510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY

A. 510(k) Number: K110722

B. Purpose for Submission: New device

C. Measurand: Adenovirus antigens

D. Type of Test: Immunochromatographic test

E. Applicant: Rapid Pathogen Screening, Inc.

F. **Proprietary and Established Names**: RPS Adeno Detector Plus™

G. Regulatory Information:

1. Regulation section: 866.3020; Adeno virus serological reagents

2. Classification: Class: I

3. Product code: GOD; antigens, CF (including CF control), Adenovirus 1 – 33

4. Panel: 83 Microbiology

H. Intended Use:

The RPS Adeno Detector Plus is a rapid immunoassay test for the visual, qualitative *in vitro* detection of Adenoviral antigens (hexon protein) directly from human eye fluid. The test is intended for professional use as an aid in the rapid differential diagnosis of acute conjunctivitis.

Negative results do not preclude Adenovirus infection nor are they intended to rule out other microbial-caused infections of the conjunctiva, and should not be used as the sole basis for treatment or other management decisions.

2. Indication(s) for use:

Same as intended use

3. Special conditions for use statement(s): For prescription use

4. Special instrument requirements: None

I. Device Description:

The RPS Adeno Detector Plus™ consists of three (3) parts: a Sample Collector, an immunoassay test strip in a plastic Test Cassette housing, and a Buffer. The Sample Collector is used to take a sample of ocular fluid. The separately packaged and sterile Sample Collector has a contoured end with a Dacron fleece to collect the samples. The plastic housing of the Test Cassette body protects the strip from unintended physical influence. Additionally the housing guarantees correct sample transfer onto the lateral flow assay strip. The Buffer is a buffered salt solution containing proteins, detergents and preservatives. The Buffer functions as the solution that initiates the test, extracts the Adenoviral proteins, filters unwanted cellular debris, and transports the immune complex and the control conjugate to the Test and Control Lines on the test strip membrane.

The RPS Adeno Detector Plus utilizes Direct Sampling Micro-Filtration technology. Adenoviral antigen, the conserved Adenovirus hexon protein, when present in the patient sample is captured between two antigen specific monoclonal antibodies. One antibody is immobilized in the detection zone of the device. The second antibody is labeled with colloidal gold. The detector is a disposable, rapid test requiring 10 minutes for a result.

J. Substantial Equivalence Information:

1. Predicate device name(s): RPS Adeno Detector

2. Predicate 510(k) number(s): K052092

3. Comparison with predicate:

Similarities		
Item	**Device**	**Predicate**
Intended use	The RPS Adeno Detector Plus is a rapid immunoassay test for the visual, qualitative *in vitro* detection of Adenoviral antigens (hexon protein) directly from human eye fluid. The test is intended for professional use as an aid in the rapid differential diagnosis of acute conjunctivitis. Negative results do not preclude Adenovirus infection nor are they intended to rule out other microbial-caused infections of the conjunctiva,	The RPS Adeno Detector is a rapid immunochromatography test for visual, qualitative in-vitro detection of adenoviral antigens (hexon protein) directly from human eye fluid. The test is intended for professional use in an office, clinic or hospital as an aid in the rapid differential diagnosis of acute adenoviral conjunctivitis. All negative test results should be confirmed by cell culture.

	and should not be used as the sole basis for treatment or other management decisions.	
Specimen type	Eye swab	Eye swab
Method	Immunochromatography	Immunochromatography
Type of assay	Rapid test	Rapid test
Differences		
Item	**Device**	**Predicate**
Test Line Color	Red	Red
Control Line Color	Blue	Red
Limit of detection	6ng/ml	50 ng/ml

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

Not applicable

L. Test Principle: Lateral Flow Immunoassay

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Precision: Samples were prepared in stabilizing buffer with purified Adenovirus hexon protein. Eight samples containing weak positive, weak negative, Positive and Negative controls were tested. At one site, 160 additional tests consisting of eight samples containing weak positive, weak negative, Positive and Negative controls were tested over 20 operating days. The inter-assay precision to detect positive and negative samples was 100% although the strength of the signal varied for the weak positive samples.

Reproducibility: Samples were prepared in stabilizing buffer with purified Adenovirus hexon protein. Eight samples containing weak positive, weak negative, Positive and Negative controls were tested. A total of 162 tests were performed at 3 sites over 3 consecutive days. The inter-assay precision to detect positive and negative samples was 100% although the strength of the signal varied for the weak positive samples.

Batch to batch reproducibility was tested with three different Adeno Detector Plus batches. There was no variability among the three batches as assessed by testing in triplicates with seven different concentrations of Hexon ranging from 0 to 48 ng/ml.

b. Linearity/assay reportable range: Not applicable

c. Traceability, Stability, Expected values (controls, calibrators, or methods): Not applicable

d. Detection limit: All human Adenovirus serotypes contain the hexon protein that is detected by the RPS Adeno Detector Plus. The antibodies target a conserved region of the hexon protein universal to all Adenovirus serotypes. In the laboratory, RPS tested serotypes 1, 3, 4, 5, 7, 8, 11, 14, 19, 31, 37 and demonstrated a positive antigen-antibody reaction. The detection limit of the RPS Adeno Detector Plus was measured by serial dilutions of the Adenovirus hexon protein and found to be 6 ng/ml or 60 pg per test and this is estimated to be equivalent to 40-50 Adenoviruses.

e. Analytical specificity: Various infectious pathogens generated in cell culture and important for conjunctivitis were tested in the laboratory to determine potential cross-reactivities with RPS Adeno Detector Plus:

Echovirus Type 6 Culture Fluid
Parainfluenza Type 2
Parainfluenza Type 3
Haemophilus influenzae
Pseudomonas aeruginosa
Streptococcus pneumoniae
Staphylococcus aureus
Parainfluenza Type 1
Moraxella catarrhalis
Echovirus Type 11
Rhinovirus Type 1A
Herpes Simplex Virus 2 Strain G
Herpes Simplex Virus 1 Strain F
Herpes Simplex Virus 1 Strain HF
Coxsackievirus B1

Echovirus Type 7
Staphylococcus epidermis (3 strains)
Chlamydia trachomatis, Serovar H
Chlamydia trachomatis, Serovar I

All isolates were cultured from human specimens. The concentrations of the suspensions were between 500,000 and 1,500,000 microorganisms (virus, bacteria) per ml. No positive test lines developed, and no cross-reactivities to these microorganisms occurred when 10µl of the culture suspension was tested.

Interfering Substances: The following eye medications were tested for interferences with the RPS Adeno Detector Plus.

"Visine" Pfizer,"Trusopt" Merck, "Xalatan" Pharmacia,"Betimol" Vistakon,"Alcaine" Alcon,"Tobra Dex" Alcon, "Alrex" B&L,"Quixin" Vistakon,"Econopred" Alcon,"Optivar" MedPointe,"Elastat" Allergan,"Alphagan" Allergan,"Zymar" Allergan,"Thera Tears" AVS,"Refresh Tears" Allergan,"Vigamox" Alcon,"Refresh Liquigel" Allergan,"Lotemax" B&L,"Polymyxin B sulfate" Falcon,"Lumigan" Allergan, human IgA (1 mg/ml), Sigma-Aldrich,human lactoferrin (1 mg/ml), Sigma-Aldrich,Transferring (1 mg/ml), Sigma-Aldrich,"Pataday"-Alcon,"Voltaren"-Novartis,"Zylet"-Bausch&Lomb,"FML"-llergan,"Nevanac"-Alcon,"Xibrom"-Ista,"Optive"-Allergan"Combigan"-Allergan,"AzaSite"-Inspire,"Acular LS"-Allergan,"Travatan"-Alcon,"Proparacaine"-Wilson,"Systaine"-Alcon,"GenTeal"-Novartis,"Blink Tears"-Amo,"Azopt"-Alcon,"Pred Forte"-Allergan,"Zaditor"-Novartis,"Iquix"-istakon,"Timolol"-Falcon,"Gentamycin Sulfate"-Falcon, and Povidone – Triad Disposables

To check for specificity, 10% of each medication was applied to the Sampling Fleece. Sensitivity was checked with 1:1 mixtures of purified Adenoviral hexon protein in human tears at twice the cutoff level and 20% of the respective medication. Neither false positives nor false negatives at the cutoff level were found.

f. *Assay cut-off:* The cut-off of the RPS Adeno Detector Plus assay was determined by serial dilutions of the Adenovirus hexon protein and found to be 6 ng/ml or 60 pg per test and this is estimated to be equivalent to 40-50 Adenoviruses.

2. <u>Comparison studies:</u>

a. Method comparison with predicate device:

A prospective, multicenter, masked, sequential, clinical study was performed at a

combination of private ophthalmology practices and academic centers. The study enrolled 128 patients presenting with a clinical diagnosis of acute viral conjunctivitis. Thirty-one patients were confirmed positive for Adenovirus by viral cell culture.

Clinical performance data of the RPS Adeno Detector Plus are summarized in the following table:

N = 128		Cell Culture +	Cell Culture -
RPS Adeno Detector Plus	**+**	28	4
	-	3	93
Sensitivity		**90% (28/31)** 95% CI [74.2-98.0]	
Specificity		**96% (93/97)** 95% CI [89.8-98.9]	
Negative Predictive Value		**97% (93/96)** 95% CI [91.1-99.3]	
Positive Predictive Value		**88% (28/32**) 95% CI [71.0-96.5]	

b. Matrix comparison: Not applicable

3. Clinical studies:

a. Clinical Sensitivity: Not applicable

*b. Clinical specificity**:*** Not applicable

c. Other clinical supportive data (when a. and b. are not applicable): Not applicable

4. Clinical cut-off**:** Not applicable

5. Expected values/Reference range:

The prevalence of Adenovirus varies during the year and from region to region, with outbreaks typically occurring during spring and early summer. The true incidence of Adenoviral conjunctivitis is dependent on many factors including the method of specimen collection and the test method used. In previous studies, the prevalence of

Adenovirus infections varied between 20% and 75% of all cases of infectious conjunctivitis. In the RPS Adeno Detector Plus clinical study the Adenoviral incidence was found to be 24%.

N. Proposed Labeling: The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

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