

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE ONLY TEMPLATE**

510(k) Number:

K033855

Analyte:

Streptococcus Group A antigens

A. Type of Test:

Chromatographic, lateral flow immunoassay

B. Applicant:

Applied Biotech, Inc.

C. Proprietary and Established Names:

SureStep Exact™ Strep Group A

Regulatory Information:

1. Regulation section:
21 CFR Part 866.3740 Streptococcus spp. serological reagents
Limitation: 21 CFR 866.9 (6)
2. Classification:
Class I
3. Product Code:
GTY – Streptococcus spp.
4. Panel:
83 (Microbiology)

D. Intended Use:

1. Intended use(s):
For in vitro diagnostic use in the rapid, detection of Group A Streptococcal antigen directly from throat swabs. The test is used to obtain a visual, qualitative result to aid in the diagnosis of Group A Streptococcal infection and is intended for professional use.
2. Indication(s) for use:
The SureStep Exact™ Strep A Test, both cassette and test strip (dipstick) format, is intended to be used for *in vitro* diagnostic use in the rapid detection of Group A Streptococcal antigen directly from throat swabs. The test is used to obtain a visual, qualitative result to aid in the diagnosis of Group A Streptococcal infection and is intended for professional use.
3. Special condition for use statement(s):
Professional Use.

4. Special instrument Requirements:
Not applicable

E. Device Description:

The submission contains information on two test formats. The cassette format is a horizontal (lateral) chromatographic immunoassay with a membrane strip mounted in a plastic cassette. The dipstick configuration is not enclosed in a plastic housing. The membrane strip (for both configurations) is coated with rabbit anti-group A Streptococcal specific carbohydrate antibody for the test line and goat anti-rabbit IgG for the control line. Colloidal gold particles coated with anti-GAS antibody appear to be embedded on the proximal end of the membrane.

Substantial Equivalence Information:

1. Predicate device name(s):
ColorQuick Strep A, ColorQuick Strep A II
2. Predicate K number(s):
K 021375, K021406
3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	The SureStep Exact™ Strep A test is a rapid immunoassay available as either a cassette device or a strip (dipstick) device for <i>in vitro</i> diagnostic use in the rapid, detection of Group A Streptococcal antigen directly from throat swabs. The test is used to obtain a visual, qualitative result to aid in the diagnosis of Group A Streptococcal infection and is intended for professional use.	Rapid immunoassay for <i>in vitro</i> diagnostic use in the rapid, detection of Group A Streptococcal antigen directly from throat swabs. The test is used to obtain a visual, qualitative result to aid in the diagnosis of Group A Streptococcal infection and is intended for professional use.
Technology	Lateral flow	Lateral flow
Extraction reagents	Reagent 1, purple to pink Reagent 2, clear color	Reagent 1, purple to pink Reagent 2, clear color
Specimen type	Throat swab	Throat swab
Indication for Use	Professional Use	Professional Use
Control Provided	Positive (1 x 10 ⁸ group A Streptococcus/ml) Negative (1 x 10 ⁸ group B	Positive (1 x 10 ⁸ group A Streptococcus/ml) Negative (1 x 10 ⁸ group B

	Streptococcus/ml)	Streptococcus/ml)
Differences		
Item	Device	Predicate
Shelf life	24 months	18 months (dipstick) 24 months (cassette)
Analytical sensitivity	5×10^4 organisms/test	1.5×10^5 organisms/test (cassette) 2.5×10^5 organisms/test (dipstick)
Clinical sensitivity	95.2% cassette 95.1% dipstick	90.5% cassette 90.2% dipstick
Clinical specificity	99%	97.5% cassette 98.1% dipstick
Overall clinical accuracy	97.7%	95.1% cassette 95.8% dipstick

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

Not applicable

G. Test Principle:

The SureStep Exact™ Strep A Test utilizes a two-site sandwich immunoassay technology for the detection of Group A Streptococcal antigen. The test consists of a cassette device, in a plastic housing containing a membrane strip that has been precoated with rabbit anti-Strep A and a colored rabbit anti-Strep A polyclonal antibody-colloid gold conjugate pad that is placed at the end of the membrane.

During testing, the Strep A antigen is extracted from the throat swab using Extraction Reagents 1 and 2. The extracted solution is then added to the cassette's sample well. The Strep A antigen reacts with colored antibody-colloidal gold conjugate to form Strep A antigen-antibody complexes. The mixture then moves chromatographically across the membrane to the immobilized rabbit anti-Strep A antibody at the test line region. If Strep A antigen is present in the specimen, a colored sandwich of antibody / Strep A antigen / gold conjugate antibody is formed on the test line. Absence of a colored line at the test line region indicates a negative result.

Regardless of the presence of Strep A antigen, the extracted mixture will continue to move laterally across the membrane to the control line region, a colored line at the control region will always appear. The presence of this colored line serves as verification that sufficient volume has been added and proper flow occurred.

Performance Characteristics (if/when applicable):1. Analytical performance:a. *Precision/Reproducibility:*

Reproducibility testing was conducted at three sites, on three separate days with 15 blinded samples of varying activity. All samples tested for Streptococcus produced the expected result.

- b. *Linearity/assay reportable range:*
Not applicable
- c. *Traceability (controls, calibrators, or method):*
Not applicable
- d. *Detection limit:*
For Streptococcus Group A, detection limit is 5×10^4 organisms per test.
- e. *Analytical specificity:*

Cross-reactivity:

Cross-reactivity studies were also performed using the SureStep Exact Strep A Test. The following organisms were tested at 1×10^8 organisms/test.

Group B Streptococcus	Candida albicans
Group C Streptococcus	Corynebacterium diphtheriae
Group D Streptococcus	Escherichia coli
Group F Streptococcus	Haemophilus parahaemolyticus
Group G Streptococcus	Moraxella catarrhalis
Streptococcus agalactiae	Neisseria gonorrhoeae
Streptococcus dysgalactiae	Neisseria lactamica
Streptococcus faecalis	Neisseria meningitidis
Streptococcus faecium	Neisseria sicca
Streptococcus oralis (formerly mitis)	Neisseria subflava
Streptococcus mutans	Proteus vulgaris
Streptococcus pneumoniae	Pseudomonas aeruginosa
Streptococcus salivarius	Staphylococcus aureus
Streptococcus sanguis	Staphylococcus epidermidis
Arcanobacterium haemolyticum	Staphylococcus saprophyticus
Bordetella pertussis	Yersinia enterocolitica

Staphylococcus aureus was tested at a concentration of 1×10^7 organisms / test.

The SureStep Exact Strep A Test gave negative results for all organisms listed.

Interfering Substances:

No interference substance testing was performed.

- f. *Assay cut-off:*
The assay detection limit is 5×10^4 organisms per test.
Clinically relevant detection limits were determined using ATCC stock preparations of group A streptococcal strains. The preparations were diluted to end point level of concentrations and seeded onto sterile polyester swabs. Replicates of four were tested at each level with each strain according to the package insert.

2. Comparison studies:

- a. *Method comparison with predicate device:*
Not applicable
- b. *Matrix comparison:*

Not applicable

3. Clinical studies:

a. Clinical sensitivity:

Sensitivity and Specificity Compared to Culture:

A correlation study between the SureStep Exact™ Strep A Test and conventional culture was performed in multi-center clinical evaluations. Throat swab specimens were taken from children and adults exhibiting symptoms of pharyngitis. The swabs were then used to inoculate blood agar plates prior to testing with the SureStep Exact™ Strep A Test. Beta-hemolytic colonies from the blood agar plates were confirmed as Group A Streptococcus using serologic streptococcal grouping methods. Strep A was reported as present or not present.

The results are summarized as follows:

Sensitivity, Specificity and Overall Accuracy

The average sensitivity, specificity and overall accuracy of the SureStep Exact™ Strep A Cassette Test are 95.2% (95% C.I. of 92.8-99.4%), 99.0% (95% C.I. of 97.0-100%) and 97.7%, respectively.

	SureStep Exact™ Strep A +	SureStep Exact™ Strep A -	<u>Totals</u>
Culture +	99	5	104
Culture –	2	199	201
<u>Totals</u>	101	204	305

The average sensitivity, specificity and overall accuracy of the SureStep Exact™ Strep A Strip Test are 95.1% (95% C.I. of 90.9% - 99.3%), 99.0% (95% C.I. of 97.9-100%) and 97.7%, respectively.

	SureStep™ Exact Strep A +	SureStep™ Exact Strep A -	<u>Totals</u>

Culture +	98	5	103
Culture –	2	200	202
<u>Totals</u>	100	205	305

b. Clinical specificity:

Refer to (a) above

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

Not applicable

4. Clinical cut-off:

See assay cut off above

5. Expected values/Reference range:

It is estimated that approximately 19% of all upper respiratory tract infections are caused by Group A Streptococci (6). Infection is most prevalent in winter and early spring, with most cases arising in patients living in highly populated areas.

H. Conclusion:

In clinical settings, the SureStep Exact Strep A Test is substantially equivalent in performance to the predicate device and to culture examination for the identification of Streptococcus group A in throat swab specimens.