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BIOPLEX 2200 MMRV IgG 510(k) SUMMARY

MAR 29 2010

This summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of SMDA 1990 and 21 CFR 807.92.

510(k) Number	510(k) Summary Report Date
K091616	March 25, 2010

MANUFACTURER INFORMATION

Manufacturer	
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CLASSIFICATION INFORMATION

Classification Name	Multiplex immunoassay for measles virus, mumps virus, rubella and varicella zoster virus
Common Name:	Multi-Analyte Detection System – MMRV IgG
Product Trade Name	BioPlex 2200 MMRV IgG on the BioPlex 2200 Multi-Analyte Detection System
Device Class	Class II
Classification Panel	Microbiology
Regulation Number	866.3520
Product Code	OPL

LEGALLY MARKETED EQUIVALENT (SE) DEVICES

Comparative FDA Cleared PREDICATE DEVICE	**510(k) Number**	**Decision Date**
BioMerieux VIDAS Measles IgG (MSG)	510(k) Exempt	N/A
BioMerieux VIDAS Mumps IgG (MPG)	510(k) Exempt	N/A
Bio-Rad Rubella IgG EIA	K961053	9/14/1996
BioMerieux VIDAS Varicella-Zoster IgG (VZV)	k923122	10/26/1992

DEVICE DESCRIPTION

The BioPlex 2200 MMRV IgG kit uses multiplex flow immunoassay, a methodology that greatly resembles traditional EIA, but permits simultaneous detection and identification of many antibodies in a single tube. Four (4) different populations of dyed beads are coated with antigens to identify the presence of IgG class antibodies associated with Measles, Mumps, Rubella and Varicella-zoster. The BioPlex 2200 System combines an aliquot of patient sample, sample diluent, and bead set reagent into a reaction vessel. The mixture is incubated at 37°C. After a wash cycle, anti-human IgG antibody, conjugated to phycoerythrin (PE), is added to the dyed beads and this mixture is incubated at 37°C. The excess conjugate is removed in another wash cycle, and the beads are re-suspended in wash buffer. The bead mixture then passes through the detector.

The identity of the dyed beads is determined by the fluorescence of the dyes, and the amount of antibody captured by the antigen is determined by the fluorescence of the attached PE. Raw data is calculated in relative fluorescence intensity (RFI). Three additional dyed beads, an Internal Standard Bead (ISB), a Serum Verification Bead (SVB) and a Reagent Blank Bead (RBB) are present in each reaction mixture to verify detector response, the addition of serum to the reaction vessel and the absence of significant non-specific binding in serum.

The instrument is calibrated using a set of three (3) distinct calibrator vials, supplied separately by Bio-Rad Laboratories.

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KIT COMPONENTS
BioPlex 2200 MMRV IgG Reagent Pack (665-2450). The reagent pack contains supplies sufficient for 100 tests.

Vial	Description
Bead Set	One (1) 10 mL vial, containing dyed beads coated with Measles (Rubeola), Mumps, Rubella, and VZV antigens plus an Internal Standard bead (ISB), a Serum Verification bead (SVB), and a Reagent Blank bead (RBB) in buffer with Glycerol and protein stabilizers (bovine). ProClin™ 300 (0.3%), sodium benzoate (0.1%) and sodium azide (< 0.1%) as preservatives.
Conjugate	One (1) 5 mL vial, containing phycoerythrin conjugated murine monoclonal anti-human IgG antibody and phycoerythrin conjugated murine monoclonal anti-human FXIII antibody, in buffer with protein stabilizers (bovine). ProClin™ 300 (0.3%), sodium benzoate (0.1%) and sodium azide (< 0.1%) as preservatives.
Sample Diluent	One (1) 10 mL vial, containing buffer with protein stabilizers (bovine and murine). ProClin™ 300 (0.3%), sodium benzoate (0.1%) and sodium azide (< 0.1%) as preservatives.

ADDITIONAL REQUIRED ITEMS, AVAILABLE FROM BIO-RAD

Catalog #	Description
663-2400	BioPlex 2200 MMRV IgG Calibrator Set: Three (3) 0.5 mL vials, each containing human IgG antibodies to Measles, Mumps, Rubella, and VZV, in a human serum matrix made from defibrinated plasma. All antibodies are derived from human disease state plasma. All calibrators contain ProClin™ 300 (0.3%), sodium benzoate (0.1%) and sodium azide (< 0.1%) as preservatives
663-2430	BioPlex 2200 MMRV IgG Control Set: Two (2) 1.5 mL Positive Control serum vials, each containing human IgG antibodies to Measles, Mumps, Rubella, and VZV, in a human serum matrix made from defibrinated plasma; and two (2) 1.5 mL Negative Control serum vials, in a human serum matrix made from defibrinated plasma. All antibodies are derived from human disease state plasma. All controls contain ProClin™ 300 (0.3%), sodium benzoate (0.1%) and sodium azide (< 0.1%) as preservatives.
660-0817	BioPlex 2200 System Sheath Fluid: Two (2) 4 L bottles containing Phosphate Buffered Saline (PBS). ProClin® 300 (0.3%) and Sodium azide (0.1%) as preservatives.
660-0818	BioPlex 2200 System Wash Solution: One (1) 10 L bottle containing Phosphate Buffered Saline (PBS) and Tween 20. ProClin® 300 (0.3%) and Sodium azide (0.1%) as preservatives.
660-0000	BioPlex 2200 Instrument and Software.

INTENDED USE / INDICATIONS FOR USE
The BioPlex™ 2200 MMRV IgG kit is a multiplex flow immunoassay intended for the qualitative detection of IgG antibodies to Measles, Mumps, Rubella, and Varicella-zoster virus (VZV) in human serum and EDTA or heparinized plasma. The BioPlex 2200 MMRV IgG kit is intended for use with the Bio-Rad BioPlex 2200 System.

This kit is intended as an aid in the determination of serological status to Measles, Mumps, Rubella, and VZV. This kit is not intended for use in screening blood or plasma donors.

The performance of this assay has not been established for use in neonates, pediatrics and immunocompromised patients, or for use at point of care facilities.

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TECHNOLOGICAL CHARACTERISTICS

The following tables summarize similarities and differences between the BioPlex 2200 MMRV IgG and the predicate Measles IgG, Mumps IgG, Rubella IgG, and VZV IgG devices used in comparative studies with the BioPlex 2200 MMRV IgG Kit.

A. Measles IgG

Table: Similarities between reagents and materials - Measles

Similarities between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate Measles IgG ELFA**
Reagents	Sample Diluent, Wash Buffer	Sample Diluent, Wash.
Controls	Negative Control and Multi-Analyte Positive Control.	Negative Control and Positive Control.

Table: Similarities between reagents with regard to function and use - Measles

Similarities between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate Measles IgG ELFA**
Analyte Detection	Qualitative detection of IgG antibodies to Measles.	Qualitative detection of IgG antibodies to Measles.

Table: Differences between reagents and materials - Measles

Differences between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate Measles IgG ELFA**
Solid Phase	Bead reagent - dyed antigen coated beads.	60 – antigen coated Solid Phase Receptacle
Reagents	Conjugate: murine anti-human IgG / Phycoerythrin.	Conjugate: murine anti-human IgG conjugated to alkaline phosphatase, fluorescent substrate, and block/pre-wash
Sheath Fluid	Sheath Fluid is used to suspend the bead reagent and introduce it into the detector.	Not similar; not utilized by this assay.
Calibrator(s)	Calibrators.	Standard.

Table: Differences between reagents with regard to function and use - Measles

Differences between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate Measles IgG ELFA**
Analyte Detection	Qualitative multi-analyte detection of human IgG antibodies to Measles, Mumps, Rubella, and Varicella Zoster Virus.	Qualitative detection of human IgG antibodies to Measles.
Matrices	Serum, EDTA, or Heparinized Plasma.	Serum.

B. Mumps IgG

Table: Similarities between reagents and materials - Mumps

Similarities between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate Mumps IgG ELFA**
Reagents	Sample Diluent, Wash Buffer.	Sample Diluent, Wash.
Controls	Negative Control and Multi-Analyte Positive Control.	Negative Control and Positive Control.

Table: Similarities between reagents with regard to function and use - Mumps

Similarities between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate Mumps IgG ELFA**
Analyte Detection	Qualitative detection of IgG antibodies to Mumps.	Qualitative detection of IgG antibodies to Mumps.

Table: Differences between reagents and materials - Mumps

Differences between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate Mumps IgG ELFA**
Solid Phase	Bead reagent - dyed antigen coated beads.	60 – antigen coated Solid Phase Receptacle
Reagents	Conjugate: murine anti-human IgG / Phycoerythrin.	Conjugate: murine anti-human IgG conjugated to alkaline phosphatase, fluorescent substrate, and block/pre-wash
Sheath Fluid	Sheath Fluid is used to suspend the bead reagent and introduce it into the detector.	Not similar; not utilized by this assay.
Calibrator(s)	Calibrators.	Standard.

Table: Differences between reagents with regard to function and use - Mumps

Differences between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate Mumps IgG ELFA**
Analyte Detection	Qualitative multi-analyte detection of human IgG antibodies to Measles, Mumps, Rubella, and Varicella Zoster Virus.	Qualitative detection of human IgG antibodies to Mumps.
Matrices	Serum, EDTA, or Heparinized Plasma.	Serum.

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C. Rubella IgG

Table: Similarities between reagents and materials - Rubella

Similarities between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate Rubella IgG EIA**
Reagents	Sample Diluent, Wash Buffer.	Sample Diluent, Wash Concentrate.
Controls	Negative Control and multi-analyte Positive Control.	Negative Control, Low Positive Control, High Positive Control.
Calibrator(s)	Calibrators.	Calibrators.

Table: Similarities between reagents with regard to function and use - Rubella

Similarities between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate Rubella IgG EIA**
Analyte Detection	Qualitative detection of IgG antibodies to Rubella.	Qualitative detection of IgG antibodies to Rubella.

Table: Differences between reagents and materials - Rubella

Differences between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate Rubella IgG EIA**
Solid Phase	Bead reagent - dyed antigen coated beads.	96 well microplate – antigen coated microwells.
Reagents	Conjugate: murine anti-human IgG / Phycoerythrin.	Conjugate: goat anti-human IgG, Substrate, Stop Reagent.
Sheath Fluid	Sheath Fluid is used to suspend the bead reagent and introduce it into the detector.	Not similar; not utilized in EIA's.

Table: Differences between reagents with regard to function and use - Rubella

Differences between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate Rubella IgG EIA**
Analyte Detection	Qualitative, multi-analyte detection of human IgG antibodies to Measles, Mumps, Rubella, and Varicella Zoster Virus.	Qualitative, semi-quantitative, and quantitative detection of IgG antibodies to Rubella.
Matrices	Serum, EDTA, or Heparinized Plasma.	Serum.

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D. VZV IgG

Table: Similarities between reagents and materials - VZV

Similarities between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate VZV IgG ELFA**
Reagents	Sample Diluent, Wash Buffer.	Sample Diluent, Wash.
Controls	Negative Control and Multi-Analyte Positive Control.	Negative Control and Positive Control.

Table: Similarities between reagents with regard to function and use - VZV

Similarities between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate VZV IgG ELFA**
Analyte Detection	Qualitative detection of IgG antibodies to VZV.	Qualitative detection of IgG antibodies to VZV.

Table: Differences between reagents and materials - VZV

Differences between Components / Materials	**BioPlex 2200 MMRV IgG Kit**	**Predicate VZV IgG ELFA**
Solid Phase	Bead reagent - dyed antigen coated beads.	60 – antigen coated Solid Phase Receptacle
Reagents	Conjugate: murine anti-human IgG / Phycoerythrin.	Conjugate: murine anti-human IgG conjugated to alkaline phosphatase, fluorescent substrate, and block/pre-wash
Sheath Fluid	Sheath Fluid is used to suspend the bead reagent and introduce it into the detector.	Not similar; not utilized by this assay.
Calibrator(s)	Calibrators.	Standard.

Table: Differences between reagents with regard to function and use - VZV

Differences between Function and Use	**BioPlex 2200 MMRV IgG Kit**	**Predicate VZV IgG ELFA**
Analyte Detection	Qualitative multi-analyte detection of human IgG antibodies to Measles, Mumps, Rubella, and Varicella Zoster Virus.	Qualitative detection of human IgG antibodies to VZV.
Matrices	Serum, EDTA, or Heparinized Plasma.	Serum.

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PERFORMANCE SUMMARY

A. Expected Values

The prevalence and expected values for each of the MMRV IgG assays were determined in a prospective study using serum samples from pregnant women (N = 396); and serum samples with a Measles, Mumps, Rubella, or VZV IgG test ordered for routine testing. The routine testing population included samples from pre-employment screening (N=393) and samples from subjects with a Measles test ordered (N=197), Mumps test ordered (N=199), Rubella test ordered (N=199), or VZV Test ordered (N=195). Results are shown in the tables below.

Table: Pregnant Women

Result	N	Age	Pos (%)	Eqv (%)	Neg (%)
Measles IgG	59	14 - 20	56 (94.9%)	1 (1.7%)	2 (3.4%)
	336	21 - 47	305 (90.8%)	8 (2.4%)	23 (6.8%)
	396	Total*	362 (91.4%)	9 (2.3%)	25 (6.3%)
Mumps IgG	59	14 - 20	54 (91.5%)	1 (1.7%)	4 (6.8%)
	336	21 - 47	295 (87.8%)	10 (3.0%)	31 (9.2%)
	396	Total*	349 (88.1%)	11 (2.8%)	36 (9.1%)
Rubella IgG	59	14 - 20	57 (96.6%)	0 (0.0%)	2 (3.4%)
	336	21 - 47	314 (93.5%)	8 (2.4%)	14 (4.2%)
	396	Total*	372 (93.9%)	8 (2.0%)	16 (4.0%)
VZV IgG	59	14 - 20	51 (86.4%)	1 (1.7%)	7 (11.9%)
	336	21 - 47	296 (88.1%)	7 (2.1%)	33 (9.8%)
	396	Total*	348 (87.9%)	8 (2.0%)	40 (10.1%)

**The total includes one sample from a subject of unknown age.*

Note: Due to rounding, numbers across columns may not total 100%.

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Table: Measles, Mumps, Rubella, or VZV Test Ordered

Result	Gender	N	Age	Pos (%)	Eqv (%)	Neg (%)	Total N
Measles IgG	F	16	8 - 20	14 (87.5%)	1 (6.3%)	1 (6.3%)	590
	M	14	8 - 20	11 (78.6%)	0 (0.0%)	3 (21.4%)	
	F	232	21 - 87	209 (90.1%)	3 (1.3%)	20 (8.6%)	
	M	328	21 - 87	297 (90.5%)	12 (3.7%)	19 (5.8%)	
	Total			531 (90.0%)	16 (2.7%)	43 (7.3%)	
Mumps IgG	F	19	8 - 20	17 (89.5%)	2 (10.5%)	0 (0.0%)	592
	M	18	8 - 20	16 (88.9%)	0 (0.0%)	2 (11.1%)	
	F	270	21 - 87	239 (88.5%)	9 (3.3%)	22 (8.1%)	
	M	285	21 - 87	252 (88.4%)	11 (3.9%)	22 (7.7%)	
	Total			524 (88.5%)	22 (3.7%)	46 (7.8%)	
Rubella IgG	F	27	8 - 20	22 (81.5%)	0 (0.0%)	5 (18.5%)	592
	M	11	8 - 20	8 (72.7%)	2 (18.2%)	1 (9.1%)	
	F	311	21 - 87	278 (89.4%)	8 (2.6%)	25 (8.0%)	
	M	243	21 - 87	210 (86.4%)	10 (4.1%)	23 (9.5%)	
	Total			518 (87.5%)	20 (3.4%)	54 (9.1%)	
VZV IgG	F	18	8 - 20	14 (77.8%)	0 (0.0%)	4 (22.2%)	588
	M	19	8 - 20	13 (68.4%)	0 (0.0%)	6 (31.6%)	
	F	254	21 - 87	229 (90.2%)	5 (2.0%)	20 (7.9%)	
	M	297	21 - 87	270 (90.9%)	7 (2.4%)	20 (6.7%)	
	Total			526 (89.5%)	12 (2.0%)	50 (8.5%)	

Note: Due to rounding numbers across columns may not total 100%.

B. Reproducibility Studies

To assess reproducibility of each of the assays in the BioPlex 2200 MMRV IgG kit, a reproducibility panel was prepared at Bio-Rad Laboratories. The positive panel members were prepared by combining one or more antibody positive patient samples in 3 different matrices (serum, EDTA plasma, and sodium heparin plasma) with one or more of the 4 analytes contained in the BioPlex 2200 MMRV IgG (Measles, Mumps, Rubella, and VZV).The panel contained members with varying levels of antibodies to the analytes in the BioPlex 2200 MMRV IgG kit, and a positive control (antibody positive for all analytes). Reproducibility testing was performed at 3 U.S. clinical trial sites. Three lots of BioPlex 2200 MMRV IgG Reagent Packs, 3 lots of BioPlex 2200 MMRV IgG Calibrator Set and 3 lots of BioPlex 2200 MMRV IgG Control Set were used to evaluate reproducibility. Each site evaluated 1 lot of the BioPlex 2200 MMRV IgG kit. Each of the panel members and a positive and negative control was tested in quadruplicate on 1 run per day over 5 days at each of 3 sites (4 replicates x 1 run x 5 days = 20 replicates per panel member per site = 60 total replicates for 3 sites). The data were analyzed for intra-assay and inter-assay reproducibility according to the Clinical and Laboratory Standards Institute (CLSI) guidance EP15-A2 (Vol. 25, No. 17). The mean Antibody Index (AI), standard deviation (SD), and percent coefficient of variation (%CV) for each panel member were calculated. Serum results are shown in the tables below.

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Table: Reproducibility: BioPlex 2200 Measles IgG Serum

Measles IgG Panel Members	Sample N	Grand Mean (AI)	Within-Run		Between-Day		Between-Site*		Total	
			SD	%CV	SD	%CV	SD	%CV	SD	%CV
High Positive 1	60	2.5	0.112	4.4	0.138	5.5	0.185	7.3	0.256	10.2
High Positive 2	60	2.1	0.083	3.9	0.126	6.0	0.250	11.9	0.292	13.9
Low Positive 1	60	1.5	0.077	5.3	0.057	3.9	0.212	14.6	0.233	16.0
Low Positive 2	60	1.8	0.077	4.4	0.132	7.4	0.186	10.4	0.241	13.5
Near Cutoff 1	60	0.9	0.087	9.8	0.063	7.2	0.075	8.5	0.131	14.8
Near Cutoff 2	60	0.9	0.066	7.3	0.066	7.4	0.000	0.0	0.093	10.4
High Negative 1	60	0.7	0.042	5.7	0.035	4.8	0.065	8.8	0.085	11.5
High Negative 2	60	0.5	0.031	6.0	0.017	3.4	0.033	6.4	0.048	9.4
Positive Control	60	3.0	0.091	3.1	0.119	4.0	0.332	11.2	0.364	12.3

** Between site includes between lot variance.*

Table: Reproducibility: BioPlex 2200 Mumps IgG Serum

Mumps IgG Panel Members	Sample N	Grand Mean (AI)	Within-Run		Between-Day		Between-Site*		Total	
			SD	%CV	SD	%CV	SD	%CV	SD	%CV
High Positive 1	60	2.7	0.083	3.1	0.078	2.9	0.160	5.9	0.196	7.2
High Positive 2	60	3.1	0.108	3.4	0.104	3.3	0.283	9.0	0.321	10.2
Low Positive 1	60	1.7	0.060	3.6	0.044	2.6	0.058	3.5	0.094	5.7
Low Positive 2	60	1.7	0.062	3.6	0.069	3.9	0.075	4.3	0.119	6.9
Near Cutoff 1	60	0.8	0.047	5.6	0.035	4.2	0.024	2.8	0.064	7.6
Near Cutoff 2	60	0.9	0.044	5.0	0.022	2.5	0.042	4.8	0.065	7.4
High Negative 1	60	0.5	0.024	4.7	0.011	2.1	0.005	1.0	0.026	5.3
High Negative 2	60	0.7	0.036	5.3	0.036	5.3	0.026	3.8	0.057	8.4
Positive Control	60	2.6	0.061	2.4	0.069	2.7	0.169	6.6	0.193	7.5

** Between site includes between lot variance.*

Table: Reproducibility: BioPlex 2200 Rubella IgG Serum

Rubella IgG Panel Members	Sample N	Grand Mean (AI)	Within-Run		Between-Day		Between-Site*		Total	
			SD	%CV	SD	%CV	SD	%CV	SD	%CV
High Positive 1	60	1.9	0.083	4.4	0.051	2.7	0.163	8.7	0.190	10.1
High Positive 2	60	2.8	0.092	3.3	0.083	3.0	0.403	14.5	0.421	15.2
Low Positive 1	60	1.4	0.068	5.0	0.073	5.3	0.045	3.3	0.110	8.0
Low Positive 2	60	1.8	0.083	4.7	0.099	5.6	0.167	9.5	0.211	12.1
Near Cutoff 1	60	0.8	0.039	5.0	0.043	5.5	0.039	5.1	0.070	9.0
Near Cutoff 2	60	0.8	0.051	6.2	0.033	4.1	0.066	8.2	0.090	11.0
High Negative 1	60	0.5	0.029	5.4	0.016	3.0	0.048	9.0	0.058	10.9
High Negative 2	60	0.5	0.029	5.8	0.037	7.4	0.033	6.6	0.057	11.5
Positive Control	60	2.1	0.068	3.3	0.096	4.6	0.191	9.1	0.225	10.7

**Between site variance includes between lot variance.*

Table: Reproducibility: BioPlex 2200 VZV IgG Serum

VZV IgG Panel Members	Sample N	Grand Mean (AI)	Within-Run		Between-Day		Between-Site*		Total	
			SD	%CV	SD	%CV	SD	%CV	SD	%CV
High Positive 1	60	2.8	0.070	2.4	0.055	1.9	0.238	8.4	0.254	9.0
High Positive 2	60	3.5	0.083	2.4	0.103	3.0	0.323	9.3	0.349	10.0
Low Positive 1	60	1.1	0.047	4.3	0.069	6.3	0.058	5.3	0.101	9.3
Low Positive 2	60	1.2	0.055	4.5	0.064	5.2	0.000	0.0	0.084	6.8
Near Cutoff 1	60	0.8	0.039	4.9	0.067	8.5	0.000	0.0	0.077	9.8
Near Cutoff 2	60	1.0	0.049	4.7	0.075	7.3	0.000	0.0	0.090	8.7
High Negative 1	60	0.7	0.024	3.4	0.030	4.2	0.021	2.9	0.043	6.1
High Negative 2	60	0.5	0.035	7.3	0.051	10.6	0.022	4.7	0.066	13.6
Positive Control	60	2.4	0.058	2.4	0.062	2.5	0.174	7.1	0.194	7.9

** Between site includes between lot variance.*

C. Comparative Testing

Comparative Testing: Prospective

Performance of the MMRV IgG kit was evaluated against corresponding commercially available Measles, Mumps, Rubella, and VZV immunoassays. Serum samples from pregnant women (N = 396) and serum samples with a Measles, Mumps, Rubella, or VZV IgG test ordered (N = 1183) were tested at 3 U.S. clinical trial sites. Serum samples with a Measles, Mumps, Rubella, or VZV IgG test ordered included serum samples submitted for routine testing (N = 790) and serum samples for pre-employment evaluation (N = 393). Results for all populations are shown in the tables below. Equivocal results obtained for Mumps and Measles on the commercially available EIAs were further tested on two additional commercially available EIAs for consensus. The consensus results are presented in the tables for Mumps and Measles, below. Equivocal results obtained for Rubella on the commercially available EIA were re-tested on the commercially available EIA, following the manufacturer's recommendations. Re-test results are presented in the tables for Rubella, below.

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Table: Pregnant Women: BioPlex 2200 MMRV IgG vs. EIA (N = 396)

Pregnant Women			BioPlex 2200 MMRV IgG					
			Pos (+)	Eqv	Neg (-)	Total	Pos (+) % Agreement	Neg (-) % Agreement
Commercially Available EIA	Measles IgG	Pos (+)	362	9	9	380	93.3% (362/388)	100% (8/8)
		Eqv*	0	0	8	8		
		Neg (-)	0	0	8	8	95% CI 90.4 - 95.4%	95% CI 67.5 - 100%
		Total	362	9	25	396		
	Mumps IgG	Pos (+)	349	10	11	370	94.3% (349/370)	96.2% (25/26)
		Eqv*	0	0	0	0		
		Neg (-)	0	1	25	26	95% CI 91.5 - 96.3%	95% CI 81.1 - 99.3%
		Total	349	11	36	396		
	Rubella IgG	Pos (+)	369	6	2	377	97.9% (369/377)	73.7% (14/19)
		Eqv**	0	0	0	0		
		Neg (-)	3	2	14	19	95% CI 95.9 - 98.9%	95% CI 51.2 - 88.2%
		Total	372	8	16	396		
	VZV IgG	Pos (+)	348	8	4	360	95.1% (348/366)	100% (30/30)
		Eqv	0	0	6	6		
		Neg (-)	0	0	30	30	95% CI 92.4 - 96.9%	95% CI 88.6 - 100%
		Total	348	8	40	396		

** Results obtained by a consensus of two out of three commercially available EIAs.*

*** Result after re-testing with the commercially available EIA following the manufacturer's recommendations.*

Table: Test Ordered Samples: BioPlex 2200 MMRV IgG vs. EIA (N = 1183)

Measles, Mumps, Rubella, or VZV Test Ordered			BioPlex 2200 MMRV IgG					
			Pos (+)	Eqv	Neg (-)	Total	Pos (+) % Agreement	Neg (-) % Agreement
Commercially Available EIA	Measles IgG	Pos (+)	1042	25	26	1093	94.7% (1042/1100)	80.2% (65/81)
		Eqv*	2	2	7	11		
		Neg (-)	4	10	65	79	95% CI 93.2 - 95.9%	95% CI 70.3 - 87.5%
		Total	1048	37	98	1183		
	Mumps IgG	Pos (+)	1006	51	49	1106	90.4% (1006/1113)	91.0% (61/67)
		Eqv*	0	3	7	10		
		Neg (-)	1	5	61	67	95% CI 88.5 - 92.0%	95% CI 81.8 - 95.8%
		Total	1007	59	117	1183		
	Rubella IgG	Pos (+)	1060	30	27	1117	94.8% (1060/1118)	86.2% (56/65)
		Eqv**	0	0	1	1		
		Neg (-)	4	5	56	65	95% CI 93.3 - 96.0%	95% CI 75.7 - 92.5%
		Total	1064	35	84	1183		
	VZV IgG	Pos (+)	1047	16	36	1099	94.0% (1047/1114)	98.4% (60/61)
		Eqv	1	8	15	24		
		Neg (-)	0	0	60	60	95% CI 92.4 - 95.2%	95% CI 91.3 - 99.7%
		Total	1048	24	111	1183		

** Results obtained by a consensus of two out of three commercially available EIAs.*

*** Result after re-testing with the commercially available EIA following the manufacturer's recommendations.*

BIO-RAD

Comparative Testing: Retrospective

Performance of the MMRV IgG kit was evaluated against corresponding commercially available Measles, Mumps, Rubella, and VZV immunoassays using retrospective serum samples negative for antibodies to Measles (N = 93), Mumps (N = 96), Rubella (N = 268), or VZV (N = 143). The negative samples for Measles and Mumps were selected using a consensus of two out of three commercially available EIAs. Negative samples for Rubella and VZV were selected using the respective commercially available EIAs used for the comparative analysis. Results are shown in the table below.

Table: Retrospective Negative Samples: BioPlex 2200 MMRV IgG vs. EIA

Retrospective Measles, Mumps, Rubella, or VZV Negative Samples			BioPlex 2200 MMRV IgG				
			Pos (+)	Eqv	Neg (-)	Total	Neg (-) % Agreement
Commercially Available EIA	Measles IgG (N = 93)	Pos (+)	0	0	0	0	100% (93/93)
		Eqv	0	0	0	0	
		Neg (-)	0	0	93	93	95% CI
		Total	0	0	93	93	96.0 - 100%
	Mumps IgG (N = 96)	Pos (+)	0	0	6	6	100% (83/83)
		Eqv	0	0	7	7	
		Neg (-)	0	0	83	83	95% CI
		Total	0	0	96	96	95.6 - 100%
	Rubella IgG (N = 268)	Pos (+)	0	0	0	0	95.9% (257/268)
		Eqv	0	0	0	0	
		Neg (-)	3	8	257	268	95% CI
		Total	3	8	257	268	92.8 - 97.7%
	VZV IgG (N = 143)	Pos (+)	0	0	0	0	100% (143/143)
		Eqv	0	0	0	0	
		Neg (-)	0	0	143	143	95% CI
		Total	0	0	143	143	97.4 - 100%

BIO-RAD

Correlation with CDC Rubella Evaluation Serum Panel
The performance of the BioPlex 2200 MMRV IgG kit was assessed using a masked, characterized Rubella IgG serum panel from the CDC. The panel consisted of 82 positive samples and 18 negative samples. The results are presented as a means to convey further information on the performance of the test kit and do not imply endorsement of the assay by the CDC. Results are shown in the table below.

Table: Characteristics of CDC Rubella IgG Reference Sera (N = 100)

CDC Samples	Reference Result	BioPlex 2200 Pos (+)	BioPlex 2200 Neg (-)
Rubella IgG	Pos (+)	81	1*
	Neg (-)	0	18

** Note: The panel consisted of 100 specimens (50 pairs). There are 9 negative sera, resulting in 18 negative samples and 41 positive sera resulting in 82 positive samples. One of the positive samples tested negative for rubella with the BioPlex 2200 MMRV IgG kit while the other member of this pair tested positive.*

Correlation of the BioPlex 2200 MMRV IgG Rubella IgG Assay with the WHO Standard
Dilutions of the WHO anti-Rubella immunoglobulin, 1st International Standard, RUBI-1-94, in the range of 0 - 20 IU/ml, were analyzed with the BioPlex 2200 Rubella IgG assay. Results can be found in the table below.

Table: Rubella World Health Organization RUBI-1-94 Sample Evaluation

Expected IU/mL	BioPlex 2200	
	Measured Mean AI (1.0 AI= 10 IU/ml)	Mean Percent of Expected
0.0	0.0	--
5.0	0.6	121
7.5	0.8	109
10.0	1.0	99
12.5	1.1	91
15.0	1.3	88
17.5	1.4	82
20.0	1.6	80

CDC Rubella Low Positive Control Testing
A lyophilized CDC low positive control serum was prepared by and tested at one clinical trial site. The control was tested neat and diluted 1/2. Each dilution was run in duplicate. Results are shown in the table below.

Table: Mean Low-Titer Anti-Rubella Human Reference Serum
CDC Biological Standard Results (N = 2)

Dilution	Mean (AI)
Neat – Prepared per package insert	2.3
1/2 Dilution	1.4

BIO-RAD

D. Cross-Reactivity

A cross-reactivity study was performed to determine if samples from various disease states and other potentially cross-reacting agents interfere with test results when tested with the BioPlex 2200 MMRV IgG kit. Samples known to be positive for one of the thirteen potential cross-reactants listed in the table below were evaluated with the BioPlex 2200 MMRV IgG assays. Due to the high prevalence of IgG antibodies to Measles, Mumps, Rubella, and VZV in the population, and in order to properly evaluate the potential cross-reactivity, all samples were pre-tested by commercially available Measles, Mumps, Rubella and VZV assays and only those that tested negative by the commercially available assay were further tested by the BioPlex 2200 MMRV IgG kit. The table below summarizes negative agreement between the BioPlex 2200 MMRV IgG assays and the corresponding commercially available Measles, Mumps, Rubella and VZV assays within each of the thirteen cross-reactant panels. The results demonstrate that the various disease state samples evaluated do not cross-react with the 4 antigens in the BioPlex 2200 MMRV IgG kit. Please note that for HCV Ab and ANA IgG, potential cross-reactivity was not well assessed due to the limitation of the sample size tested.

Table: Cross-Reactivity

Potential Cross-Reactant	Number of Negative BioPlex 2200 Results / Number of Negative Commercially Available Assay Results							
	Measles		Mumps		Rubella		VZV	
	N	Negative Agreement	N	Negative Agreement	N	Negative Agreement	N	Negative Agreement
ANA IgG	5	5/5	5	5/5	2*	2/2	5	5/5
CMV IgG	10	10/10	10	10/10	10	10/10	10	10/10
EBV VCA IgG	10	10/10	10	10/10	10	10/10	10	10/10
HBsAb IgG	10	10/10	10	10/10	10	10/10	10	10/10
HCV Ab	3*	3/3	3*	3/3	1*	1/1	1*	1/1
HSV-1 IgG	10	10/10	10	10/10	10	10/10	10	10/10
HSV-2 IgG	10	10/10	10	10/10	10	10/10	10	10/10
Measles IgG	-	N/A	10	10/10	10	10/10	10	10/10
Mumps IgG	10	10/10	-	N/A	10	10/10	10	10/10
Parvovirus B19 IgG	10	10/10	10	10/10	10	10/10	10	10/10
Rubella IgG	10	10/10	10	10/10	-	N/A	10	10/10
Toxoplasma IgG	10	10/10	6	6/6	8	8/8	10	10/10
VZV IgG	10	10/10	10	10/10	10	10/10	-	N/A

** Potential cross-reactivity was not well assessed due to the limitation of the sample size tested.*

DEPARTMENT OF HEALTH & HUMAN SERVICES Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Mail Center-WO66-G609
Silver Spring, MD 20993-0002

Bio-Rad Laboratories, Inc.
c/o Mr. David Bhend
Regulatory Affairs Representative
Bio-Rad Laboratories – Redmond Operations
6565 185th Ave NE
Redmond, WA 98052

MAR 2 9 2010

Re: K091616
Trade/Device Name: BioPlex 2200 MMRV IgG on the BioPlex 2200 Multi-Analyte Detection System
Regulation Number: 21 CFR§ 866.3510
Regulation Name: Rubella Virus Serological Reagents
Regulatory Class: Class II
Product Code: OPL, LJB, LJY, LFY
Dated: March 25, 2010
Received: March 26, 2010

Dear Mr. Bhend:

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.

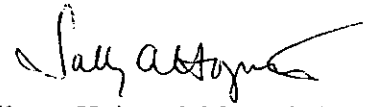
If your device is classified (see above) into class II (Special Controls), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements 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); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); 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 Parts 801 and 809), please contact the Office of *In Vitro* Diagnostic Device Evaluation and Safety at (301) 796-5450. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

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 (301) 796-7100 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

Indication for Use

510(k) Number (if known): k091616

Device Name: BioPlex 2200 MMRV IgG kit on the
BioPlex 2200 Multi-Analyte Detection System

Indication For Use:

The BioPlex™ 2200 MMRV IgG kit is a multiplex flow immunoassay intended for the qualitative detection of IgG antibodies to Measles, Mumps, Rubella, and Varicella-zoster virus (VZV) in human serum and EDTA or heparinized plasma. The BioPlex 2200 MMRV IgG kit is intended for use with the Bio-Rad BioPlex 2200 System.

This kit is intended as an aid in the determination of serological status to Measles, Mumps, Rubella, and VZV. This kit is not intended for use in screening blood or plasma donors.

The performance of this assay has not been established for use in neonates, pediatrics and immunocompromised patients, or for use at point of care facilities.

Prescription Use ___X___	And/Or	Over the Counter Use ____.
(21 CFR Part 801 Subpart D)		(21 CFR Part 801 Subpart C)

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

Concurrence of CDRH, Office of In Vitro Diagnostic Device Evaluation and Safety (OIVD)

Division Sign-Off
Office of In Vitro Diagnostic Device
Evaluation and Safety

510(k) k091616