



**Clinical Study Report**  
**for**  
***Flowflex* SARS-CoV-2 Antigen**  
**Rapid Test**

**I. Intend for Use**

The Flowflex SARS-CoV-2 Antigen Rapid Test is a lateral flow chromatographic immunoassay for the qualitative detection of the nucleocapsid protein antigen from SARS-CoV-2 in nasal swab specimens directly from individuals who are suspected of COVID-19 by their healthcare provider. The Flowflex SARS-CoV-2 Antigen Rapid Test does not differentiate between SARS-CoV and SARS-CoV-2.

**II. Objective**

A multi-site clinical study was conducted in China and USA to evaluate the performance of the Flowflex SARS-CoV-2 Antigen Rapid Test when compared to RT-PCR method.

**III. Clinical Study Site and Study Period**

Clinical Study Sites in USA:

Sample collection sites in USA	Testing sites in USA
<u>Site 1:</u> Boca Raton 6877 SW 18th Street Boca Raton, FL 33433	<u>Site 1:</u> Dr. Fowl 7200 Parkway drive, Suite 117, La Mesa, CA91942
<u>Site 2:</u> COVID CLINIC Westminster (WM) 2109 Westminster Mall Westminster, CA 92683	<u>Site 2:</u> COVID CLINIC Westminster (WM) 2109 Westminster Mall Westminster, CA 92683
<u>Site 3:</u> COVID CLINIC La Mesa (LM) 5601 Grossmont Center Drive La Mesa, CA 91942	<u>Site 3:</u> COVID CLINIC La Mesa (LM) 5601 Grossmont Center Drive La Mesa, CA 91942
<u>Site 4:</u> COVID CLINIC Down Town San Diego (DTSD) 1350 Third Avenue San Diego - San Diego County	<u>Site 4:</u> COVID CLINIC Down Town San Diego (DTSD) 1350 Third Avenue San Diego - San Diego County

Clinical Study Sites in China:

Sample collection sites in China	Testing sites in China
<u>Site 1:</u> <u>Shenzhen CDC</u> No. 8 Longyuan Road, Nanshan District, Shenzhen, P.R. China	<u>Site 1:</u> <u>Shenzhen CDC</u> No. 8 Longyuan Road, Nanshan District, Shenzhen, P.R. China
<u>Site 2:</u> Adicon No.208 Zhenzhong Road, West Lake District, Hangzhou, Zhejiang, P.R. China	<u>Site 2:</u> Adicon No.208 Zhenzhong Road, West Lake District, Hangzhou, Zhejiang, P.R. China

Study Period

Study Initiation Date: September, 2020

Study Completion Date: December, 2020

**IV. Study acceptance criteria**

Total Sensitivity: >85%

Total Specificity: >98%

**V. Study Procedure:**

The clinical performance of the Flowflex SARS-CoV-2 Antigen Rapid Test was evaluated at four (4) investigational sites in U.S and two (2) investigational sites in China using a total of 605 nasal swab specimens collected from the patients at multiple sites in U.S and China.

**5.1 Clinical Study in USA**

**Material:**

- SARS-CoV-2 Antigen Rapid Test, Lot# 202009001
- Comparison method:

TaqPath COVID-19 Combo Kit, FDA authorized RT-PCR test for emergency use, manufactured by Thermo Fisher Scientific, Inc.

CDC 2019-nCoV RT-PCR, ABI 7500DX, FDA authorized RT-PCR test for emergency use

- Nasal swab samples from infected patients and non-infected patients

**Procedure:**

A total of 153 nasal swab specimens were collected from the patients at multiple sites in U.S. The patients presenting the COVID-19 like symptoms within 14 days of symptom onset at the collection sites are enrolled.

The nasal swabs were randomized and blinded tested by operators following product package insert.

A companion nasopharyngeal (NP) swab was also collected from the same patient and confirmed as positive or negative and validated with Ct counts by the FDA EUA RT-PCR as a comparator method.

**Test results:**

Candidate method		RT-PCR method		
		Negative	Positive	Total
Flowflex Test Results	Negative	52	3*	55
	Positive	1	97	98
	Total	53	100	153

**\*3 samples with PCR CT value 32.9-33**

Relative Sensitivity: 97.0% (95% CI: 91.2%-99.4%)

Relative Specificity: 98.1% (95% CI: 89.1%-99.9%)

Accuracy: 97.4% (95% CI: 93.2%-99.2%)

**5.2 Clinical Study in China**

**Material:**

- SARS-CoV-2 Antigen Rapid Test, Lot# 202009001
- RT-PCR, Novel Coronavirus (2019-nCoV) Nucleia Acid Diagnostic Kit (PCR-Fluorescence Probing), FDA authorized RT-PCR test for emergency use, manufactured by Sansure BioTech Inc.
- Nasal swab samples from infected patients and non-infected patients

**Procedure:**

A total of 452 nasal swab specimens were collected from the patients at multiple sites in China. The patients presenting the COVID-19 like symptoms within 14 days of symptom onset at the collection sites are enrolled.

The nasal swabs were randomized and blinded tested by operators following product package insert.

A companion nasopharyngeal (NP) swab was also collected from the same patient and confirmed as positive or negative and validated with Ct counts by the FDA EUA RT-PCR as a comparator method.

Also the RT-PCR test results were confirmed by the clinical diagnostic result. RT-PCR positive specimens were all from diagnosis of COVID-19 patients

and RT-PCR negative specimens were all from non COVID-19 patients.

**Test results:**

Candidate method		RT-PCR method		
		Negative	Positive	Total
Flowflex Test Results	Negative	381	2*	383
	Positive	1	68	69
	Total	382	70	452

**\*2 samples with PCR CT value 34-35**

Relative Sensitivity: 97.1% (95% CI: 89.6%-99.8%)

Relative Specificity: 99.7% (95% CI: 98.4%-99.9%)

Accuracy: 99.3% (95% CI: 98.0%-99.9%)

**5.3 Summary of combined clinical studies at all sites:**

Candidate method		RT-PCR method		
		Negative	Positive	Total
Flowflex Test Results	Negative	433	5	438
	Positive	2	165	167
	Total	435	170	605

Relative Sensitivity: 97.1% (95% CI: 93.1%-98.9%)

Relative Specificity: 99.5% (95% CI: 98.2%-99.9%)

Accuracy: 98.8% (95% CI: 97.6%-99.5%)

**5.4 Positive results to be reported by different Ct value range**

Ct value	RT-PCR Positive (+)	Proportion	Flowflex SARS-CoV-2 Antigen Rapid Test Positive (+)	PPA
≤27	86	50.6%	86	100%
27-30	38	22.4%	38	100%
>30-33	29	17.1%	27	93.1%
>33	9	5.3%	6	66.7%

Note: There are eight samples only have the PCR result of positive and no Ct value available.

Comparing with RT-PCR, the positive percent agreement (PPA) of the Flowflex SARS-CoV-2 Antigen Rapid Test is 100% for samples with Ct value ≤30, 93.1% for samples with Ct value from >30 to 33. For samples with Ct value >33, the PPA is 66.7%.

### **5.5 Positive results to be reported by days since symptom onset**

<b>Days Since Symptom Onset</b>	<b>RT-PCR Positive (+)</b>	<b>Proportion</b>	<b>Flowflex SARS-CoV-2 Antigen Rapid Test Positive (+)</b>	<b>PPA</b>
<b>0-3</b>	81	46.3%	80	98.8%
<b>4-7</b>	62	37.0%	60	96.8%
<b>&gt;7</b>	19	11.7%	17	89.5%

Note: There are four patients is asymptomatic individuals. And there are four patients lack “Days Since Symptom Onset” information.

Nasal swab specimens obtained early ( $\leq 7$  days) after symptom onset may contain higher viral concentration.

### **5.6 Patient Demographics**

<b>Age Group</b>	<b>Total</b>	<b>RT-PCR Positive (+)</b>	<b>Flowflex SARS-CoV-2 Antigen Rapid Test Positive (+)</b>	<b>PPA</b>
<b>Children (Age &lt; 18)</b>	13	12	11	91.7%
<b>Adult (Age 18 to 60)</b>	565	132	128	97.0%
<b>Elderly (Age <math>\geq 60</math>)</b>	23	22	22	100%

Note: There are four patients lack age information.

## **VI. Conclusions:**

Using a total of 605 specimens tested at multiple sites in U.S and China, the Flowflex SARS-CoV-2 Antigen Rapid Test has sensitivity of 97.1%, specificity of 99.5%, and accuracy of 98.8% when comparing with FDA EUA RT-PCR.