APR 16 2008

510(K) SUMMARY OF SAFETY AND EFFECTIVENESS

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.

The assigned 510(k) number is: K071591.

Establishment:

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Prepared: April 15, 2008

Regulatory Information:

Trade Name:	RAMP® Influenza A/B Assay
Common Name:	Influenza A/B immunological test system
Classification Name:	Influenza A/B immunological test system
Regulation Number:	866.3330, Influenza virus serological reagents
Classification:	Class I
Product Code:	GNX
Panel:	Microbiology

Predicate Device:

Immunoassay:	BinaxNOW® Influenza A & B Test, (K062109), which is currently marketed by Binax, Inc.

Intended Use:

The RAMP® Influenza A/B Assay is a qualitative immunochromatographic assay used to identify the presence of Influenza A and Influenza B nucleoprotein antigens in nasal wash, nasal aspirate, nasopharyngeal aspirate, and nasopharyngeal swab specimens from symptomatic patients. It is an *in vitro* diagnostic assay that aids in the rapid differential diagnosis of influenza viral infections in symptomatic patients. A negative test is presumptive and it is recommended these results be confirmed by cell culture. Negative results do not preclude influenza virus infection and should not be used as the sole basis for treatment or other management decisions.

The test performance characteristics for Influenza B were established primarily with retrospective, frozen specimens. Users may wish to further evaluate the sensitivity performance of this test for Influenza B using fresh samples.

Description of the Device:

The RAMP Influenza A/B Assay is a qualitative immunochromatographic test that utilizes the RAMP 200 for the differential determination of Influenza A and Influenza B in nasal wash, nasal aspirate, nasopharyngeal aspirate, and nasopharyngeal swab samples. A wash/aspirate or swab sample is added to the Sample Buffer. The Sample Buffer is optimized to improve binding of the anti-influenza antibodies to the nucleoprotein antigens and reduce non-specific binding and fluorescent signal background. This sample is then mixed using the Assay Tip containing fluorescent-dyed particles conjugated to specific antibodies and applied into the sample well of the Test Cartridge. The sample migrates along the strip. Fluorescent-dyed particles coated with anti-Influenza A and anti-Influenza B antibodies bind to Influenza A or B antigens, respectively, if present in the sample. As the sample migrates along the strip, Influenza-bound particles are captured at either the Influenza A or the Influenza B detection zone, and excess fluorescent- dyed particles are captured at the internal standard zone.

The instrument then measures the amount of fluorescence emitted by the complexes at the two detection zones (Influenza A and Influenza B) and at the internal standard zone. The instrument calculates a ratio (RAMP Ratio) using the fluorescence reading of each detection zone (A or B) and the internal standard zone. The instrument compares these ratios to pre-defined threshold limits to determine a positive or negative result for Influenza A and Influenza B in the tested sample.

Comparison of Technological Characteristics:

The RAMP Influenza A/B Assay and BinaxNOW Influenza A & B Test are rapid immunochromatographic tests used for the detection of influenza virus antigen utilizing antibodies targeted toward the nucleoprotein (NP) of the virus and thus do not require viable virus particles for detection. The RAMP and BinaxNOW tests provide results in approximately 15 minutes. Viral cell culture relies on the growth of cell lines and their infection with virus contained in the clinical sample. The time required to get a definitive result using these culture methods can be up to 30 days depending on the samples and methods used.

The RAMP Influenza A/B Assay and BinaxNOW Influenza A & B Test are for use in the central laboratory, stat-lab and point-of-care facilities, while viral cell culture is for use in the central laboratories due to its requirement for specialized equipment and highly trained operators.

These methods are indicated for use in the differential determination of Influenza A and Influenza B in nasal wash/aspirate, nasopharyngeal aspirate, and nasopharyngeal swab samples.

Summary of Studies:

ANALYTICAL PERFORMANCE CHARACTERISTICS

Assay Precision

The total intra-assay and inter-assay precision of the RAMP Influenza A/B Assay was evaluated using a panel consisting of high negative Influenza A, Influenza A LoD (Limit of Detection) positive, Influenza A 2x LoD positive, high negative Influenza B, Influenza B LoD positive, and Influenza B 2x LoD positive samples. The influenza strains used to prepare the samples were Influenza A/Hong Kong/8/68 and Influenza B/Lee/40 following viral titer determinations. Multiple operators across multiple sites tested replicates of each sample on 5 different days. There was 100% (540/540) agreement with the expected test results for all specimens tested, with no significant differences within run (same operator on same day), between run, operators, or sites. The RAMP Flu A/B assay is a qualitative assay based on numerical RAMP Ratio values. The overall RAMP Ratio %CV across all sites ranged from 9.6% to 15.1% depending upon analyte type and concentration tested.

	Panel Member ID	Influenza A High Negative	Influenza A Low Positive	Influenza A Medium Positive	Influenza B High Negative	Influenza B Low Positive	Influenza B Medium Positive	Total Agreement All (%)
	Viral Titer (EID_{50}/mL)	50	300	600	60	316	632	
Site 1	Agreement with Expected result	30/30	30/30	30/30	30/30	30/30	30/30	180/180 (100%)
	% CV	11.6%	6.3%	7.9%	16.4%	8.9%	7.9%	
Site 2	Agreement with Expected result	30/30	30/30	30/30	30/30	30/30	30/30	180/180 (100%)
	% CV	7.7%	8.1%	9.3%	15.6%	9.5%	7.0%	
Site 3	Agreement with Expected result	30/30	30/30	30/30	30/30	30/30	30/30	180/180 (100%)
	% CV	14.5%	9.9%	13.5%	11.3%	9.5%	10.5%	
	Total Agreement with Expected result	90/90 (100%)	90/90 (100%)	90/90 (100%)	90/90 (100%)	90/90 (100%)	90/90 (100%)	540/540 (100%)
	95% CI	96%-100%	96%-100%	96%-100%	96%-100%	96%-100%	96%-100%	99%-100%
	Overall % CV	11.9%	10.4%	12.6%	15.1%	10.6%	9.6%	

Analytical Sensitivity

The RAMP Influenza A/B Assay was evaluated for analytical sensitivity after viral titer was determined by testing 2 strains of Influenza A (Hong Kong/8/68 and PR/8/34) and 2 strains of Influenza B (Lee/40 and Allen/45) at the Limit of Detection (LoD) concentration, the cut-off concentration, and at a high negative concentration in either VTM (Viral Transport Medium, to simulate a swab sample type) or PBS (Phosphate Buffered Saline, to simulate a wash sample type). Although the specific influenza strains causing infection in humans can vary year to year, all contain the conserved nucleoproteins targeted by the RAMP Influenza A/B Assay.[1] Analytical sensitivity (LoD) ranged from $3.0x10^2$ to $6.4x10^2$ EID_{50}/mL for the Influenza A strains and $2.8x10^2$ to $7.1x10^4$ EID_{50}/mL for the Influenza B strains in VTM and PBS.

Viral Strain	LoD Concentration
Influenza A/Hong Kong/8/68 (H3N2), ATCC VR-544 in VTM	3.0×10^2 EID_{50}/mL
Influenza A/Hong Kong/8/68 (H3N2), ATCC VR-544 in PBS	5.0×10^2 EID_{50}/mL
Influenza A/PR/8/34 (H1N1), ATCC VR-95 in VTM	2.0×10^2 EID_{50}/mL
Influenza A/PR/8/34 (H1N1), ATCC VR-95 in PBS	6.4×10^2 EID_{50}/mL
Influenza B/Lee/40, ATCC VR-101 in VTM	3.2×10^2 EID_{50}/mL
Influenza B/Lee/40, ATCC VR-101 in PBS	2.8×10^2 EID_{50}/mL
Influenza B/Allen/45, ATCC VR-102 in VTM	5.3×10^4 EID_{50}/mL
Influenza B/Allen/45, ATCC VR-102 in PBS	7.1×10^4 EID_{50}/mL

Analytical Reactivity

The RAMP Influenza A/B Assay was evaluated for analytical reactivity by testing 5 strains of Influenza A (FM/1/47, NWS/33, New Jersey/8/76, Aichi/2/68, and Victoria/3/75) and 3 strains of Influenza B (GL/1739/54, Taiwan/2/62, and Hong Kong/5/72) prepared in VTM at concentrations that would consistently give positive results. Five (5) replicates were tested for each viral strain. The viral titers of these influenza strains were determined prior to analytical sensitivity testing. Analytical reactivity was established for the 5 Influenza A and 3 Influenza B strains tested. The concentrations for reactivity ranged from $3.0x10^2$ to $3.0x10^3$ EID_{50}/mL for the Influenza A strains and $1.6x10^1$ to $9.5x10^3$ EID_{50}/mL for the Influenza B strains.

Strain	Reactivity Concentration	RAMP Result
Influenza A/FM/1/47 (H1N1) ATCC VR-97	3.0×10^3 EID_{50}/mL	100% Flu A Positive
Influenza A/NWS/33 (H1N1) ATCC VR-219	3.0×10^2 EID_{50}/mL	100% Flu A Positive
Influenza A/New Jersey/8/76 (H1N1), ATCC VR-897	3.0×10^2 EID_{50}/mL	100% Flu A Positive
Influenza A/Aichi/2/68 (H3N2) ATCC VR-547	9.0×10^2 EID_{50}/mL	100% Flu A Positive
Influenza A/Victoria/3/75 (H3N2), ATCC VR-822	9.0×10^2 EID_{50}/mL	100% Flu A Positive
Influenza B/GL/1739/54 ATCC VR-103	9.5×10^3 EID_{50}/mL	100% Flu B Positive
Influenza B/Taiwan/2/62 ATCC VR-295	1.6×10^1 EID_{50}/mL	100% Flu B Positive
Influenza B/Hong Kong/5/72 ATCC VR-823	6.3×10^3 EID_{50}/mL	100% Flu B Positive

Analytical Specificity (Potential Cross-Reactive Organisms)

The analytical specificity of the RAMP Influenza A/B Assay was determined by testing a panel consisting of 15 viruses and 17 bacteria that may be present in the nasal cavity or nasopharynx. Viral and bacterial isolates were tested at the concentrations listed after titer determination at n=3 replicates each. None of the organisms tested gave a positive result in the RAMP Influenza A/B Assay. Note: RAMP Influenza A/B Assay potential cross-reactivity with *Chlamydophilia pneumoniae* has not been determined.

Specificity; Potential Cross-Reactive Substances

Strain/Isolate	Concentration	RAMP Flu A result	RAMP Flu B result
Adenovirus, Type 1	10^5 $TCID_{50}$/mL	Negative	Negative
Adenovirus, Type 7a	$10^{5.15}$ $TCID_{50}$/mL	Negative	Negative
Respiratory Syncytial Virus (RSV)	10^5 $TCID_{50}$/mL	Negative	Negative
Human coronavirus, strain OC43	10^5 $TCID_{50}$/mL	Negative	Negative
Human coronavirus Strain 229E	$10^{5.23}$ $TCID_{50}$/mL	Negative	Negative
Cytomegalovirus	$10^{5.15}$ $TCID_{50}$/mL	Negative	Negative
Enterovirus, Type 71	$10^{5.15}$ $TCID_{50}$/mL	Negative	Negative
Epstein Barr Virus	10^5 $TCID_{50}$/mL	Negative	Negative
Measles	10^5 $TCID_{50}$/mL	Negative	Negative

Strain/Isolate	Concentration	RAMP Flu A result	RAMP Flu B result
Mumps virus	10^5 $TCID_{50}$/mL	Negative	Negative
Human Parainfluenza, Type 1	$10^{4.75}$ $TCID_{50}$/mL	Negative	Negative
Human Parainfluenza, Type 2	10^5 $TCID_{50}$/mL	Negative	Negative
Human Parainfluenza, Type 3	10^5 $TCID_{50}$/mL	Negative	Negative
Human metapneumovirus	10^5 $TCID_{50}$/mL	Negative	Negative
Human Rhinovirus, Strain 1A	10^5 $TCID_{50}$/mL	Negative	Negative
Bordetella pertussis	10^6 cfu/mL	Negative	Negative
Corynebacterium Sp.	10^6 cfu/mL	Negative	Negative
Escherichia coli	10^6 cfu/mL	Negative	Negative
Haemophilus influenzae	10^6 cfu/mL	Negative	Negative
Lactobacillus casei	10^6 cfu/mL	Negative	Negative
Legionella pneumophila	10^6 cfu/mL	Negative	Negative
Moraxella catarrhalis	10^6 cfu/mL	Negative	Negative
Mycobacterium tuberculosis avirulent	10^6 cfu/mL	Negative	Negative
Mycoplasma pneumoniae	10^6 cfu/mL	Negative	Negative
Neisseria menigitidis	10^6 cfu/mL	Negative	Negative
Neisseria sicca	10^6 cfu/mL	Negative	Negative
Psudomonas aeruginosa	10^6 cfu/mL	Negative	Negative
Streptococcus pneumoniae	10^6 cfu/mL	Negative	Negative
Streptococcus pyogenes (Group A)	10^6 cfu/mL	Negative	Negative
Streptococcus salivarius	10^6 cfu/mL	Negative	Negative
Staphylococcus epidermidis	10^6 cfu/mL	Negative	Negative
Staphylococcus aureus (Protein A producer)	10^6 cfu/mL	Negative	Negative

Interference

Whole blood and a number of other potentially interfering substances (medications and over the counter (OTC) products) that may be present naturally or artificially introduced in the nasal cavity or nasopharynx were evaluated in the RAMP Influenza A/B Assay. The substances were added to a negative sample (viral transport media), an Influenza A LoD positive sample, an Influenza A 2x LoD positive sample, an Influenza B LoD positive sample and an Influenza B 2x LoD positive sample and tested in the RAMP Influenza A/B Assay. The influenza strains used to prepare the samples were Influenza A/Hong Kong/8/68 and Influenza B/Lee/40 following titer determination. There was 100% agreement with expected results for all replicates (for n=3 replicates tested). None of the substances tested at the concentrations indicated interfered with the test results of negative and positive influenza samples in the RAMP Influenza A/B Assay. The RAMP Flu A/B assay is a qualitative assay based on numerical RAMP Ratio values. The Percent of Mean Control Ratio values were calculated using these RAMP Ratios.

Interfering Substances Study Results

Substance Tested	Conc. Tested	RAMP Results: Percent of Mean Control Ratio				
		Negative FluA / Flu B	Influenza A LoD	Influenza A 2x LoD	Influenza B LoD	Influenza B 2x LoD
Control (No interfering substance)	Not Applicable	100% / 100%	100%	100%	100%	100%

Substance Tested	Conc. Tested	RAMP Results: Percent of Mean Control Ratio				
		Negative FluA / Flu B	Influenza A LoD	Influenza A 2x LoD	Influenza B LoD	Influenza B 2x LoD
Fisherman's Friend Throat Drop	15% w/v	120% / 105%	101%	103%	99%	120%
Halls Throat Drop	15% w/v	96% / 104%	101%	111%	91%	111%
Cepacol Throat Drop	15% w/v	91% / 101%	98%	101%	105%	118%
4-Acetamidophenol	10 mg/mL	110% / 117%	99%	100%	104%	117%
Acetylsalicylic Acid	15 mg/mL	89% / 106%	98%	97%	110%	118%
Chloropheniramine	5 mg/mL	107% / 110%	101%	95%	112%	118%
Diphenylhydramine	5 mg/mL	109% / 126%	99%	100%	115%	116%
Phenylpropanolamine HCl	20 mg/mL	126% / 100%	91%	96%	113%	113%
Oseltamivir Phosphate (Tamiflu)	50 mg/mL	106% / 101%	105%	105%	106%	111%
Rimantadine HCl	500 ng/mL	103% / 103%	105%	94%	111%	113%
Ribavirin (Rebetol)	100 mg/mL	137% / 136%	111%	106%	118%	120%
Good and Kind Mouthwash	20% v/v	97% / 118%	97%	106%	99%	125%
Cepacol Mouth Wash	20% v/v	88% / 85%	103%	104%	98%	118%
Scope Mouthwash	20% v/v	88% / 99%	96%	94%	98%	112%
Rhinocort Nasal Spray	15% v/v	85% / 88%	109%	101%	90%	122%
Nasonex Nasal Spray	15% v/v	104% / 90%	103%	106%	92%	113%
Flonase Nasal Spray	15% v/v	103% / 104%	109%	100%	95%	113%
Oxymetazoline HCl	0.05% v/v	116% / 95%	101%	103%	97%	108%
Phenylephrine HCl	10 mg/mL	126% / 119%	101%	99%	106%	117%
Guaiacol Glycerol Ether (Benylin)	20 mg/mL	166% / 153%	118%	113%	118%	124%
Dextromethorphan	2 mg/mL	95% / 101%	115%	115%	126%	134%
Salbutamol Sulfate	400 ng/mL	102% / 92%	98%	99%	111%	116%

Substance Tested	Conc. Tested	RAMP Results: Percent of Mean Control Ratio				
		Negative FluA / Flu B	Influenza A LoD	Influenza A 2x LoD	Influenza B LoD	Influenza B 2x LoD
Whole Blood*	2% v/v	126% / 91%	75%	90%	106%	98%

*A warning is added to the package insert to reflect that samples contaminated with whole blood in greater concentrations (visibly bloody samples) may interfere in the interpretation of the assay.

Transport Media

Six commercially available and two clinical-site-prepared transport media were evaluated for compatibility in the RAMP Influenza A/B Assay by testing a negative sample (transport media only), an Influenza A LoD positive sample, an Influenza A 2x LoD positive sample, an Influenza B LoD positive sample, and an Influenza B 2x LoD positive sample in the RAMP Influenza A/B Assay. The influenza strains used to prepare the samples were Influenza A/Hong Kong/8/68 and Influenza B/Lee/40 following titer determination. The RAMP Flu A/B assay is a qualitative assay based on numerical RAMP Ratio values. The %CVs were calculated for the RAMP Ratios. None of the tested transport media interfered with the performance of the RAMP Influenza A/B Assay.

Transport Media Tested	RAMP Results				
	Negative	Influenza A LoD	Influenza A 2x LoD	Influenza B LoD	Influenza B 2x LoD
Copan Universal Transport Media (UTM)	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Remel M4 Media	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Remel M4-RT Media	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Remel M5 Media	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Starplex Transport Media	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Phosphate Buffered Saline (PBS) Solution	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Site B In-house Media	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Site A In-house Media	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
RAMP Ratio % CV	Flu A 19% Flu B 13%	4%	9%	7%	11%

Sample Collection Swabs

Four swab materials were evaluated for compatibility in the RAMP Influenza A/B Assay by testing a negative sample (swab alone with no virus present), an Influenza A low positive sample (LoD), an Influenza A positive sample (2x LoD), an Influenza B low positive sample (LoD), and an Influenza B positive sample (2x LoD) in the RAMP Influenza A/B Assay. The Flu strains used to prepare the samples were Influenza A/Hong Kong/8/68 and Influenza B/Lee/40 following titer

determination. Each swab was dosed with the appropriate sample and extracted into Copan Universal Transport media prior to testing in the RAMP Influenza A/B Assay. The RAMP Flu A/B assay is a qualitative assay based on numerical RAMP Ratio values. The %CVs were calculated based on the RAMP Ratios for the testing. The negative sample (swab alone) tested negative. At least 67% of each swab type inoculated with Influenza A or Influenza B at the LoD tested positive for the virus.

Note: In general, calcium alginate swabs are not recommended because they may be cytotoxic to cells and cause viral culture assay inhibition.[2].

Swab Material Tested	RAMP Results				
	Negative	Influenza A LoD	Influenza A 2x LoD	Influenza B LoD	Influenza B 2x LoD
Foam	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
Polyester	100% Neg	67% Flu A Pos	100% Flu A Pos	67 % Flu B Pos	100% Flu B Pos
Rayon	100% Neg	100% Flu A Pos	100% Flu A Pos	67 % Flu B Pos	100% Flu B Pos
Nylon	100% Neg	100% Flu A Pos	100% Flu A Pos	100% Flu B Pos	100% Flu B Pos
RAMP Ratio % CV	Flu A 17% Flu B 22%	15%	8%	29%	24%

CLINICAL PERFORMANCE

Method Comparison

The performance of the RAMP Influenza A/B Assay was compared to cell culture in a prospective study conducted as part of a multi-center trial in North America during the 2006-2007 influenza season when influenza A/H3 (36.5%) and A/H1 (63.5%) were the predominant Influenza A viruses in circulation.[3] Four independent laboratories (located in distinct geographic regions) evaluated the RAMP Influenza A/B Assay in parallel with cell culture. Eight hundred forty-four (844) fresh specimens (nasal wash/aspirate, nasopharyngeal aspirate, or nasopharyngeal swab samples) prospectively collected during the 2006-2007 influenza season were tested. Across the sites these samples were drawn from an approximately equal mix of pediatric (0 – 21 years) and adult patients (21+ years) with approximately equal numbers of male and female patients. The mean (standard deviation) age of the patients was 28.6 (30.7) years. In order to supplement the prospective study, performance of the RAMP Influenza A/B Test was also evaluated by two independent laboratories comparing to the original cell culture testing results (cell culture testing was performed using fresh specimens) on 75 retrospective frozen clinical nasopharyngeal swab samples and 130 retrospective frozen clinical wash/aspirate samples.

Prospective Testing

Sensitivity and Specificity by Age Relative to Culture – Fresh Nasopharyngeal Swab; Age 0-5

Prospective Fresh Nasopharyngeal Swab (Age 0-5)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	11	1	12	1	0	1
Negative	12	187	199	6	204	210
Total	23	188	211	7	204	211
			95% CI			**95% CI**
Sensitivity	11/12	91.7%	61.5-99.8%	1/1	100%	NA
Specificity	187/199	94.0%	89.7-96.8%	204/210	97.1%	93.9-98.9%

Sensitivity and Specificity by Age Relative to Culture - Fresh Nasopharyngeal Swab; Age 6-21

Prospective Fresh Nasopharyngeal Swab (Age 6-21)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	12	3	15	2	2	4
Negative	4	66	70	4	77	81
Total	16	69	85	6	79	85
			95% CI			**95% CI**
Sensitivity	12/15	80.0%	51.9-95.7%	2/4	50.0%	6.8-93.2%
Specificity	66/70	94.3%	86.0-98.4%	77/81	95.1%	87.8-98.6%

Sensitivity and Specificity by Age Relative to Culture - Fresh Nasopharyngeal Swab; Age 22-59

Prospective Fresh Nasopharyngeal Swab (Age 22-59)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	16	7	23	2	2	4
Negative	1	136	137	1	155	156
Total	17	143	160	3	157	160
			95% CI			**95% CI**
Sensitivity	16/23	69.6%	47.1-86.8%	2/4	50.0%	6.8-93.2%
Specificity	136/137	99.3%	96.0-100%	155/156	99.4%	96.5-100%

Sensitivity and Specificity by Age Relative to Culture – Fresh Nasopharyngeal Swab; Age ≥60

Prospective Fresh Nasopharyngeal Swab (Age ≥60)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	14	2	16	2	1	3
Negative	2	152	154	1	166	167
Total	16	154	170	3	167	170
			95% CI			**95% CI**
Sensitivity	14/16	87.5%	61.7-98.4%	2/3	66.7%	9.4-99.2%
Specificity	152/154	98.7%	95.4-99.8%	166/167	99.4%	96.7-100%

Sensitivity and Specificity by Age Relative to Culture - Fresh Wash/Aspirate; Age 0-5

Prospective Fresh Nasal Wash/Aspirate (Age 0-5)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	24	4	28	6	0	6
Negative	6	117	123	1	144	145
Total	30	121	151	7	144	151
			95% CI			**95% CI**
Sensitivity	24/28	85.7%	67.3-96.0%	6/6	100%	54.1-100%
Specificity	117/123	95.1%	89.7-98.2%	144/145	99.3%	96.2-100%

Sensitivity and Specificity by Age Relative to Culture - Fresh Wash/Aspirate; Age 6-21

Prospective Fresh Nasal Wash/Aspirate (Age 6-21)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	12	5	17	3	0	3
Negative	5	41	46	1	59	60
Total	17	46	63	4	59	63
			95% CI			**95% CI**
Sensitivity	12/17	70.6%	44.0-89.7%	3/3	100%	29.2-100%
Specificity	41/46	89.1%	76.4-96.4%	59/60	98.3%	91.1-100%

Sensitivity and Specificity by Age Relative to Culture - Fresh Wash/Aspirate; Age 22-59

Prospective Fresh Nasal Wash/Aspirate (Age 22-59)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	0	0	0	0	0	0
Negative	0	3	3	0	3	3
Total	0	3	3	0	3	3
			95% CI			**95% CI**
Sensitivity	0/0	NA	NA	0/0	NA	NA
Specificity	3/3	100%	29.2-100%	3/3	100%	29.2-100%

Sensitivity and Specificity by Age Relative to Culture - Fresh Wash/Aspirate; Age ≥60

Prospective Fresh Nasal Wash/Aspirate (Age ≥60)	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	0	0	0	0	0	0
Negative	0	1	1	0	1	1
Total	0	1	1	0	1	1
			95% CI			**95% CI**
Sensitivity	0/0	NA	NA	0/0	NA	NA
Specificity	1/1	100%	NA	1/1	100%	NA

Sensitivity and Specificity by Collection Type Relative to Culture - Fresh Nasopharyngeal Swab

Prospective Fresh Nasopharyngeal Swab	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	53	13	66	7	5	12
Negative	19	541	560	12	602	614
Total	72	554	626	19	607	626
			95% CI			**95% CI**
Sensitivity	53/66	80.3%	68.7-89.1%	7/12	58.3%	27.7-84.8%
Specificity	541/560	96.6%	94.8-97.9%	602/614	98.0%	96.6-99.0%

Sensitivity and Specificity by Collection Type Relative to Culture - Fresh Wash/Aspirate

Prospective Fresh Nasal Wash/Aspirate	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	36	9	45	9	0	9
Negative	11	162	173	2	207	209
Total	47	171	218	11	207	218
			95% CI			**95% CI**
Sensitivity	36/45	80.0%	65.4-90.4%	9/9	100%	66.4-100%
Specificity	162/173	93.6%	88.9-96.8%	207/209	99.0%	96.6-99.9%

Retrospective Testing

In order to supplement the prospective study, performance of the RAMP Influenza A/B Test was also evaluated by two independent laboratories comparing to the original cell culture testing results (cell cultures were performed originally using fresh specimens) on 75 retrospective frozen clinical nasopharyngeal swab samples and 130 retrospective frozen clinical wash/aspirate samples. The results of the retrospective clinical trials based on sample type are given in the following tables:

Retrospective Positive and Negative Percent Agreements by Collection Type Relative to Culture; Nasopharyngeal Swab

Retrospective Frozen Nasopharyngeal Swab	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	11	2	13	23	7	30
Negative	0	62	62	0	45	45
Total	11	64	75	23	52	75
			95% CI			**95% CI**
Positive Percent Agreement	11/13	84.6%	54.5-98.1 %	23/30	76.7%	57.7-90.1%
Negative Percent Agreement	62/62	100%	94.2-100%	45/45	100%	92.1-100%

Retrospective Positive and Negative Percent Agreements by Collection Type Relative to Culture; Wash / Aspirate

Retrospective Frozen Nasal Wash/Aspirate	RAMP Influenza A			RAMP Influenza B		
Tissue Culture	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
Positive	35	10	45	33	6	39
Negative	2	83	85	2	89	91
Total	37	93	130	35	95	130
			95% CI			**95% CI**
Positive Percent Agreement	35/45	77.8%	62.9-88.8%	33/39	84.6%	69.5-94.1%
Negative Percent Agreement	83/85	97.6%	91.8-99.7%	89/91	97.8%	92.3-99.7%

REFERENCES

[1] Storch GA, Rapid diagnostic tests for influenza. Current Opinion in Pediatrics 2003, 15:77-84.

[2] Lauer and Masters, Journal Clinical Microbiology, 1988 January; 26(1): 54–56

[3] Centers for Disease Control, Weekly Report: Influenza Summary Update, Week ending May 19, 2007 – Week 20

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
2098 Gaither Road
Rockville MD 20850

Mr. Ken Pilgrim
Director - Quality/Regulatory
Response Biomedical Corporation
100-8900 Glenlyon Parkway
Burnaby, B.C.
Canada V5J 5J8

APR 16 2008

Re: k071591
Trade/Device Name: RAMP® Influenza A/B Assay
Regulation Number: 21 CFR § 866.3330
Regulation Name: Influenza virus serological reagents
Regulatory Class: I
Product Code: GNX
Dated: April 3rd, 2008
Received: April 7th, 2008

Dear Mr. Pilgrim:

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

Statement of Indications for Use

Indications for Use

510(k) Number (if known): K071591

Device Name: RAMP® Influenza A/B Assay

Indications for Use:

The RAMP® Influenza A/B Assay is a qualitative immunochromatographic assay used to identify the presence of Influenza A and Influenza B nucleoprotein antigens in nasal wash, nasal aspirate, nasopharyngeal aspirate, and nasopharyngeal swab specimens from symptomatic patients. It is an in vitro diagnostic assay that aids in the rapid differential diagnosis of influenza viral infections in symptomatic patients. A negative test is presumptive and it is recommended these results be confirmed by cell culture. Negative results do not preclude influenza virus infection and should not be used as the sole basis for treatment or other management decisions.

The test performance characteristics for Influenza B were established primarily with retrospective, frozen specimens. Users may wish to further evaluate the sensitivity performance of this test for Influenza B using fresh samples.

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

Uwe Scherf

Division Sign-Off

Office of In Vitro Diagnostic Device Evaluation and Safety

510(k) K071591