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## Pilot evaluation of a commercial PCR-DNA microarray system (PneumoVir) for detection of respiratory viruses in clinical specimens.

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### Background

- Diagnosis of respiratory virus infections is useful for guiding antimicrobial and antiviral therapy, and for infection control, but traditional methods are either too slow (e.g. viral culture, retrospective serology) or lack sensitivity (rapid antigen detection methods).
- Nucleic acid amplification techniques offer increased sensitivity and improved standardization, but their application to respiratory virus detection has been delayed by the need for multiplex solutions to detect the large number of potential respiratory viruses implicated.
- DNA array technology provides a possible solution to multiplex virus detection, including the detection of mixed infections.
- We therefore evaluated the PneumoVir Clinical Array (Genomica SA, Madrid) which has been designed to detect 17 respiratory virus types and subtypes (Table 1) in clinical specimens.

### Methods

We performed beta testing retrospectively on 47 nasopharyngeal aspirate, sputum or bronchio-alveolar lavage samples which had been submitted for viral diagnosis during the 2006-7 winter season using the PneumoVir Clinical Array (Figure 1), and compared results with those of viral culture, direct immunofluorescence (DIF) for influenza virus (IF) A and B, respiratory syncytial virus (RSV), parainfluenzavirus (PIV) types 1-3 and adenoviruses, and in-house real-time PCR for IF A and B, RSV and human metapneumovirus (HMPV) detected prospectively.

**Table 1**  
Viruses detected by PneumoVir  
Clinical Array

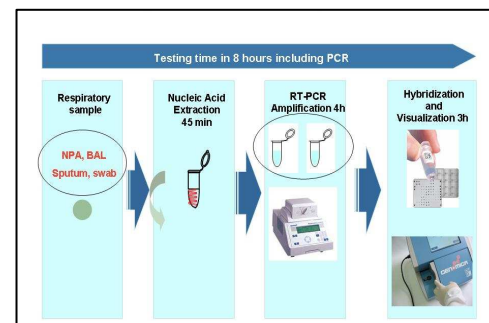
Influenza A H1N1	HMPV type A	PIV type 4a
Influenza A H3N2	HMPV type B	PIV type 4b
Influenza B	Adenoviruses	Rhinoviruses
Influenza C	PIV type 1	Enteroviruses
RSV type A	PIV type 2	Bocavirus
RSV type B	PIV type 3	Coronavirus

### Results

The range and numbers of respiratory viruses detected by each method is shown in Table 2. The proportion of samples positive for the three most commonly detected viruses by culture, DIF and/or real-time PCR which also tested positive using the PneumoVir Clinical Array is shown in Table 3.

### Figure

**PneumoVir test principle**



**Table 2**  
Respiratory viruses detected in panel

Virus	Culture	DIF	Real-time PCR	PneumoVir
Influenza A	2/45	3/43	8/47	8/47
RSV	16/45	20/43	27/47	26/47
HMPV	-	-	6/47	4/47
Rhinovirus	1/45	-	-	12/47
Adenovirus	1/45	0/43	-	5/47
Enterovirus	0/45	-	-	1/47
PIF 3	0/45	0/43	-	1/47
PIF 4	-	-	-	1/47
Bocavirus	-	-	-	2/47
Multiple virus	0/45	0/43	3/47	17/47
Any virus	20/45	23/43	39/47	40/47

**Table 3**

Numbers of culture, DIF or real-time PCR +ve results confirmed by PneumoVir Clinical Array

Virus	PneumoVir +ve
Influenza A	7/8
RSV	23/27
HMPV	3/6

### Acknowledgement

We thank Genomica SA, Madrid, for providing PneumoVir Clinical Array reagents, equipment and training for this study.

### Conclusions

- The PneumoVir Clinical Array gave high diagnostic yield and good correlation with existing methods.
- The ability to detect a broad range of viruses within a same day or overnight turnaround increases clinical utility.
- The ability to detect mixed viral infections may increase our understanding of the pathogenesis of respiratory tract infection.