

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY**

A. 510(k) Number:

k111369

B. Purpose for Submission:

New Device

C. Measurand:

Monoclonal Immunoglobulins (IgG, IgA, IgM) and light chains (kappa, lambda) in serum

D. Type of Test:

Capillary Electrophoresis by Immunodisplacement, Qualitative

E. Applicant:

Helena EU Laboratories

F. Proprietary and Established Names:

Helena V8 Immunodisplacement Kit and Helena V8 Capillary Electrophoresis System

G. Regulatory Information:

1. Regulation section:

21 CFR §866.5510 Immunoglobulins A, G, M, D and E Immunological Test System
21 CFR §866.5550 Immunoglobulin (light chain specific) Immunological Test System
21 CFR §862.1630 Protein (fractionation) Test System

2. Classification:

Class II

3. Product code:

CFF – Immuno-electrophoretic, Immunoglobulins (G, A, M)
DFH – Kappa, Antigen, Antiserum, Control
DEH – Lambda, Antigen, Antiserum, Control
CEF – Electrophoretic, Protein Fractionation

4. Panel:

Immunology (82)

Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

The Helena V8 Immunodisplacement Kit is designed for the detection and the characterization of monoclonal proteins (immunoglobulin's IgG, IgA, IgM, kappa (bound) and lambda (bound) light chains), in human serum with the Helena V8 Capillary Electrophoresis System. It is used in conjunction with the Helena V8 Serum Protein SPE Kit designed for serum protein separation into 6 major fractions in alkaline buffer. The electrophoretograms of separated proteins mixed with individual specific antisera are evaluated visually to detect the presence of specific reactions with the suspect monoclonal proteins. The test results are to be used in conjunction with clinical findings and other laboratory tests.

For In Vitro Diagnostic Use Only.

2. Indication(s) for use:

Same as Intended use.

3. Special conditions for use statement(s):

For prescription only.

4. Special instrument requirements:

The Helena V8 Capillary Electrophoresis System

I. Device Description:

The Helena V8 Immunodisplacement Kit contains 5 antisera bottles (1x1.3 mLx50 tests) ready for use. The antisera bottles have monospecific antibodies against heavy chains (IgG, IgA, IgM); Kappa (bound) and Lambda (bound) light chains. The Helena V8 Immunodisplacement Kit is to be used on the Helena V8 Capillary Electrophoresis System.

J. Substantial Equivalence Information:

1. Predicate device name(s) and 510(k) number(s):
Helena SPIFE Kit, k973040

2. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	For detection and the characterization of monoclonal proteins	Same
Antisera Specificity	Antibody specificity to heavy chains (IgG, IgA, IgM) and to kappa (bound) and lambda (bound) light chains .	Same
Antisera Storage	2 – 8°C	Same
Results Interpretation	Qualitative	Same

Differences		
Item	Device	Predicate
Immunoglobulin detection	IgG, IgA, IgM, kappa (bound) and lambda (bound) light chains	IgG, IgA, IgM, kappa: (bound & free) and lambda (bound & free) light chains
Sample Type	Serum	Serum, CSF and urine
Technology	Capillary Electrophoretic migration with Immunofixation by Immunodisplacement	Agarose Gel Electrophoretic Migration by Immunofixation
Instrument	Helena V8 Capillary Electrophoresis System	Helena SPIFE 2000 or SPIFE 3000 electrophoresis analyzer systems
Method of monoclonal protein identification	Removal of target protein	Isolation and fixation of target protein
Visualisation of target protein	UV absorbance scan on CE Electrophoretogram	Acid Violet Gel Staining
Lowest Detectable Limit	Serum: 0.25 g/L	Serum, CSF and Urine: Not available

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

None.

L. Test Principle:

The V8 Immunodisplacement Kit is intended for the separation and determination of monoclonal gammopathies by capillary zone electrophoresis. This technique separates

proteins on the basis of their net charge in an alkaline buffer solution in combination with their differing interaction with the wall of the silica capillary. Immunotyping of gammaglobulins is achieved by testing aliquots of sample with a panel of monospecific antisera. The complex formed by the test antisera and their target proteins has a modified migration profile and is therefore displaced from the standard serum protein electropherogram. By comparing the results from the test panel with a reference analysis the immunoglobulin type present can be determined by the specific removal or reduction of the abnormal spike from the CE electropherogram.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. *Precision/Reproducibility:*

Eight samples were used for reproducibility study, including one normal sample and seven pathological samples: monoclonal subtypes IgG κ (n=1), IgG λ (n=1), IgA κ (n=1), IgA λ (n=1), IgM κ (n=2), IgM λ (n=1). The total immunoglobulin levels were between 2.0 and 22.5 g/L. Each sample was analyzed in six replicates and the run was repeated with three different lots of antisera. According to the identified monoclonal protein characterization, replicates of each sample showed 100% concordant and reproducible results within each run and between different lots of antisera.

b. *Linearity/assay reportable range:*

Not applicable.

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

Stability data from 3 lots support the assay shelf life claims of 24 months for unopened antisera vials and four weeks for opened vials at 2-8°C. Testings were performed at 0, 1, 2, 4, 6 week and at 12, 26, 28 months intervals.

d. *Detection limit:*

Six pathological samples comprising each monoclonal isotype IgG κ (51 g/L), IgG λ (37 g/L), IgA κ (69 g/L), IgA λ (61 g/L), IgM κ (42 g/L), IgM λ (69 g/L) were diluted with a normal sample until a sample was produced with a monoclonal peak of 0.75 g/L. These initial diluted samples were further serially diluted to produce a range of monoclonal concentrations of 0.45, 0.35, 0.25, 0.20 and 0.15 g/L. These dilutions were analyzed by the V8 System to show the decreasing appearance of the monoclonal peak. The data demonstrated the claimed detection limit of 0.25 g/L.

e. *Analytical specificity:*

Interference by endogenous and other substances: No interference was observed in

six pathological samples (IgGκ, IgGλ, IgAκ, IgAλ, IgMκ, IgMλ ranging from 1.3 g/L to 43.0 g/L monoclonal protein concentrations) spiked with hemoglobin up to 0.17 g/dL; 16.05 mg/L indirect bilirubin; 15.9 mg/dL direct bilirubin; triglycerides at 386, 669 or 1991 mg/dL; 317 IU/mL RF; and up to 16.28 mmol/L cholesterol.

f. Assay cut-off:

Not applicable.

2. Comparison studies:

a. Method comparison with predicate device:

A total of 130 serum samples (108 pathological and 22 normal) were performed on Helena V8 Immunodisplacement (ID) kit using the Helena V8 System and Helena SPIFE/IFE Gel electrophoresis using Helena SPIFE System. The study was performed at three different sites and demonstrated 99% agreement between the two methods. The numbers of samples for different subtypes in the study are listed below.

Qualitative Results	Total Number	Complete Agreement	Partial Agreement	Monoclonal Concentration Ranges (g/L)
Normal	22	22	0	N/A
IgGκ	36	36	0	0.35 – 4.78
IgGλ	23	23	0	0.47 – 4.39
IgAκ	9	8	1	0.27 – 4.09
IgAλ	11	11	0	0.25 – 4.09
IgMκ	18	18	0	0.30 – 3.10
IgMλ	5	5	0	0.80 – 2.80
Biclonal	2	2	0	0.40 – 0.70
Oligoclonal	1	1	0	1.50
Other	4	4	0	-
Grand Total	131	130	1	N/A

b. Matrix comparison:

Not applicable.

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:

Same as Expected values/ Reference range

5. Expected values/Reference range:

Absence of monoclonal immunoglobulins

N. Instrument Name:

The Helena V8 Capillary Electrophoresis System

O. System Descriptions:

1. Modes of Operation:

V8 is designed as a fully automated Clinical Capillary Electrophoresis System, providing automation from primary sample tube handling to analyte profiling and abnormal data detection. Sample identification, preparation, analysis, capillary cleaning, instrument maintenance and data transfer are fully automated. The V8 system can be integrated to all host networks for bi-directional interfacing. V8 is designed for professional laboratory conditions with minor installation and bench-space requirements. Operators load the V8 instrument with primary sample tubes and monitor the process. Trained clinicians and scientists diagnose the result for proper patient treatment.

2. Software:

FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types:

Yes X or No

3. Specimen Identification:

The instrument is a fully automated 8 channel capillary electrophoresis instrument. The system can hold up to 112 blood samples or urine samples in bar-coded primary sample tubes. V8 employs a barcode scanner to detect the barcodes on the sample tubes and the racks containing the sample tubes.

4. Specimen Sampling and Handling:

The system can hold up to 112 blood samples or urine samples in bar-coded primary sample tubes and is able to identify, prepare, separate by CE, and transfer the sample data to a PC. The two main functions of the V8, sample preparation and sample separation, are conducted concurrently. Prepared samples are introduced to the CE where an 8-channel detector measures the samples using a UV-sensitive detector and sends results to the PC. The V8 also prepares samples and loads a sample tray to be used for gel electrophoresis.

5. Calibration:

All V8 instrument calibration should be carried out by a Helena Bioscience's trained and certified engineer; this will be carried out during scheduled site service visits.

6. Quality Control:

It is recommended that Helena Bioscience's control ranges (Catalogue number: 802400, 802500) are used to perform daily calibration check on the performance of the V8 instrument. All control kits are supplied with assay sheets which provide details of these normal ranges. It is recommended that each lab configures its own normal range.

**~~P. Other Supportive Instrument Performance Characteristics Data Not Covered In The~~
"Performance Characteristics" Section above: Q. Proposed Labeling:**

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

R. Conclusion:

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