A Capillary Electrophoresis Based Multiplex PCR Panel for Respiratory Pathogen Identification in Adults with Severe Community-acquired Pneumonia

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INTRODUCTION

The morbidity and mortality in patients with severe community-acquired pneumonia (SCAP) remain high. For treatment of SCAP, rapidly pathogen analysis is essential. While, the respiratory pathogen detection rate was below 50% by traditional PCR method. It is necessary to achieve a rapid, accurate and cost-effective testing way to detect SCAP pathogens.

To access a method for detection pathogens in adult with SCAP, a capillary electrophoresis based multiplex PCR panel operated on GenomeLab GeXP™ Genetic Analysis System (GeXP) was researched and developed.

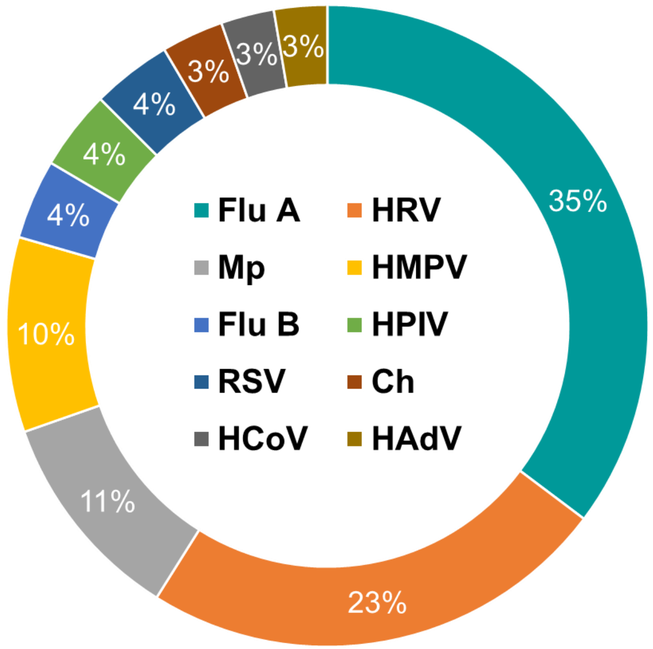

Fig 1 The distribution of pathogens detected positive

RESULTS

In total, 54.67% (158/289) specimens were tested positive with viruses and atypical bacteria. All the viruses including in the GeXP panel were detected except bocavirus (Figure 1). The specificity and positive predictive value (PPV) of the GeXP panel were 100.00% for all pathogens. The sensitivity/ negative predictive value (NPV) were 95.65%/99.58% for HMPV, 81.82%/99.20% for HPIV, 85.71%/99.61% for HCoV, and 100.00%/100.00% for Flu A, Flu B, HRV, HAdV, RSV, Mp and Ch, respectively. High accordance rate was demonstrated between the GeXP assay and reference results (REF) (Table1).

Table1 Comparison the performance of the GeXP panel with reference results.

	GeXP+ /REF+	GeXP+ /REF-	GeXP- /REF+	GeXP- /REF-	REF+	sensitivity %	PPV%	specificity %	NPV%
Flu A	43	0	0	219	41	100	100	100	100
2009H1N1	9	0	0	251	9	100	100	100	100
H3	27	0	0	235	27	100	100	100	100
HRV	53	0	0	209	53	100	100	100	100
HMPV	22	0	1	238	23	95.65	100	100	99.58
Flu B	9	0	0	251	9	100	100	100	100
HPIV	9	0	2	249	11	81.82	100	100	99.20
HCoV	6	0	1	253	7	85.71	100	100	99.61
HAdV	6	0	0	254	6	100	100	100	100
RSV	9	0	0	252	9	100	100	100	100
Mp	24	0	0	236	24	100	100	100	100
Ch	7	0	0	253	7	100	100	100	100

METHODS

This study collected 289 induced sputum from SCAP patients from January 2014 to December 2016 at Beijing Tongren Hospital affiliated to Capital Medical University. Viral and atypical bacteria was tested by multiplex GeXP panel. PCR products were analyzed by capillary electrophoresis on GeXP. Specific amplification fragment of 13 different pathogens were detected, including Flu A (subtype 2009H1N1 and H3), Flu B, RSV, HPIV, HMPV, HAdV, HRV, HBoV, HCoV, Mycoplasma pneumoniae(Mp) and Chlamydia (Ch). (Figure 2)

CONCLUSIONS

- Respiratory infection in adult patients remain high, and the pathogen is predominantly Flu A.
- The GeXP panel is a better approach for SCAP pathogens detection. It is also a rapid, accurate, cost effective, and high-throughput method to detect both viruses and atypical bacteria at one time.

ACKNOWLEDGEMENT

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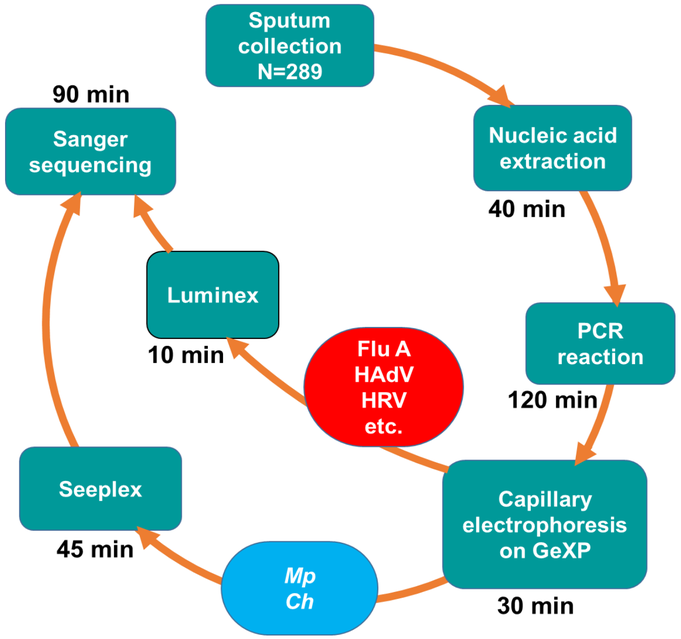

Fig 2 The working flow of this research