K073381

510(k) Summary of Safety and Effectiveness
Plexus EBV IgM Multi-Analyte Diagnostics Catalog No. MP0600M
Prepared Date: July 22, 2008

Applicant	Focus Diagnostics, Inc. 10703 Progress Way Cypress, California 90630 USA
Establishment Registration No.	2023365
Contact Person	Constance Bridges tel 714.220.1900 fax 714.995.6921 cbridges@focusdx.com
Summary Date	June 27, 2008
Proprietary Name	Plexus EBV IgM Multi-Analyte Diagnostics
Generic Name	Epstein-Barr Virus Serological Assays
Classification	Class I
Predicate Devices	Osom® Mono Test Diamedix EBV VCA IgM ELISA Athena Multi-Lyte EBV VCA IgM Test System Epstein-Barr Virus VCA (IgM) Recomb Immun Antibod

AUG - 4 2008

Device Description
Multiplexed Immunoassay for the Qualitative Detection of Human IgM Antibodies to Epstein-Barr Virus

Intended Use
Focus Diagnostics' Plexus™ EBV IgM Multi-Analyte Diagnostics test kit is intended for qualitatively detecting the presence or absence of human IgM class antibodies to viral capsid antigen (VCA), and heterophile antibodies in human sera. The test is indicated as an aid in the diagnosis of EBV infection and EBV-associated infectious mononucleosis.

The performance of this assay has not been established for use in the diagnosis of nasopharyngeal carcinoma and Burkitt's lymphoma, for testing of immunocompromised patients, for use by a point of care facility or for use with automated equipment. This assay has not been evaluated for donor screening.

The Focus Diagnostics Plexus™ EBV IgM uses an Antigen Bead suspension that contains two distinct EBV antigen bead types (VCA and Heterophile) and one process control bead type that fluoresce at different wavelengths and/or intensities.

The Focus Diagnostics Plexus™ EBV IgM is a three step procedure.

1. Patient sera are diluted, and the diluted sera are incubated with Antigen Beads. If EBV antibodies are present, then the antibodies bind to the corresponding antigen beads.
2. Phycoerythrin-conjugated goat Anti-human IgM (Conjugate) is added, binds to the bound EBV antibody (if present), and forms a Conjugate-EBV antibody-antigen bead sandwich.
3. Fluorescence from each distinct EBV antigen bead type is measured and compared against a Cutoff Calibrator.

Comparison with Predicate Devices: VCA IgM analyte:

Item	Device	Predicates		
Name	**Plexus™ EBV IgM Multi-Analyte Diagnostics**	**Diamedix VCA IgM, ELISA**	**Athena Multi-Lyte EBV VCA IgM Test System**	**Epstein-Barr Virus VCA (IgM) Recomb Immun Antibod (IFA)**
Similarities between Device and Predicate				
Intended use	Focus Diagnostics' Plexus™ EBV (VCA) IgM Multi-Analyte Diagnostics test kit is intended for qualitatively detecting the presence or absence of human IgM class antibodies to viral capsid antigen (VCA), and heterophile antibodies in human sera. The test is indicated as an aid in the diagnosis of EBV infection and EBV-associated infectious mononucleosis.	Diamedix Corp EBV VCA IgM ELISA is intended for the qualitative and semi-quantitative determination of IgM antibodies to Epstein-Barr Virus (recombinant) viral capsid antigen (EBV-VCA IgM) in human serum by indirect enzyme immunoassay. The *Is*-EBV-VCA IgM test kit may be used in combination with other Epstein-Barr serologies, Viral Capsid Antigen (VCA) IgG, Epstein-Barr Nuclear Antigen-1 (EBNA-1) IgG and IgM, Early Antigen-Diffuse (EA-D) IgG and IgM and heterophile antibody, as an aid in the diagnosis of infectious mononucleosis (IM).	The Zeus Scientific, Inc. AtheNA Multi-Lyte® EBV VCA IgM Test System is a microparticle-based immunoassay intended for the qualitative detection of IgM class antibody to Epstein-Barr virus, viral capsid antigen in human serum. The test system is intended to be used for the laboratory diagnosis of EBV-associated infectious mononucleosis and provides epidemiological information on the diseases caused by Epstein-Barr virus.	Focus Diagnostics' Epstein-Barr Virus Viral Capsid Antigens (EBV VCA) IgG Immunofluorescence Antibody (IFA) test is intended for the detection and semi-quantitation of human IgG antibodies to the viral capsid antigens (VCA) of Epstein-Barr virus in human serum as an aid in the clinical diagnosis of infectious mononucleosis.
Indications for use	The test is indicated as an aid in the diagnosis of EBV infection and EBV-associated infectious mononucleosis.	The device is indicated for use with patients with the signs and symptoms of infectious mononucleosis.	The device is indicated for laboratory diagnosis of EBV-associated infectious mononucleosis and to provide epidemiological information on the diseases caused by Epstein-Barr virus	The test is indicated as an aid in the clinical diagnosis of infectious mononucleosis.
Immunoglobulin Type	IgM	IgM	IgM	IgM
Sample matrix	Serum	Serum	Serum	Serum
CLIA complexity	High	High	High	High
Difference between Device and Predicate				
Antigen	EBV-VCA: VCA gp 125, affinity purified	EBV-VCA: Recombinant 47 kDa fusion half of p18	EBV VCA pg125	Recombinant VCA antigen (rVCA)

Item	Device	Predicates		
Name	**Plexus™ EBV IgM Multi-Analyte Diagnostics**	**Diamedix VCA IgM, ELISA**	**Athena Multi-Lyte EBV VCA IgM Test System**	**Epstein-Barr Virus VCA (IgM) Recomb Immun Antibod (IFA)**
	antigen			
Strain	N/A- purified protein	N/A- Recombinant protein	N/A native protein	N/A- Recombinant protein
Host Cell Line	EBV-VCA: Native (P_3H_3 or P_3HR-1)	EBV-VCA: E. coli (unknown)	Unknown	Mammalian cell line
Methodology	Multiplex Microbead Immunoassay (MMIA) based on Luminex XMAP technology	Enzyme Immunoassay technology.	Flow cytometry immunoassay	Indirect Immunofluorescence Antibody Test
Interpretation of test results	Perform automated calculations using Plexus software.	Manual calculation	AtheNA Multi-Lyte instrument	Manual

Comparison with Predicate Devices: Heterophile IgM analyte:

Item	Device	Predicate
Name	**Plexus™ EBV IgM Multi-Analyte Diagnostics**	**Osom® Mono Test, Heterophile**
Similarity between Device and Predicate		
Intended use	Focus Diagnostics' Plexus™ EBV (Heterophile) IgM Multi-Analyte Diagnostics test kit is intended for qualitatively detecting the presence or absence of human IgM class antibodies to viral capsid antigen (VCA), and heterophile antibodies in human sera. The test is indicated as an aid in the diagnosis of EBV infection and EBV-associated infectious mononucleosis.	The OSOM Mono Test is intended for the quantitative detection infectious mononucleosis heterophile antibodies in serum, plasma and whole blood as an aid in the diagnosis of infectious mononucleosis.
Indications for use	The test is indicated as an aid in the diagnosis of EBV infection and EBV-associated infectious mononucleosis.	Intended to make a serological diagnosis of EBV infections
Immunoglobulin Type	IgM	IgM
Difference between Device and Predicate		
Sample matrix	Serum	Serum / Plasma / Whole Blood
CLIA complexity	High	Moderate
Methodology	Multiplex Microbead Immunoassay (MMIA) based on Luminex XMAP technology.	Immunocheomatorgraphic Test

Item	Device	Predicate
Name	Plexus™ EBV IgM Multi-Analyte Diagnostics	Osom® Mono Test, Heterophile
Strain	NA purified protein	NA native protein
Host Cell Line	Purified from bovine red blood cells	Extract of bovine erythrocytes
Antigen	Heterophile: purified protein	Heterophile: native protein
Interpretation of test results	Perform automated calculations using Plexus software.	Visual evaluation

EXPECTED VALUES

Outside investigators assessed the device with prospective masked sequential samples that were submitted for routine EBV testing (n=723.) The prevalence of EBV will vary depending on age, geographic location, testing method used, and other factors. The comparator assay was perfomed by indirect enzyme immunoassay used in combination with other Epstein-Barr serologies (VCA) IgG and IgM, Epstein-Barr Nuclear Antigen-1 (EBNA-1) IgG, Early Antigen-Diffuse (EA-D) IgG and a heterophile rapid antibody test. The observed prevalence is in Table 1. Expected values are presented by age and gender in the tables below for serum sample from a Total Population (N= 723). For all analytes, index values of <0.90 are negative, ≥0.90 to ≤ 1.10 are equivocal and > 1.10 are positives.

Table 1: Observed Prevalence – EBV Plexus

	VCA IgM	Heterophile
Positive	12.7% (92/723)	9.3% (67/723)
Equivocal	0.6% (4/723)	0% (0/723)
Negative	86.7% (627/723)	90.7% (656/723)

Table 2: EBV Plexus Results VCA IgM

		Positive		Equivocal		Negative		
Age	Gender	n	%	n	%	n	%	Total
<5	F	1	6.7	0	0	14	93.3	15
<5	M	2	5.6	0	0	34	94.4	36
5-12	F	10	10	2	2	88	88	100
5-12	M	6	6.3	0	0	89	93.7	95
13-20	F	28	16.8	0	0	139	83.2	167
13-20	M	24	18.5	1	0.8	105	80.8	130
21-30	F	7	18.4	0	0	31	81.6	38
21-30	M	5	27.8	0	0	13	72.2	18
31-40	F	1	6.3	0	0	15	93.8	16
31-40	M	1	7.1	0	0	13	92.9	14
41-50	F	3	15.8	0	0	16	84.2	19
41-50	M	1	7.7	0	0	12	92.3	13
51-60	F	1	6.3	1	6.3	14	87.5	16
51-60	M	0	0	0	0	11	100	11
61-70	F	0	0	0	0	9	100	9

Table 2: EBV Plexus Results VCA IgM

		Positive		Equivocal		Negative		
Age	Gender	n	%	n	%	n	%	Total
61-70	M	1	10	0	0	9	90	10
>70	F	0	0	0	0	7	100	7
>70	M	1	11.1	0	0	8	88.9	9
Total		92	12.7	4	0.6	627	86.7	723

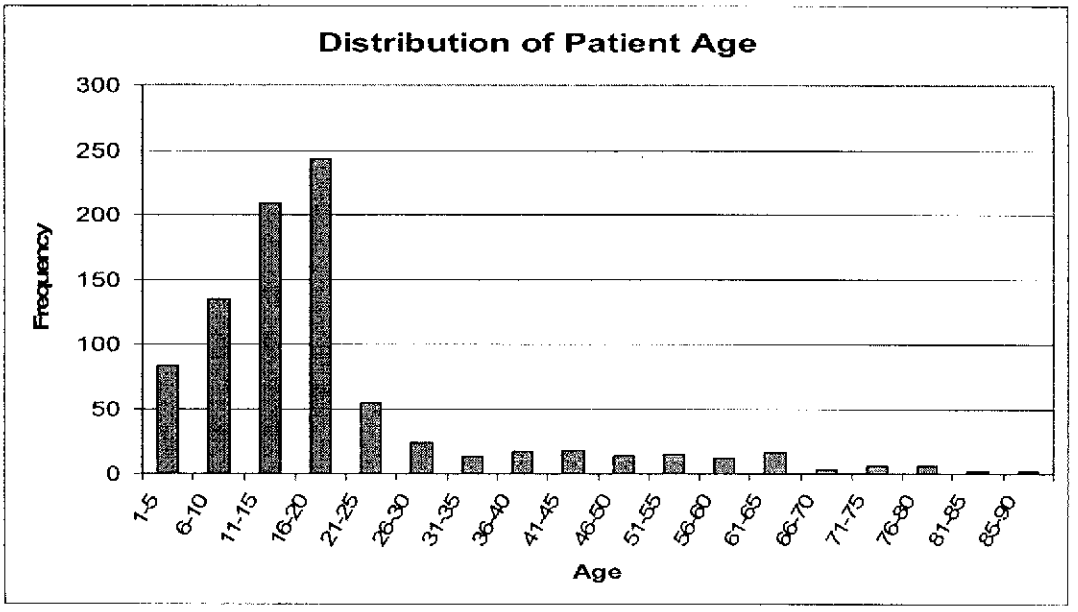
Table 3: EBV Plexus Results Heterophile IgM

		Positive		Equivocal		Negative		
Age	Gender	n	%	n	%	n	%	Total
<5	F	0	0	0	0	15	100	15
<5	M	2	5.6	0	0	34	94.4	36
5-12	F	5	5	0	0	95	95	100
5-12	M	4	4.2	0	0	91	95.8	95
13-20	F	21	12.6	0	0	146	87.4	167
13-20	M	24	18.5	0	0	106	81.5	130
21-30	F	5	13.2	0	0	33	86.8	38
21-30	M	5	27.8	0	0	13	72.2	18
31-40	F	1	6.3	0	0	15	93.8	16
31-40	M	0	0	0	0	14	100	14
41-50	F	0	0	0	0	19	100	19
41-50	M	0	0	0	0	13	100	13
51-60	F	0	0	0	0	16	100	16
51-60	M	0	0	0	0	11	100	11
61-70	F	0	0	0	0	9	100	9
61-70	M	0	0	0	0	10	100	10
>70	F	0	0	0	0	7	100	7
>70	M	0	0	0	0	9	100	9
Total		67	9.3	0	0	656	90.7	723

The table below summarizes the breakdown of the samples age and gender information. The distribution chart below exhibits the age distribution of all 873 samples included in the study.

Age Information:

Summary of Female Subjects		Summary of Male Subjects	
n	474	n	399
mean	20.0	mean	18.3
median	16.0	median	14.0
min	1	min	1
max	88	max	87


Distribution of Patient Age
Frequency
300
250
200
150
100
50
0
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
61-65
66-70
71-75
76-80
81-85
85-90
Age

PERFORMANCE CHARACTERISTICS

Typical Antibody Response Classification

The table below summarizes a generally accepted algorithm for classifying the EBV infection status via EBV serologic profiles.

EBV Serological Status		EBNA-1 IgG	EBV VCA IgG	EBV EA-D IgG	EBV VCA IgM	Heterophile Antibody
Acute	Primary Acute	Negative	Negative	Negative	Positive	Negative
		Negative	Negative	Negative	Positive	Positive
		Negative	Positive	Negative	Positive	Positive
		Negative	Negative	Positive	Positive	Negative
		Negative	Negative	Positive	Positive	Positive
		Negative	Positive	Positive	Positive	Negative
		Negative	Positive	Positive	Positive	Positive
		Negative	Positive	Positive	Negative	Positive
	Late Acute	Positive	Positive	Positive	Negative	Negative
		Positive	Positive	Positive	Positive	Positive
		Positive	Positive	Positive	Positive	Negative
		Positive	Positive	Negative	Positive	Positive
		Positive	Positive	Negative	Positive	Negative
		Negative	Positive	Negative	Positive	Negative
Recovering		Negative	Positive	Positive	Negative	Negative
Past Infection		Negative	Positive	Negative	Negative	Negative
		Positive	Positive	Negative	Negative	Negative
No Infection		Negative	Negative	Negative	Negative	Negative
Indeterminant		Combinations not listed above (n =18)				

Comparison Studies

Performance of the Plexus EBV VCA IgM analyte was tested against a combination (hereafter referred to as 'consensus predicate') of a FDA-cleared commercially available ELISA, a FDA cleared commercially available immunofluroscent (IFA) test and a FDA cleared commercially available flow cytometry based immunoassay. For each sample, a consensus based algorithm (2/3) was used to determine the predicate result for comparison with the Plexus VCA IgM result. The Plexus EBV Heterophile IgM analyte was tested against a FDA cleared heterophile rapid test. The studies were conducted at three United States testing sites: a hospital laboratory located in Northeast, a pediatric hospital laboratory located in the Mid-West, and Focus with serum samples in which EBV tests were ordered. The sera were sequentially submitted to the laboratory, archived, and masked. Samples were collected at three sites and include both prospective (n = 723) and retrospective (n = 150) specimens. The Plexus EBV IgM tests were run in conjunction with the Plexus EBV IgG tests for a complete antibody profile. The samples were then classified into EBV infection status using the Serological Status table above.

Prospective Population Samples: Plexus EBV vs. Consensus Predicate for VCA IgM analyte *(N = 723)*
Samples were collected and tested by the Northeast investigator *(n = 350)*, Mid-West investigator *(n=249)* and Focus *(n=124)*.

The following table outlines the positive and negative percent agreements for prospective samples for VCA IgM analyte when the consensus predicate is used for VCA IgM analysis.

Table 4: EBV VCA IgM Results

Consensus Predicate	Plexus				
	n	Positive	Equivocal	Negative	% Agreement
Positive	88	79	3	6	85.9%(79/92), 95% CI:77.3-91.6%
Negative	630	12	1	617	97.8%(617/631), 95% CI:96. 3-98.7%

Table 4: EBV VCA IgM Results					
Consensus Predicate	**Plexus**				
	n	**Positive**	**Equivocal**	**Negative**	**% Agreement**
No consensus[1]	5	1	0	4	NA

[1] No consensus results: the combination of three predicates could not yield a conclusive result for these samples – a 2/3 majority could not be obtained.

Prospective Population Samples: Plexus EBV vs. Heterophile Rapid Test for Heterophile IgM analyte *(N = 723)*
Samples were collected and tested by the Northeast investigator *(n = 350)*, Mid-West investigator *(n=249)* and Focus *(n=124)*.

The following table outlines the positive and negative percent agreements for prospective samples for Heterophile IgM analyte when the Heterophile rapid test is used as predicate for Heterophile IgM analysis and consensus predicate is used for VCA IgM analysis.

Table 5: EBV Heterophile Results					
Predicate Rapid Test	**Plexus**				
	n	**Positive**	**Equivocal**	**Negative**	**% Agreement**
Positive	75	60	0	15	80%(60/75), 95% CI:69.6-87.5%
Equivocal	0	0	0	0	N/A
Negative	648	7	0	641	98.9%(641/648), 95% CI:97.8-99.5%

Prospective Population Samples: Plexus EBV vs. Consensus Predicate for VCA IgM analyte (by Serological Status) *(N = 723)*
Samples were collected and tested by the Northeast investigator *(n = 350)*, Mid-West investigator *(n=249)* and Focus *(n=124)*.

The following table outlines the positive and negative percent agreements across various serological classifications for prospective samples for VCA IgM analyte when the consensus predicate is used for VCA IgM analysis.

Table 6: EBV VCA IgM Results							
		Consensus Predicate	**Plexus**				
Serostatus by Predicates			**n**	**Positive**	**Equivocal**	**Negative**	**% Agreement**
Acute	Primary Acute	Positive	59	56	2	1	94.9%(56/59), 95% CI:86.1-98.3%
		Negative	1	0	0	1	100%(1/1), 95% CI:20.7-100%
		No consensus	0	0	0	0	NA
	Late Acute	Positive	14	9	1	4	64.3%(9/14), 95% CI:38.8-83.7%
		Negative	58	2	0	56	96.6%(56/58), 95% CI:88.3-99%
		No consensus	0	0	0	0	NA
Recovering		Positive	0	0	0	0	NA
Recovering		Negative	1	0	0	1	100%(1/1), 95% CI:20.7-100%
Recovering		No consensus	0	0	0	0	NA
Previous Infection		Positive	1	0	0	1	0%(0/1), 95% CI:0-79.3%
Previous Infection		Negative	296	9	1	286	96.3%(286/297), 95% CI:93.5-97.9%
Previous Infection		No consensus[1]	1	1	0	0	NA
No Infection		Positive	1	1	0	0	50%(1/2), 95% CI:9.5-90.5%

Table 6: EBV VCA IgM Results						
	Consensus Predicate		**Plexus**			
Serostatus by Predicates		**n**	**Positive**	**Equivocal**	**Negative**	**% Agreement**
No Infection	Negative	225	0	0	225	100%(225/225), 95% CI:98.3-100%
No Infection	No consensus[1]	1	0	0	1	NA
Indeterminate	Positive	13	13	0	0	81.3%(13/16), 95% CI:57.0-93.4%
Indeterminate	Negative	49	1	0	48	98%(48/49), 95% CI:89.3-99.6%
Indeterminate	No consensus[1]	3	0	0	3	NA

[1] No consensus results: the combination of three predicates could not yield a conclusive result for these samples – a 2/3 majority could not be obtained.

Prospective Population Samples: Plexus EBV vs. Heterophile Rapid Test for Heterophile IgM analyte (by Serological Status) *(N = 723)*

Samples were collected and tested by the Northeast investigator *(n = 350)*, Mid-West investigator *(n=249)*, and Focus *(n=124)*.

The following table outlines the positive and negative percent agreements across various serological classifications for prospective samples for Heterophile IgM analyte when the Heterophile rapid test is used as predicate for Heterophile IgM analysis and consensus predicate is used for VCA IgM analysis.

Table 7: EBV Heterophile IgM Results							
		Predicate Heterophile Rapid Test		**Plexus**			
Serological Status by Predicates		Primary Acute	**n**	**Positive**	**Equivocal**	**Negative**	**% Agreement**
Acute	Primary Acute	Positive	51	48	0	3	94.1%(48/51), 95% CI:84.1-98%
		Equivocal	0	0	0	0	NA
		Negative	9	1	0	8	88.9%(8/9), 95% CI:56.5-98%
	Late Acute	Positive	5	2	0	3	40%(2/5), 95% CI:11.8-76.9%
		Equivocal	0	0	0	0	NA
		Negative	67	1	0	66	98.5%(66/67), 95% CI:92-99.7%
Recovering		Positive	0	0	0	0	NA
		Equivocal	0	0	0	0	NA
		Negative	1	0	0	1	100%(1/1), 95% CI:20.7-100%
Previous Infection		Positive	0	0	0	0	NA
		Equivocal	0	0	0	0	NA
		Negative	298	2	0	296	99.3%(296/298), 95% CI:97.6-99.8%
No Infection		Positive	0	0	0	0	NA
		Equivocal	0	0	0	0	NA
		Negative	227	3	0	224	98.7%(224/227), 95% CI:96.2-99.5%
Indeterminate		Positive	19	10	0	9	52.6%(10/19), 95% CI:31.7-72.7%
		Equivocal	0	0	0	0	NA
		Negative	46	0	0	46	100%(46/46), 95% CI:92.3-100%

Presumed Acute Retrospective Samples: Plexus EBV vs. Consensus Predicate for VCA IgM analyte
Samples were collected and tested by Mid-West investigator (n=150).

The following table outlines the positive and negative percent agreements for retrospective samples for VCA IgM analyte when the consensus predicate is used for VCA IgM analysis.

Table 7: EBV VCA IgM Results

Consensus Predicate		Plexus			
	n	Positive	Equivocal	Negative	% Agreement
Positive	143	140	0	3	97.2%(140/144), 95% CI:93.1-98.9%
Negative	5	3	0	2	33.3%(2/6), 95% CI:9.7-70.0%
No consensus[1]	2	1	0	1	NA

[1] No consensus results: the combination of three predicates could not yield a conclusive result for these samples – a 2/3 majority could not be obtained.

Presumed Acute Retrospective Samples: Plexus EBV vs. Heterophile Rapid Test for Heterophile IgM analyte
Samples were collected and tested by Mid-West investigator *(n=150)*.

The following table outlines the positive and negative percent agreements for retrospective samples for Heterophile IgM analyte when the Heterophile rapid test is used as predicate for Heterophile IgM analysis and consensus predicate is used for VCA IgM analysis.

Table 8: EBV Heterophile Results

Predicate Rapid Test		Plexus			
	n	Positive	Equivocal	Negative	% Agreement
Positive	112	98	3	11	87.5%(98/112), 95% CI:80.1-92.4%
Negative	38	3	0	35	92.1%(35/38), 95% CI:79.2-97.3%

Presumed Acute Retrospective Samples: Plexus EBV vs. Consensus Predicate for VCA IgM analyte (by Serological Status)
Samples were collected and tested by Mid-West investigator *(n=150)*.

The following table outlines the positive and negative percent agreements across various serological classifications for retrospective samples for VCA IgM analyte when the consensus predicate is used for VCA IgM analysis.

Table 9: EBV VCA IgM Results

Serological Status by Predicates		Consensus Predicate	n	Plexus			% Agreement
				Positive	Equivocal	Negative	
Acute	Primary Acute	Positive	104	103	0	1	99%(103/104), 95% CI:94.8-99.8%
		Negative	1	0	0	1	50%(1/2), 95% CI:9.5-90.5%
		No consensus[1]	1	1	0	0	NA
	Late Acute	Positive	8	7	0	1	87.5%(7/8), 95% CI:52.9-97.8%
		Negative	0	0	0	0	NA
		No consensus	0	0	0	0	NA
No Infection		Positive	0	0	0	0	NA
No Infection		Negative	2	1	0	1	50%(1/2), 95% CI:9.5-90.5%
No Infection		No consensus	0	0	0	0	NA
Indeterminate		Positive	31	30	0	1	93.8%(30/32), 95% CI:79.9-98.3%

Table 9: EBV VCA IgM Results						
	Consensus Predicate		Plexus			
Serological Status by Predicates		n	Positive	Equivocal	Negative	% Agreement
Indeterminate	Negative	2	2	0	0	0%(0/2), 95% CI:0-65.8%
Indeterminate	No consensus[1]	1	0	0	1	NA

[1] No consensus results: the combination of three predicates could not yield a conclusive result for these samples – a 2/3 majority could not be obtained.

Presumed Acute Retrospective Samples: Plexus EBV vs. Heterophile Rapid Test for Heterophile IgM analyte (by Serological Status)

Samples were collected and tested by Mid-West investigator *(n=150)*.

The following table outlines the positive and negative percent agreements across various serological classifications for retrospective samples for Heterophile IgM analyte when the Heterophile rapid test is used as predicate for Heterophile IgM analysis and consensus predicate is used for VCA IgM analysis.

Table 10: EBV Heterophile IgM Results							
		Predicate Heterophile Rapid Test		Plexus			
Serological Status by Predicates			n	Positive	Equivocal	Negative	% Agreement
Acute	Primary Acute	Positive	87	75	2	10	86.2%(75/87), 95% CI:77.4-91.9%
		Negative	19	2	0	17	89.5%(17/19), 95% CI:68.6-97.1%
	Late Acute	Positive	3	2	0	1	66.7%(2/3), 95% CI:20.8-93.9%
		Negative	5	0	0	5	100%(5/5), 95% CI:56.6-100%
No Infection		Positive	0	0	0	0	NA
No Infection		Negative	2	0	0	2	100%(2/2), 95% CI:34.2-100%
Indeterminate		Positive	22	21	1	0	95.5%(21/22), 95% CI:78.2-99.2%
Indeterminate		Negative	12	1	0	11	91.7%(11/12), 95% CI:64.6-98.5%

Inter-laboratory, Intra-assay and Inter-assay Reproducibility

The inter/intra-assay reproducibility and the inter-laboratory reproducibility testing were performed at three laboratories. Each of the three laboratories tested twelve samples in triplicate on five different days. The results of the study are summarized in the table below.

Table 11: Inter-laboratory, Intra-assay and Inter-assay Reproducibility											
Plexus VCA IgM						Plexus Heterophile Antibody					
ID	Intra-assay & Inter-assay %CV			Inter-Lab		ID	Intra-assay & Inter-assay %CV			Inter-Lab	
	Mean Index	Intra-assay	Inter-assay	Mean Index	% CV		Mean Index	Intra-assay	Inter-assay	Mean Index	% CV
6	4.48	2.2%	13.7%	4.48	8.8%	6	6.12	3.0%	16.7%	6.12	14.1%
5	2.67	4.2%	15.0%	2.67	10.0%	2	4.46	3.8%	15.8%	4.46	10.2%
2	2.08	2.4%	18.7%	2.08	16.3%	4	2.19	5.0%	13.8%	2.19	1.9%
4	1.24	3.6%	13.2%	1.24	6.7%	3	1.20	6.1%	15.8%	1.20	5.2%
12	1.12	4.4%	25.3%	1.12	9.0%	13	0.74	6.4%	14.0%	0.74	7.2%
8	0.98	5.2%	22.1%	0.98	16.0%	8	0.55	5.7%	12.8%	0.55	3.3%
3	0.77	6.1%	28.2%	0.77	24.3%	5	0.27	8.3%	47.2%	0.27	47.8%
13	0.59	6.1%	46.8%	0.59	51.8%	11	0.14	5.6%	20.2%	0.14	3.8%

1	0.16	4.5%	68.4%	0.16	67.7%	7	0.04	8.5%	55.6%	0.04	9.0%
11	0.07	7.3%	122.4%	0.07	52.5%	12	0.04	10.5%	47.4%	0.04	23.6%
7	0.06	8.7%	45.6%	0.06	20.4%	1	0.03	7.0%	77.7%	0.03	47.8%

Inter-Lot Reproducibility

The inter-lot reproducibility was evaluated with eleven (11) samples in triplicates on three (3) lots of Plexus EBV kit. The results of the study are summarized in the table below.

Table 12: Inter-lot Reproducibility

Plexus VCA IgM			Plexus Heterophile Antibody		
ID	Mean Index	%CV	ID	Mean Index	%CV
6	4.64	5.2%	6	5.65	3.8%
5	2.83	7.6%	2	4.42	4.5%
2	2.09	6.0%	4	2.05	4.3%
4	1.13	5.0%	3	1.12	5.6%
8	0.87	16.9%	13	0.78	7.2%
12	0.84	17.5%	8	0.54	10.6%
3	0.71	17.1%	5	0.44	37.9%
13	0.60	24.4%	11	0.13	8.4%
7	0.05	19.4%	7	0.04	14.8%
11	0.05	16.0%	12	0.04	20.4%
1	0.04	19.3%	1	0.03	18.8%

Cross-Reactivity

A cross-reactivity study was performed to determine if samples from various disease states and other potentially cross-reactivity factors interfere with test results when tested with the Plexus EBV IgM kit. A panel of (Antinuclear Antibody test (ANA) n=28, Cytomegalovirus (CMV) n=25, Herpes Simplex Virus-1 (HSV-1) and Herpes Simplex Virus-2 (HSV-2) n =2, Rheumatoid Factor (Rh) n=29, Rubella Virus n=5, and Varicella-Zoster Virus (VZV) n=42). samples for each cross reactant were evaluated for possible cross reactivity with the Plexus EBV IgM kit for each of the two (VCA and Heterophile) IgM analyte. The test samples were also evaluated on commercially available ELISA and heterophile rapid test. The majority of all samples that elicit a negative result were also confirmed negative by the corresponding commercially available tests, showing that the Plexus EBV IgM kit did not have additional cross-reactivity

Table 13: Cross-Reactivity

Cross Reactives	N	Method	EBV VCA IgM			EBV Heterophile		
			Positive	Equivocal	Negative	Positive	Equivocal	Negative
ANA	28	Plexus	0	2	26	0	0	28
		ELISA	0	0	28	0	0	28
		Discrepants	2^2			0		
Cytomegalovirus (CMV)	25	Plexus[4]	2	1	21	0	0	24
		ELISA	1	0	24	0	0	25
		Discrepants	5^1			1^4		
HSV 1 & HSV 2	2	Plexus	0	0	2	0	0	2
		ELISA	0	0	2	0	0	2
		Discrepants	0			0		
Rheumatoid Factor (Rh)	29	Plexus	4	0	25	0	0	29
		ELISA	0	0	29	0	0	29

		Discrepants	4			0		
Rubella	5	Plexus	0	0	5	0	0	5
		ELISA	0	0	5	0	0	5
		Discrepants	0			0		
Varicella-zoster (VZV)	42	Plexus	2	1	39	2	0	40
		ELISA	1	2	39	2	0	40
		Discrepants	3[3]			0		

[1]One Equivocal Sample; [2]Two Equivocal Samples; [3]Three Equivocal Samples; [4] One Invalid Sample

Sample Storage and Handling

Fifteen (15) negative and positive for EBV IgM samples were used to assess the reactivity of unfrozen sample against samples that were frozen and thawed for up to five cycles. No effect was observed for any of the freeze-thaw cycling in either the positive or negative sample.

Interference

The test performance was evaluated with the presence of interfering substances. Four samples, two positive and two negative for EBV VCA IgM and heterophile antibody by Plexus EBV IgM were used in the study. Baseline EBV IgM levels were established for each sample before interferents were added. Two concentration levels of each interferent were used: triglycerides (1 mg/mL and 10 mg/mL), albumin (6 mg/mL and 60 mg/mL), bilirubin (0.02 mg/mL and 0.2 mg/mL), and hemoglobin (22 mg/mL and 220 mg/mL) The higher interferent concentrations represent levels that exceed the expected human range. All samples were evaluated to determine if these interfering substances affect the assay. No interference was observed for any of the substances in either the positive or negative sample.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
2098 Gaither Road
Rockville MD 20850

Focus Diagnostics, Inc.
C/O Deborah Morris
10703 Progress Way
Cypress, California 90630

AUG - 4 2008

Re: k073381
Trade/Device Name: Plexus EBV IgM Multi-Analyte Diagnostics
Regulation Number: 21 CFR 866.3235
Regulation Name: Epstein-Barr Virus Serological Reagents
Regulatory Class: Class I
Product Code: LJN
Dated: November 30, 2007
Received: December 3, 2007

Dear Ms. Morris:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); and good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820). This letter will allow you to begin marketing your device as described in your Section 510(k) premarket

notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of In Vitro Diagnostic Device Evaluation and Safety at (240) 276-0450. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). For questions regarding postmarket surveillance, please contact CDRH's Office of Surveillance and Biometric's (OSB's) Division of Postmarket Surveillance at (240) 276-3474. For questions regarding the reporting of device adverse events (Medical Device Reporting (MDR)), please contact the Division of Surveillance Systems at (240) 276-3464. You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (240) 276-3150 or at its Internet address http://www.fda.gov/cdrh/industry/support/index.html.

Sincerely yours,

Sally A. Hojvat, M.Sc., Ph.D.
Director
Division of Microbiology Devices
Office of *In Vitro* Diagnostic Device Evaluation and Safety
Center for Devices and Radiological Health

Enclosure

510(k) Number (if known): K073381

Device Name: Plexus EBV IgM Multi-Analyte Diagnostics

Indications for Use: Focus Diagnostics' Plexus™ EBV IgM Multi-Analyte Diagnostics test kit is intended for qualitatively detecting the presence or absence of human IgM class antibodies to viral capsid antigen (VCA), and heterophile antibodies in human sera. The test is indicated as an aid in the diagnosis of EBV infection and EBV-associated infectious mononucleosis.

The performance of this assay has not been established for use in the diagnosis of nasopharyngeal carcinoma and Burkitt's lymphoma, for testing of immunocompromised patients, for use by a point of care facility or for use with automated equipment. This assay has not been evaluated for donor screening.

Prescription Use ____X____ AND/OR Over-the-Counter Use _____
(Part 21 CFR 801 Subpart D) (21 CFR 807 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Devices (OIVD)

Division Sign-Off

Office of In Vitro Diagnostic Device
Evaluation and Safety

(Optional) K073381