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

**A. 510(k) Number:**

K053576

**B. Purpose for Submission:**

New Device

**C. Measurand:**

Myoglobin

**D. Type of Test:**

Chemiluminescent Immunoassay

**E. Applicant:**

Dade Behring Inc.

**F. Proprietary and Established Names:**

Dimension Vista™ MYO reagent cartridge

Dimension Vista™ MYO calibrator

**G. Regulatory Information:**

1. Regulation section:

   21 CFR 866.5680

   21CFR 862.1150

2. Classification:

   Class II

3. Product code:

   DDR, JIT respectively

4. Panel:

   Immunology (82); Chemistry (75)

## H. Intended Use:

1. Intended use(s):

   See indications for use statement below.

2. Indication(s) for use:

   For the quantitative measurement of myoglobin in human serum and plasma on the Dimension Vista™ System as an aid in the rapid diagnosis of acute myocardial infarction.

   For the calibration of the myoglobin (MYO) method on the Dimension Vista™ System.

3. Special conditions for use statement(s):

   For prescription use only

4. Special instrument requirements:

   Dade Behring Dimension Vista™ System

## I. Device Description:

The MYO Flex reagent cartridge utilizes a sandwich chemiluminescent immunoassay based on luminescent oxygen channeling immunoassay (LOCI) technology. It includes two latex bead reagents, a biotinylated anti-myoglobin monoclonal antibody fragments and buffer. All the reagents are contained in wells on the cartridge. The first bead reagent (sensibead) is coated with streptavidin and contains photosensitive dye. The second reagent (chemibeads) is coated with anti-myoglobin antibody and contains dye also.

The Dade Behring MYO calibrator is a tri-level frozen liquid (2 vials per level) containing human heart myoglobin in a bovine albumin matrix with stabilizers and preservatives. Each donor unit used in preparation of this product was tested by FDA approved methods for the presence of antibodies to human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2), as well as for hepatitis B surface antigen and antibody to hepatitis C virus (HCV), and found to be negative (not repeatedly reactive).

**J. Substantial Equivalence Information:**

1. Predicate device name(s):

   Dade Behring MYO immunoassay and calibrator

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

   K984191 and k984193

3. Comparison with predicate:

| **Similarities** | | |
|---|---|---|
| Item | Predicate | Device |
| Indications for Use | In vitro quantitative determination of myoglobin in human serum and heparinized plasma as an aid in the diagnosis of myocardial infarction | Same |
| Antibody | Mouse | Same |
| Calibrator Analyte | Human Heart Myoglobin | Same |
| | | |

| **Differences** | | |
|---|---|---|
| Item | Predicate | Device |
| Assay Type | Photometric immunoassay | Chemiluminescent immunoassay |
| Assay Range | 1 to 1000 ng/mL | 0.5 to 1000 ng/mL |
| Analytical Sensitivity | 1 ng/mL | 0.5 ng/mL |
| Sample Volume | 20 uL | 2 uL |
| Levels of Calibrator | 5 levels | 3 levels. |

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

NCCLS (CLSI) EP5-A2, NCCLS (CLSI) H18-A2, NCCLS (CLSI) EP7-A, NCCLS (CLSI) EP9-A2

## L. Test Principle:

The MYO method is a homogenous sandwich chemiluminescent immunoassay based on Luminescent Oxygen Channeling Immunoassay (LOCI) technology. LOCI regents include two latex bead regents and a biotinylated anti-myoglobin monoclonal antibody fragment. The first bead reagent (Sensibeads) is coated with streptavidin and the second bead regent (Chemibeads) is coated with a second anti-myoglobin monoclonal antibody. The sample is incubated with Chemibeads and biotinylated antibody to form a bead-myoglobin-biotinylated antibody sandwich. Sensibeads are added and bind to a biotin to form bead-pair immunocomplexes. Illumination of the complex by light at 680 nm generates singlet oxygen from Sensibeads which diffuses into the Chemibeads, triggering a chemiluminescent reaction. The resulting signal is measured at 612 nm and is a direct function of the myoglobin concentration in the sample.

## M. Performance Characteristics (if/when applicable):

All of the following studies were conducted on the Dimension Vista System unless noted otherwise.

1. Analytical performance:

*a. Precision/Reproducibility:*

Precision was assessed and calculated according to NCCLS EP5-A2. The study was performed on two human serum pools and one commercially available control. The samples were analyzed in duplicates twice a day for 20 days (number of observations=80). The results are summarized below (units-ng/mL).

| | | Repeatability | | Within Lab | |
|---|---|---|---|---|---|
| Sample | Mean (ng/mL) | SD (ng/mL) | %CV | SD (ng/mL) | %CV |
| Control | 113.5 | 2.7 | 2.4 | 4.0 | 3.6 |
| Pool 1 | 110.3 | 5.4 | 4.9 | 5.5 | 5.0 |
| Pool 2 | 501.5 | 17.3 | 3.4 | 18.7 | 3.7 |
| Pool 3 | 830.8 | 23.1 | 2.8 | 27.6 | 3.3 |

*b. Linearity/assay reportable range:*

A linearity study was conducted by comparing observed values by using a high concentration MYO serum diluted across the expected range with a normal MYO concentration serum sample. Recovery ranged from 98.7 to 100%. A linear regression analysis of expected versus observed test results provided a slope of 1.0 and an intercept of -0.197 ng/mL.

The reportable range of the assay is 0.5 ng/mL – 1000 ng/mL

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

The tri-level calibrators are distributed as a frozen liquid product. The matrix is 6% bovine albumin with buffers, stabilizers and preservatives. Level A is 6% bovine albumin serum, targeted to have 0 ng/mL. Levels B and C contain purified human heart myoglobin at target values 125 and 1050 ng/mL. The masterpool is a six-level human serum base material targeted to 10% above the claimed assay range. The three calibrators are capable of 6 concentrations (via intermixing) when placed on the Dimension Vista System: 0, 35, 105, 350, 700 and 1050 ng/mL.

Value assignment of the calibrators are determined by deriving a working standard (Dimension Vista Masterpool) from the Dimension Masterpool by running 9 runs of 3 separate lots in replicates of 5 on three instruments. The calibrators are derived from the working standard by running 9 runs of three separate lots in replicates of 5 on three instruments.

The sponsor stability dating assignment reflects the real time stability data for 12 months and 1 week on 3 lots to support the 12 month exp date claim. Stability was tested for 12 months and tested at 7 time intervals. The acceptance criteria were identified and the results supported the 12 month stability at -20°.

d. *Detection limit:*

Analytical sensitivity is defined as the concentration at two standard deviations (N=20) above a sample without myoglobin. The equation of mean + (2xSD) was calculated to be 0.11 ng/mL. The results support the claim for a detection limit of 0.50 ng/mL.

e. *Analytical specificity:*

MYO was evaluated for interference according to NCCLS EP7-A. Bias is the difference in the results between the control sample (without the interferent) and the test sample (contains the interferent) expressed in percent. Interference acceptance criteria is a bias less than 10%. There was no interference (<10%) from 27 substances, listed in the package insert and also from the following substances:

Hemoglobin up to 1000 mg/dL,

Bilirubin (conjugated and unconjugated) up to 60 mg/dL and

Lipemia up to 3000 mg/dL.

To analyze the hook effect using the Dimension Vista MYO, a study was conducted by the sponsors using normal human serum samples spiked with human myoglobin to provide appropriate concentrations. The sponsor reports that there is no hook effect up to 350,000 ng/mL and insert a claim of 300,000 ng/mL to their insert. If a sample concentration is within the assay range (0.5 to 1000 ng/mL), the myoglobin value will be reported. If the concentration is above 1000 ng/mL, the report will present an "above assay range" error message with no analyte value.

*f. Assay cut-off:*

Not applicable.

2. Comparison studies:

*a. Method comparison with predicate device:*

One hundred and sixty serum and heparinized plasma patient samples ranging from 9 to 943 ng/mL. The sponsor conducted a split sample method comparison between the Dade Behring Behring Dimension Vista and the predicate Dimension® MYO immunoassay with serum and heparinized plasma patients samples.

The following results were observed:

Dimension Vista System= 1.003( Dimension MYO) + 6.98 with a correlation coefficient of 0.998.

*b. Matrix comparison:*

Serum and heparin plasma matched pairs were examined on the Dimension Vista system. Serum samples (n=37) ranging 28 to 600 ng/mL when compared to lithium heparin samples gave a slope of 1.05, correlation coefficient of 1.0, and an intercept of -5.12 ng/mL using linear least squares regression. A separate study was conducted to evaluate the comparison of 115 lithium and sodium heparin samples ranging from 16 ng/mL to 823 ng/mL. A linear least squares regression analysis comparing the lithium to sodium heparin samples gave a slope of 1.00, a correlation coefficient of 1.0 and an intercept of -0.54 ng/mL.

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:

The values for the upper and lower limit for apparently health individuals was calculated based on 299 samples (150 males and 149 females) in an internal study conducted by Dade Behring. A mean of 37 ng/mL was obtained with an S.D. of 22 ng/mL. The reference interval for MYO was calculated non-parametrically and represents the central 95% population. The values are shown below.

| | |
|---|---|
| Combined male and female myoglobin values: | 14 – 106 ng/mL [μg/L] |
| Male myoglobin values: | 16 – 116 ng/mL [μg/L] |
| Female myoglobin values: | 13 – 71 ng/mL [μg/L] |

The sponsor advises the each laboratory should establish its own expected values for myoglobin as performed on the Dimension Vista™ System.

**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.