard SY; under typical operating conditions, the HS-CRP reagents must be calibrated every 4 weeks, and also with certain parts replacement or maintenance procedures
Testing Environment	Professional-Use, point-of-care	Professional-Use, conventional laboratory

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

NCCLS protocol EP5-A, Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline (1998)

L. Test Principle:

Lateral flow immunoassay utilizing colloidal gold particles coated with monoclonal antibodies detected by reflectance spectrophotometry

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

A study was conducted according to NCCLS protocol EP5-A, Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline (1998).

hs-CRP

	Control Material Level 1	Control Material Level 2	Serum Pool
X (mg/L) =	1.20	2.94	6.51
Within run %CV=	12.1%	11.7%	8.7%
Total %CV=	14.3%	11.5%	11.4%

Whole Blood
Within-run Precision

	Level 1	Level 2	Level 3	Level 4
X (mg/L)	= 0.60	1.22	2.89	4.85
SD (mg/L)	= 0.09	0.21	0.33	0.32
%CV	= 15.2%	17.4%	11.5%	6.6%

b. Linearity/assay reportable range:
The reportable range for hs-CRP using whole blood or capillary blood from fingerstick is 0.3-10 mg/L. Results outside this range will appear as <0.3 or >10. The reportable range for hs-CRP using serum is 0.3-8 mg/L. Results outside this range will appear as <0.3 or >8. The reportable ranges are based on Linearity Studies and Deming regression correlation adjustments for sample matrix.

c. Traceability (controls, calibrators, or method):
Calibration is traceable to the predicate device. The calibration curve is encoded on the brown magnetic stripe of the cassette. The magnetic stripe is read by the Cholestech LDX each time a cassette is run.

d. Detection limit:
The limit of detection (0.3 mg/L) is based on the functional sensitivity of the assay which is defined as the concentration of CRP that results in a 20% Coefficient of Variation (CV).

e. Analytical specificity:
The substances listed below were tested for interference with the hs-CRP test. Less than 10% interference was seen at the levels shown.

Substance Concentration	(mg/dL)
Triglycerides	3000
Bilirubin (unconjugated)	20
Ditauro Bilirubin	20
Hemoglobin	120
Lactate	100
Glucose	1200
Ascorbic Acid	3
Uric Acid	20
Urea	500
Creatinine	30
Potassium	10 mmol/L
Protein (total)	9 g/dL
Protein (albumin)	7 g/dL
Protein (gamma globulin)	6 g/dL

f. Assay cut-off:
Not Applicable

2. <u>Comparison studies:</u>

a. Method comparison with predicate device:

A comparison with a nephelometric method using 72 samples was performed. The following linear regression equation was obtained:

X = Nephelometric Reference Method (serum)
Y = Cholestech LDX Analyzer

Sample Type LDX	No. of Pairs	Slope	y Intercept	Correlation coefficient	Range of Values
Serum	72	1.02	0.21	0.976	0.17-7.18

b. Matrix comparison:
Comparison studies between serum and venous whole blood and between serum and fingerstick whole blood, using 78 samples, were performed. The following linear regressions were obtained:

Sample Type LDX	No. of Pairs	Slope	y Intercept	Correlation coefficient	Range of Values
Venous Whole Blood	78	1.06	0.07	0.977	0.17-8.75
Fingerstick	78	1.08	0.00	0.982	0.17-8.75

3. Clinical studies:
   a. Clinical sensitivity:
   Not Applicable
   b. Clinical specificity:
   Not Applicable
   c. Other clinical supportive data (when a and b are not applicable):
   Not Applicable
4. Clinical cut-off:
   Not Applicable
5. Expected values/Reference range:
   From published literature
   Hs-CRP values range between 0.3 and 8.6 mg/L in healthy men and between 0.2 and 9.1 mg/L in healthy women who are not taking hormone replacement therapy. [1] Hs-CRP values > 8 mg/L observed in an apparently healthy individual should be repeated in order to help rule out a recent response to undetected infection or tissue injury. [2]

N. Conclusion:

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

[1] Clinical Chemistry 2003; 49:8, 1258-71
[2] Circulation 2003; 107(3), 499-511