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

A. 510(k) Number:

k051962

B. Purpose for Submission:

Notification of intent to manufacture and market the device: Ultra HDL

C. Measurand:

High Density Lipoprotein - Cholesterol

D. Type of Test:

Quantitative, Colorimetric

E. Applicant:

Abbott Laboratories

F. Proprietary and Established Names:

ULTRA HDL Cholesterol reagent

G. Regulatory Information:

1. Regulation section:

   21 CFR 862.1475 Lipoprotein test system

2. Classification:

   Class I, meets the limitations of exemptions 21 CFR 862.9 (c) (4). The device is an in vitro device that is intended for assessing the risk of cardiovascular disease.

3. Product code:

   LBS

4. Panel:

75, Clinical Chemistry

H. Intended Use:

1. Intended use(s):

   Please see indications for use below.

2. Indication(s) for use:

   The Ultra HDL assay is used for the quantitation of high-density lipoprotein cholesterol levels in human serum or plasma. Low HDL measurements are used in the diagnosis and treatment of coronary artery disease.

3. Special conditions for use statement(s):

   For prescription use only

4. Special instrument requirements:

   The Abbott Laboratories Ultra HDL is designed for use on the Abbott AEROSET® and ARCHITECT® c8000® instruments.

I. Device Description:

The Abbott Laboratories Ultra HDL is a homogenous method for directly measuring HDL cholesterol concentration in serum or plasma without the need of any off line pretreatment or centrifugation steps. The method uses a two reagent format and depends on the properties of a unique detergent.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   Genzyme N-genuous Ultra HDL Cholesterol Assay

2. Predicate 510(k) number(s):

   k021316

3. Comparison with predicate:

Comparison of Ultra HDL to Genzyme N-geneous Ultra HDL Cholesterol assay on the Hitachi® 717 Analyzer

Assay Characteristics	Ultra HDL	Genzyme N-geneous Ultra HDL Cholesterol Assay on the Hitachi 717 Analyzer (K021316)
Analyte Measured	HDL	Same
Intended Use	The Ultra HDL assay is used for the quantitation of high-density lipoprotein cholesterol in human serum or plasma.	Same
Assay Principle	The Ultra HDL assay is a homogeneous method for directly measuring HDL cholesterol concentrations in serum or plasma without the need for any off-line pretreatment or centrifugation steps. The method uses a two-reagent format and depends on the properties of a unique detergent. This method is based on accelerating the reaction of cholesterol oxidase (CO) with non-HDL unesterified cholesterol and dissolving HDL cholesterol selectively using a specific detergent. In the first reagent, non-HDL unesterified cholesterol is subject to an enzyme reaction and the peroxide generated is consumed by a peroxidase reaction with DSBmT yielding a colorless product. The second reagent consists of a detergent (capable of solubilizing HDL cholesterol), cholesterol esterase (CE), and chromagenic coupler to develop color for the quantitative determination of HDL cholesterol.	Same
Detection of Analyte	Endpoint	Same
Samples	Serum or plasma	Same
Assay Range	5 mg/dL to 180 mg/dL	2.5 mg/dL to 200 mg/dL
Analysis Medium	Aqueous solution	Same
Use of Calibrators	Yes	Yes
Use of Controls	Yes	Yes

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

The following documents were referenced in this submission as CLSI standards used by the company to prepare this submission. EP9-A2 *Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline - Second Edition,* EP06-A2 *Evaluation of the Linearity of Quantitative Analytical Methods; Approved Guideline*, EP05-A2 *Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline-Second Edition***,** EP17-A *Protocols for Determination of Limits of Detection and Limits of Quantitation; Approved Guideline*

L. Test Principle:

The method uses a two-reagent format and depends on the properties of a unique detergent. This method is based on accelerating the reaction of cholesterol oxidase (CO) with non-HDL unesterified cholesterol and dissolving HDL cholesterol selectively using a specific detergent. In the first reagent, non-HDL unesterified cholesterol is subject to an enzyme reaction and the peroxide generated is consumed by a peroxidase reaction with DSBmT yielding a colorless product. The second reagent consists of a detergent (capable of solubilizing HDL cholesterol), cholesterol esterase (CE), and chromagenic coupler to develop color for the quantitative determination of HDL cholesterol.

M. Performance Characteristics (if/when applicable):

1. <u>Analytical performance:</u>

   a. *Precision/Reproducibility:*

   The total precision as well as the precision for each component of variation (between-day, between-run, and within-run) was estimated by assaying two control levels (Level 1 and Level 2 at normal and abnormal analyte concentrations). These controls were tested in duplicate, twice per day (separated by a minimum of two hours), for 20 days, using two instruments: one AEROSET, one c8000. This study was conducted in accordance with NCCLS Document EP5-A.

AEROSET Precision

Level	N	Mean (mg/dl)	Within Run		Between Run		Between Day		Total	
			SD	%CV	SD	%CV	SD	%CV	SD	%CV
1	80	20.90	0.36	1.7	0.23	1.1	1.07	5.1	1.15	5.5
2	80	78.90	0.76	1.0	0.36	0.5	0.73	0.9	1.11	1.4

ARCHITECT c8000 Precision

Level	N	Mean (mg/dl)	Within Run		Between Run		Between Day		Total	
			SD	%CV	SD	%CV	SD	%CV	SD	%CV
1	80	23.67	0.46	1.9	0.39	1.7	0.51	2.1	0.79	3.3
2	80	84.06	0.83	1.0	0.65	0.8	0.46	0.5	1.15	1.4

b. *Linearity/assay reportable range:*

Eleven samples at various concentrations were run in four replicates. At least one level was included which exceeded the desired range. The acceptable difference between the observed result and expected value was based on clinical significance for reagent accuracy. This study was based on NCCLS Document EP6-A.

Data generated during linearity studies indicate an acceptable assay recovery from 5 to 180 mg/dL on the AEROSET and ARCHITECT c8000 Systems, with percent recoveries within 10% of the predicted values with 95% confidence.

c. *Traceability, Stability, Expected values (controls, calibrators, or methods):*

The Abbott Laboratories ARCHITECT c8000 and AEROSET analyzer has shown traceability using the Abbott calibrator (previously cleared) and the ULTRA HDL assay and has been certified by the Cholesterol Reference Method Laboratory Network.

d. *Detection limit:*

Data generated during linearity studies indicate an acceptable assay recovery from 5 to 180 mg/dL on the AEROSET and ARCHITECT c8000 Systems. The limit of quantitation (functional sensitivity) of the Ultra HDL was verified to be 5 mg/dL. A test sample prepared to a concentration of $\leq$ 5mg/dL was analyzed in replicates of ten, on three instruments, two runs per instrument and resulted in $\leq$ 20% CV (pooled within instrument). The study was done consistent with the guidelines in NCCLS Protocol EP17-A.

e. *Analytical specificity:*

Interferents which may falsely elevate or reduce results were tested. Human serum samples were spiked with various levels of interferents. Three replicates of each interferent level and three replicates of each reference sample were run at the medical decision levels. Medical Decision Level 1

target is 35 mg/dL, Medical Decision Level 2 target is 70 mg/dL.

At Medical Decision Level 1 and 2 the percent interference was within ±5% difference for serum samples containing 2,000 mg/dL hemoglobin.

At Medical Decision Level 1 the percent interference was within ±5% difference for serum samples containing 1,000 mg/dL Intralipid. At Medical Decision Level 2 the percent interference was within ±5% difference for serum samples containing 2,000 mg/dL Intralipid.

At Medical Decision Level 1 and 2 the percent interference was within ±5% difference for serum samples containing 3.86 mg/dL ascorbic acid.

At Medical Decision Level 1 the percent interference was within ±5% difference for serum samples containing 32.6 mg/dL conjugated bilirubin. At Medical Decision Level 2 the percent interference was within ±5% difference for serum samples containing 63.5 mg/dL conjugated bilirubin.

At Medical Decision Level 1 the percent interference was within ±5% difference for serum samples containing 32.4 mg/dL unconjugated bilirubin. At Medical Decision Level 2 the percent interference was within ±5% difference for serum samples containing 67.1 mg/dL unconjugated bilirubin.

f. *Assay cut-off:*

Not applicable

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

a. *Method comparison with predicate device:*

Data generated demonstrate an acceptable degree of correlation between the Ultra HDAL assay on the AEROSET System and Architect c8000 System, and the Predicate assay on the Hitachi 717 Analyzer.

The degree of correlation was determined per the work instruction protocol for the Ultra HDL assay. 111 samples (minimum of one replicate per run) were tested using the AEROSET vs Hitachi 717, 110 samples were tested using the ARCHITECT c8000 vs Hitachi 717 and 110 samples were tested using the AEROSET vs ARCHITECT c8000. A linear regression analysis was performed comparing the results for each method. A single replicate was used for the linear regression analysis. This study was conducted in accordance with NCCLS Document EP9-A2. The linear regression analyses were reported as follows: AEROSET vs Hitachi 717 - 111 serum samples ranging from 12.20 to 187.94 mg/dL showed a correlation coefficient of 0.999, a slope of 0.97 and a Y intercept of 0.46 mg/dL.

ARCHITECT c8000 vs Hitachi 717 – 110 serum samples ranging from 12.20 – 180.21 mg/dL showed a correlation coefficient of 0.999, a slope of 0.97, and a Y intercept of 0.91 mg/dL.

AEROSET vs ARCHITECT c8000 – 110 serum samples ranging from 12.30 to 178.69 mg/dL showed a correlation coefficient of 0.999, a slope of 1.00 and a Y intercept of 0.61 mg/dL.

b. *Matrix comparison:*

Twenty two subjects were tested using each of the collection tubes to be evaluated. Data were analyzed for statistical differences between different tube types. Based upon the equivalency between the AEROSET and c8000, testing was performed on the AEROSET. Less than or equal to ≤ 5% difference with 95% confidence for the serum was observed for lithium heparin, sodium heparin, EDTA, PST (plasma separator tube), and SST (serum separator tube) tubes for the Ultra HDL assay.

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:

Guidelines for reference ranges have been suggested by the Panel of the National Institutes of Health's Cholesterol Consensus Development Conference and adopted by the National Cholesterol Education Program

The suggested guidelines of the Panel are as follows:

HDL Cholesterol	Classification
<1.0 mmol/L (40.00 mg/dL)	Low (undesirable, High risk) ≥1.6
mmol/L (60.00 mg/dl)	High (desirable, Low risk)

N. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

O. Conclusion:

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