510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY

I Background Information:

A 510(k) Number

K250398

B Applicant

Innovita (Tangshan) Biological Technology CO., LTD

C Proprietary and Established Names

Innovita Flu A/B Antigen Rapid Test

D Regulatory Information

Product Code(s)	Classification	Regulation Section	Panel
PSZ	Class II	21 CFR 866.3328 - Influenza Virus Antigen Detection Test System	MI - Microbiology

II Submission/Device Overview:

A Purpose for Submission:

The purpose of this submission is to request premarket notification 510(k) clearance for the Innovita Flu A/B Antigen Rapid Test for prescription use.

B Measurand:

Influenza type A and type B nucleoprotein antigens

C Type of Test:

Qualitative lateral flow immunoassay

III Intended Use/Indications for Use:

A Intended Use(s):

See Indications for Use below.

B Indication(s) for Use:

The Innovita Flu A/B Antigen Rapid Test is a rapid immunochromatographic assay for the qualitative detection of influenza A and B viral nucleoprotein antigens directly from nasopharyngeal swabs from patients with signs and symptoms of respiratory infection.

The test is intended for use as an aid in the differential diagnosis of acute influenza A and B viral infections. The test is not intended for the detection of influenza C viruses. Negative test results are presumptive and should be confirmed by viral culture or an FDA-cleared influenza A and B molecular assay. Negative test results do not preclude influenza viral infection and should not be used as the sole basis for treatment or other patient management decisions.

Performance characteristics for influenza A were established during the December 2023 and July 2024 influenza season when influenza A/H1N1pdm09, influenza A/H3N2 and influenza B/Victoria viruses were the predominant influenza viruses in circulation. When other influenza A viruses are emerging, performance characteristics may vary.

If an infection with a novel influenza A virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel virulent influenza viruses and sent to state or local health department for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.

C Special Conditions for Use Statement(s):

Rx - For Prescription Use Only

D Special Instrument Requirements:

Not applicable. There is no associated instrumentation as the test is visually read.

IV Device/System Characteristics:

A Device Description:

The Innovita Flu A/B Antigen Rapid Test is intended for the qualitative detection of Influenza Virus type A and Influenza Virus type B antigen directly from nasopharyngeal swab (NPS) specimen of symptomatic patients. The Innovita Flu A/B Antigen Rapid Test is validated for testing nasopharyngeal swab without transport media. The nasopharyngeal swab does not use biotin-streptavidin/avidin chemistry.

The test cassette in the test kit is assembled with a test strip in a plastic housing that contains a nitrocellulose membrane with three lines: two test lines (Flu A line and Flu B line) and a control line (C line).

Briefly, the NPS specimen is collected from symptomatic individuals using the supplied flocked swabs. Then, the lid of the tube containing the extraction diluent is unsealed and the swab is inserted into the tube. The swab tip should be completely immersed in the solution, and then stirred 10 - 15 times. The tube is squeezed when removing the swab to extract the contents of the swab. The tube containing the diluted specimen with the extraction diluent is then closed with a lid. Three (3) drops of the extracted specimen is added into the specimen well on the test cassette. After 10 – 30 minutes, the results are read visually.

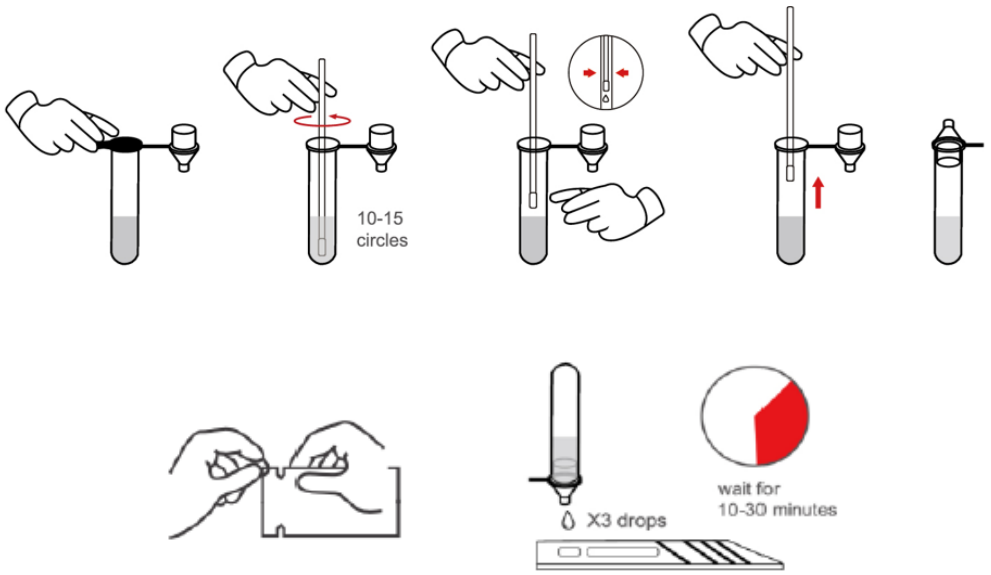

Figure 1: Pictorial description of the steps for Innovita Flu A/B Antigen Rapid Test

Kit Components

The Innovita Flu A/B Antigen Rapid Test consists of the following components:

- Test cassette
- Extraction diluent
- Swab
- Nasopharyngeal swab
- Package Insert
- Quick Reference Instructions (QRI)
- External Controls
    - Influenza A Positive Control
    - Influenza B Positive Control
    - Negative Control

B Principle of Operation:

The Innovita Flu A/B Antigen Rapid Test is a double antibody sandwich immunoassay-based test intended to detect influenza A and B viral nucleoprotein antigens in nasopharyngeal samples. The test device consists of the specimen zone and the test zone.

- *Specimen zone*: The specimen zone contains monoclonal antibody against the Flu A/Flu B antigen labeled with latex microspheres and chicken IgY antibody conjugated with latex microspheres.
- *Test zone*: The test line contains the other monoclonal antibody against Flu A/Flu B antigen. The control line contains rabbit anti-chicken IgY antibody.

A Interpretation of Results

The qualitative results of the Innovita Flu A/B Antigen Rapid Test are visually interpreted by the user.

1. ***Positive results***:
   The presence of two red-purple lines at the positions of Flu A and Control (C) in the result window indicates positive for Flu A antigen. The presence of two red-purple lines at the positions of Flu B and Control (C) indicates positive for Flu B antigen. The presence of three red-purple lines appear at the positions of Flu A, Flu B and Control (C) indicates positive for both Flu A antigen and Flu B antigen positive.
2. ***Negative results:***
   Only one red-purple line appearing at the control line (C) indicates negative result.
3. ***Invalid***

   If the control line (C) fails to appear, no matter whether the Flu A/Flu B line is visible or not, the test is invalid. Review the procedure and repeat the test with a new test device.

Examples of the positive, negative, and invalid results interpretations are provided below.

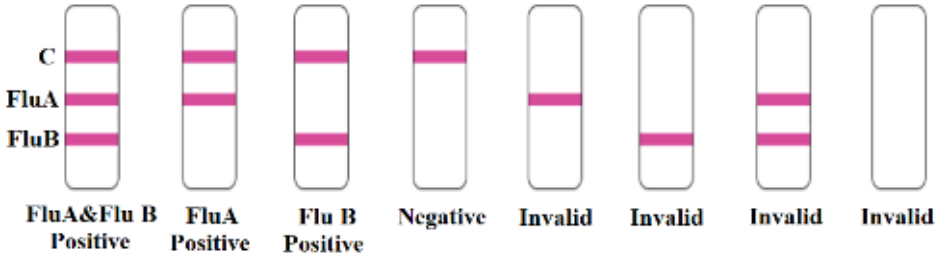

Figure 3: Pictorial representation of the Interpretation of Results for Innovita Flu A/B Antigen Rapid Test *(In this image, C = Control Line, Flu A = Influenza A Test Line, and Flu B = Influenza B Test Line*)

V Substantial Equivalence Information:

A Predicate Device Name(s):

CareStart Flu A&B Plus

B Predicate 510(k) Number(s):

K191514

C Comparison with Predicate(s):

Device & Predicate Device(s):	K191514 - CareStart Flu A&B Plus	K250398 - Innovita Flu A/B Antigen Rapid Test
General Device Characteristic Similarities		
Intended Use/Indications For Use	The CareStart Flu A&B Plus is an in vitro rapid immunochromatographic assay for the qualitative detection of influenza virus type A and B nucleoprotein	The Innovita Flu A/B Antigen Rapid Test is a rapid immunochromatographic assay for the qualitative detection of influenza A and B viral nucleoprotein antigens

	antigens directly nasopharyngeal swab specimens of symptomatic patients. The test is intended for use as an aid in the rapid differential diagnosis of acute influenza type A and B viral infections. This test is intended to distinguish between influenza type A and/or B virus in a single test. This test is not intended to detect influenza type C viral antigens. Negative test results are presumptive and should be confirmed by viral culture or an FDA-cleared influenza A and B molecular assay. Negative results do not preclude influenza virus infections and should not be used as the basis for treatment or other patient management decisions. Performance characteristics for influenza A and B were established during the 2018-2019 influenza season when influenza A/H3N2 and A/H1N1pdm09, and B/Victoria were the predominant influenza viruses in circulation. When other influenza viruses are emerging, performance characteristics may vary. If infection with a novel influenza virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be	directly from nasopharyngeal swabs from patients with signs and symptoms of respiratory infection. The test is intended for use as an aid in the differential diagnosis of acute influenza A and B viral infections. The test is not intended for the detection of influenza C viruses. Negative test results are presumptive and should be confirmed by viral culture or an FDA-cleared influenza A and B molecular assay. Negative test results do not preclude influenza viral infection and should not be used as the sole basis for treatment or other patient management decisions. Performance characteristics for influenza A were established during the December 2023 and July 2024 influenza season when influenza A/H1N1pdm09, influenza A/H3N2 and influenza B/Victoria viruses were the predominant influenza viruses in circulation. When other influenza A viruses are emerging, performance characteristics may vary. If infection with a novel influenza A virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel

	collected with appropriate infection control precautions for novel virulent influenza viruses and sent to the state or local health department for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to received and culture specimens.	virulent influenza viruses and sent to state or local health department for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.
Assay target	Influenza A and B nucleoprotein	Same
Intended matrix	Nasopharyngeal swabs	Same
Assay Format	Qualitative	Same
Technology	Immunochromatographic assay, lateral flow	Same
Detection Method	Visually read	Same
General Device Characteristic Differences		
Time to result	10 - 15 minutes	10 - 30 minutes

VI Standards/Guidance Documents Referenced:

Document Title	Issued by	Applicable study
Guidance: *Testing for Detection and Differentiation of Influenza A Virus Subtypes Using Multiplex Assays - Class II Special Controls Guidance for Industry and FDA Staff*	FDA/CDRH	All Studies
Guidance: *Establishing the Performance Characteristics of In Vitro Diagnostic Devices for the Detection or Detection and Differentiation of Influenza Viruses*	FDA/CDRH	All Studies
Guidance: *Testing for Biotin Interference in In Vitro Diagnostic Devices*	FDA/CDRH	Interference
Guideline: CLSI EP12 *Evaluation of Qualitative, Binary Output Examination Performance*	CLSI	All Studies
Guideline: CLSI EP07 *Interference Testing in Clinical Chemistry*	CLSI	Interference
Guideline: CLSI EP37-*Supplemental Tables for Interference Testing in Clinical Chemistry*	CLSI	Interference
Standard: ISO 14971-2019 *Medical devices - Application of risk management to medical devices*	ISO	All Studies Risk Management
Standard: ISO 11135:2014, *Sterilization of health care products - Ethylene oxide - Requirements for development, validation and routine control of a sterilization process for medical devices*	ISO	Sterility

Standard: ISO 11737-2:2020 *Sterilization of health care products — Microbiological methods*	ISO	Sterility
Standard: ISO 11135:2014, *Sterilization of health care products - Ethylene oxide - Requirements for development, validation and routine control of a sterilization process for medical devices*		
Standard: ISO 10993-7, *Biological Evaluation of Medical Devices – Part 7: Ethylene Oxide Sterilization Residuals*		
Standard: ISO 10993-1, *Biological Evaluation of Medical Devices – Part 1: Evaluation and testing within a risk management process*	ISO	Biocompatibility
Standard: ISO 10993-5, *Third edition, Biological evaluation of medical devices – Part 5: Tests for in vitro cytotoxicity*		
Standard: *ISO 10993-10, Third Edition, Biological evaluation of medical devices – Part 10: Tests for irritation and skin sensitization*		
Standard: *ISO 10993-11:2017, Biological evaluation of medical devices — Part 11: Tests for systemic toxicity*		
Standard: *ISO 10993-23:2021, Biological evaluation of medical devices — Part 23: Tests for irritation USP-NF (151) Pyrogen test*		

VII Performance Characteristics (if/when applicable):

A Analytical Performance:

1. Precision/Reproducibility:

A combined precision and reproducibility study was conducted for the Innovita Flu A/B Antigen Rapid Test. Three concentrations each of Flu A: H1N1 A/Dominican Republic/7293/2013 pdm09 and Flu B: Victoria/ B/Michigan/01/2021 were spiked into pooled nasal fluid of which 50 microliters (µL) of each sample were applied to dry nasal swabs to prepare the following test sample panel members:

1. Negative Sample
2. High Negative Sample at 0.1xLoD for each strain
3. Low Positive Sample at 1xLoD for each strain
4. Positive Sample at 3xLoD for each strain

The study was conducted at three (3) different sites to assess variability between days, runs, operators, reagent lots, and site, with the following study design: 3 sites x 2 operators per site x 1 lot per site x 5 days x 1 run x 5 replicates yielding 150 results/sample panel. Samples were blinded and randomized before allotting them to the operators and processed per the IFU of the candidate device.

The results were in 100% agreement with the expected results for negative, 1xLoD, and 3xLoD samples by lot/site, by operator, by day, and overall for both analytes. All results were negative when tested with high negative samples. The results are summarized below by lot/site and are presented as percent positive agreement.

Table 1.1. Precision – Reproducibility Study results

Sample	Positive Percent Agreement						Total Positive Percent Agreement (95% Confidence Intervals)	
	Site 1/Lot 1		Site 2/Lot 2		Site 3/Lot 3			
	Flu A	Flu B	Flu A	Flu B	Flu A	Flu B	Flu A	Flu B
Negative sample	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/150 (0%) (0%-2.5%)	0/150 (0%) (0%-2.5%)
Flu A high negative (0.1×LoD)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/150 (0%) (0%-2.5%)	0/150 (0%) (0%-2.5%)
Flu A low positive (1×LoD)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/50 (0%)	150/150 (100%) (97.5%-100%)	0/150 (0%) (0%-2.5%)
Flu A moderate positive (3×LoD)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/50 (0%)	150/150 (100%) (97.5%-100%)	0/150 (0%) (0%-2.5%)
Flu B high negative (0.1×LoD)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/50 (0%)	0/150 (0%) (0%-2.5%)	0/150 (0%) (0%-2.5%)
Flu B low positive (1×LoD)	0/50 (0%)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/150 (0%) (0%-2.5%)	150/150 (100%) (97.5%-100%)
Flu B moderate positive (3×LoD)	0/50 (0%)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/50 (0%)	50/50 (100%)	0/150 (0%) (0%-2.5%)	150/150 (100%) (97.5%-100%)

A separate precision study was conducted to assess the precision of the external controls that will be packaged with the test kit. Three lots of the external controls were tested with the following study design: 3 operators (1 lot per operator) x 1 day x 20 replicates.

Results were in 100% agreement with the expected results and are summarized below as positive percent agreement by lot/operator.

Table 1.2. Precision Study results for external controls

Sample	Positive Percent Agreement						Total Positive Percent Agreement (95% Confidence Intervals)	
	Lot 1		Lot 2		Lot 3			
	Flu A	Flu B	Flu A	Flu B	Flu A	Flu B	Flu A	Flu B
Negative control swab	0/20 (0%)	0/20 (0%)	0/20 (0%)	0/20 (0%)	0/20 (0%)	0/20 (0%)	0/60 (0%) (0%, 6.02%)	0/60 (0%) (0%, 6.02%)
Flu A positive control swab	20/20 (100%)	0/20 (0%)	20/20 (100%)	0/20 (0%)	20/20 (100%)	0/20 (0%)	60/60 (100%) (93.98%,100%)	0/60 (0%) (0%, 6.02%)
Flu B positive control swab	0/20 (0%)	20/20 (100%)	0/20 (0%)	20/20 (100%)	0/20 (0%)	20/20 (100%)	0/60 (0%) (0%, 6.02%)	60/60 (100%) (93.98%,100%)

2. Linearity:

Not applicable; the device is a qualitative assay with binary visually read results.

3. Analytical Specificity/Interference:

a) Cross Reactivity and Microbial Interference:

Cross reactivity and microbial interference studies were conducted to assess potential false positives or interference from other respiratory pathogens in nasal samples. A total of 49 potential cross reactive or interfering microorganisms were individually spiked into pooled nasal fluid with or without live influenza A or B at 2.5x LoD. Fifty (50) microliters of each sample was directly applied to the test swab and processed per the IFU. Each organism was tested in replicates of 3 using 3 different reagent lots.

Results are summarized in the table below. Neither cross-reactivity nor microbial interference was observed for any of the tested microorganisms at the concentration used in the study.

Table 2. Cross reactivity and microbial interference results

Microorganism	Concentration tested	Flu A positive swabs		Flu B positive swabs		Negative swabs	
		Positive rate		Positive rate		Positive rate	
		Flu A	Flu B	Flu A	FluB	Flu A	Flu B
Human rhinovirus 1A	6.6×10^6 PFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human parainfluenza virus 1 (HPIV-1)	3.2×10^6 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Acinetobacter calcoaceticus	6.2×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human adenovirus 1	3.2×10^6 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human mastadenovirus B7	1.78×10^6 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Bordetella pertussis	3.08×10^6 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Candida albicans	7.3×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Chlamydophila pneumoniae	4.6×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human coronavirus 229E	3.2×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Beta coronavirus 1 (Human coronavirus OC43)	1.0×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Corynebacterium diphtheriae	1.28×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human Coxsackievirus B4	3.2×10^6 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)

Cytomegalovirus	1.4×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Enterococcus faecalis	1.78×10^9 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Escherichia coli	2.88×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Gardnerella vaginalis	9.92×10^6 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Haemophilus influenzae	3.36×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Klebsiella pneumoniae subsp. *pneumoniae*	1.04×10^9 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Lacticaseibacillus casei	4.32×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Legionella pneumophila subsp. *pneumophila*	1.12×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Listeria monocytogenes	2.28×10^9 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Measles virus	1.78×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human Metapneumovirus 27 (hMPV-27) Type A2	7.6×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Moraxella (Branhamella) *catarrhalis*	8.8×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Mumps virus	9.84×10^6 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Mycobacterium tuberculosis	3.32×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Mycoplasma pneumoniae	6.6×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Neisseria gonorrhoeae	2.8×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Neisseria meningitidis	1.44×10^6 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Neisseria sicca	8.4×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human parainfluenza. virus 2	1.78×10^6 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Human parainfluenza virus 3	3.2×10^7 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Proteus vulgaris	1.04×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Pseudomonas paraeruginosa	6.4×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)

Human respiratory syncytial virus B	5.6×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Rubella	1.78×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
SARS-CoV-2	3.16×10^5 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Serratia marcescens subsp. *marcescens*	2.64×10^9 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Staphylococcus aureus subsp. *aureus*	1.16×10^9 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Staphylococcus epidermidis	2.12×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus agalactiae	1.28×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus anginosus	2.32×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus dysgalactiae subsp *equisimilis*	1.12×10^9 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus mutans	4.42×10^9 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus pneumoniae	3.4×10^6 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus pyogenes	2.8×10^7 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus sanguinis	1.52×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus constellatus	4.28×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
Streptococcus intermedius	8.34×10^8 CFU/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)

b) Endogenous/Exogenous Interfering Substances Study

The performance of the Innovita Flu A/B Antigen Rapid Test was evaluated in the presence of potentially interfering substances that might be present in respiratory specimens. Each potential interferent was prepared in pooled nasal fluid in the presence or absence of 2.5xLoD concentration of influenza virus and was tested by 3 operators using 3 different reagent lots. No cross-reactivity or interference was observed amongst the substances tested. The results are summarized below.

Table 3. Endogenous/exogenous interfering substances study results

Interfering Substance	Final Concentration	Without Analytes		With Analytes	
		Positive rate		Positive rate	
		Flu A	Flu B	Flu A	Flu B
Acetaminophen	10 mg/mL	0/3	0/3	3/3	3/3
Acetyl salicylic acid	15 mg/mL	0/3	0/3	3/3	3/3
Beclomethasone	15%	0/3	0/3	3/3	3/3

Benzocaine	5 mg/mL	0/3	0/3	3/3	3/3
Budesonide	15%	0/3	0/3	3/3	3/3
Chlorpheniramine maleate	5 mg/mL	0/3	0/3	3/3	3/3
Dexamethasone	1 mg/mL	0/3	0/3	3/3	3/3
Dextromethorphan HBr	2 mg/mL	0/3	0/3	3/3	3/3
Diphenhydramine HCl	5 mg/mL	0/3	0/3	3/3	3/3
Ephedrine HCl	10 mg/mL	0/3	0/3	3/3	3/3
Flunisolide	15%	0/3	0/3	3/3	3/3
Fluticasone	15%	0/3	0/3	3/3	3/3
Guaiacol Glyceryl Ether	20 mg/mL	0/3	0/3	3/3	3/3
Histamine Dihydrochloride	10 mg/mL	0/3	0/3	3/3	3/3
Menthol	10 mg/mL	0/3	0/3	3/3	3/3
Mometasone	15%	0/3	0/3	3/3	3/3
Mucin	3 mg/mL	0/3	0/3	3/3	3/3
Mupirocin	10 mg/mL	0/3	0/3	3/3	3/3
OTC Throat drop (Halls)	15%	0/3	0/3	3/3	3/3
OTC Throat drop (Ricola)	15%	0/3	0/3	3/3	3/3
OTC Nasal spray (Afrin)	15%	0/3	0/3	3/3	3/3
OTC Nasal spray (Vicks Sinex)	15%	0/3	0/3	3/3	3/3
OTC Nasal spray (Zicam)	15%	0/3	0/3	3/3	3/3
Oxymetazoline HCl	10 mg/mL	0/3	0/3	3/3	3/3
Phenylephrine HCl	5 mg/mL	0/3	0/3	3/3	3/3
Phenylpropanolamine	5 mg/mL	0/3	0/3	3/3	3/3
Tobramycin	1 mg/mL	0/3	0/3	3/3	3/3
Triamcinolone	1 mg/mL	0/3	0/3	3/3	3/3
Whole Blood	3%	0/3	0/3	3/3	3/3
Zanamivir	1 mg/mL	0/3	0/3	3/3	3/3

c) Biotin Interference

To detect if biotin interferes with the Innovita Flu A/B Antigen Rapid Test, biotin concentrations up to 4000 ng/mL were tested. Each dilution of biotin prepared in nasal fluid was tested by 3 operators using 3 different reagent lots with contrived positive samples containing 2.5x LoD analytes for influenza A, and influenza B in pooled nasal fluid. No interference was observed. Results are summarized below.

Table 4. Biotin interference results summary

Concentration of biotin interference	**Flu A positive swabs**		**Flu B positive swabs**		**Negative swabs**	
	Positive rate		**Positive rate**		**Positive rate**	
	Flu A	**Flu B**	**Flu A**	**Flu B**	**Flu A**	**Flu B**
0 ng/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (00%)	0/9 (00%)
250 ng/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (100%)	0/9 (00%)
500 ng/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
1000 ng/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)
2000 ng/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)

4000 ng/mL	9/9 (100%)	0/9 (0%)	0/9 (0%)	9/9 (100%)	0/9 (0%)	0/9 (0%)

d) Competitive Interference

A competitive interference study was conducted to evaluate potential for a high concentration of one target analyte to interfere with the detection of another target analyte at low concentration. Testing was conducted in triplicates with different combinations of concentrations at 6x LoD and high concentrations (2000x LoD) of influenza A, and influenza B prepared in pooled nasal fluid.

The table below summarizes the results of the competitive interference study. There was no competitive interference observed.

Table 5. Competitive interference results summary

Operator	Lot No.	Low concentration sample	High concentration sample	# of positive results/total reps (concordance rate)	
				Flu A	Flu B
1	Lot 1	Flu A low	Flu B high	3/3 (100%)	3/3 (100%)
		Flu B low	Flu A high	3/3 (100%)	3/3 (100%)
2	Lot 2	Flu A low	Flu B high	3/3 (100%)	3/3 (100%)
		Flu B low	Flu A high	3/3 (100%)	3/3 (100%)
3	Lot 3	Flu A low	Flu B high	3/3 (100%)	3/3 (100%)
		Flu B low	Flu A high	3/3 (100%)	3/3 (100%)

4. Assay Reportable Range:

Not applicable; the device is a binary qualitative assay that is visually read.

5. Traceability, Stability, Expected Values (Controls, Calibrators, or Methods):

a) Controls

Internal procedural control:

A built-in internal procedural control is needed to indicate the test device is functioning properly and to ensure correct use of the device. The internal control is part of the test strip membrane and is therefore automatically run within the development time of each test. The control line yields a red-purple control line (C).

External Controls:
External Quality Control materials are supplied with the kit and consist of two positive swabs (influenza A and B) and 1 negative swab (negative for both influenza A and B).

b) Stability Studies

i. Real Time Stability

A real-time stability study was conducted to evaluate stability and determine the shelf-life of the unopened test kit. Three lots of unopened Innovita Flu A/B Antigen Rapid Test were stored under two conditions: 30 ± 2 °C (which is the upper end of the 15-30º C room temperature range and representative of the worst-case scenario) and 4 ± 2 °C. At defined intervals, each lot was assessed with following three-membered sample panel: negative clinical matrix, and co-spiked positive samples

with inactivated influenza A (H1N1), or live influenza B (Victoria) viruses, each at 3x LoD.

Fifty (50) µL of each sample were applied to the swab and tested according to the instructions for use. Three replicates of each sample were tested for each time point.

Baseline testing was performed within one month of each manufactured lot. Subsequent time testing time points were every three (3) months. At the time of clearance, all study data have met the protocol defined acceptance criteria, and support storage of the test kits at 4-30 °C for 12 months.

ii. Transport Stability

Transport stability under simulated summer and winter shipping conditions was tested to evaluate worst-case shipping and handling conditions over an extended period of time. Performance of unopened test kits was assessed by comparing pre- and post-transport results, using the same sample panel described for real-time stability study (above). Samples were tested in triplicates each of three (3) device lots. Each kit was stored at the following temperature profiles for a five-cycle period to simulate transport conditions:

- Summer profile (Ranging from 22 - 40°C)
- Winter profile (Ranging from -10 – 18°C)

All results were as expected and demonstrated reagent stability in all transport conditions tested.

6. Detection Limit:

a) Limit of Detection

A limit of detection (LoD) study was conducted to determine the lowest detectable concentration of four (4) influenza A virus strains (including H3N2, and H1N1 subtypes) and four (4) influenza B virus strains (representing the Victoria and Yamagata lineage) at which at least 95% of all true positive replicates tested positive. Fifty (50) µL sample of each virus subtype was diluted in nasal fluid and pipetted onto the dry swab and thereafter processed per the instructions for use. Testing was conducted on three (3) lots of test devices.

A preliminary LoD was first determined by testing serial 10-fold dilutions of viral stocks diluted in nasal fluid. The last concentrations that produced 3 positive test results from a 1:10 dilution was further evaluated using a 2-fold dilution series, in triplicate for each level, to refine the tentative LoD. The lowest concentration at which all 3 replicates were positive was treated as the tentative LoD. This LoD was then confirmed by testing 20 replicates/lot using 3 different lots with concentrations at the tentative limit of detection for each virus strain.

As per the acceptance criteria for confirmation of the LoD, at least 95% of the replicates (≥ 19/20) should be positive to be considered as the confirmed LoD. The confirmed LoDs observed for all strains were identical for the 3 lots tested. The results of the two-fold dilutions and confirmatory LoD for each strain are included below. The final LoD for each strain is presented in the bold in the table.

Table 6. Single analyte LoD results

Virus strain	Virus concentration		Positive replicates			
	$TCID_{50}$/mL	$TCID_{50}$/Swab	Preliminary LoD Results (Representative Lot)	Confirmatory LoD Results (3 lots)		
Influenza A Flu A virus (H3N2) A/Virginia/ATCC6/2012	8.90E+03*	4.45E+02	3/3	*Not tested*		
	4.45E+03	2.23E+02	3/3			
	2.23E+03	**1.11E+02**	**3/3**	**20/20**	**20/20**	**20/20**
	1.11E+03	5.56E+01	0/3	*Not tested*		
Influenza A Flu A virus (H3N2) (A/Baltimore/JH-0586/2022)	5.00E+03*	2.50E+02	3/3	*Not tested*		
	2.50E+03	**1.25E+02**	**3/3**	**20/20**	**20/20**	**20/20**
	1.25E+03	6.25E+01	2/3	*Not tested*		
Flu A virus (H1N1) (A/Dominican Republic/7293/2013 pdm09)	**5.00E+02***	**2.50E+01**	**3/3**	**20/20**	**20/20**	**20/20**
	2.50E+02	5.00E+03	2/3	*Not tested*		
Flu A virus (H1N1) A/Virginia/ATCC1/2009 TC isolate	1.60E+03*	8.00E+01	3/3	*Not tested*		
	8.00E+02	**4.00E+01**	**3/3**	**20/20**	**20/20**	**20/20**
	4.00E+02	2.00E+01	2/3	*Not tested*		
Flu B virus (Victoria lineage) (B/New Jersey/1/2012)	8.80E+03*	4.40E+02	3/3	*Not tested*		
	4.40E+03	2.20E+02	3/3			
	2.20E+03	**1.10E+02**	**3/3**	**20/20**	**20/20**	**20/20**
	1.10E+03	5.50E+01	1/3	*Not tested*		
Flu B virus (Victoria lineage) (B/Michigan/01/2021)	5.70E+03*	2.85E+02	3/3	*Not tested*		
	2.85E+03	1.43E+02	3/3			
	1.43E+03	**7.13E+01**	**3/3**	**20/20**	**20/20**	**20/20**
	7.13E+02	3.56E+01	1/3	*Not tested*		
Flu B virus (Yamagata lineage) (B/Brisbane/9/14)	**1.26E+02***	**6.30E+00**	**3/3**	**20/20**	**20/20**	**20/20**
	6.30E+01	3.15E+00	1/3	*Not tested*		
Flu B virus (Yamagata lineage) (Panama/45/90)	3.80E+03*	1.90E+02	3/3	*Not tested*		
	1.90E+03	9.50E+01	3/3			
	9.50E+02	**4.75E+01**	**3/3**	**20/20**	**20/20**	**20/20**
	4.75E+02	2.38E+01	2/3	*Not tested*		

*Last concentrations that produced three positive test results from 1:10 dilution

b) Inclusivity

Analytical reactivity testing for the Innovita Flu A/B Antigen Rapid Test was performed to determine that the device can adequately detect the target analytes across a variety of strains. A selection of temporally, geographically, and genetically diverse influenza strains were tested for inclusivity, including 29 influenza A strains and 12 influenza B strains. In this study, each influenza virus strain was serially diluted to a concentration near the LoD and tested in replicates of 10 with the Innovita Flu A/B Antigen Rapid Test. The lowest concentrations at which 10/10 replicates were detected per lot with three different lots at the concentrations shown below.

Table 7. Analytical reactivity with variants of Influenza A and B

Virus	Viral strain	Inclusivity
Flu A virus (H1N1)	A/Baltimore/JH-22377/2022	1.6×10^5 $TCID_{50}$/mL
	A/Bangladesh/3002/2015 (H1N1) pdm09	1.3×10^4 $CEID_{50}$/mL

	A/Bretagne/06091/2023	5.5×10^3 PFU/mL
	A/California/04/2009 (H1N1) pdm09	1.1×10^2 $TCID_{50}$/mL
	A/California/07/2009 pdm09	2.3×10^4 $CEID_{50}$/mL
	A/California/08/2009 pdm09	1.6×10^4 $CEID_{50}$/mL
	A/Iowa/53/2015（H1N1）pdm09	2.9×10^4 $CEID_{50}$/mL
	A/Massachusetts/15/2013（H1N1）pdm09	1.6×10^4 $CEID_{50}$/mL
	A/Michigan/272/2017	9.6×10^3 $TCID_{50}$/mL
	A/Michigan/45/2015(H1N1）pdm09	1×10^4 $CEID_{50}$/mL
	A/New Hampshire/02/2010 (H1N1）pdm09	1.8×10^4 $CEID_{50}$ /mL
	A/South Carolina/2/2010（H1N1）pdm09	2.5×10^5 $CEID_{50}$ /mL
	A/St. Petersburg/61/2015	9.3×10^5 $CEID_{50}$ /mL
Flu A virus (H3N2)	A/Aichi/2/68	2.3×10^3 $CEID_{50}$/mL
	A/Alaska/232/2015	2.6×10^4 $CEID_{50}$/mL
	A/Baltimore/JH-0440/2022	2.8×10^4 $TCID_{50}$/mL
	A/Baltimore/JH-286/2021	2.8×10^5 $TCID_{50}$/mL
	A/Baltimore/JH-335/2022	8.9×10^4 $TCID_{50}$/mL
	A/California/2/2014	5.8×10^2 $TCID_{50}$/mL
	A/Hong Kong/4801/2014	9.6×10^5 $CEID_{50}$ / mL
	A/Hong Kong/8/68	1.58×10^3 $CEID_{50}$/mL
	A/Indiana/08/2011(H3N2)	8.1×10^2 $TCID_{50}$/mL
	A/Michigan/15/2014	9.3×10^3 FFU/mL
	A/Minnesota/11/2010(H3N2)v	2.2×10^4 $CEID_{50}$/mL
	A/Perth/16/2009	1.1×10^5 $TCID_{50}$/mL
	A/Singapore/INFIMH-16-0019/2016	2.2×10^4 $CEID_{50}$/mL
	A/Switzerland/9715293/2013	1.6×10^5 $CEID_{50}$/mL
	A/Texas/71/2017	9.3×10^3 FFU/mL
	A/Wisconsin/67/2005 (H3N2)	1.5×10^5 CEID50/mL
Flu B virus (Victoria lineage)	B/Baltimore/JH002/2021	1.6×10^4 $TCID_{50}$/mL
	B/Brisbane/60/2008	1×10^4 $CEID_{50}$/mL
	B/Colorado/6/2017	1.6×10^4 $CEID_{50}$/mL
	B/Florida/78/2015	2.8×10^4 $TCID_{50}$/mL
	B/Hong Kong/286/2017	2.7×10^3 $TCID_{50}$/mL
	B/Maryland/15/2016	1.3×10^3 $TCID_{50}$/mL
	B/New Hampshire/01/2021	1.3×10^2 $TCID_{50}$/mL
Flu B virus (Yamagata lineage)	B/Florida/4/2006	5×10^4 $CEID_{50}$/mL
	B/Guangdong/120/00	1.68×10^2 $TCID_{50}$/mL
	B/Massachusetts/2/2012	1.0×10^4 $TCID_{50}$/mL
	B/Texas/6/11	3.8×10^2 $TCID_{50}$/mL
	B/Wisconsin/1/2010 BX-41A	1.8×10^5 $CEID_{50}$/mL

7. High Dose Hook Effect:

The device was tested to determine if the device was affected by a high dose hook effect at high concentrations of the analytes. A high dose of inactive influenza A and B were tested in this study. Fifty (50) microliters of each sample was added directly to the head of the swabs. Swabs were processed per the test's IFU/QRI with one device lot. No high dose hook effect was observed for the high concentration tested.

Table 8. High-dose hook effect study results

Sample	Concentration	Positive Results / Total Replicates	
		Influenza A	Influenza B
Flu A virus (H1N1) A/Baltimore/JH-22377/2022	1.6×10^9 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)
Flu A virus (H3N2) A/Switzerland/9715293/2013	1.6×10^9 $TCID_{50}$/mL	9/9 (100%)	0/9 (0%)
Flu B virus (Victoria Lineage) B/Colorado/6/2017	1.6×10^8 $CEID_{50}$/mL	0/9 (0%)	9/9 (100%)
Flu B virus (Yamagata Lineage) B/Wisconsin/1/2010 BX-41A	1.8×10^9 $CEID_{50}$/mL	0/9 (0%)	9/9 (100%)

B Comparison Studies:

1. Method Comparison with Predicate Device:

Not applicable. See "C. Clinical Studies." for performance comparison with a clinical comparator.

2. Matrix Comparison:

This device is only intended for use with nasopharyngeal swab specimens. As no other specimen or sample type are claimed for us with this device, a matrix comparison study is not applicable.

C Clinical Studies:

1. Clinical Sensitivity and Specificity

A prospective clinical study was conducted to assess the performance of the candidate test when compared to a 510(k)-cleared influenza RT-PCR assay with an extraction step. The study prospectively enrolled symptomatic subjects at three (3) clinical study sites between December 2023, and July 2024.

A nasopharyngeal sample for the RT-PCR comparator was collected first from one nostril and a nasopharyngeal sample for the candidate test was then collected from the other nostril. This order of sample collection was consistent across the entire study. Comparator test samples were collected at the clinical study site and inserted into viral transport media per the IFU of the comparator test and transported to a central laboratory for testing. Samples for the candidate device were collected and were immediately tested with the Innovita Flu A/B Antigen Rapid Test according to the instructions for use.

A total of 1109 subjects were enrolled, of which 8 samples were excluded due to being lost during transit to the laboratory for comparator testing. Hence, 1101 subjects were evaluable.

The number of positives and positivity rate of influenza A and influenza B specimens per age group are presented in Table below.

Table 9. Prospective clinical study during the 2023/2024 influenza season

Age Group	**Positivity Rates for influenza A based on an FDA-cleared molecular test during the Clinical Study**		
	Number of Subjects	**Number of Influenza A Positives**	**Influenza A Positivity Rate**
≤5 Years of Age	463	121	26.1%
6-21 Years of Age	399	95	23.8%
≥22 Years of Age	239	21	8.8%
Total	1101	237	21.5%
Age group	**Positivity Rates for influenza B based on an FDA-cleared molecular test during the Clinical Study**		
	Number of Subjects	**Number of Influenza B Positives**	**Influenza B Positivity Rate**
≤5 Years of Age	463	14	3.0%
6-21 Years of Age	399	19	4.8%
≥22 Years of Age	239	9	3.8%
Total	1101	42	3.8%

Results from the Innovita Flu A/B Antigen Rapid Test were compared with those from the result obtained by highly sensitive influenza RT-PCR comparator assay, leading to the following performance estimates:

Table 10. Clinical performance estimates – influenza A

	Comparator Positives	***Comparator Negatives***	***Total***
Candidate Positives	203	4	207
Candidate Negatives	34	860	894
Total	**237**	**864**	**1101**
Positive Percent Agreement (PPA) = 85.7% (95% CI: 80.6%-89.5%)			
Negative Percent Agreement (NPA) = 99.5% (95% CI: 98.8%-99.8%)			

Table 11. Clinical performance estimates – influenza B

	Comparator Positives	**Comparator Negatives**	**Total**
Candidate Positives	36	0	36
Candidate Negatives	6	1059	1065
Total	**42**	**1059**	**1101**
Positive Percent Agreement (PPA) = 85.7% (95% CI: 72.2%-93.3%)			
Negative Percent Agreement (NPA) = 100% (95% CI: 99.6%-100%)			

D Clinical Cut-Off:

Not applicable

E Expected Values/Reference Range:

When the test is valid, it produces binary values, positive or negative for influenza A or B antigens.

VIII Proposed Labeling:

The labeling supports the finding of substantial equivalence for this device.

IX Conclusion:

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