

# Comparison of two Multiplex Respiratory Virus Panel including SARS-CoV-2: The PowerChek™ Respiratory Virus Panel 1/2/3/4 with BioFire® FilmArray Respiratory Panel 2.1 Plus

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## Background

Since the COVID-19 pandemic, accurate detection of respiratory viruses has become more critical due to shifts in seasonal circulation and transmission patterns.

Multiplex PCR assays enable simultaneous detection of multiple pathogens, supporting timely diagnosis and infection control.

The PowerChek™ Respiratory Virus Panel 1/2/3/4 is Korea's first multiplex PCR assay covering 15+ respiratory viruses, including SARS-CoV-2.

This study compared the diagnostic performance of PowerChek™ with the widely used BioFire® FilmArray RP 2.1 Plus

## Method

Nasopharyngeal swabs were collected from pediatric patients with respiratory symptoms at Kangwon National University Hospital between 2023 and 2024 (IRB No: KNUH 2024-09-010)

BioFire® FilmArray results were used for clinical diagnosis. Residual samples were tested with PowerChek™ after RNA extraction.

Relative specificity reflects the ability to correctly identify negative cases, while relative accuracy indicates the overall agreement between each assay and the reference method.

Sensitivity, specificity, accuracy and Cohen's kappa coefficient with 95% confidence intervals were calculated using two-by-two contingency tables

## Results

Among 327 total samples, 223 were positive and 104 negative by BioFire® FilmArray

When using BioFire® FilmArray as the reference assay, PowerChek™ showed negative results for 1 cases of adenovirus, 1 case of HCoV-NL63, 1 case of influenza B, 1 case of parainfluenza virus type 3, and 2 cases of influenza A, despite being positive by BioFire® FilmArray (Table 1).

When PowerChek™ was used as the reference, BioFire® FilmArray yield negative results in 22 cases of HRV/HEV, 2 cases of adenovirus, 1 case of HCoV-NL63, and 5 cases of parainfluenza viruses (types 1, 2, 3, and 4), which were positive by PowerChek™.

Among 30 SARS-CoV-2 positive samples, concordance was 96.7%, increasing to 100% when PowerChek™ inconclusive results were considered positive.

Overall relative sensitivity, relative specificity and relative accuracy was 97.4%, 88.5% and 94.6% respectively (Table 2).

Cohen's kappa values for agreement between PowerChek™ RVP and BioFire® RP 2.1 Plus ranged from 0.843 to 1.000 (Table 3).

## Conclusion

The PowerChek™ RVP 1/2/3/4 demonstrated comparable performance to the BioFire® FilmArray RP 2.1 Plus in detecting a broad range of respiratory viruses, including SARS-CoV-2.

Optimization of Cycle threshold for HRV/HEV, may further enhance diagnostic concordance.

Its high-throughput capacity and broad viral coverage make it well suited for large-scale diagnostic use.

Limitations include the single-center design and relatively small sample size and further larger scale studies are needed to confirm its clinical utility.

Table 1. Comparison of the PowerChek™ RVP 1/2/3/4 with the Biofire® RP 2.1 plus for the detection of respiratory viruses in NPS specimens.

Pathogen	BioFire® RP2.1 plus (bioMérieux)		PowerChek™ RVP (Kogene)		Total	
	Positive	Negative	Positive	Negative		
AdV	20	0	AdV	19	1	20
CoV-229E	3	0	CoV-229E	3	0	3
CoV-NL63	10	0	CoV-NL63	9	1	10
CoV-OC43	9	0	CoV-OC43	9	0	9
Flu A-H3	10	0				10
FluA-H1- 2009	10	0	Flu A	20	2	10
Flu A, NS	2	0				2
Flu B	20	0	Flu B	19	1	20
hMPV	10	0	hMPV	10	0	10
PIV1	9	0	PIV1	9	0	9
PIV2	10	0	PIV2	10	0	10
PIV3	10	0	PIV3	9	1	10
PIV4	10	0	PIV4	10	0	10
RSV	30	0	RSV	30	0	30
HRV/HEV	30	0	HRV/HEV	30	0	30
SARS-CoV-2	30	0	SARS-CoV-2	30	0	30
Total No.	223	0		217	6	232

Table 2. Diagnostic performance of the PowerChek™ RVP 1/2/3/4 using the BioFire® RP 2.1 plus as the reference

Pathogen	Relative Sensitivity	Relative Specificity	Relative Accuracy (*)
AdV	95.00%	98.10%	97.60%
CoV-229E	100%	100%	100%
CoV-NL63	90%	100%	99.10%
CoV-OC43	100%	100%	100%
Flu A-H3			
FluA-H1-2009	90.90%	100%	98.40%
Flu A, NS			
Flu B	95.00%	100%	99.20%
hMPV	100%	100%	100%
PIV1	100%	99.00%	99.10%
PIV2	100%	100%	100%
PIV3	90.00%	100%	99.10%
PIV4	100%	99.00%	99.10%
RSV	100%	100%	100%
HRV/HEV	100%	92.30%	94.00%
SARS-CoV-2	100%	100%	100%
Overall	97.40%	88.50%	94.60%

Table 3. Agreement of the PowerChek™ RVP 1/2/3/4 with the BioFire® RP 2.1 plus for respiratory viral detection

Pathogen	BioFire® RP2.1 plus vs. PowerChek™ RVP	
	Kappa	95% C.I.
AdV	0.912	0.815 – 1.000
CoV-229E	1	1.000 – 1.000
CoV-NL63	0.943	0.831 – 1.000
CoV-OC43	1	1.000 – 1.000
Flu A-H3		
FluA-H1-2009	0.943	0.864 – 1.000
Flu A, NS		
Flu B	0.97	0.910 – 1.000
hMPV	1	1.000 – 1.000
PIV1	0.943	0.831 – 1.000
PIV2	1	1.000 – 1.000
PIV3	0.943	0.831 – 1.000
PIV4	0.948	0.845 – 1.000
RSV	1	1.000 – 1.000
HRV/HEV	0.843	0.739 – 0.947
SARS-CoV-2	1	1.000 – 1.000
Overall	0.873	0.816 – 0.930

**Abbreviations:** AdV: Adenovirus; CoV: Coronavirus; Flu A: Influenza virus A; Flu B: Influenza virus B; hMPV: Human Metapneumovirus; PIV: Parainfluenza virus; HCoV: hHuman bocavirus; RSV: rRespiratory syncytial virus; HRV: Human Rhinovirus; HEV: Human Enterovirus; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2.3

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