

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

A. 510(k) Number:

K051169

B. Purpose for Submission:

New device

C. Measurand:

IgM antibodies to *Borrelia burgdorferi*

D. Type of Test:

Western blot test

E. Applicant:

Viramed Biotech AG

F. Proprietary and Established Names:

Borrelia B31 IgM ViraBlot[®]

G. Regulatory Information:

1. Regulation section: 21CFR 866. 3830, Treponema pallidum treponemal test reagents
2. Classification: Class: II
3. Product code: 83 LSR; Reagent, Borrelia Serological Reagent
4. Panel: 83 Microbiology

H. Intended Use:

1. Intended use(s):

The Viramed Biotech Borrelia B31 IgM ViraBlot[®] is an *in vitro* qualitative assay for the detection of IgM antibodies to *Borrelia burgdorferi* in human serum. It is

intended for use in testing human serum samples which have been found positive or equivocal using an EIA or IFA test procedure for *B. burgdorferi* antibodies. Positive results from this Western Blot assay are supportive evidence of infection with *B. burgdorferi*, the causative agent of Lyme disease. The Viramed Biotech Borrelia B31 ViraBlot can be used during the acute phase (0-4 weeks of symptoms onset) of *B. burgdorferi* infection. After this early period, infected patients are usually found to be Western blot positive for IgG. A positive IgM test alone is not recommended for use in determining active disease in persons with illness of longer than one month.

2. Indication(s) for use:

The Viramed Biotech Borrelia B31 IgM ViraBlot® is an *in vitro* qualitative assay for the detection of IgM antibodies to *Borrelia burgdorferi* in human serum. It is intended for use in testing human serum samples which have been found positive or equivocal using an EIA or IFA test procedure for *B. burgdorferi* antibodies. Positive results from this Western Blot assay are supportive evidence of infection with *B. burgdorferi*, the causative agent of Lyme disease. The Viramed Biotech Borrelia B31 ViraBlot can be used during the acute phase (0-4 weeks of symptoms onset) of *B. burgdorferi* infection. After this early period, infected patients are usually found to be Western blot positive for IgG. A positive IgM test alone is not recommended for use in determining active disease in persons with illness of longer than one month.

3. Special conditions for use statement(s):

For prescription use

4. Special instrument requirements:

None

I. Device Description:

Electrophoretically isolated antigens are bound to a solid phase nitrocellulose support membrane called an immunoblot strip. For each test to be performed, the immunoblot strip and diluted test sera are placed in a well to react. If specific antibodies that recognize an antigen are present, they will bind to the specific antigens on the strip. After incubation the immunoblot strip is washed to remove unbound antibody. An enzyme labeled anti-human IgM is then added to each strip and incubated. If antibody is present, the conjugate will bind to the antibody attached to the specific antigens. The strip is washed to remove unbound conjugate and a substrate solution is added. If the enzyme/antibody complex is present, the substrate will undergo a precipitation and color change. After an incubation period, the reaction is stopped and the presence of precipitated substrate is visualized at specific locations on the strip. The presence of a colored precipitation at various locations on the Virastripe strip is an indirect measurement of *Borrelia burgdorferi* specific antibody in the patient specimen. A lot specific band locator (reacted immunoblot strip) is supplied and used to locate and identify

specific *Borrelia burgdorferi* B31 antibodies on the test strip.

Positivity: The criteria for a positive Western blot result defined by the CDC are followed. For *B. burgdorferi* IgM positivity, the blot should be positive for at least 2 of the 3 protein bands: p41, p39, p23kDa

J. Substantial Equivalence Information:

1. Predicate device name(s):
B. burgdorferi (IgM) Marblot Strip Test System from MarDx
2. Predicate 510(k) number(s):

k951709
3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Procedure	Qualitative; <i>B. burgdorferi</i> IgM antibodies to specific protein bands.	Qualitative; <i>B. burgdorferi</i> IgM antibodies to specific protein bands.
Assay	Western blot	Western blot
Specimen Type	Serum	Serum
Differences		
Item	Device	Predicate
Not applicable	Not applicable	Not applicable

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

Not applicable

L. Test Principle:

Western blot

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. *Precision/Reproducibility:*

As a measure of kit precision, 6 blind coded specimens (2 strongly positive, 2 weakly positive and 2 negative) and kit controls were tested at three laboratory sites using the same kit lot number. For this study, two different readers within the three different laboratories assessed the band identification for each sample on the same blot. Six qualified technicians at the three sites assessed the Western blot bands from the same master lot kit number of Western blot kit. All samples were correctly interpreted by the 3 laboratories and 6 readers with 100% concordance in 18 of 19 bands for IgM.

b. *Linearity/assay reportable range:*

Not applicable

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

Not applicable

d. *Detection limit:*

Not applicable

e. *Analytical specificity:*

For determination of specificity, two hundred sera from normal blood donor individuals representing endemic and non-endemic geographic regions of the United States were tested for IgM *Borrelia burgdorferi* antibodies by the Viramed Borrelia B31 IgM Virablot®.

Negativity = 96% (194/200)

f. *Assay cut-off:*

Not applicable

2. Comparison studies:

a. *Method comparison with predicate device:*

Western blot testing was compared to a predicate device at two sites on routinely submitted specimens. At site 1, of a total 132 specimen tested, 8 were found to be EIA positive. At site 2, of a total of 109 specimens tested, 40 were found to be EIA positive.

EIA Positive / IgM WB		BBI Western Blot		
Prospective Site 1		Pos	Neg	Total
Viramed Biotech	Pos	2	3	
Virablot®	Neg	0	3	
				8
Agreement (5/8) =62.5%				
Prospective Site 2		Trinity/MarDx Western Blot		
		Pos	Neg	Total
Viramed Biotech	Pos	13	5	
Virablot®	Neg	1	21	
				40
Agreement (34/40)=85%				

Correlations to the CDC Lyme Disease Panel

A Lyme Disease Clinical panel containing 45 clinically defined positives and negative samples was obtained from the Center for Disease Control and Prevention, Fort Collins, Colorado.

Viramed Borrelia B31 IgM Western blot	CDC National Lyme Disease Panel
Positive	15/19
Negative	2325
	Correlation = 86.4%(38/44)

College of American Pathologists 2003 Tick-borne Disease Proficiency Panel

The CAP Tick-borne Proficiency samples for the year 2003 were tested.

Samples tested: Positive 2 Negative 13
Correlation to Published CAP results proficiency = 86.7% (13/15)

b. Matrix comparison:

Not applicable

3. Clinical studies:

a. Sensitivity:

One hundred sera were obtained from patients that were clinically diagnosed with Lyme borreliosis. Of these 100 sera, forty were paired (20 acute and 20 convalescent) sera from patients diagnosed with erythema migrans, 20 with early-disseminated neuroborreliosis and 40 with late stage Lyme arthritis.

<u>Clinical Stage</u>	<u>Sensitivity</u>
Acute/Erythema Migrans (Sampled 8-10 days after onset)	70% (14/20)
Convalescent/Erythema Migrans (Sampled 4 weeks after onset)	95% (19/20)
Early disseminated neuroborreliosis	95% (19/20)
Late Stage Lyme Arthritis	35% (14/40)

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:

Not applicable

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.