



# Comparison of Xpert Flu<sup>®</sup>, FilmArray RVP<sup>®</sup>, Simplexa FluA/B & RSV<sup>®</sup> and Luminex RVP<sup>®</sup> for Diagnosis of Viral Lower Respiratory Tract Infection

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## Introduction

Respiratory viruses as etiologic agents of acute lower respiratory tract infections (LRTIs) are being better recognized (1). With recent improvement in viral diagnosis, an incidence of up to 30% has been reported in the literature (2). However, many clinicians do not suspect influenza among patients with LRTIs. Also, clinicians often do not test for influenza, results from currently available diagnostic tests for influenza may be delayed resulting in delayed treatment, and several tests have low sensitivity and will give false negative results. Point of care (POC) diagnosis for viral LRTIs may have significant clinical implications by providing early antiviral therapy and, in some patients, avoidance of antibacterial therapy altogether. Although viral culture is the gold standard test, the result is not available until 48-72 hours, making it less useful to assist with the decision of starting antiviral therapy.

The objective of this study was to compare four FDA-approved tests, GeneXpert Flu (Cepheid)(GX), FilmArray RVP (Biofire)(FA), Simplexa FluA/B & RSV (Focus)(SM) all considered POC tests because results are available in less than one hour, and Luminex RVP (Luminex)(LX) for the detection of respiratory viruses in patients with LRTI. The Luminex RVP requires 5 to 8 hours to complete and is not considered POC.

## Methods & Materials

This was a prospective, community-acquired pneumonia study conducted during the winter season of 2011-2012. The inclusion criteria were: (1) a clinical diagnosis of LRTI and (2) the collection of a nasopharyngeal swab (NS). All NS were processed according to package insert instructions on each of the four assays on the same day. The diagnosis of acute LRTIs requires the presence of two respiratory symptoms and one sign of acute infection at the time of admission:

*Respiratory symptoms and signs at the time of admission:*

- A. New pulmonary infiltrate (at time of hospitalization)
- B. New or increased cough
- C. Change in sputum production (color or quantity)
- D. Evidence for reduced oxygenation
- E. New auscultatory findings (rales, rhonchi, wheezing)
- F. New shortness of breath
- G. Rapid respiratory rate (>24 breaths per minute).

*Signs of acute infection at the time of admission:*

- A. Documented fever
- B. Changes in WBC
- C. Altered mental status

## Results

A total of 150 consecutive NS specimens were processed. There were 14 specimens positive for Influenza A (9.3%) and one positive for Influenza B (0.06%). All four assays agreed on the one Influenza B specimen. The SM assay detected Influenza A in 14 NS specimens and each of the other assays gave a positive result in 10 specimens. Of these ten, there were three separate Influenza A-positive specimens that gave discrepant results with these three assays. The LX assay failed to detect one Influenza A specimen that was detected by the other assays. Likewise, the GX assay failed to detect one Influenza A that was detected by the LX and FA test. Finally, the FA assay gave an equivocal result on a third specimen, while the LX and GX gave positive results.

In the two assays that can sub-type Influenza A (LX and FA) there were four specimens that gave discrepant sub-type results. Three separate specimens which were sub-typed as H3 by the FA assay failed to give a sub-type result with the LX assay. Likewise, one specimen sub-typed as H3 by the LX gave an equivocal H3 sub-type result in the FA assay.

In the assays that can detect multiple viral targets, the LX and FA, the positive results are as follows: 6 and 8 RSV, 4 and 1 parainfluenza virus, 6 and 8 human meta-pneumovirus, 8 and 5 rhinovirus, and 3 and 10 coronavirus, respectively. The SM assay detected RSV in 7 specimens.

Target	GX	FA	SM	LX
Flu A	10	10	14	10
Flu B	1	1	1	1
RSV A/B	N/A	8	7	N/A
RSV A	N/A	N/A	N/A	5
RSV B	N/A	N/A	N/A	1
Para 1	N/A	0	N/A	2
Para 2	N/A	0	N/A	0
Para 3	N/A	0	N/A	0
Para 4	N/A	1	N/A	2
HMPV	N/A	8	N/A	6
Rhino	N/A	5	N/A	8
Adeno	N/A	0	N/A	0
Corona SARS	N/A	N/A	N/A	0
Corona NL63	N/A	3	N/A	2
Corona 229E	N/A	N/A	N/A	0
Corona OC43	N/A	2	N/A	0
Corona HKU1	N/A	5	N/A	1

GX = GenXpert; FA = FilmArray; SM = Simplexa; LX = Luminex  
 N/A = not in the assay menu

## Discussion

The SM assay detected 4 additional Influenza A-positive NS specimens than the other three POC tests, and the non-POC LX test. However, all three POC tests performed as well as the longer LX assay. There was a slight discrepancy in detection of Influenza A between the GX, FA and LX assays, however this could be explained by differences in the inherent thresholds of each assay. The FA POC assay offers the ability to detect additional viral targets and performs similar to the longer assay, however, the SM assay appears to offer increased sensitivity in detection of Influenza A in NS specimens. In addition, the SM assay is simple and easy to set up.

Use of POC testing for viral targets in LRTIs in adults offers the distinct advantage of rapid detection and the initiation of appropriate antimicrobial therapy.

## References

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